ISSN 0149-1776

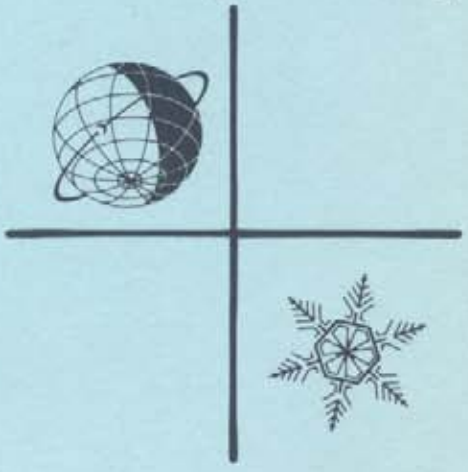
REPORT GD-23

# GLACIOLOGICAL DATA

## ICE CORE UPDATE 1980-1989

## PERMAFROST DATA WORKSHOP

World Data Center A
for
Glaciology
[Snow and Ice]



December 1989

# WORLD DATA CENTER A

National Academy of Sciences
2101 Constitution Avenue, NW
Washington, DC 20418 USA

---

World Data Center A consists of the Coordination Office and the following eight Subcenters:

**COORDINATION OFFICE**
World Data Center A
National Academy of Sciences
2101 Constitution Avenue, NW
Washington, DC 20418 USA
[Telephone: (202) 334-3368]

**GLACIOLOGY** (Snow and Ice)
World Data Center A: Glaciology
(Snow and Ice)
Cooperative Inst. for Research in
Environmental Sciences
University of Colorado
Boulder, Colorado 80309 USA
Telephone: (303) 492-5171

**MARINE GEOLOGY AND GEOPHYSICS**
(Gravity, Magnetics, Bathymetry, Seismic Profiles, Marine Sediment, and Rock Analyses):
World Data Center A for Marine
Geology and Geophysics
NOAA, E/GC3
325 Broadway
Boulder, Colorado 80303-3328 USA
Telephone: (303) 497-6487

**METEOROLOGY** (and Nuclear Radiation)
World Data Center A: Meteorology
National Climatic Data Center
NOAA, E/CC
Federal Building
Asheville, North Carolina 28801 USA
Telephone: (704) 259-0682

**OCEANOGRAPHY**
World Data Center A: Oceanography
National Oceanographic Data Center
NOAA, E/OC
1825 Connecticut Avenue, NW
Universal Building, Room 406
Washington, DC 20235 USA
Telephone: (202) 673-5594

**ROCKETS AND SATELLITES**
World Data Center A: Rockets and
Satellites
NASA/Goddard Space Flight Center
Code 630.2
Greenbelt, Maryland 20771 USA
Telephone: (301) 286-7354

**ROTATION OF THE EARTH**
World Data Center A: Rotation
of the Earth
U.S. Naval Observatory
Washington, DC 20392-5100 USA
Telephone: (202) 653-1529 or 1527

**SEISMOLOGY**
World Data Center A: Seismology
U.S. Geological Survey
Branch of Global Seismology
and Geomagnetism
Box 25046, Mail Stop 967
Denver Federal Center
Denver, Colorado 80225 USA
Telephone: (303) 236-1500

**SOLAR-TERRESTRIAL PHYSICS** (Solar and Interplanetary Phenomena, Ionospheric Phenomena, Flare-Associated Events, Geomagnetic Variations, Aurora, Cosmic Rays, Airglow):
World Data Center A
for Solar-Terrestrial Physics
NOAA, E/GC2
325 Broadway
Boulder, Colorado 80303-3328 USA
Telephone: (303) 497-6324

**SOLID-EARTH GEOPHYSICS** (Seismicity, Earthquake Strong Motion, Tsunamis, Gravimetry, Earth Tides, Recent Movements of the Earth's Crust, Magnetic Measurements, Paleomagnetism and Archeomagnetism, Volcanology, Geothermics):
World Data Center A
for Solid-Earth Geophysics
NOAA, E/GC1
325 Broadway
Boulder, Colorado 80303-3328 USA
Telephone: (303) 497-6521

World Data Centers conduct international exchange of geophysical observations in accordance with the principles set forth by the International Council of Scientific Unions. WDC-A is established in the United States under the auspices of the National Academy of Sciences. Communications regarding data interchange matters in general and World Data Center A as a whole should be addressed to World Data Center A, Coordination Office (see address above). Inquiries and communications concerning data in specific disciplines should be addressed to the appropriate subcenter listed above.

# GLACIOLOGICAL DATA

**REPORT GD-23**

# ICE CORE UPDATE 1980-1989

# PERMAFROST DATA WORKSHOP

Edited by
Ann M. Brennan and Roger G. Barry

Ice Core Update Funded by
National Geophysical Data Center
as part of the
NOAA Climate and Global Change Program

**Published by:**

**WORLD DATA CENTER FOR GLACIOLOGY**
**[SNOW AND ICE]**
Cooperative Institute for Research in Environmental Sciences
University of Colorado
Boulder, Colorado 80309 U.S.A.

WDC operated for:
U.S. Department of Commerce
National Oceanic and Atmospheric Administration
National Environmental Satellite, Data, and Information Service
Boulder, Colorado 80303 U.S.A.

**December 1989**

## DESCRIPTION OF THE WORLD DATA CENTER SYSTEM[1]

The World Data Centers (WDCs) were established in 1957 to provide archives for the observational data resulting from the International Geophysical Year (IGY). In 1958 the WDCs were invoked to deal with the data resulting from the International Geophysical Cooperation 1959, the one-year extension of the IGY. In 1960, the International Council of Scientific Unions (ICSU) Comite International de Geophysique (CIG) invited the scientific community to continue to send to the WDCs similar kinds of data from observations in 1960 and following years, and undertook to provide a revised *Guide to International Data Exchange* for that purpose. In parallel the CIG inquired of the IGY WDCs whether they were willing to treat the post-IGY data; with few exceptions, the WDCs agreed to do so. Thus the WDCs have been serving the scientific community continuously since the IGY, and many of them archive data for earlier periods.

In November 1987 the International Council of Scientific Unions (ICSU) Panel on World Data Centers prepared a new version of the *Guide to International Data Exchange*, originally published in 1957, and revised in 1963, 1973 and 1979. The new publication, *Guide to the World Data Center System, Part 1, The World Data Centers (General Principles, Locations and Services)*, was issued by the Secretariat of the ICSU Panel on World Data Centers. This new version of the *Guide* contains descriptions of each of the twenty-seven currently operating disciplinary centers, with address, telephone, telex, and contact persons listed. The reader is referred to the new *Guide* for descriptions of the responsibilities of the WDCs, the exchange of data between them, contribution of data to WDCs, and the dissemination of data by them. The WDCs for Glaciology are listed below.

### World Data Center A for Glaciology [Snow and Ice]

| | |
|---|---|
| Address: | WDC-A for Glaciology<br>CIRES, Campus Box 449<br>University of Colorado<br>Boulder, Colorado 80309-0449<br>USA |
| Telephone: | (303)492-5171 |
| Telex: | 7401426 WDCA UC |
| Telefax: | (303)492-2468 |
| Network Address: | [NSIDC/OMNET] MAIL/USA<br>VAX Mail (via SPAN) KRYOS::NSIDC |
| Director: | Dr. R. G. Barry |

### World Data Center B1

| | |
|---|---|
| Address: | World Data Center B1 for Glaciology<br>Molodezhnaya 3<br>Moscow 117296<br>USSR |
| Telephone: | 130-05-87 |
| Telex: | 411478 SGC SU |
| Director: | Dr. V. I. Smirnov |

**World Data Center C for Glaciology**

| | |
|---|---|
| Address: | WDC-C for Glaciology<br>Scott Polar Research Institute<br>Lensfield Road<br>Cambridge CB2 1ER<br>UNITED KINGDOM |
| Telephone: | (0223)336556 |
| Telex: | 81240 CAMSPL G |
| Network Address: | (JANET)ADM13@UK.AC.CAMBRIDGE.PHOENIX |
| Manager: | Mrs. Ailsa D. Macqueen |

**World Data Center D for Glaciology [Snow and Ice] and Geocryology**

| | |
|---|---|
| Address: | Lanzhou Institute of Glaciology and Geocryology<br>Chinese Academy of Sciences<br>Lanzhou 730000, China |
| Telephone: | (86)0931-26725, ext. 308 |
| Director: | Professor Xie Zichu |

The following organization provides international data services including data analyses and preparation of specialized data products. It merges the previous activity of the Permanent Service on the Fluctuations of Glaciers and the Temporary Technical Secretariat for World Glacier Inventory. These activities are not part of the WDC system but the center cooperates with WDCs in the discipline. Users wishing assistance in seeking data or services from this group may contact an appropriate WDC.

**World Glacier Monitoring Service (WGMS)**

Dr. W. Haeberli
Section of Glaciology
VAW/ETH, ETH Zentrum
8092 Zurich
SWITZERLAND

[1]Adapted from *Guide to the World Data Center System. Part 1. The World Data Centers (General Principles, Locations and Services).* International Council of Scientific Unions. Panel on World Data Centers, November 1987, 91pp.

## FOREWORD

In 1979 the WDC undertook an inventory of ice core data and completed a bibliography of selected literature references. In view of the growing interest in the paleoclimatic records contained in ice cores, as expressed in the International Geosphere Biosphere Program plans, this issue provides an updated inventory and bibliography. We are grateful to the National Geophysical Data Center which supported this activity through their Paleoclimate Program.

Climate trends can also be extracted from ground temperature profiles in permafrost areas. The availability of information and data on permafrost, thermal regimes and ground ice was the subject of a workshop organized by WDC-A for Glaciology in August 1988. Summaries of the workshop reports and associated recommendations are also included in this issue.

Roger G. Barry
Director
WDC-A for Glaciology

CONTENTS

## ICE CORE INVENTORY

The analysis of ice core data has proven to be one of the most accurate methods to describe past climates. Climate change can be eveluated in terms of air temperature, snow accumulation rate, atmospheric constituents, terrestrial volcanic and cosmic fallout, and human impact. Deep ice cores from polar regions are truly key data sets in paleoclimate studies because they bridge the time-scale gap between instsrumental and proxy records with annual resolution (e.g. tree rings) and those data from ocean and lake sediments which have resolutions of hundreds to thousands of years. Global ecosystems are typically affected more by the rate of climate change than by the eventual magnitude of the change. The period of record and time scale resolution of ice core data provide an excellent basis for the study of rapid fluctuations in the global environment over the past 200,000 or more years.

The ice core tables which follow update the inventory which was published in *Glaciological Data, Report GD*-8, in 1980. They document the ice cores reported in the literature between 1979 and mid-1989.

The tables, listing over 150 individual cores, are grouped into six geographical areas: 1) North America, 2) Greenland, 3) Europe, 4) Asia, 5) Southern Hemisphere, excluding Antarctica, 6) Antarctica. Within areas, the listings are arranged alphabetically by site name. Each core listing includes site name, year core taken, location (lat.-long.), core depth, drill type, drilling and curating agency. The reference column refers the reader to the complete citation in the Author Listing of the Ice Core Bibliography (beginning on p.55) from which the core information was extracted.

## NORTH AMERICA

| SITE NAME | YEAR | LAT | LONG | ELEV (m) | CORE DEPTH (m) | CORE DIA. (cm) | DRILL TYPE | DRILLING AGENCY | CURAT. AGENCY | REFERENCES |
|---|---|---|---|---|---|---|---|---|---|---|
| Agassiz Ice Cap Ellesmere Island | 1977 | 80°45'N | 73°35'W | 1700 | 139 | | | | | Fisher (1988) |
| Agassiz Ice Cap Ellesmere Island | 1977 | 80°45'N | 73°35'W | 1670 | 338 | | | | | Fisher (1988) |
| Agassiz Ice Cap Ellesmere Island | 1980 | 81°N | 73°W | 1630 | 10 | | | | | Barrie (1985) |
| Agassiz Ice Cap Ellesmere Island | 1984 | | | 1730 | 128 | | | | | Fisher (1988) |
| Mt. Logan | 1980 | 60°36'N | 140°30'W | 5340 | 26.8 | 10 | | Environment Canada | | Holdsworth and Pourchet (1984) |
| NWT | 1981 | 82.2° | 76.6°W | | 10 | | | | | Barrie (1985) |
| Penny Ice Cap Baffin Island | 1979 | 67°14'N | 65°42'W | 1980 | 6 | | SIPRE Corer | NHRI | | Short (1985) |
| Penny Ice Cap Baffin Island | 1979 | 67°14'N | 65°43'W | 1975 | 20 | | SIPRE Corer | | | Holdsworth (1984) |
| Tuktoyaktuk NWT | 1982 | | | | 23 | | Electro-Mech | | | Fujino (1983) |
| Tuktoyaktuk NWT (W-3) | 1987 | | | | 21.5 | | Electro-Mech | Institute of Low Temp. Science | | Fujino (1988) |
| Mt. Wrangell Alaska | 1982 | 62°N | 144°W | 4000 | 43.5 | | PICO lt. wt. drill | | | Benson (1984) |

## GREENLAND

| SITE NAME | YEAR | LAT | LONG | ELEV (m) | CORE DEPTH (m) | CORE DIA. (cm) | DRILL TYPE | DRILLING AGENCY | CURAT. AGENCY | REFERENCES |
|---|---|---|---|---|---|---|---|---|---|---|
| 20D | 1984 | 65°N | 44°52'W | 2615 | 117 | | 4" Electro-Mech | PICO | UNH | Mayewski et al. (1986) |
| Dye-3 (Snow Pit) | 1986 | | | | 1.5 | | | | | Davidson (1987) |
| Dye-3 | 1981 | 62°2'N | 43°8'W | 2480 | 2035 | | Danish deep drill | GISP Denmark Switzerland USA | | Dansgaard (1981) |
| Dye-3 | 1980-1981 | 65°11'N | 43°50'W | | 1801 | | | | | Heron (1981) Azuma (1984) |
| Dye-3 | 1980-1981 | 65°11'N | 43°50'W | | 1900 | | | | | Heron (1981) Azuma (1984) |
| Dye-3 | 1980-1981 | 65°11'N | 43°50'W | | 2000 | | | | | Heron (1981) Azuma (1984) |
| Dye-3 | 1988 | 65°11'N | 43°50'W | | 150 | | 4" Electro-Mech | PICO | | Mosley-Thompson |
| Dye-3-4B | 1983 | 65°11'N | 43°49'W | | 174 | | | | SUNY Buffalo | Finkel (1986) |
| GISP 2 Core A | 1989 | 72°35'N | 38°28'W | 3203 | 32 | 12.9 | Electro-Mech | PICO | UNH | |
| GISP 2 Core B | 1989 | 72°35'N | 38°28'W | 3203 | 200 | 12.9 10.0 | Electro-Mech | PICO | UNH | |
| GISP 2 Core C | 1989 | 72°35'N | 38°28'W | 3203 | 92 | 12.8 | Electro-Mech | PICO | UNH | |
| GISP 2 Core D | 1989 | 72°35'N | 38°28'W | 3203 | 100 | 12.6 | Electro-Mech | PICO | UNH | |
| Greenland Site A | 1985 | 70°38'N | 39°49'W | 3090 | | | Electro-Mech | | | Steffensen (1988) |
| Greenland Site A | 1985 | 70°63'N | 35°82'W | 3002 | 128.6 | | | Denmark Switzerland USA | | Clausen (1988) |
| Greenland Site A | 1985 | 70°45'N | 35°57'W | 3145 | 95.5 109.5 | | Electro-Mech | PICO | | Alley (1988) |

## GREENLAND, cont.

| SITE NAME | YEAR | LAT | LONG | ELEV (m) | CORE DEPTH (m) | CORE DIA. (cm) | DRILL TYPE | DRILLING AGENCY | CURAT. AGENCY | REFERENCES |
|---|---|---|---|---|---|---|---|---|---|---|
| Greenland Site B | 1984 | 70°65'N | 37°48'W | 3138 | 105.6 | | | Denmark Switzerland USA | | Clausen (1988) |
| Greenland Site C | 1984 | 70°68'N | 38°79'W | 3072 | 24.9 | | | Denmark Switzerland USA | | Steffensen (1988) |
| Greenland Site D | 1984 | 70°38'N | 39°47'W | 3020 | | | Electro-Mech | Denmark Switzerland USA | | Clausen (1988) |
| Greenland Site D | 1984 | 70°64'N | 39°62'W | 3018 | 100.1 | | | Denmark Switzerland USA | | Clausen (1988) |
| Greenland Site E | 1985 | 71°76'N | 35°85'W | 3087 | 77.8 | | | Denmark Switzerland USA | | Clausen (1988) |
| Greenland Site F | 1985 | 71°49'N | 35°88'W | 3092 | 25.7 | | | Denmark Switzerland USA | | Clausen (1988) |
| Greenland Site G | 1985 | 71°15'N | 35°84'W | 3098 | 70.8 | | | Denmark Switzerland USA | | Clausen (1988) |
| Greenland Site H | 1985 | 70°87'N | 35°84'W | 3102 | 26.2 | | | Denmark Switzerland USA | | Clausen (1988) |
| Greenland near Dye | 1984 | 65°01'N | 44.87°W | 2615 | 72 | | Electro-Mech | | | Mayewski et al. |
| Summit Eurocore Prop. | | 72°34'N | 37°38'W | 3231 | 200 100 | | Rufli | | | Stauffer |

## EUROPE

| SITE NAME | YEAR | LAT | LONG | ELEV (m) | CORE DEPTH (m) | CORE DIA. (cm) | DRILL TYPE | DRILLING AGENCY | CURAT. AGENCY | REFERENCES |
|---|---|---|---|---|---|---|---|---|---|---|
| Kessel - Wandferner Austria | 1979 | | | | | | | | | Ambach (1982) |
| Vernagtferner Borehole I-III | 1979 | 46°52'N | 10°49'E | 3150 | 79.05<br>42.70<br>31.60 | 10.2 | Electro-Mech | U. of Berne | | Gurter (1983)<br>Oerter (1982) |
| Vernagtferner Borehole IV-VI | 1982 | 46°52'N | 10°49E | | 39.9<br>80 | | | | | Oerter (1985)<br>Oerter (1988) |
| Högate Breakulen (Jostedalsbreen Norway) | 1987 | 61°41'N | 7°2'E | 1957 | 49.96 | | | Jap. Arctic Glaciological Expedition (JAGE) | Jap. Arctic Glaciological Expedition (JAGE) | Watanabe (1988) |
| Höghetta Spitsbergen | 1987 | 79°17'N | 16°50'W | 1200 | 85.61 | | | Jap. Arctic Glaciological Expedition (JAGE) | Jap. Arctic Glaciological Expedition (JAGE) | Watanabe (1988) |
| Storøya Svalbard | 1980 | | | | 6 | | | | YMER-80 Expedition | Heitzenberg (1988) |
| Svalbard | 1980 | | | | 368 | | Electro-thermal | USSR Academy of Sciences | USSR Academy of Sciences | Zagorodnov (1988) |
| Svalbard Lomonosovfonna | 1982 | 78°44'N | 17°34'E | 1020 | 135 | | | USSR Academy of Sciences | USSR Academy of Sciences | |
| Svalbard Austtonna | 1987 | 79°51'N | 24°08'E | 750 | 566 | | | USSR Academy of Sciences | USSR Academy of Sciences | |

| SITE NAME | YEAR | LAT | LONG | ELEV (m) | CORE DEPTH (m) | CORE DIA. (cm) | DRILL TYPE | DRILLING AGENCY | CURAT. AGENCY | REFERENCES |
|---|---|---|---|---|---|---|---|---|---|---|
| Biafo Glacier | 1986 | 36°01'N | 75°32'E | 5450 | 20 | | | | | Wake (1987; 1989) |
| Changme Khangpu | 1978 | | | | 12 | | | | | Bhanddi (1983) |
| Changme Khangpu | 1979 | 27°58'N | 88°42'E | 5040 | 12 | | | | | Nijampurkar (1984) |
| Chongce Ice Cap W. Kunlun Mountains | 1987 | | | 6310 | 32 | | | | | |
| Chongce Ice Cap W. Kunlun Mountains | 1987 | | | 6327 | 23 | | | | | |
| Chongce Ice Cap W. Kunlun Mountains | 1987 | 35°21'N | 81°07'E | 6366 | 10 | | | | | Nakawo et al. (1989) |
| Chongce Ice Cap W. Kunlun Mountains (Section 2) | 1987 | | | 6106 | 32.49 | | | Lanzhou Int. Nagoya Water Res. Institute | | Zheng (1988) |
| Chongce Ice Cap W. Kunlun Mountains (Section 8) | 1987 | | | 6312 | 23.07 | | | Lanzhou Int. Nagoya Water Res. Institute | | Zheng (1988) |
| Chongce Ice Cap W. Kunlun Mountains (Section 13) | 1987 | 38°06'N | 96°24.5'E | 6374 | 10.58 | | | Lanzhou Int. Nagoya Water Res. Institute | | Zheng (1988) |
| Dunde Ice Cap | 1984 | 38°06'N | 96°24.5'E | 5150 | 16 | | | Lanzhou BPRC | | Wu (1988) |
| Dunde Ice Cap | 1984 | 38°06'N' | 96°24.5'E | 5300 | 10.2 | | | | | Wu (1988) |
| Dunde Ice Cap | 1987 | 38°06'N | 96°24.5'E | | 136<br>138<br>139 | | | BPRC | OSU<br>China<br>Lanzhou | Thompson (1988) |
| K2 North Glacier | 1986 | 36°00'N | 76°28'E | 4440 | 10 | | | | | Qin Dahe et al. (in press) |
| K2 North Glacier | 1986 | 35°55'N | 76°28'E | 5320 | 9 | | | | | |

## ASIA, cont.

| SITE NAME | YEAR | LAT | LONG | ELEV (m) | CORE DEPTH (m) | CORE DIA. (cm) | DRILL TYPE | DRILLING AGENCY | CURAT. AGENCY | REMARKS |
|---|---|---|---|---|---|---|---|---|---|---|
| Khel Khod Glacer | 1979 | 75°40'N | 34°14'E | 4695 | 5 | | | | | Mayewski et al. (1981) |
| Nehnar Glacier | 1978 | | | | 102 | | | | | Bhanddi (1983) |
| Nehnar Glacier | 1979 | 34°09'N | 75°31'E | 4170 | 102 | | | Geol. Survey India | | Nijampurkar (1984) |
| Sentik Glacer Ladakh, Himalayas | 1980 | 33°59'N | 75°57'E | 4908 | 16.6 | | | | UNH | Mayewaski, et al. (1984) |
| Yala Glacier | 1981 | 28°15'N | 85°37'E | 5180 | 30 | | | | | Watanabe et al. (1984) |
| Yala Glacier | 1982 | | | 5400 | 60 | | | | | |

## SOUTHERN HEMISPHERE, EXCLUDING ANTARCTICA

| SITE NAME | YEAR | LAT | LONG | ELEV (m) | CORE DEPTH (m) | CORE DIA. (cm) | DRILL TYPE | DRILLING AGENCY | CURAT. AGENCY | REFERENCES |
|---|---|---|---|---|---|---|---|---|---|---|
| Lewis Glacier Mt. Kenya | 1978 | 0°9'N | 37°14'W | 4870 | 13.4 | 7.5 | SIPRE Hand Operated | BPRC | | Thompson (1979) Thompson and Hastenrath (1981) |
| Chimborazo Ecuador | 1981 | 1°28'S | 78°70'W | 6300 | 6 | | Lt. Wt. hand operated | BPRC | | Thompson JGR (1984) |
| Huascaran Col Peru | 1980 | 9°07'S | 77°36'W | 5990 | 10 | | | BPRC | | Thompson JGR (1984) |
| Quelccaya Ice Cap | 1983 | 13°56'S | 70°50'W | 5670 | 154.8 | | Sun power deep drill | BPRC-PCIO | OSU | Thompson (1985-86) |
| Quelccaya Ice Cap | 1983 | 13°56'S | 70°50'W | 5670 | 163.8 | | Sun power deep drill | BPRC-PCIO | OSU | Thompson (1985-86) |
| San Rafael Glacier N. Patagonia | 1985 | 46°44'S | 73°44'S | 1296 | 37.6 | | Electro-Mech ILTS-1--S | Inst. of Low Temp. Science Sapporo | | Yamada (1987) |

## ANTARCTICA

| SITE NAME | YEAR | LAT | LONG | ELEV (m) | CORE DEPTH (m) | CORE DIA. (cm) | DRILL TYPE | DRILLING AGENCY | CURAT. AGENCY | REFERENCES |
|---|---|---|---|---|---|---|---|---|---|---|
| Adelie Land D57 | 1980-1981 | 68°11'S | 137°33'E | 2050 | 203 | | Electro-Mech | Lab. de Glac Grenoble | | Gillet (1984) Raynaud (1985) Zanolini (1985) |
| Advance Camp | 1985-1986 | 74°12'S | 34°59'W | | 200 | | | JARE (1984-1986) | OSU | Ageta (1987) |
| Antarctic Peninsula Plateau | 1987 | 70°39'S | 65°01'W | 2000 | 108 104 | | Electro-Mech | BAS-BPRC | | Thompson |
| BHC1 | 1981-1982 | 66°44'S | 112°50'E | | 300 | | | | | Jacka (1985) |
| BHC2 | 1981-1982 | 66°44'S' | 112°50'E | | 700 | | | | | Jacka (1985) |
| Brunt Ice Shelf | 1982 | 75°31'S | 25°56'W | | 21.44 | | ILTS MK III | BAS | | Fujii (1983) |
| Cape Folger | | 66°22'S | 111°E | | 324 | | | Aust. Ant. Div. | | Ackley (1979) |
| D79 Dalinger Dome | 1979 | 64°12'54"S | 57°40'30"W | | 225 | | | IAA Lab de Glac | | Aristarain (1986) |
| D81 Dalinger Dome | 1981 | 64°12'54"S | 57°40'30"W | 3138 | 154.3 | | | IAA Lab de Glac | | Aristarain (1986) |
| Dolleman Island | 1986 | 70°35'S | 60°55.5'W | 398 | 133 32 10.5 | | | BAS | | Peel (1988) |
| Dolleman Island | 1985-1986 | 70°35'S | 60°55'W | | 130 | | | BAS | | Moore (1988) |
| Dome C (Firn Core) | Aus. Sum. 1978-1979 | 74°30'S | 123°10'E | 3240 | 50 | 7.5 | | PICO | OSU | Alley (1982) |
| Dome C | 1981 | | | | 235 | | Electro-Mech | Lab. de Glac. Grenoble | | Gillet (1982) |

## ANTARCTICA, cont.

| SITE NAME | YEAR | LAT | LONG | ELEV (m) | CORE DEPTH (m) | CORE DIA. (cm) | DRILL TYPE | DRILLING AGENCY | CURAT. AGENCY | REFERENCES |
|---|---|---|---|---|---|---|---|---|---|---|
| Dome Camp | 1985 1986 | 77°00'S | 35°00'E | | 40 | | | JARE (1984-1986) | | Ageta (1987) |
| Explorer's Cove McMurdo | 1982 | 70°33'S | 163°29'E | | 300 cm 305 cm | | SPIRE Cover | | | Stockton (1984) |
| G2 Grid Station | 1982 | 71°02'S | 39°02'S | 1787 | 127.655 | | | | JARE | Nishio (1984) |
| Georg von Neumayer Station | 1980 | | | | 10.5 | | | German Antarctic Expedition | | Reinwarth (1985) |
| Georg von Neumayer Station | 1982 | | | | 51.5 | | | German Antarctic Expedition | | Reinwarth (1985) |
| H231 | 1980 | 70°42'S | 44°18'E | 1667 | 56.80-57.02 68.16-66.55 81.32-81.63 99.72-99.90 | | | JARE 21 | | Higashi (1983) |
| James Ross Island | 1977 | 64°13'S | 57.38°W | | 10 | | | Inst. Ant. Argentino; Lab. de Glac. | | Aristarain (1981) |
| James Ross Island | 1981 | | | | 150 | | Electro-Mech | Lab. de Glace Grenoble | | Gillet (1984) |
| Komsomolskaya Station | 1982 | | | | 800 | | | SAE | | Samoilov (1985) |
| Komsomolskaya Station | 1983 | | | | 870 | 10.2 | | SAE | | Samoilov (1985) |
| Meserve Glacier | 1979-1980 | 77°35'S | 162°23'E | 1230 | 12.85 | | | | UNH | Mayewski (1982) |
| Mizuho S48 | 1979 | 70°42'E | 44°18'E | 1200 | 61.56-61.77 57.58-57.67 51.42-51.47 | | | JARE-20 | | Higashi |
| Mizuho Station | 1983 | 70°41.9'S | 44°19.9'E | | 413.5 | | Thermal | JARE-24 | | Nakawo (1985) Narita (1985) |

| SITE NAME | YEAR | LAT | LONG | ELEV (m) | CORE DEPTH (m) | CORE DIA. (cm) | DRILL TYPE | DRILLING AGENCY | CURAT. AGENCY | REFERENCES |
|---|---|---|---|---|---|---|---|---|---|---|
| Mizuho Station | 1984 | 70°42'S | 44°20'E | 2230 | 700.56 | | | | JARE-24 | Higashi (1988) Fuji (1988) |
| Newall Glacier | 1988 | 77°43'S | 162°33'E | 1700 | 150 | | 4" Electro-Mech | PICO | UNH | |
| Newall Glacer | 1988 | 77°43'S | 162°33'E | 1700 | 174 | | 4" Electro-Mech | PICO | UNH | |
| Palmer Land Plateau | 1981 | 74°01'S | 70°38'W | 1130 | 30.5 82.47 | 75 | Electro-Mech | BAS | | Peel (1988) |
| Plateau Station | 1984-1985 | | | | 150-200 | | | PICO | | Mosley-Thompson |
| PS 1 Firn Amundsen-Scott | 1983-1984 | | | 2850 | 130 | | | | | Kichner (1988) |
| Rennick Glacier | 1981 | 71°15'S | 169°30'E | 2385 | 6.35 | | 3" SIPRE | UNH | UNH | Allen et al. (1985) |
| Rennick Glacier | 1981 | 71°15'S | 169°30'E | 1400 | 4.65 | | 3" SIPRE | UNH | UNH | Allen et al. (1985) |
| Ronne Ice Shelf | 1983-1984 | | | | 100 | | Rufli design | U. of Boechum | | Graf (1988) |
| S25 | 1985-1986 | 69°02'S | 40°28'E | | 100 | | | JARE (1984-1986 | | Ageta (1987) |
| Siple Coast UpB | 1984-1985 | 83°28'S | 138°05'W | 335 | 700 | | | PICO | U. of Wisconsin | Alley (1988) |
| Siple Coast BC | 1985-1986 | 82°53'S | 136°39'W | 509 | 102 | | | PICO | U. of Wisconsin | Alley (1985) |
| Siple Station | 1983-1984 | 74°55'S | 83°55'W | | 200 | | | PICO U. of Bern | | Friedli |
| Siple Station | 1985-1986 | 75°55'S | 84°15'W | | 20 | | | PICO | OSU | Mosley-Thompson (1988) |
| Siple Station | 1985-1986 | 75°55'S | 84°15'W | | 132 | | | PICO | OSU | Mosley-Thompson (1988) |

## ANTARCTICA, cont.

| SITE NAME | YEAR | LAT | LONG | ELEV (m) | CORE DEPTH (m) | CORE DIA. (cm) | DRILL TYPE | DRILLING AGENCY | CURAT. AGENCY | REFERENCES |
|---|---|---|---|---|---|---|---|---|---|---|
| Siple Station | 1985-1986 | 75°55'S | 84°15'W | 1054 | 302 | | | PICO | OSU | Mosley-Thompson (1988) |
| South Pole A-S | 1979-1980 | | | | 44.2 | | PICO Shallow drill | PICO | | Kuivinen (1980) |
| South Pole A-S | 1979-1980 | | | | 32 | 10.1 | PICO Shallow drill | PICO | | Kuivinen (1980) |
| South Pole | 1980-1<br>1981-2<br>1982-3<br>1983-4 | | | | 106<br>237<br><br>354 | 10.1<br>10.2 | Rufli-Rand 4" Electro-Mech<br>PICO Interm. drill | PICO | CRREL | Cragin (1984)<br>Kuivinen (1982)<br>Kuivinen (1983) |
| T340 Filchner Ronne Ice Shelf | 1985-1986 | 78°6'S | 55°W | | | | | Alfred Wegener Institute | | Graf (1988) |
| Transantarctic Mountains Dominion Range | 1984-1985 | 85°15'S | 166°10'E | 2800 | 201 | | 4" Electro-Mech | PICO UNH | UNH | Mayewski (1988) |
| Transantarctic Mountains Dominion Range | 1984 | 85°20'S | 166°E | 2800 | 201 | | 4" electro-mech | PICO | UNH | Mayewski, et al. (in press)<br>Spencer, et al. (in press) |
| Vostok | 1979-1980 | 78°28'S | 106°48'E | | 25 | 10.1 | PICO Shallow dirll | PICO | | Kuivinen (1980) |
| Vostok | 1979-1980 | 78°28'S | 106°48'E | | 60 | 10.1 | PICO Shallow | PICO | | Kuivinen (1980) |
| Vostok | 1979-1980 | 78°28'S | 106°48'E | | 101 | 7.5 | NSF Swiss Shallow Drill | PICO | | Kuivinen (1980) |
| Vostok | 1979-1980 | 78°28'S | 106°48'E | | 102 | 7.5 | NSF Swiss Shallow Drill | PICO | | Kuivinen (1980) |

## ANTARCTICA, cont.

| SITE NAME | YEAR | LAT | LONG | ELEV (m) | CORE DEPTH (m) | CORE DIA. (cm) | DRILL TYPE | DRILLING AGENCY | CURAT. AGENCY | REFERENCES |
|---|---|---|---|---|---|---|---|---|---|---|
| Vostok | 1980 | 78°28'S | 106°48'E | 3488 | 2089 | | | SAE | | Lorius et al. (1985) |
| Vostok | 1981 | 78°28'S | 106°48'E | 3490 | 1415 | | | SAE | | |
| Yamato Mountains | 1983 | | | | 101.5 | | | JARE-24 | | Nakawo (1988) |

## ICE CORE BIBLIOGRAPHY, 1980-1989

This bibliography provides a supplement to "Ice Cores: A Selected Bibliography" published in ***Glaciological Data, Report GD***-8, in 1980. The references are divided into nine subject categories. They are:

| | |
|---|---|
| Chemistry | Physical and Mechanical Properties |
| Drill Technology | Radio Isotopes |
| General | Stable Isotopes |
| Miscellaneous Related Topics | Trapped Gas Composition |
| Particulates | |

An alphabetical list by first author is also provided.

We have attempted to be as comprehensive as possible by searching a variety of data sources and using broad subject categories. The major on-line sources searched are:

**COLD** (Bibliography of Cold Regions Science and Technology)
**GEOREF**
**GEOARCHIVE**
**NTIS** (U.S. National Technical Information Service)
**Dissertation Abstracts**
**Compendex** (Engineering Index)
**Meteorological and Geoastrophysical Abstracts**
**CITATION** (WDC/NSIDC).

Because we do not have all of the original material in hand, we cannot be certain of the completness of each citation. However, every effort has been made to ensure accuracy.

We would appreciate your comments on the bibliography - on references we have not included, sources not searched, or subject areas not adequately covered. We plan to keep this bibliography up-to-date and your suggestions are welcome.

Ann M. Brennan
Compiler

## CHEMISTRY

Alderton, D.H.M.; Coleman, D.O. (1985) Ice cores and snow. *London. University. Monitoring and Assessment Centre. Technical Report*, no.31, p.97-153. WDC No. 86000583. CRREL No. 39003905.

Barkov, N.I.; Voytylov, V.V.; Spartakov, A.A.; Tolstoy, N.A.; Trusov, A.A.; Gorshkov, E.S. (1984) Izuchenie granulometricheskogo sostava nikrochastits v ledianom kerne Stantsii Vostok Elektroopticheskie metodom. (Study of the granulometric composition of ice core trace elements at Vostok Station by an electrooptical method.) *Sovetskaia Antarkticheskaia Ekspeditsiia. Informatsionnyi Builleten*, no.106, p.26-33. WDC No. 85000126. CRREL No. 39001007.

Batifol, F.; Boutron, C.; DeAngelis, M. (1989) Changes in copper, zinc and cadmium concentration in Antarctic ice during the past 40,000 years. *Nature*, 337(6207), p.544-546. CRREL No. 43001775.

Broecker, W.S. (1981) Glacial and interglacial changes in ocean and atmosphere chemistry. (In: Berger, A. *Climatic Variations and Variability: Facts and Theories*. Dordrecht, Holland, D. Reidel Publishing Co., p.111-121.) CRREL No. 36003191.

Cragin, J.H.; Giovinetto, M.B.; Gow, A.J. (1984) Baseline acidity of ancient precipitation from the South Pole. *U.S. Army. Cold Regions Research and Engineering Laboratory. Report*, 84-15, 12p. WDC No. 84001504. CRREL No. 39000387.

DeAngelis, M.; Legrand, M.; Petit, J.R.; Barkov, N.I.; Korotkevitch, E.S.; Kotliakov, V.M. (1984) Soluble and insoluble impurities along the 950 m deep Vostok ice core (Antarctica) - Climatic implications. *Journal of Atmospheric Chemistry*, 1, p.215-239. WDC No. 85000050.

Delmas, R.J.; Aristarain, A.; Legrand, M. (1980) Acidity of Antarctic snow: A natural reference level for acid rains. (In: *International Conference on the Ecological Impact of Acid Precipitation, Norway, 1980. Proceedings*. p.104-105.) WDC No. 83000193.

Delmas, R.; Bourton, C. (1980) Are the past variations of the stratospheric sulfate burden recorded in central Antarctic snow and ice layers? *Journal of Geophysical Research*, vol.85, p.5645-5649.

Dreschhoff, G.A.M.; Zeller, E.J.; Parker, B.C. (1983) Past solar activity variation reflected in nitrate concentrations in Antarctic ice. (In: *International Symposium on Solar-Terrestrial Influences on Weather and Climate, 2nd, National Oceanic and Atmospheric Administration, Boulder, CO., August 2-6, 1982, Weather and Climate Response to Solar Variations. Proceedings*. Boulder, Colorado Associated University Press, p.225-236.)

Finkel, R.C.; Langway, C.C., Jr. (1985) Global and local influences on the chemical composition of snowfall at Dye 3, Greenland: the record between 10Ka B.P. and 40Ka B.P. *Earth and Planetary Science Letters*, 73(2-4), p.196-206. WDC No. 85002036.

Finkel, R.C.; Langway, C.C., Jr.; Clausen, H.B. (1986) Changes in precipitation chemistry at Dye-3, Greenland. *Journal of Geophysical Research*, 91(D9), p.9849-9855. WDC No. 87000350. CRREL No. 41001021.

Fujii, Y. (1983) Past 30-year Ph record in a firn core from the Brunt Ice Shelf, Antarctica, and its relationship to volcanic events. (In: Kusunoki, K., ed. *Symposium on Polar Meteorology and Glaciology, 5th, December 7-9, 1982, National Institute of Polar Research, Tokyo. Proceedings. Tokyo. National Institute of Polar Research. Memoirs. Special Issue*, no.29, p.176-184.) WDC No. 84000667. CRREL No. 38002015.

Fujii, Y. (1983) Preliminary report of glaciological study at Brunt Ice Shelf near Halley Base, Antarctica in January 1982. *Antarctic Record*, no.77, p.144-152. WDC No. 83001235. CRREL No. 37002926.

Fujino, K.; Horiguchi, K.; Shinbori, K.; Kato, K. (1982) Analysis and characteristics of cores from a massive ice body in Mackenzie Delta, N.W.T., Canada. *Low Temperature Science (Teion Kagaku). Series A Physical Science*, vol.41, p.143-150. WDC No. 83001529. CRREL No. 37003420.

Fujino, K.; Horiguchi, K.; Shinbori, M.; Kato, K. (1983) Analysis and characteristics of cores from a massive ice body in Mackenzie Delta, N.W.T., Canada. (In: Brown, J., ed. *International Conference on Permafrost, 4th, Fairbanks, Alaska, July 17-22, 1983. Proceedings*. Washington, DC. National Academy Press, p.316-321.) WDC No. 84000195. CRREL No. 38001157.

Gorlach, U.; Wagenbach, D.; Kipfstuhl, J.; Stuckenberg, U. (1985) Spurenstoffglaziologische Untersuchungen an den deutschen Antarktisstationen. (Glaciological trace element investigations at German Antarctic stations.) (In: Kohnen, H., ed. *Filchner-Ronne Ice Shelf Programme: Report 2. Bremerhaven. Alfred Wegener Institute for Polar Research*, p.42-49.)

**CHEMISTRY (Cont.)**

Hammer, C.U. (1980) Acidity of polar ice cores in relation to absolute dating, past volcanism, and radio echoes. *Journal of Glaciology*, 25(93), p.359-372. WDC No. 81000298. CRREL No. 35001500.

Hammer, C.U.; Clausen, H.B.; Dansgaard, W. (1981) Past volcanism and climate revealed by Greenland ice. *Journal of Volcanology and Geothermal Research*, 11, p.3-10. WDC No. 82000225. CRREL No. 36001200.

Hammer, C.U. (1982) History of atmospheric composition as recorded in ice sheets. (In: *Dahlem Workshop on Atmospheric Chemistry, Berlin, W. Germany, May 2-7, 1982, Reports*. New York, Springer-Verlag, p.119-134.)

Hammer, C.U. (1983) Initial direct current in the buildup of space charges and the acidity of ice cores. (In: *International Symposium on the Physics and Chemistry of Ice, 6th, Rolla, Missouri, August 2-6 1982. Journal of Physical Chemistry*, 87(21), p.4099-4103.) WDC No. 84001826. CRREL No. 38001581.

Hammer, C.U.; Clausen, H.B.; Langway, C.C., Jr. (1985) Byrd ice core: continuous acidity measurements and solid electrical conductivity measurements. (In: *Symposium on Snow and Ice Chemistry and the Atmosphere, Peterborough, Ontario, August 19-24, 1984. Proceedings. Annals of Glaciology*, vol.7, p.214.) WDC No. 86000836. CRREL No. 40002423.

Hammer, C.U. (1985) Continuous impurity analysis along the Dye 3 deep core. *American Geophysical Union. Geophysical Monograph Series*, no.33, p.90-94. WDC No. 85001665. CRREL No. 39003572.

Herron, M.M.; Langway, C.C., Jr. (1979) Dating of Ross Ice Shelf cores by chemical analysis. (In: Glen, J.W.; Adie, R.J.; Johnson, D.M.; Homer, D.R.; MacQueen, A.D., eds. *Symposium on Dynamics of Large Ice Masses, Ottawa, 21-25 August 1978. Proceedings. Journal of Glaciology*, 24(90), p.345-357.) WDC No. 80001836. CRREL No. 34002837.

Herron, M.M. (1980) *Impact of Volcanism on the Chemical Composition of Greenland Ice Sheet Precipitation*. Buffalo, NY. State University of New York. Ph.D. Dissertation. University Microfilm Order no. 8027608, 158p. WDC No. 83000088. CRREL No. 37001178.

Herron, M.M.; Herron, S.L.; Langway, C.C., Jr. (1981) Climatic signal of ice melt features in Southern Greenland. *Nature*, 293(5831), p.389-391. WDC No. 82000944.

Herron, M.M. (1982) Glaciochemical dating techniques. (In: Currie, L.A., ed. *Nuclear and Chemical Dating Techniques: Interpreting the Environmental Record. American Chemical Society. ACS Symposium Series*, no.176, p.303-318.) WDC No. 84000433. CRREL No. 37000757.

Herron, M.M.; Herron, S.L. (1983) Past atmospheric environments revealed by polar ice core studies. *Hydrological Sciences Journal*, 28(1), p.139-153. WDC No. 84001307. CRREL No. 38000567.

Herron, M.M.; Langway, C.C., Jr. (1985) Chloride, nitrate, and sulfate in the Dye 3 and Camp Century, Greenland ice cores. *American Geophysical Union. Geophysical Monograph Series*, no.33, p.77-84. WDC No. 85001663. CRREL No. 39003570.

Holdsworth, G.; Krouse, H.R.; Peake, E. (1988) Trace-acid ion content of shallow snow and ice cores from mountain sites in Western Canada. (In: Oeschger, H., ed. *Symposium on Ice-Core Analysis, Bern, Switzerland, March 30-April 3, 1987. Proceedings. Annals of Glaciology*, vol.10, p.57-62.)

Johnson, B.B. (1981) Dating of the Dome summit core, Law Dome, Antarctica, by chemical analysis. (In: Young, N.W., comp. *Antarctica: Weather and Climate*, 8p.) CRREL No. 37001382.

Johnson, B.B.; Chamberlain, J.M. (1981) Sodium, magnesium, potassium and calcium concentrations in ice cores from the Law Dome, Antarctica. *Geochimica et Cosmochimica Acta*, 45(5), p.771-776. WDC No. 81002439. CRREL No. 35002885.

Josephson, J. (1982) Air pollutant baselines from glacial studies. *Environmental Science and Technology*, 16(8), 437A-441A.

Kanamori, S. (1987) Preliminary report on the contamination control for chemical analyses of Antarctic ice samples. (In: Matsuda, T.; Kawaguchi, S.; Watanabe, O., eds. *Symposium on Polar Meteorology and Glaciology, 9th, National Institute of Polar Research, Tokyo, December 11-12, 1986. Proceedings, vol.1*. Tokyo, National Institute of Polar Research, p.132-139.) CRREL No. 42001186.

Kirchner, S.; Delmas, R.J. (1988) 1000 year glaciochemical study at the South Pole. (In: Oeschger, H., ed. *Symposium on Ice-Core Analysis, Bern, Switzerland, March 30-April 3, 1987. Proceedings. Annals of Glaciology*, vol.10, p.80-84.)

Kubik, P.W.; Elmore, D.; Gove, H.E.; Conard, N.J. (1988) $^{36}$Cl depth profile in the 1966 Camp Century deep ice core covering the Wolf, the Spoerer, and the Maunder sunspot minima periods. (Abstract only) (In: V.M. Goldschmidt *Conference, Baltimore, MD. May 11-13, 1988*. Pennsylvania State University. Geochemistry Society of America, p.54.)

**CHEMISTRY (Cont.)**

Laird, C.M.; Zeller, E.J.; Dreschhoff, G.A.M. (1987) Nitrate variability in South Pole ice sequences and fossil surface effects. *Antarctic Journal of the United States*, 22(5), p.80-83. CRREL No. 43002745.

Langway, C.C., Jr.; Goto-Azuma, K. (1988) Temporal variations in the deep ice-core chemistry record from Dye 3, Greenland. (Abstract only) (In: Oeschger, H., ed. *Symposium on Ice-Core Analysis, Bern, Switzerland, March 30-April 3, 1987. Proceedings. Annals of Glaciology*, vol.10, p.209.)

Legrand, M. (1980) Mesure de l'acidité et de la conductivité électrique des précipitations Antarctiques. (Measuring acidity and electrical conductivity in Antarctic precipitation.) *France. Centre National de la Recherche Scientifique. Laboratoire de Glaciologie. Publication*, no.316, PhD. Dissertation, 109p. CRREL No. 37002158.

Legrand, M.; Delmas, R.J. (1987) 220-year continuous record of volcanic H2S04 in the Antarctic ice sheet. *Nature*, 327(6124), p.671-676. WDC No. 87002013. CRREL No. 41004325.

Legrand, M.; Delmas, R.J. (1987) Environmental changes during last deglaciation inferred from chemical analysis of the Dome C ice core. (In: Berger, W.H.; Labeyrie, L.D., eds. *Abrupt Climatic Chnages; Evidence and Implications, St. Hugues de Biviers, France, October 1985. NATO Advanced Study Institutes Series. Series C; Mathematical and Physical Sciences*, vol.216, p.247-259.)

Legrand, M.; Saigne, C. (1988) Formate, acetate and methanesulfonate measurements in Antarctic ice: some geochemical implications. *Atmospheric Environment*, 22(5), p.1011-1017. CRREL No. 42003708.

Legrand, M.; Delmas, R.J. (1988) Soluble impurities in four Antarctic ice cores over the last 30,000 years. (In: Oeschger, H., ed. *Symposium on Ice-Core Analysis, Bern, Switzerland, March 30-April 3, 1987. Proceedings. Annals of Glaciology*, vol.10, p.116-120.)

Legrand, M.R.; Lorius, C.; Barkov, N.I.; Petrov, V.N. (1988) Vostok (Antarctica) ice core: Atmospheric chemistry changes over the last climatic cycle (160,000 years). *Atmospheric Environment*, 22(2), p.317-331. CRREL No. 42003171.

Legrand, M.R.; Delmas, R.J.; Charlson, R.J. (1988) Climate forcing implications from Vostok ice-core sulphate data. *Nature*, 334(6181), p.418-420.

Liu, Y.G. (1988) Analysis of trace elements in the BHQ ice core, Law Dome, Antarctica. *Journal of Glaciology*, 34(118), p.297-300. CRREL No. 43001985.

Lyons, W.B.; Mayewski, P.A. (1983) Nitrate plus nitrite concentrations in a Himalayan ice core. *Geophysical Research Letters*, 10(12), p.1160-1163. WDC No. 85002102. CRREL No. 38001534.

Maccagnan, M.; Barnola, J.M.; Delmas, R.; Duval, P. (1981) Static electrical conductivity as an indicator of the sulfate content of polar ice cores. *Geophysical Research Letters*, 8(9), p.970-972. WDC No. 82000597. CRREL No. 36001131.

Maccagnan, M.; Duval, P. (1982) Electrical behavior of Antarctic ice and radio echo layers in ice sheets. (In: *International Symposium on Antarctic Glaciology, 3rd, Columbus, OH, September 7-12, 1981. Proceedings. Annals of Glaciology*, vol.3, p.195-198.) WDC No. 83000439. CRREL No. 37000271.

Mayewski, P.A.; Lyons, W.B.; Ahmad, N.; Smith, G.; Pourchet, M. (1984) Interpretation of the chemical and physical time-series retrieved from Sentik Glacier, Ladakh Himalaya, India. *Journal of Glaciology*, vol.30(104), p.66-76. WDC No. 84001982. CRREL No. 39000244.

Mayewski, P.A.; Lyons, W.B. (1985) Can high-altitude ice masses in temperate areas provide useful climatic records? (Abstract only) (In: *Symposium on Snow and Ice Chemistry and the Atmosphere, Peterborough, Ontario, August 19-24, 1984. Proceedings. Annals of Glaciology*, vol.7, p.89.)

Mayewski, P.A.; Lyons, W.B.; Spencer, M.J.; Twickler, M.; Dansgaard, W.; Clausen, H. (1985) *Detailed (1869-1984) record of sulfate and nitrate concentrations from South Greenland.* p.168-185. WDC No. 85002053.

Mayewski, P.A.; Lyons, W.B.; Spencer, M.J.; Twickler, M.; Dansgaard, W.; Koci, B.; Davidson, C.I.; Honrath, R.E. (1986) Sulfate and nitrate concentrations from a South Greenland ice core. *Science*, 232(4753), p.975-977. WDC No. 86001607.

Mayewski, P.A. (1987) Transantarctic Mountains ice core study. *Antarctic Journal of the United States*, 22(5), p.78. CRREL No. 43002742.

McGinnis, L.D.; Osby, D.R.; Kohout, F.A. (1981) Paleohydrology inferred from salinity measurements on Dry Valley Drilling Project cores from Taylor Valley, Antarctica. (In: Craddock, C., ed. *Antarctic Geoscience. Symposium on Antarctic Geology and Geophysics, Madison, WI, 22-27 August 1977. Proceedings. International Union of Geological Sciences*, B(4), p.1133-1137.) WDC No. 82000733. CRREL No. 36003140.

## CHEMISTRY (Cont.)


Mosley-Thompson, E.; Thompson, L.G.; Paskievitch, J.; Grootes, P.M. (1988) Shallow-core analysis and pit studies at Siple Station, Antarctica; implications for extraction of a 500 year proxy climate record. (Abstract only) (In: Oeschger, H., ed. *Symposium on Ice-Core Analysis, Bern, Switzerland, March 30-April 3, 1987. Proceedings. Annals of Glaciology*, vol.10, p.212.)

Mulvaney, R.; Peel, D.A. (1988) Anions and cations in ice cores from Dolleman Island and the Palmer Land Plateau, Antarctic Peninsula. (In: Oeschger, H., ed. *Symposium on Ice-Core Analysis, Bern, Switzerland, March 30-April 3, 1987. Proceedings. Annals of Glaciology*, vol.10, p.121-125.)

Murozumi, M.; Nakamura, S.; Yoshida, Y. (1978) Compiled data of chemical compositions in ice cores drilled at Mizuho Station. *Japan. National Institute of Polar Research. Memoirs, Special Issue*, no.10, p.67-168.

Neftel, A.; Jacob, P.; Klockow, D. (1986) Long-term record of $H_2O_2$ in polar ice cores. *Tellus*, 38B(3-4), p.262-270. WDC No. 87001062. NTIS No. 41001756

Neftel, A.; Beer, J.; Oeschger, H.; Zurcher, F.; Finkel, R.C. (1985) Sulphate and nitrate concentrations in snow from South Greenland 1895-1978. *Nature*, 314(6012), p.611-613. CRREL No. 40001003.

Palais, J.M.; Kyle, P.R. (1988) Chemical composition of ice containing tephra layers in the Byrd Station ice core, Antarctica. *Quaternary Research*, 30(3), p.315-330. CRREL No. 43002006.

Peel, D.A. (1983) Antarctic ice: The frozen time capsule. *New Scientist*, 98(1358), p.476-483. WDC No. 84001467. CRREL No. 38003325.

Rasmussen, R.A.; Khalil, M.A.K. (1984) Atmospheric methane in the recent and ancient atmospheres: Concentrations, trends, and interhemispheric gradient. *Journal of Geophysical Research. Atmospheres*, 89(D7), p.11,599-11,605. WDC No. 85002025.

Saigne, C.; Legrand, M. (1987) Measurements of methanesulphonic acid in Antarctic ice. *Nature*, 330(5145), p.240-242. CRREL No. 42001145.

Schove, D.J. (1981) Aurorae, sunspots and weather, mainly since A.D. 1200. (In: Deehr, C.S.; Holtet, J.A., eds. *Exploration of the Polar Upper Atmosphere. Nato Advanced Study Institute, Norway, May 1980. Proceedings*. D. Reidel, p.421-430.)

Sigg, A.; Neftel, A. (1988) Seasonal variations in hydrogen peroxide in polar ice cores. (In: Oeschger, H., ed. *Symposium on Ice-Core Analysis, Bern, Switzerland, March 30-April 3, 1987. Proceedings. Annals of Glaciology*, vol.10, p.157-162.)

Thompson, L.G.; Mosley-Thompson, E.; Grootes, P.M.; Pourchet, M.; Hastenrath, S. (1984) Tropical glaciers: potential for ice core paleoclimatic reconstructions. *Journal of Geophysical Research*, 81(7), p.4638-4646. WDC No. 85000333. CRREL No. 39000759.

Thompson, L.G.; Mosley-Thompson, E.; Bolzan, J.F.; Koci, B.R. (1985) 1500-year record of tropical precipitation in ice cores from the Quelccaya Ice Cap, Peru. *Science*, 299(4717), p.971-973. WDC No. 85001812.

Thompson, L.G. (1986) Overview of 1000 years of tropical climatic variability from ice cores from the Andes of Southern Peru. (In: *Workshop on Climate Variability of the Eastern North Pacific and Western North America, 3rd, Pacific Grove, CA, March 25-28, 1986*. 29p.)

Wagenbach, D.; Muennich, K.O.; Schotterer, U.; Oeschger, H. (1988) Anthropogenic impact on snow chemistry of Colle Gnifetti, Swiss Alps. (In: Oeschger, H., ed. *Symposium on Ice-Core Analysis, Bern, Switzerland, March 30-April 3, 1987. Proceedings. Annals of Glaciology*, vol.10, p.183-187.)

Watroba, D.A.; Langway, C.C., Jr. (1979) Chemical investigation of two ice cores taken from the Ross Ice Shelf, Antarctica. (In: *Geological Society of America, Northeastern Section, 14th Annual Meeting, Hershey, PA., March 1-3, 1979. Geological Society of America, Abstracts and Programs*, 11(1), p.58.)

Watroba, D.A. (1980) Chemical investigation of two ice cores taken from the Ross Ice Shelf, Antarctica. (In: *Geological Society of America, Northeastern Section, 15th Annual Meeting, Philadelphia, PA, March 13-15, 1980. Geologcial Society of America. Abstracts and Programs*, 12(2), p.88.)

Weertman, J.; Peel, D.A. (1981) On Antarctic glaciology: ice sheets and ice cores. *Nature*, 294(5838), p.210-212. WDC No. 82000630. CRREL No. 36001621.

Wilson, A.T.; Hendy, C.H. (1981) Chemical stratigraphy of polar ice sheets -- a method of dating ice cores. *Journal of Glaciology*, 27(95), p.3-9. WDC No. 82001255. CRREL No. 36003330.

Wolff, E.W. (1986) Climate, pollution and ice. Great Britain. National Environment Research Council. NERC News Journal, 3(9), p.4-7. WDC No. 87000189. CRREL No. 40002999.

## CHEMISTRY (Cont.)

Wolff, E.W.; Peel, D.A. (1985) Record of global pollution in polar snow and ice. *Nature*, 313(6003), p.535-540. CRREL No. 39002927.

Wolff, E.W.; Peel, D.A. (1988) Concentrations of cadmium, copper, lead and zinc in snow from near Dye 3 in South Greenland. (In: Oeschger, H., ed. *Symposium on Ice-Core Analysis, Bern, Switzerland, March 30-April 3, 1987. Proceedings. Annals of Glaciology*, vol.10, p.193-197.)

Zanolini, F.; Delmas, R.J.; Legrand, M. (1985) Sulphuric and nitric acid concentrations and spikes along a 200 m deep ice core at D57 (Terre Adelie, Antarctica). (In: *Symposium on Snow and Ice Chemistry and the Atmosphere, Peterborough, Ontario, August 19-24, 1984. Proceedings. Annals of Glaciology*, vol.7, p.70-75.) WDC No. 86000813. CRREL No. 40002400.

Zanolini, F. (1987) Conductimetrie et chimie de la glace a D57 (Terre Adelie); application a la recherche du paleovolcanisme. (Conductivity and chemical measurements along the ice core from D57 (Adelie Coast); application at the study of the paleovolcanism.) *Bulletin - Programme Interdisciplinaire de Recherche sur la Prevision et la Surveillance des Eruptions Volcanique*, vo.76, 84p. CNRS-RS 19497

## DRILL TECHNOLOGY

Benson, C.S. (1984) Ice core drilling on Mt. Wrangell, Alaska, 1982. (In: Holdsworth, G.; Kuivinen, K.C.; Rand, J.H., eds. *International Workshop/Symposium on Ice Drilling Technology, 2nd, Calgary, Alberta, August 30-31, 1982. Proceedings. U.S. Army. Cold Regions Research and Engineering Laboratory. Special Report*, SR 84-34, p.61-68.) WDC No. 86000625. CRREL No. 40001184. NTIS No. ADA-156 733

Bogorodskii, V.V.; Morev, V.A. (1984) Equipment and technology for core drilling in moderately cold ice. (In: *International Workshop/Symposium on Ice Drilling Technology, 2nd, Calgary, Alberta, 30-31 August 1982. Proceedings. U.S. Army. Cold Regions Research and Engineering Laboratory. Special Report*, SR 84-34, p.129-132.) CRREL No. 40001196.

Bogorodskii, V.V.; Morev, V.A.; Pukhov, V.A.; Iakovlev, V.M. (1984) New equipment and technology for deep core drilling in cold glaciers. (In: Holdsworth, G.; Kuivinen, K.C.; Rand, J.H., eds. *International Workshop/Symposium on Ice Drilling Technology, 2nd, Calgary, Alberta, August 30-31, 1982. Proceedings. U.S. Army. Cold Regions Research and Engineering Laboratory. Special Report*, SR 84-34, p.139-140.) WDC No. 86000640. CRREL No. 40001199. NTIS No. ADA-157 485

Browning, J.A.; Bigl, R.A.; Somerville, D.A. (1979) Hot-water drilling and coring at Site J-9, Ross Ice Shelf. *Antarctic Journal of the United States*, 14(5), p.60-61. WDC No. 80003388. CRREL No. 35000649.

Chiang, E.; Langway, C.C., Jr. (1978) Antarctic ice core recovery. *Antarctic Journal of the United States*, 13(4), p.59-61.

Clausen, H.B.; Gundestrup, N.S.; Johnsen, S.J.; Bindschadler, R.; Zwally, J. (1988) Glaciological investigations in the Crete area, central Greenland; a search for a new deep-drilling site. (In: Oeschger, H., ed. *Symposium on Ice-Core Analysis, Bern, Switzerland, March 30-April 3, 1987. Proceedings. Annals of Glaciology*, vol.10, p.10-15.)

Cole, D.M.; Gould, L.D.; Burch, W.B. (1985) System for mounting end caps on ice specimens. *Journal of Glaciology*, vol.31(109), p.362-365. WDC No. 86001110. CRREL No. 40002694.

Discoveries in Antarctica's deepest bedrock drillhole (1987) *New Scientist*, 113(1546), p.44. WDC No. 87000782.

Diurgerov, M.B.; Korolev, P.A. (1981) Gliatsiologicheskie nabliudeniia v pokhode ot Stantsii Mirnyi do Kupola C v 1981 g. (Glaciological observations along the route Mirnyi - Dome C in 1981.) *Akademiia Nauk SSSR. Institut Geografii. Materialy Gliatsiologicheskikh issledovanii. Khronika Obsuzhdeniia*, 42, p.211. WDC No. 82001084. CRREL No. 36003797.

Donnou, D. (1984) Deep core drilling: Electromechanical or thermal drill. (In: Holdsworth, G.; Kuivinen, K.C.; Rand, J.H., eds. *International Workshop/Symposium on Ice Drilling Technology, 2nd, Calgary, Alberta, August 30-31, 1982. Proceedings. U.S. Army. Cold Regions Research and Engineering Laboratory. Special Report*, SR 84-34, p.81-84.) WDC No. 86000628. CRREL No. 40001187. NTIS No. ADA-156 733

Efimov, V.A.; Govorukha, L.S.; Evseev, M.P. (1981) O matematicheskoi rekonstruktsii paleoklimatov po dannym glubokogo bureniia Antarkticheskogo lednikovogo pokrova. (Mathematical reconstructions of paleoclimates from deep drilling data obtained in the Antarctic Ice Sheet. *Akademiia Nauk SSSR. Institut Geografii. Materialy Gliatsiologicheskikh Issledovanii. Khronika Obsuzhdeniia*, vol.42, p.187-191. CRREL No. 36003790.

Fomin, S.A.; Chistiakov, V.K. (1985) Ob optimalnom raspredelenii temperatury na rabochei poverkhnosti termobura pri burenii-plavlenii. (Optimal temperature distribution over the drilling-bit surface during drilling-melting.) *Problemy Arktiki i Antarktiki*, vol.59, p.111-113. CRREL No. 40003740.

## DRILL TECHNOLOGY (Cont.)

Frederking, R. (1981) Ice coring and testing, Issungnak 1980--results of NRC's data collection. *Arctic Petroleum Operators Association, Calgary, Alta. Report*, APOA NO.171-1V6, 5p. WDC No. 87001260. CRREL No. 41003554.

French, H.M. (1983) Short term environmental effects of surface disposal of waste drilling fluids: Panarctic et al surface disposal experiment, Ellef Ringnes Island, N.W.T. (In: Duerden, F., ed. *Annual Applied Geography Conference, 6th, 12-15 October 1983. Proceedings.* Toronto, Ontario. Ryerson Polytechnical Institute, p.163-200.) CRREL No. 40001234.

Gillet, F.; Rado, C. (1979) 180-meter core drilling at Dome C and measurements in the 905-meter drill hole. *Antarctic Journal of the United States*, 14(5), p.101. WDC No. 80003411. CRREL No. 35000672.

Gillet, F.; Lorius, C. (1982) French field activities at Dome C. *Antarctic Journal of the United States*, 17(5), p.75-76. WDC No. 83002010. CRREL No. 37003947.

Gillet, F. (1984) "Climatopic" thermal probe. (In: *International Workshop/Symposium on Ice Drilling Technology, 2nd, Calgary, Alberta, 30-31 August 1982. Proceedings. U.S. Army. Cold Regions Research and Engineering Laboratory. Special Report*, SR 84-34, p.95-99.) CRREL No. 40001190.

Gillet, F. (1984) Ice core quality in electro-mechanical drilling. (In: Holdsworth, G.; Kuivinen, K.C.; Rand, J.H., eds. *International Workshop/Symposium on Ice Drilling Technology, 2nd, Calgary, Alberta, August 30-31, 1982. Proceedings, ings. U.S. Army. Cold Regions Research and Engineering Laboratory. Special Report*, SR 84-34, p.73-80.) WDC No. 86000627. CRREL No. 40001186. NTIS No. ADA-156 733

Gorodnov, V.S. (1988) Recent Soviet activities on ice core drilling and core investigations in Arctic region. *Bulletin of Glacier Research*, no.6, p.81-84.

Grzes, M. (1980) Non-cored hot point drills on Hans Glacier (Spitsbergen), method and first results. *Polish Polar Research*, 1(2/3), p.75-85. CRREL No. 36003686.

Gundestrup, N.S.; Hansen, B.L. (1984) Bore-hole survey at Dye 3, South Greenland. *Journal of Glaciology*, vol.30(106), p.282-288. WDC No. 85001739. CRREL No. 39003776.

Gundestrup, N.S.; Johnsen, S.J.; Reeh, N. (1984) ISTUK--a deep ice core drill system. (In: Holdsworth, G.; Kuivinen, K.C.; Rand, J.H., eds. *International Workshop/Symposium on Ice Drilling Technology, 2nd, Calgary, Alberta, August 30-31, 1982. Proceedings. U.S. Army. Cold Regions Research and Engineering Laboratory. Special Report*, SR 84-34, p.7-19.) WDC No. 86000618. CRREL No. 40001177. NTIS No. ADA-156 733

Gundestrup, N.S.; Johnsen, S.J. (1985) Battery powered, instrumented deep ice core drill for liquid filled holes. *American Geophysical Union. Geophysical Monograph Series*, no.33, p.19-22. CRREL No. 39003562.

Hamley, T.C.; Morgan, V.I.; Thawaites, R.J.; Gao, X.Q. (1986) Ice-core drilling site at Law Dome Summit, Wilkes Land, Antarctica. *Australian National Antarctic Research Expeditions. ANARE Research Notes*, no.37, 34p. WDC No. 86002036. CRREL No. 41000459.

Hansen, B.L. (1984) Overview of ice drilling technology. (In: Holdsworth, G.; Kuivinen, K.C.; Rand, J.H., eds. *International Workshop/Symposium on Ice Drilling Technology, 2nd, Calgary, Alberta, August 30-31, 1982. Proceedings. U.S. Army. Cold Regions Research and Engineering Laboratory. Special Report*, SR 84-34, p.1-6.) WDC No. 86000617. CRREL No. 40001176. NTIS No. ADA-156 733

Holdsworth, G. (1984) Canadian Rufli-Rand electro-mechanical core drill and reaming devices. (In: Holdsworth, G.; Kuivinen, K.C.; Rand, J.H., eds. *International Workshop/Symposium on Ice Drilling Technology, 2nd, Calgary, Alberta, August 30-31, 1982. Proceedings. U.S. Army. Cold Regions Research and Engineering Laboratory. Special Report*, SR 84-34, p.21-32.) WDC No. 86000619. CRREL No. 40001178. NTIS No. ADA-156 733

Holdsworth, G., ed.; Kuivinen, K.C., ed.; Rand, J.H., ed. (1984) Ice drilling technology. *International Workshop/Symposium on ice drilling technology, 2nd, Calgary, Alberta, Canada, 30-31 August 1982. Proceedings. U.S. Army. Cold Regions Research and Engineering Laboratory. Special Report*, 84-31, 142p. WDC No. 85000365.

Jessberger, H.L.; Dorr, R. (1984) Recent experiences with a modified Rufli ice drill. (In: Holdsworth, G.; Kuivinen, K.C.; Rand, J.H., eds. *International Workshop/Symposium on Ice Drilling Technology, 2nd, Calgary, Alberta, August 30-31, 1982. Proceedings. U.S. Army. Cold Regions Research and Engineering Laboratory. Special Report*, SR 84-34, p.45-49.) WDC No. 86000622. CRREL No. 40001181. NTIS No. ADA-156 733

Jessberger, H.L.; Bassler, K.-H. (1985) Ice core drilling and drill hole investigations on the Filchner and Ronne Ice Shelves, Antarctica. (In: Kohnen, H., comp. *Filchner-Ronne Ice Shelf Programme, Report 2.* Bremerhaven, Alfred Wegener Institute for Polar Research, p.32-41.) CRREL No. 39002803.

## DRILL TECHNOLOGY (Cont.)

Jezek, K.C.; Roefloffs, E.A.; Greischar, L.L. (1985) Geophysical survey of subglacial geology around the deep-drilling site at Dye 3, Greenland. (In: Langway, C.C., Jr.; Oeschger, H.; Dansgaard, W., eds. *Greenland Ice Core; Geophysics, Geochemistry, and the Environment. Geophysical Monograph*, vol.33, p.105-110.)

Johnsen, S.J. (1980) Fast light-weight core drill. *Journal of Glaciology*, 25(91), p.169-174. CRREL No. 34003808.

Kaminuma, K. (1983) Core drilling at Showa Station, Antarctica. *Antarctic Record*, no.77, p.134-143. CRREL No. 37002925.

Kawamura, T. (1988) Ice core drilling operation of the Japanese Arctic Glaciological Expedition in 1987. (In Japanese). *Seppyo*, 50(3), p.151-154. CRREL No. 43002402

Koci, B.R. (1985) Ice-core drilling at 5700 m powered by a solar voltaic array. *Journal of Glaciology*, vol.31(109), p.360-361. WDC No. 86001109. CRREL No. 40002693.

Koci, B.R. (1984) Hot water drilling in Antarctic firn, and freezing rates in water-filled boreholes. (In: *International Workshop/Symposium on Ice Drilling Technology, 2nd, Calgary, Alberta, 30-31 August 1982. Proceedings. U.S. Army. Cold Regions Research and Engineering Laboratory. Special Report*, SR 84-34, p.101-103.) CRREL No. 40001191.

Koci, B.R. (1984) Lightweight hand coring auger. (In: Holdsworth, G.; Kuivinen, K.C.; Rand, J.H., eds. *International Workshop/Symposium on Ice Drilling Technology, 2nd, Calgary, Alberta, August 30-31, 1982. Proceedings. U.S. Army. Cold Regions Research and Engineering Laboratory. Special Report*, SR 84-34, p.55-59.) WDC No. 86000624. CRREL No. 40001183. NTIS No. ADA-156 733

Koci, B.R. (1984) New horizons in drill development. (In: Holdsworth, G.; Kuivinen, K.C.; Rand, J.H., eds. *International Workshop/Symposium on Ice Drilling Technology, 2nd, Calgary, Alberta, August 30-31, 1982. Proceedings. U.S. Army. Cold Regions Research and Engineering Laboratory. Special Report*, SR 84-34, p.51-54.) WDC No. 86000623. CRREL No. 40001182. NTIS No. ADA-156 733

Koci, B.R.; Kuivinen, K.C. (1986) PICO drilling activities at Siple Station and on the Siple Coast. *Antarctic Journal of the United States*, 21(5), p.117. CRREL No. 43001627.

Korotkevich, E.S.; Savtiugin, L.M.; Morev, V.A. (1979) Through drilling a shelf glacier in the region of Novolazarev Station. *Sovetskaia Antarkticheskaia Ekspeditsiia. Informatsionnyi Builleten*, no.98, 5p. WDC No. 81001417. CRREL No. 35001057.

Korotkevich, E.S. (1985) Stratigrafiia tsentral'noi chasti Lednika Vavilova [Severnaia Zemlia]. (Stratigraphy of the central part of Vavilov Glacier [Severnaya Zemlya].) *Problemy Arktiki i Antarktiki*, vol.59, p.5-21. WDC No. 86001417. CRREL No. 40003721.

Korotkevich, E.S. (1989) Stratigraphy of the central part of Vavilov Glacier (Severnaya Zemlya). *Problems of the Arctic and the Antarctic*, v.59, p.1-20. CRREL No. 43002042.

Kovalenko, V.I.; Moiseev, B.S.; Zagrivnyi, E.A. (1981) Burenie-protaivanie skvazhiny na Stantsii Vostok-1. (Thermal core drilling at Vostok-1 Station.) *Sovetskaia Antarkticheskaia Ekspeditsiia. Trudy*, no.73, p.112-116. CRREL No. 36003733.

Kudriashov, B.B.; Chistiakov, V.K.; Bobin, N.E. (1984) Problema bureniia glubokikh skvazhin v tsentral' nykh raionakh Antarktidy. (Problems of drilling deep wells in central parts of Antarctica.) *Akademiia Nauk SSSR. Institut Geografii. Materialy Gliatsiologicheskikh Issledovanii*, vol.51, p.168-172. CRREL No. 40000870.

Kudriashov, B.B.; Chistiakov, V.K.; Morev, V.A. (1983) Burenie lednikovogo pokrova Antarktidy teplovym sposobom. (Thermal drilling of Antarctic Ice cover.) (In: Korotkevich, E.S., ed. *25 Let Sovetskoi Antarkticheskoi Ekspeditsii. (25 Years of Soviet Antarctic Expeditions.)* Leningrad, Gidrometeoizdat, p.138-149.) WDC No. 85001856. CRREL No. 38002709.

Kudriashov, B.B.; Chistiakov, V.K.; Morev, V.A. (1983) Results of and future prospects for the development of ice core drilling equipment and technology. (In: *Symposium on Antarctic Logistics, 3rd, Leningrad, 1982*. Scientific Committee on Antarctic Research, p.574-583.) CRREL No. 39002631.

Kudriashov, B.B.; Chistiakov, V.K.; Zagrivnii, E.A.; Lipenkov, V.Ia. (1984) Preliminary results of deep drilling at Vostok Station, Antarctica, 1981-82. (In: Holdsworth, G.; Kuivinen, K.C.; Rand, J.H., eds. *International Workshop/Symposium on Ice Drilling Technology, 2nd, Calgary, Alberta, August 30-31, 1982. Proceedings. U.S. Army. Cold Regions Research and Engineering Laboratory. Special Report*, SR 84-34, p.123-124.) WDC No. 86000635. CRREL No. 40001194. NTIS No. ADA-156 733

Kudriashov, B.B.; Chistiakov, V.K.; Pashkevich, V.M.; Petrov, V.N. (1984) Selection of a low tempera-ture filler for deep holes in the Antarctic Ice Sheet. (In: Holdsworth, G.; Kuivinen, K.C.; Rand, J.H., eds. *International Workshop/Symposium on Ice Drilling Technology, 2nd, Calgary, Alberta, 30-31 August 1982. Proceedings. U.S. Army. Cold Regions Research and Engineering Laboratory. Special Report*, SR 84-34, p.137-138.) CRREL No. 40001198.

**DRILL TECHNOLOGY (Cont.)**

Kuivinen, K.C.; Marshall, P.S.; Koci, B.R. (1980) Polar Ice Coring Office (PICO) drilling activities, 1979-80. *Antarctic Journal of the United States*, 15(5), p.76-77. CRREL No. 35003183.

Kuivinen, K.C.; Koci, B.R. (1980) Polar Ice Coring Office ice drill status report. (In: MacKinnon, P., comp. *Ice Cores*. Boulder, Colorado, World Data Center A for Glaciology (Snow and Ice), *Glaciological Data, Report GD-8*, p.77-85.) CRREL No. 34004028.

Kuivinen, K.C. (1981) Ice core drilling, 1980-1981. *Antarctic Journal of the United States*, 16(5), p.78. CRREL No. 36003978.

Kuivinen, K.C.; Koci, B.R.; Holdsworth, G.W.; Gow, A.J. (1982) South Pole ice core drilling, 1981-1982. *Antarctic Journal of the United States*, 17(5), p.89-91. WDC No. 83002018. CRREL No. 37003955.

Kuivinen, K.C. (1983) 237-meter ice core from South Pole Station. *Antarctic Journal of the United States*, 18(5), p.113-114. WDC No. 84001886. CRREL No. 39000011.

Kuivinen, K.C.; Koci, B.R. (1984) Hot-water drilling on the Siple Coast and ice core drilling at Siple and South Pole Stations. *Antarctic Journal of the United States*, 19(5), p.58-59. CRREL No. 40001772.

Langway, C.C., Jr., ed.; Oeschger, H., ed.; Dansgaard, W., ed. (1985) Greenland ice core: geophysics, geochemistry, and the environment. *American Geophysical Union. Geophysical Monograph*, no.33, 118p. WDC No. 85000439.

Litwak, J.; Kersten, L.; Kuivinen, K. (1984) PICO intermediate drill system. (In: Holdsworth, G.; Kuivinen, K.C.; Rand, J.H., eds. *International Workshop/Symposium on Ice Drilling Technology, 2nd, Calgary, Alberta, August 30-31, 1982. Proceedings. U.S. Army. Cold Regions Research and Engineering Laboratory. Special Report*, SR 84-34, p.41-44.) WDC No. 86000621. CRREL No. 40001180. NTIS No. ADA-156 733

Morev, V.A.; Raikovskii, IU.V. (1979) Burenie antarkticheskogo lednikovogo pokrova v raione Stantsii Novolazarevskaia. (Drilling of the Antarctic ice sheet in the Novolazarevskaya Station area.) *Akademiia Nauk SSSR. Institut Geografii. Materialy Gliatsiologicheskikh Issledovanii. Khronika Obsuzhdeniia*, vol.37, p.198-200. WDC No. 80002726. CRREL No. 34003714.

Morev, V.A.; Raikovskii, IU.V. (1979) Drilling of the Antarctic ice sheet in the Novolazarevskaya Station area. *Akademiia Nauk SSSR, Institut Geografii, Materialy Gliatsiologicheskikh Issledovanii, Khronika Obsuzhdeniia*, v.37, p.198-200. In Russian.

Morev, V.A.; Pukhov, V.A. (1981) Eksperimental'nye raboty po bureniiu kholodnykh pokrovnykh lednikov termoburovymi snariadami AANII. (Using AANII thermodrills in experimental drilling of cold ice sheets.) *Leningrad. Arkticheskii I Antarkticheskii Nauchno-Issledovatel'skii Institut. Trudy*, vol.367, p.64-68. CRREL No. 36001592.

Morev, V.A.; Pukhov, V.A.; IAkovlev, V.M.; Zagorodnov, V.A. (1984) Equipment and technology for drilling in temperate glaciers. (In: *International Workshop/Symposium on Ice Drilling Technology, 2nd, Calgary, Alberta, 30-31 August 1982. Proceedings. U.S. Army. Cold Regions Research and Engineering Laboratory. Special Report*, SR 84-34, p.125-127.) CRREL No. 40001195.

Morev, V.A.; Yakovlev, V.A. (1984) Liquid fillers for bore holes in glaciers. (In: *International Workshop/Symposium on Ice Drilling Technology, 2nd, Calgary, Alberta, Canada, 30-31 August 1982. Proceedings*, p.133-135.) NTIS No. AD-P004 820/7.

Morgan, V.I.; McCray, A.P.; Wehrle, E. (1984) Ice drilling at Cape Folger, Antarctica. (In: *International Workshop/Symposium on Ice Drilling Technology, 2nd, Calgary, Alberta, 30-31 August 1982. Proceedings. U.S. Army. Cold Regions Research and Engineering Laboratory. Special Report*, SR 84-34, p.85-86.) CRREL No. 40001188.

Morgan, V.I.; Davis, E.R.; Wehrle, E. (1984) Rigsby stage with remote computer compatible output. *Cold Regions Science and Technology*, 10(1), p.89-92. WDC No. 84002238. CRREL No. 39001625.

Nakawo, M.; Nakayama, Y.; Kohskima, S.; Nishimura, T.; Han, J.; Zhou, T. (1989) Ice coring operation at high altitudes in West Kunlun Mountains China. *Bulletin of Glacier Research*, no.7, p.15-19.

Oerter, H.; Rauert, W. (1983) Core drilling on Vernagtferner (Oetztal Alps, Austria) in 1979: tritium contents. *Zeitschrift für Gletscherkunde und Glazialgeologie*, 18(1), p.13-22. WDC No. 84001898. CRREL No. 39000044.

Oerter, H.; Reinwarth, O.; Rufli, H. (1983) Core drilling through a temperate alpine glacier (Vernagtferner, Oetztal Alps) in 1979. *Zeitschrift für Gletscherkunde und Glazialgeologie*, 18(1), p.1-11. WDC No. 84001897. CRREL No. 39000043.

Peel, D.A. (1986) Ice core drilling on Dolleman Island. (In: *Workshop on Filchner-Ronne Ice Shelf Programme, 4th, Scott Polar Research Institute, Cambridge, UK, 5-6 June 1986. Filchner-Ronne-Ice-Schelf-Programme-Report, Bremerhaven, 3*, p.58-61.)

## DRILL TECHNOLOGY (Cont.)

Radok, U. (1980) Ice core sampling. (In: MacKinnon, P., comp. *Ice Core*, Boulder, Colorado, World Data Center A for Glaciology (Snow and Ice), *Glaciological Data, Report GD-8*, p.71-76.) CRREL No. 34004027.

Rand, J. (1980) Danish deep drill. Progress report: February-March 1979. *U.S. Army. Cold Regions Research and Engineering Laboratory. Special Report*, 80-3, 37p. WDC No. 80003109.

Rand, J.H.; Mellor, M. (1985) Ice-coring augers for shallow depth sampling. *U.S. Army. Cold Regions Research and Engineering Laboratory. Report*, CR 85-21. 22p. CRREL No. 40003273.

Reeh, N. (1984) Antitorque leaf springs: a design guide for ice-drill antitorque leaf springs. (In: *International Workshop/Symposium on Ice Drilling Technology, 2nd, Calgary, Alberta, 30-31 August 1982. Proceedings. U.S. Army. Cold Regions Research and Engineering Laboratory. Special Report*, SR 84-34, p.69-72.) CRREL No. 40001185.

Sanderson, T.J.O. (1979) Deviation of a bore hole during drilling. *Journal of Glaciology*, 22(86), p.195-197. CRREL No. 33004531.

Sellman, P.V.; Rand, J.H. (1984) Ice drilling and coring systems--a retrospective view. (In: *Workshop on Penetration Technology, Hanover, NY, 12-13 June 1984. Proceedings. U.S. Army. Cold Regions Research and Engineering Laboratory. Special Report*, SR 84-33, p.125-127.) CRREL No. 40001966.

Stichler, W.; Baker, D.; Oerter, H.; Trimborn, P. (1983) Core drilling on Vernagtferner (Oetztal Alps, Austria) in 1979: deuterium and oxygen-18 contents. *Zeitschrift für Gletscherkunde und Glazialgeologie*, 18(1), p.23-35. WDC No. 84001899. CRREL No. 39000045.

Suzuki, Y. (1984) Light weight electro-mechanical drills. (In: Holdsworth, G.; Kuivinen, K.C.; Rand, J.H., eds. *International Workshop/Symposium on Ice Drilling Technology, 2nd, Calgary, Alberta, August 30-31, 1982. Proceedings. U.S. Army. Cold Regions Research and Engineering Laboratory. Special Report*, SR 84-34, p.33-40.) WDC No. 86000620. CRREL No. 40001179. NTIS No. ADA-156 733

Suzuki, Y.; Shimbori, K. (1984) Mechanical drill systems for the 25th Japanese Antarctic Research Expedition. *Tokyo. National Institute of Polar Research. Memoirs. Special Issue*, no.34, p.188-196. CRREL No. 39003461.

Suzuki, Y. (1985) Outlook of ice excavation techniques. *Antarctic Record*, no.85, p.24-38. CRREL No. 39003954.

Suzuki, Y.; Shimbori, K. (1986) Development of an ice core drill for liquid-filled holes. (In: Kawaguchi, S.; Watanabe, O., eds. *Symposium on Polar Meteorology and Glaciology, 8th, Tokyo, 11-12 December 1985. Proceedings. Tokyo. National Institute of Polar Research. Memoirs. Special Issue*, no.45, p.86-92.) CRREL No. 41003662.

Verrall, R.; Baade, D. (1984) Simple hot-water drill for penetrating ice shelves. (In: Holdsworth, G.; Kuivinen, K.C.; Rand, J.H., eds. *International Workshop/Symposium on Ice Drilling Technology, 2nd, Calgary, Alberta, 30-31 August 1982. Proceedings. U.S. Army. Cold Regions Research and Engineering Laboratory. Special Report*, SR 84-34, p.87-94.) CRREL No. 40001189.

Wehrle, E. (1985) Shallow-core collecting mechanical ice drill. *Australian National Antarctic Research Expeditions. ANARE Research Notes*, no.28, p.196-201. CRREL No. 40000757.

Wu, X.; Thompson, L.G. (1988) 40 year record in an ice core from the Dunde Ice Cap, China. (Abstract only) (In: Oeschger, H., ed. *Symposium on Ice-Core Analysis, Bern, Switzerland, March 30-April 3, 1987. Proceedings. Annals of Glaciology*, vol.10, p.221.)

Yamada, T.; Kondo, H.; Fukuzawa, T. (1987) Ice core drilling operations in the Northern Patagonia Icefield. *Bulletin of Glacier Research*, no.4, p.151-155. CRREL No. 41003840.

Yukutake, H.; Ito, K. (1984) Velocities of P and S waves for drilling core rocks at Syowa Station, Antarctica. (In: Nagata, T., ed. *Symposium on Antarctic Geosciences, 4th, Tokyo, October 28-29,1983. Proceedings. Tokyo. National Institute of Polar Research. Memoirs. Special Issue*, no.33, p.17-27.) WDC No. 84002194. CRREL No. 39001087.

Zagorodnov, V.S.; Zotikov, I.A. (1988) Core drilling at Spitsbergen. (In: Avsiuk, G.A., ed. *Data of Glaciological Studies: Chronicle Discussions.* New Delhi, Amerind Publishing Co., p.257-266.) CRREL No. 42002729.

Zagorodnov, V.S. (1988) Recent Soviet activities on ice core drilling and core investigations in Arctic region. *Bulletin of Glacier Research*, no.6, p.81-84. CRREL No. 42003627.

Zagrivnyi, E.A.; Zemtsov, A.A.; Vostretsov, R.N.; Shkurko, A.M. (1980) Eksperimental'noe burenie skvazhiny, zalitol nezamerzaiushehei zhidkost'iu. (Drilling experiments with drilling fluids.) *Sovetskaia Antarkticheskaia Ekspeditsiia. Informatsionnyi Biulleten*, no.100, p.119-123. CRREL No. 35002045.

## DRILL TECHNOLOGY (Cont.)

Zotikov, I.A. (1979) Antifreeze-thermodrilling for core through the central part of the Ross Ice Shelf (J-9 Camp), Antarctica. *U.S. Army Cold Regions Research and Engineering Laboratory. Report*, CR 79-24, 12p. WDC No. 80001380. CRREL No. 34001577. NTIS No. ADA-078 748

Zotikov, I.A.; Zagorodnov, V.S.; Raikovskii, J.V. (1979) Core drilling through Ross Ice Shelf. *Antarctic Journal of the United States*, 14(5), p.63-64. WDC No. 80003390. CRREL No. 35000651.

Zotikov, I.A.; Zagorodnov, V.S.; Raikovski, J.V. (1980) Core drilling through the Ross Ice Shelf (Antarctica) confirmed basal freezing. *Science*, 207(4438), p.1463-1465. WDC No. 80002585. CRREL No. 34002485.

Zotikov, I.A.; Zagorodnov, V.S.; Raikovskii, IU.V.; Morev, V.A. (1981) Kernovoe burenie na shelfovom Lednike Rossa. (Core drilling on the Ross Ice Shelf.) *Sovetskaia Antarkticheskaia Ekspeditsiia. Informatsionnyi Builleten*, no.102, p.68-74. WDC No. 82000711. CRREL No. 36000453.

## GENERAL

Ageta, Y.; Kikuchi, T.; Kamiyana, K.; Okuhira, F. (1987) Glaciological Research Program in East Queen Maud Land, East Antarctica, Part 5, 1985. *Japanese Antarctic Research Expedition. JARE Data Report*, no.125, 71p. WDC No. 87002007. CRREL No. 41003668.

Andrews, J.T. (1980) Nomenclature applied to ice cores: A geological viewpoint. (In: MacKinnon, P., comp. *Ice Cores*. Boulder, Colorado, World Data Center A for Glaciology (Snow and Ice), *Glaciological Data, Report GD*-8, p.87-89.) CRREL No. 34004029.

Barry, R.G.; MacKinnon, P.K. (1980) Status and future of ice core data. (In: MacKinnon, P., comp. *Ice Cores*. Boulder, Colorado, World Data Center A for Glaciology (Snow and Ice), *Glaciological Data, Report GD*-8, p.1-4.) CRREL No. 34004021.

Bradley, R.S. (1985) *Quaternary Paleoclimatology. Methods of Paleoclimatic Reconstruction*. Boston, Allen & Unwin, 472p. WDC No. 85001186. CRREL No. 39002885.

Clough, J.W. (1979) Ross Ice Shelf project 1978-79. *Antarctic Journal of the United States*, 14(5), p.60. WDC No. 80003387. CRREL No. 35000648.

Coleman, D.O.; Alderton, D.H.M.; Burton, M.A.S.; Hutton, M. (1985) Historical monitoring: a technical report. *Monitoring and Assessment Research Centre, Chelsea College, University of London. MARC Report*, 31, 320p.

Danilov, I.D. (1987) Problems of global glaciation during the Quaternary. *Polar Geography and Geology*, 11(2), p.127-140. WDC No. 87002412. CRREL No. 42000814.

Dansgaard, W. (1981) Greenland ice sheet program (GISP) 1981: deep drilling completed. *Denmark. Commission for Scientific Research in Greenland. Newsletter*, 5, p.11-12. WDC No. 82000640. CRREL No. 36000841.

Dansgaard, W. (1981) Ice core studies: dating the past to find the future. *Nature*, 290(5805), p.360-361. WDC No. 81001402. CRREL No. 35002893.

Efimov, V.A. (1979) Predvaritel'naia matematicheskaia model; rekonstruktsii klimatov proshlogo po opornoy informatsii gliatsiologicheskikh dannykh antarkticheskogo kontinental' nogo lednika. (Preliminary mathematical model for reconstruction of past climate, based on glaciological reference data on the Antarctic ice sheet.) *Leningrad. Arkticheskii i Antarkticheskii Nauchno-Issledovatel'skii Institut. Trudy*, v.357, p.5-12.

Fifield, R. (1971) Frozen assets of the ice cores. *New Scientist*, 118(1608), p.28-29.

Funder, S. (1984) Chronology of the last interglacial/glacial cycle in Greenland: first approximation. (In: Mahaney, W.C, ed. *Correlation of Quaternary Chronologies. Symposium held May 1983, Toronto, Canada*. p.261-278.) CRREL No. 41004324.

Gillet, F.; Legrand, M. (1984) French glaciological activities at the South Pole. *Antarctic Journal of the United States*, 19(5), p.61. CRREL No. 40001774.

Holdsworth, G. (1984) Glaciological reconnaissance of an ice core drilling site, Penny Ice Cap, Baffin Island. *Journal of Glaciology*, vol.30(104), p.3-15. WDC No. 84001974. CRREL No. 39000236.

Ice cores available for research. (1984) *Antarctic Journal of the United States*, 19(1), p.16-17. WDC No. 84002229.

Imbrie, J.; Hays, J.D. (1980) *Evaluation of Climatic Research on Ice Cores*. 21p. WDC No. 85002046.

Jacka, T.H., ed. (1985) Australian Glaciological Research; 1982-1983. *Australia. Department of Science and Technology. Antarctic Division. Australian National Antarctic Research Expeditions. Research Notes*, no.28, 206p. WDC No. 85001759.

**GENERAL (Cont.)**

Kawaguchi, S., ed.; Watanabe, O., ed. (1986) Symposium on Polar Meteorology and Glaciology, 8th, Tokyo, 11-12 December 1985. Proceedings. *Tokyo. National Institute of Polar Research. Memoirs. Special Issue*, no.45, 113p. WDC No. 87001996. CRREL No. 41003653.

Kazarian, R. (1981) Scientists obtain longest ice core in Arctic after drilling to bedrock in Greenland. *National Science Foundation News*, 81(58), 2p.

Kornilov, N.A.; Kozlovskii, A.M. (1985) Itogi rabot sezonnogo sostava dvadtsat' piatoi Sovetskoi Antarkticheskoi Ekspeditsii [1979/80 G.]. (Report of the 25th Soviet Antarctic Expedition for 1979-1980.) Sovetskaia Antarkticheskaia Ekspeditsiia. Informatsionnyi Biulleten', no.107, p.10-16. WDC No. 86001084. CRREL No. 40002627.

Kuivinen, K.C.; Koci, B.R. (1987) Polar Ice Coring Office activties in East and West Antarctica. *Antarctic Journal of the United States*, 22(5), p.84-85. CRREL No. 43002747.

Kusunoki, K.; Suzuki, Y. (1978) Ice-coring project at Mizuho Station, East Antarctica, 1970-75. *Japan. National Institute of Polar Research. Memoirs, Special Issue*, no.10, 172p.

Kusunoki, K. (1981) Progress of Japanese glaciological research in Antarctica. *Seppyo*, 43(1), p.55-61.

Langway, C.C., Jr.; Chiang, E. (1980) Central ice core storage facility and information exchange. (In: MacKinnon, P., comp. *Ice Cores*. Boulder, Colorado, World Data Center A for Glaciology (Snow and Ice), *Glaciological Data, Report GD-8*, p.65-70.)

Langway, C.C., Jr.; Oeschger, H.; Dansgaard, W. (1985) Greenland ice sheet program in perspective. *American Geophysical Union. Geophysical Monograph Series*, no.33, p.1-8. WDC No. 85001653. CRREL No. 39003560.

Lopez, B. (1989) Our frail planet in cold, clear view: the South Pole as global laboratory. *Harper's Magazine*, 278(1668), p.43-49. CRREL No. 43002729

Lorius, C. (1985) International Antarctic Glaciological Program activities at South Pole Station and Vostok. *Antarctic Journal of the United States*, 20(5), p.73-74. WDC No. 87000725. CRREL No. 41002633.

MacKinnon, P. (1980) Ice core inventory. 1. Survey of North American ice core studies. 2. International summary. 3. Ice core tables and core site maps. (In: MacKinnon, P., comp. *Ice Cores*. Boulder, Colorado, World Data Center A for Glaciology (Snow and Ice), *Glaciological Data, Report GD-8*, p.15-57.) CRREL No. 34004023.

Mae, S.; Hondoh, T.; Nakawo, M.; Langway, C.C., Jr. (1988) Dielectric properties of deep ice cores with air-hydrate inclusions. (Abstract only) (In: Oeschger, H., ed. *Symposium on Ice-Core Analysis, Bern, Switzerland, March 30-April 3, 1987. Proceedings. Annals of Glaciology*, vol.10, p.210.)

Marshall, P.S. (1981) Coring in Antarctica. *Explorers Journal*, 59(3), p.130-134. WDC No. 82000963. CRREL No. 36002837.

Marshall, P.S.; Kuivinen, K.C. (1981) Greenland ice sheet program 1980. *Polar Record*, 20(129), p.562-565. WDC No. 82000719. CRREL No. 36000913.

Marshall, P.S.; Kuivinen, K.C. (1981) Polar Ice Coring Office Antarctic field activities, 1979-80. *Polar Record*, 20(129), p.561-562. WDC No. 82000718. CRREL No. 36000912.

Matsuda, T.; Kawaguchi, S.; Watanabe, O., eds. (1987) *Symposium on Polar Meteorology and Glaciology, 9th, National Institute of Polar Research, Tokyo, December 11-12, 1986. Proceedings, vol.1*. Tokyo, National Institute of Polar Research, 159P. WDC No. 87002059.

Mayewski, P.A. (1986) Dominion Range ice core. *Antarctic Journal of the United States*, 21(5), p.120-121. CRREL NO. 43001629.

Mosley-Thompson, E.; Gow, A.J.; Herron, M.M.; Jezek, K.; Kamb, B. (1985) *Scientific Plan for Deep Ice Core Drilling in Central Greenland (GISP 2 - Greenland Ice Sheet Project)* National Science Foundation, 108p. NTIS No. PB86-123197.

Mosley-Thompson, E.; Mountain, K.R.; Paskievitch, J.F. (1986) Paleoclimatic ice core program at Siple Station. *Antarctic Journal of the United States*, 21(5), p.115-117.

Mosley-Thompson, E.; Paskievitch, J.F.; Gross, S.M. (1987) Ice-core drilling for paleoclimatic information at plateau remote. *Antarctic Journal of the United States*, 22(5), p.78-79. CRREL No. 43002743.

Nagata, T., ed. (1979) Symposium on Antarctic Geosciences, 1st, 1978, Proceedings. *Tokyo. National Institute of Polar Research. Special Issue*, no.14, 229p. WDC No. 84001173.

**GENERAL (Cont.)**


National Research Council. Polar Research Board. Committee on Glaciology. (1984) *Environment of West Antarctica: Potential $CO_2$-induced changes. Report of a workshop held in Madison, Wisconsin 5-7 July 1983*. 236p. WDC No. 84001487.

National Research Council. Polar Research Board. Committee on Glaciology. (1986) *Recommendations for a U.S. Ice Coring Program*. Washington, DC. National Academy Press, 67P. WDC No. 87000760.

National Science Foundation. Directorate for Geoscience. (1987) *FY 1988 Global Geosceiences Program*. 27P. WDC No. 87002070.

National Science Foundation. Division of Polar Pro grams. (1980) Central ice core storage facility-ice core sampling procedures. (In: MacKinnon, P., comp. *Ice Cores*. Boulder, Colorado, World Data Center A for Glaciology (Snow and Ice), *Glaciological Data, Report GD*-8, p.66-68. CRREL No. 34004025

National Science Foundation. Division of Polar Programs. (1980) Specimen and core-sample distribution policy. (In: MacKinnon, P., comp. *Ice Cores*. Boulder, Colorado, World Data Center A for Glaciology (Snow and Ice), *Glaciological Data, Report GD*-8, p.69-70.) CRREL No. 34004026.

New York. State University, Buffalo. Ice Core Storage Facility and Information Exchange. (1983) *Ice Core Samples from Greenland and Antarctica*. 49p. WDC No. 83002101.

Nishio, F.; Ohmae, H.; Ishikawa, M. (1986) Glaciological research program in East Queen Maud Land, East Antarctica, part 3, 1982. *Japanese Antarctic Research Expedition. JARE Data Reports*, v.110, 36p.

Oeschger, H. (1980) In der natur gespeicherte Geschichte von Umweltsvorgangen. (History of environmental processes stored in nature.) (In: Oeschger, H.; Messerli, B.; Svilar, M., eds. *Das Klima: Analysen und Modelle Geschichte und Zukunft*. Springer-Verlag, p.209-236.)

Palais, J.M. (1987) Polar ice cores. *Oceanus*, 29(4), p.55-60. WDC No. 87000030.

Qin, D.H. (1988) Development of China's research on Antarctic glaciology. (In Chinese). *Journal of Glaciology and Geocryology*, 10(3), p.250-255. CRREL No. 43002864.

Radok, U. (1978) Climatic roles of ice: a contribution to the International Hydrological Programmme (IHP). *International Association of Hydrological Sciences. Bulletin*, 23(3), p.333-354.

Raynaud, D. (1980) Ice core work at the Laboratoire de Glaciologie, CNRS, Grenoble. (In: MacKinnon, P., comp. *Ice Cores*. Boulder, Colorado, World Data Center A for Glaciology (Snow and Ice), *Glaciological Data, Report GD*-8, p.103-107.) CRREL No. 34004031.

Reinwart, C.; Lange, M.; Bassler, K.-H. (1984) Programm und vorlaufige Ergebnisse der glaziologischen Arbeiten auf dem Filchner-Schelfeis 1983/84. (Program and preliminary data of glaciological studies of the Filchner Ice Shelf 1983/84.) (In: Kohnen, H., ed. Expedition Ant- arktis-II MIT FS POLARSTERN 1983/84; Bericht Vomfahrtabschnitt 4 Punta Arenas - Kapstadt (ANT-II/4). *Berichte zur Polarforschung*, no.19, p.37-52.) WDC No. 85000172. CRREL No. 39001600.

Scientific Committee for Antarctic Research. SCAR (1981) *SCAR Action Plan for Antarctic Climate Research*. 62p. WDC No. 82000330.

Spindler, M., ed. (1989) Expedition Arctic V/1a, 1b, and 2 with RV POLARSTERN 1988. *Berichte zur Polarforschung*, no.59, 197p. CRREL No. 43003077.

Thompson, J.M.; MacKinnon, P.K. (1980) An ice core and information storage and exchange system. (In: MacKinnon, P., comp. *Ice Cores*. Boulder, Colorado, World Data Center A for Glaciology (Snow and Ice), *Glaciological Data, Report GD*-8, p.59-63.) CRREL No. 34004024.

Torii, T. (1981) Review of the Dry Valley drilling project, 1971-76. *Polar Record*, 20(129), p.533-541. WDC No. 82000716. CRREL No. 36000910.

Watanabe, O; Fujii, Y. (1988) Outlines of the Japanese Arctic Glaciological Expedition in 1987. *Bulletin of Glacier Research*, no.6, p.47-50. CRREL No. 42003622.

Webb, T., III; Kutzbach, J.E.; Street-Perrott, F.A. (1985) 20,000 years of global climatic change; paleoclimatic research plan. (In: Malone, T.F.; Roederer, J.G., eds. *Global Change*. Cambridge University Press, p.182-218.)

Weiner, J. (1989) Glacier bubbles are telling us what was in ice age air. *Smithsonian*, 20(2), p.78-87.

Wolff, E. (1987) The answer lies in the ice. *Geographical Magazine*, v.59(2), p.73-77.

Workshop on the status and future of ice core research and ice core data, Boulder, Colorado, 24-26 September 1979. (1980) (In: MacKinnon, P., comp. *Ice Cores*. Boulder, Colorado, World Data Center A for Glaciology (Snow and Ice), *Glaciological Data, Report GD*-8, p.5-14.) CRREL No. 34004022.

## GENERAL (Cont.)

Zheng, B.; Chen, J.; Ageta, Y. (1988) Preliminary report of Sino-Japanese Joint Glaciological Expedition in West Kunlun Mountains 1987. *Bulletin of Glacier Research*, no.6, p.75-80. CRREL No. 42003626.

## MISCELLANEOUS RELATED TOPICS

Gow, A.J.; Kohnen, H. (1978) Ultrasonic measurements on deep ice cores from Antarctica. *Antarctic Journal of the United States*, 13(4), p.48-50.

Harwood, D.M. (1986) Do diatoms beneath the Greenland ice sheet indicate interglacials warmer than present. *Arctic*, 39(4), p.304-308. WDC No. 87000543. CRREL No. 41002688.

Koerner, R.M. (1989) Ice core evidence for extensive melting of the Greenland Ice Sheet in the last interglacial. *Science*, 244(4907), p.964-968. CRREL No. 43002859.

## PARTICULATES

Barrie, L.A.; Fisher, D.; Koerner, R.M. (1985) Twentieth century trends in arctic air pollution revealed by conductivity and acidity observations in snow and ice in the Canadian High Arctic. *Atmospheric Environment*, 19(12), p.2055-2063. WDC No. 86001574.

Bourgeois, J.C. (1986) Pollen record from the Agassiz Ice Cap, northern Ellesmere Island, Canada. *Boreas*, 15(4), p.345-354. CRREL No. 41003470.

Boutron, C.; Delmas, R.; Lorius, C. (1980) Homme a-t-il pollue l'atmosphere a une echelle globale? (Has man polluted the atmosphere on a global scale?). *Recherche*, 11(109), p.340-343. WDC No. 83000178.

Bourton, C.F. (1986) Atmospheric toxic metals and metalloids in the snow and ice layers deposited in Greenland and Antarctica from prehistoric times to present. (In: Nriagu, J.O.; Davidson, C.I., eds. *Toxic Metals in the Atmosphere. Advances in Environmental Science and Technology*, vol.17, p.467-505.) CRREL No. 41000672.

Boutron, C.F.; Patterson, C.C. (1986) Lead concentration changes in Antarctic ice during the Wisconsin/Holocene transition. *Nature*, 323(6085), p.222-225. WDC No. 86001920.

Boutron, C.F.; Patterson, C.C. (1987) Lead concentration changes in antarctic ice during the Wisconsin/Holocene Transition; corrigendum. *Nature*, 326(6113), p.626. WDC No. 87001467.

Boutron, C.F.; Patterson, C.C.; Petrov, V.N.; Barkov, N.I. (1987) Preliminary data on changes of lead concentrations in Antarctic ice from 155,000 to 26,000 years BP. *Atmospheric Environment*, 21(5), p.1197-1202. WDC No. 87002260. CRREL No. 41004603.

Boutron, C.F.; Patterson, C.C.; Lorius, C.; Petrov, V.N.; Barkov, N.I. (1988) Atmospheric lead in Antarctic ice during the last climatic cycle. (In: Oeschger, H., ed. *Symposium on Ice-Core Analysis, Bern, Switzerland, March 30-April 3, 1987. Proceedings. Annals of Glaciology*, vol.10, p.5-9.)

Briat, M.; Royer, A.; Petit, J.R.; Lorius, C. (1982) Late glacial input of eolian dust in Dome C ice core: additional evidence from individual microparticle analysis. (In: *International Symposium on Antarctic Glaciology, 3rd, Columbus, OH, September 7-12, 1981. Proceedings. Annals of Glaciology*, vol.3, p.27-31.) WDC No. 83000410. CRREL No. 37000242.

Burckle, L.H.; Gayley, R.I.; Ram, M.; Petit,. J.R. (1988) Diatoms in Antarctic ice cores; some implications for the glacial history of Antarctica. *Geology*, 16(4), p.326-329.

Clausen, H.B.; Hammer, C.U. (1988) Laki and Tambora eruptions as revealed in Greenland ice cores from 11 locations. (In: Oeschger, H., ed. *Symposium on Ice-Core Analysis, Bern, Switzerland, March 30-April 3, 1987. Proceedings. Annals of Glaciology*, vol.10, p.16-22.)

DeAngelis, M.; Jouzel, J.; Lorius, C.; Merlivat, L.; Petit, J.R.; Raynaud, D. (1984) Ice age data for climate modelling from an Antarctic (Dome C) ice core. (In: Berger, A.L.; Nicolis, C. *New Perspectives in Climate Modelling. Developments in Atmospheric Science*, no.16, p.23-45.) WDC No. 84001219.

DeAngelis, M.; Fehrenbach, L.; Jehanno, C.; Maurette, M. (1985) Micrometer-sized volcanic glasses in polar ices and snows. *Nature*, vol.317, p.52-54. CRREL No. 40001766.

Fredston H,A, (1982) *Ice Cores as Indicators of Environmental Change*. Cambridge. University. Darwin College. M. Phil. Thesis, 101p. WDC No. 85000920.

Fujii, Y.; Ohata, T. (1982) Possible causes of variation in microparticle concentration in an ice core from Mizuho Station, Antarctica. (In: *International Symposium on Antarctic Glaciology, 3rd, Columbus, OH, September 7-12, 1981. Proceedings. Annals of Glaciology*, vol.3, p.107-112.) WDC No. 83000424. CRREL No. 37000256.

## PARTICULATES (Cont.)


Fujii, Y.; Watanabe, O. (1988) Microparticle concentration and electrical conductivity of a 700m ice core from Mizuho Station, Antarctica. (In: Oeschger, H., ed. *Symposium on Ice-Core Analysis, Bern, Switzerland, March 30-April 3, 1987. Proceedings. Annals of Glaciology*, vol.10, p.38-42.)

Ganapathy, R. (1983) Tunguska explosion of 1908: discovery of meteorite debris near the explosion site and at the South Pole. *Science*, 220(4602), p.1158-1161. CRREL No. 37003308.

Gaudichet, A.; Petit, J.R.; LeFevre, R.; Lorius, C. (1986) Investigation by analytical transmission electron microscopy of individual insoluble microparticles from Antarctic (Dome C) ice core samples. *Tellus*, 38B(3-4), p.250-261. WDC No. 87001061. CRREL No. 41001755.

Gaudichet, A. (1988) Mineralogy of insoluble particles in the Vostok Antarctic ice core over the last climatic cycle (150 kyr). *Geophysical Research Letters*, 15(13), p.1471-1474. CRREL No. 43001483.

Gayley, R.I.; Ram, M. (1985) Atmospheric dust in polar ice and the background aerosol. *Journal of Geophysical Research*, 90(D7), p.12,921-12,925. WDC No. 86002094. CRREL No. 40004620.

Gordienko, F.G. (1979) Issledovanie pyli v lednikovykh pokrovakh I ispol'zovanie ee pri opredelenii vozrasta l'da. (Studying dust in ice covers and using it in ice age determination.) *Akademiia Nauk SSSR. Institut Geografii. Materialy Gliatsiologicheskikh Issledovanii. Khronika Obsuzhdeniia*, vol.36, p.259-268. WDC No. 80002633. CRREL No. 34003151.

Goss, E.; Mayewski, P.A.; Lyons, W.B. (1985) Examination of selected microparticles from the Sentik Glacier core, Ladakh, Himalaya, India. *Journal of Glaciology*, vol.31(108), p.196-197. WDC No. 86000780. CRREL No. 40001331.

Gow, A.J.; Epstein, S.; Sheehy, W. (1979) On the origin of stratified debris in ice cores from the bottom of the Antarctic ice sheet. *Journal of Glaciology*, 23(89), p.185-192. CRREL No. 34002231.

Hammer, C.U.; Clausen, H.B.; Dansgaard, W. (1980) Greenland ice sheet evidence of post-glacial volcanism and its climatic impact. *Nature*, 288(5788), p.230-235. WDC No. 81000370.

Hammer, C.U. (1985) Influence on atmospheric composition of volcanic eruptions as derived from ice-core analysis. (In: Symposium on Snow and Ice Chemistry and the Atmosphere, Peterborough, Ontario, August 19-24, 1984. Proceedings. Annals of Glaciology, vol.7, p.125-129.) WDC No. 86000821. CRREL No. 40002408.

Hammer, C.U.; Clausen, H.B.; Friedrich, W.L; Tauber, H. (1987) Minoan eruption of Santorini in Greece dated to 1645 BC? *Nature*, 328(6130), p.517-519.

Hastenrath, S. (1984) Tropical glacier and climate variations. (In: Lauer, W., ed. *Natur- und Mench in Okosystemen Tropischer Hochgebierg. (Natural Environment and Man in Tropical Mountain Ecosystems.) Erdwissenschaftliche Forschung*, 18, p.235-248.) WDC No. 86001931.

Heintzenberg, J.; Kallstrom, M.; Hansson, H.C.; Jonsson, S. (1988) Chemical composition of insoluble particles in an ice cap on Storoya, Svalbard. (Abstract only) (In: Oeschger, H., ed. Symposium on Ice-Core Analysis, Bern, Switzerland, March 30-April 3, 1987. Proceedings. Annals of Glaciology, vol.10, p.204.)

Herron, S.; Langway, C.C., Jr. (1979) Debris-laden ice at the bottom of the Greenland ice sheet. (In: Glen, J.W.; Adie, R.J.; Johnson, D.M.; Homer, D.R.; MacQueen, A.D., eds. *Symposium on Glacier Beds: The Ice-Rock Interface, Ottawa, 15-19 August 1978. Proceedings. Journal of Glaciology*, 23(89), p.193-207.) WDC No. 80002221. CRREL No. 34002232.

Hogan, A.; Kebschull, K.; Townsend, R.; Murphey, B.; Samson, J.; Barnard, S. (1984) Particle concentrations at the South Pole, on meterological and climatological time scales; is the difference important? *Geophysical Research Letters*, 11(9), p.850-853.

Kallemeyn, G.W.; Rasmussen, K.L. (1985) Composition of terrestrial and cosmic dust components in Greenland ice cores. *Meteoritics*, 20(4), p.678-679.

King, E.A.; Wagstaff, J. (1980) Search for cometary dust in the Antarctic ice. *Antarctic Journal of the United States*, 15(5), p.78-79. CRREL No. 35003184.

King, E.A.; Wagstaff, J. (1981) Micrometeorites from Antarctic ice cores. *Antarctic Journal of the United States*, 16(5), p.92-93. CRREL No. 36003987.

King, E.A.; Wagstaff, J. (1982) Extraterrestrial microparticles from Antarctic ice cores and the search for cometary dust. *Antarctic Journal of the United States*, 17(5), p.61-62.

Koerner, R.M.; Bourgeois, J. C.; Fisher, D.A. (1988) Pollen analysis and discussion of time-scales in Canadian ice cores. (In: Oeschger, H., ed. *Symposium on Ice-Core Analysis, Bern, Switzerland, March 30-April 3, 1987. Proceedings. Annals of Glaciology*, vol.10, p.85-91.)

Kumai, M.; Langway, C.C., Jr. (1988) Scanning electron-microscope analysis of aerosols in snow and ice cores from Greenland. (Abstract only) (In: Oeschger, H., ed. *Symposium on Ice-Core Analysis, Bern, Switzerland, March 30-April 3, 1987. Proceedings. Annals of Glaciology*, vol.10, p.208.)

Kyle, P.R.; Jezek, P.A.; Mosley-Thompson, E.; Thompson, L.G. (1981) Tephra layers in the Byrd Station ice core and the Dome C ice core, Antarctica and their climatic importance. *Journal of Volcanology and Geothermal Research*, 11(1), p.29-39. WDC No. 82000237. CRREL No. 36001332.

Kyle, P.; Palais, J.; Delmas, R. (1982) Volcanic record of Antarctic ice cores: Preliminary results and potential for future investigations. (In: *International Symposium on Antarctic Glaciology, 3rd, Columbus, OH, September 7-12, 1981. Proceedings. Annals of Glaciology*, vol.3, p.172-177.) WDC No. 83000435. CRREL No. 37000267.

Kyle, P.R.; Palais, J.; Thomas, E. (1984) Vostok Tephra--an important englacial stratigraphic marker?. *Antarctic Journal of the United States. Special Issue*, 19(5), p.64-65. WDC No. 86000965. CRREL No. 40001776.

Laird, C.M. (1982) Solar activity and nitrate deposition in South Pole snow. *Geophysical Research Letters*, 9(10), p.1195-1198.

Laird, C.M. (1983) Solar particle flux and nitrate in South Pole snow. (In: *International Symposium on Solar-Terrestrial Influences on Weather and Climate, 2nd, National Oceanic and Atmospheric Administration, Boulder, CO., August 2-6, 1982, Weather and Climate Response to Solar Variations. Proceedings.* Boulder, Colorado Associated University Press, p.237-242.)

Laird, C.M. (1985) Nitrate deposition in Antarctica: temporal and spatial variations. *Quaternary Science Reviews*, 4(4), p.333-355. CRREL No. 41003155.

Landy, M.P.; Peel, D.A. (1981) Short-term fluctuations in heavy metal concentrations in Antarctic snow. *Nature*, 291(5811), p.144-146.

Langway, C.C., Jr.; Shoji, H; Azuma, N. (1988) Crystal size and orientation patterns in the Wisconsin-age ice from Dye 3, Greenland. (In: Oeschger, H., ed. *Symposium on Ice-Core Analysis, Bern, Switzerland, March 30-April 3, 1987. Proceedings. Annals of Glaciology*, vol.10, p.109-115.)

Mayewski, P.A.; Lyons, W.B. (1982) Source and climatic implication of the reactive iron and reactive silicate concentration found in a core from Meserve Glacier, Antarctica. *Geophysical Research Letters*, 9(3), p.190-192. WDC No. 84001081. CRREL No. 36003589.

McAndrews, J.H. (1984) Pollen analysis of the 1973 ice core from Devon Island glacier, Canada. *Quaternary Research*, 22(1), p.68-76. WDC No. 87001540. CRREL No. 39002062.

Mercer, J.H.; Ager, T.A. (1983) Glacial and floral changes in Southern Argentina since 14,000 years ago. *National Geographic Society. Research Reports*, 15, p.457-477. WDC No. 84000454.

Miklishanskii, A.Z.; Iakovlev, IU.V.; Savelev, B.V.; Zvev, A.P. (1980) Levels and composition of the mineral components in ice cores from Central Antarctica. *Geochemistry International*, 17(1), p.152-158. WDC No. 82000250. CRREL No. 35004148.

Mosley-Thompson, E.; Thompson, L.G. (1979) Micro-particle deposition at South Pole. *Antarctic Journal of the United States*, 14(5), p.91-93. WDC No. 80003404. CRREL No. 35000665.

Mosley-Thompson, E.M. (1979) *911 years of microparticle deposition at the South Pole: A climatic interpretation.* Columbus. Ohio State University. Ph.D Dissertation. UM Order no. 7916035, 200p. WDC No. 81001444. CRREL No. 34002455.

Mosley-Thompson, E.; Thompson, L.G. (1980) Glaciological interpretation of the microparticle concentration in the 905-meter Dome C core. *Antarctic Journal of the United States*, 15(5), p.71-75. CRREL No. 35003180.

Mosley-Thompson, E. (1980) 911 years of microparticle deposition at the south pole: A climatic interpretation. *Ohio. State University. Institute of Polar Studies. Report*, no.73, 134p. WDC No. 81001819.

Mosley-Thompson, E.M. (1980) Tales the ice can tell. *Mosaic*, 9(5), p.15-21. WDC No. 81002501. CRREL No. 35000401.

Mosley-Thompson, E.; Thompson, L.G. (1981) Microparticle record from Q-13: preliminary report. *Antarctic Journal of the United States*, 16(5), p.89-90. CRREL No. 36003985.

Mosley-Thompson, E.; Thompson, L.G. (1982) Micro- particle analysis of the Ross Ice Shelf Q-13 core and preliminary results from the J-9 Core. (In: *International Symposium on Antarctic Glaciology, 3rd, Columbus, OH, September 7-12, 1981. Proceedings. Annals of Glaciology*, vol.3, p.211-215.) WDC No. 83000442. CRREL No. 37000274.

Mosley-Thompson, E.; Thompson, L.G. (1982) Nine centuries of microparticle deposition at the South Pole. *Quaternary Research*, 17, p.1-13. WDC No. 82000605.

**PARTICULATES (Cont.)**


Mosley-Thompson, E.; Thompson, L.G. (1983) South Pole ice core processing and microparticle analysis. *Antarctic Journal of the United States*, 18(5), p.118-119. WDC No. 84001889. CRREL No. 39000014.

Mosley-Thompson, E.; Kruss, P.D.; Bain, T. (1983) South Pole pit stratigraphic studies. *Antarctic Journal of the United States*, 18(5), p.116-118. WDC No. 84001888. CRREL No. 39000013.

Mumford, J.W.; Peel, D.A. (1982) Microparticles, marine salts and stable isotopes in a shallow firn core from the Antarctic Peninsula. *British Antarctic Survey. Bulletin*, no.56, p.37-47. WDC No. 83000732. CRREL No. 37000023.

Nakahara, J.; Shigesato, Y.; Higashi, A.; Hondoh, T.; Langway, C.C., Jr. (1988) Raman spectra of natural clathrates in deep ice cores. *Philosophical Magazine B*, 57(3), p.421-430. CRREL No. 42003165.

Ng, A.; Patterson, C. (1981) Natural concentrations of lead in ancient Arctic and Antarctic ice. *Geochimica et Cosmochimica Acta*, 45(11), p.2109-2121. WDC No. 82000609. CRREL No. 36001675.

Nishio, F. (1986) Volcanic activities recorded in the Antarctic ice sheet. *Polar News*, no.43, p.2-9. CRREL No. 42001502.

Palais, J.M.; Kyle, P.R.; Delmas, R. (1983) Detailed studies of tephra layers in the Byrd Station ice core: preliminary results and interpretation. *Antarctic Journal of the United States*, 18(5), p.109-110.

Palais, J.M. (1985) Particle morphology, composition and associated ice chemistry of tephra layers in the Byrd ice core: evidence for hydrovolcanic eruptions. (In: *Symposium on Snow and Ice Chemistry and the Atmosphere, Peterborough, Ontario, August 19-24, 1984. Proceedings. Annals of Glaciology*, vol.7, p.42-48.)

Palais, J.M.; Legrand, M. (1985) Soluble impurities in the Byrd Station ice core, Antarctica: their origin and sources. *Journal of Geophysical Research*, 90(C1), p.1143-1154. WDC No. 85000805. CRREL No. 39002365.

Palais, J.M. (1985) *Tephra Layers and Ice Chemistry in the Byrd-Station Ice Core, Antarctica*. Columbus. Ohio State University, Ph.D. Dissertation, 545p.

Palais, J.M.; Kyle, P.R.; McIntosh, W.C.; Seward. D. (1986) Magmatic and phreatomagmatic volcanic activity at Mt. Takahe, West Antarctica, based on tephra layers in the Byrd ice core and field observations at Mt. Takahe. *EOS, Transactions, American Geophysical Union*, 67(44), p.1250-1251.

Palais, J.M.; Kyle, P.R.; Mosley-Thompson, E.; Thomas, E. (1987) Correlation of a 3,200 year old tephra in ice cores from Vostok and South Pole stations, Antarctica. *Geophysical Research Letters*, 14(8), p.804-807.

Patterson, C.C.; Boutron, C.; Flegal, R. (1985) Present status and future of lead studies in polar snow. (In: Langway, C.C., Jr.; Oeschger, H.; Dansgaard, W., eds. *Greenland Ice Core; Geophysics, Geochemistry, and the Environment. Geophysical Monograph*, 33, p.101-104.)

Petit, J.-R.; Briat, M.; Royer, A. (1981) Ice age aerosol content from East Antarctic ice core samples and past wind strength. *Nature*, 293(5831), p.391-394.

Porter, S.C. (1985) Glaciological evidence of Holocene climatic change. (In: Wigley, T.M.L.; et al., eds. *Climate and History*, Cambridge University Press, p.82-110.)

Rampino, M.R.; Self, S.; Stothers, R. (1983) Volcanoes, climate and Greenland ice cores; eruption volatiles provide key to climate impact. (In: *Geological Society of America; Northeastern Section, 19th Annual Meeting, Kiamesha Lake, NY, March 23-25, 1983. Abstracts with Programs - Geological Society of America*, 15(3), p.19.)

Rampino, M.R.; Self, S. (1984) Sulphur-rich volcanic eruptions and stratospheric aerosols. *Nature*, 310(5979), p.677-679.

Risbo, T.; Clausen, H.B.; Rasmussen, K.L. (1981) Supernovae and nitrate in the Greenland Ice Sheet. *Nature*, 294(5842), p.637-639. CRREL No. 36002218.

Royer, A.; DeAngelis, M.; Petit, J.R. (1983) Thirty-thousand-year record of physical and optical properties of microparticles from an East Antarctic ice core and implications for paleoclimate reconstruction models. *Climatic Change*, 5(4), p.381-412. WDC No. 84001463. CRREL No. 38002838.

Short, S.K.; Holdsworth, G. (1985) Pollen, oxygen isotope content and seasonality in an ice core from the Penny Ice Cap, Baffin Island. *Arctic*, 38(3), p.214-218. WDC No. 86000789. CRREL No. 40001348.

Steffensen, J.P. (1988) Analysis of the seasonal variation in dust, $Cl^-$, $NO_3^-$, and $SO_4^{2-}$ in two central Greenland firn cores. (In: Oeschger, H., ed. *Symposium on Ice-Core Analysis, Bern, Switzerland, March 30-April 3, 1987. Proceedings. Annals of Glaciology*, vol.10, p.171-177.)

Steffensen, J.P. (1985) Microparticles in snow from the south Greenland ice sheet. *Tellus*, Series B, Chemical and Physical Meteorology, 37(4/5), p.286-295.

**PARTICULATES (Cont.)**

Stolle, D.F.E.; Killeavy, M.S. (1986) Determination of particle paths using the finite-element method. *Journal of Glaciology*, vol.32(111), p.219-223. WDC No. 86002237. CRREL No. 41000681.

Strothers, R. (1980) Giant solar flares in Antarctic ice. (1980) *Nature*, 287(5780), p.365. CRREL No. 35001076.

Strothers, R.B.; Rampino, M.R. (1983) Historic volcanism, European dry fog, and Greenland acid precipitation, 1500 B.C. to A.D. 1500. *Science*, 222(4622), p.411-413. CRREL No. 38002235.

Thompson, L.G.; Mosley-Thompson, E.; Petit, J.R. (1979) Glaciological and climatological implications of microparticle concentrations over the past 25,000 years in three deep ice cores. (In: *International Union of Geodesy and Geophysics, 17th General Assembly; Interdisciplinary Symposia, Canberra, Australia, December 3-15, 1979. International Union of Geodesy and Geophysics, General Assembly, Abstract*, 17, p.61.)

Thompson, L.G. (1979) Ice core records from tropical regions; Mt. Kenya, Africa and the Quelccaya Ice Cap, Peru. (In: *International Union of Geodesy and Geophysics, 17th General Assembly; Interdisciplinary Symposia, Canberra, Australia, December 3-15, 1979. International Union of Geodesy and Geophysics, General Assembly, Abstract*, 17, p.63.)

Thompson, L.G. (1980) Glaciological investigations of the tropical Quelccaya Ice Cap, Peru. *Journal of Glaciology*, 25(91), p.69-84. WDC No. 80002771. CRREL No. 34003799.

Thompson, L.G. (1981) Ice core studies from Mt. Kenya, Africa, and their relationship to the other tropical ice core studies. (In: Allison, I., ed. *General Assembly of IUGG, 17th, Symposium on Sea Level, Ice and Climate Change, Canberra, 7-8 December 1978. Proceedings. International Association of Hydrological Sciences. IAHS-AISH Publication*, no.131, p.55-62.) WDC No. 81001072. CRREL No. 35003021.

Thompson, L.G.; Mosley-Thompson, E. (1981) Microparticle concentration variations linked with climatic change: evidence from polar ice cores. *Science*, v.212, p.812-815. WDC No. 81001323.

Thompson, L.G. (1984) Analysis of microparticles in ice cores: an indicator of past environments. *Journal of Glaciology and Cryopedology*, 6(1), p.25-32. WDC No. 84002182. CRREL No. 39000931.

Thompson, L.G.; Mosley-Thompson, E.; Petit, J.-R. (1981) Glaciological interpretation of microparticle concentrations from the French 905-m Dome C, Antarctica, core. (In: Allison, I., ed. *General Assembly of IUGG, 17th, Symposium on Sea Level, Ice and Climate Change, Canberra, 7-8 December 1978. Proceedings. International Association of Hydrological Sciences. IAHS-AISH Publication*, no.131, p.227-234.) WDC No. 81001084. CRREL No. 35003033.

Thompson, L.G.; Mosley-Thompson, E. (1981) Temporal variability of microparticle properties in polar ice sheets. *Journal of Volcanology and Geothermal Research*, 11(1), p.11-27.

Thompson, L.G.; Bolzan, J.F.; Brecher, H.H.; Kruss, P.D.; Mosley-Thompson, E.; Jezek, K.C. (1982) Geophysical investigations of the tropical Quelccaya Ice Cap, Peru. *Journal of Glaciology*, 28(98), p.57-69. CRREL No. 36003290.

Thompson, L.G.; Mosley-Thompson, E. (1982) Microparticle concentration and size-distribution determinations from the J-9 core, Ross Ice Shelf. *Antarctic Journal of the United States*, 17(5), p.83-85. WDC No. 83002015. CRREL No. 37003952.

Thompson, L.G.; Mosley-Thompson, E. (1982) Spherical particles in Antarctic ice cores. (In: Bull, C.; Lipschutz, M.E., eds. *Workshop on Antarctic Glaciology and Meteorites, Houston, TX, April 19-21, 1982. Lunnar and Planetary Institute. Technical Report*, 82-03, p.54-55.)

Thompson, L.G.; Mosley-Thompson, E.; Arnao, B.M. (1984) El Nino-Southern Oscillation events recorded in the stratigraphy of the tropical Quelccaya Ice Cap, Peru. *Science*, 226(4670), p.50-53.

Thompson, L.G.; Mosley-Thompson, E.; Dansgaard, W.; Grootes, P.M. (1986) Little ice age as recorded in the stratigraphy of the tropical Quelccaya Ice Cap. *Science*, 234(4774), p.361-364. WDC No. 86001958.

Thompson, L.G.; Wu, X.; Mosley-Thompson, E.; Xie, Z. (1988) Climatic records from the Dunde Ice Cap, China. (In: Oeschger, H., ed. *Symposium on Ice-Core Analysis, Bern, Switzerland, March 30-April 3, 1987. Proceedings. Annals of Glaciology*, vol.10, p.178-182.)

Thompson, L.G.; Davis, M.E.; Mosley-Thompson, E.; Liu, K.-b. (1988) Pre-Incan agricultural activity recorded in dust layers in two tropical ice cores. *Nature*, p.763-765.

## PARTICULATES (Cont.)

Thompson, L.G., Mosley-Thompson, E.; Paskievitch, J.; Grootes, P. (1988) Shallow core analysis and pit studies at Siple Station: implications for extraction of a 500-year proxy climate recored. (In: Oeschger, H., ed. *Symposium on Ice-Core Analysis, Bern, Switzerland, March 30-April 3, 1987. Proceedings. Annals of Glaciology*, vol.10, p. 212. Abstract)

Thompson, L.G.; Mosley-Thompson, E.; Wu, X.; Xie, Z. (1988) Wisconsin/Würm glacial stage ice in the subtropical Dunde Ice Cap, China. *GeoJournal*, 17(4), p.517-523.

Turner, M.D.; McKenzie, G.D. (1982) Polar research. *Geotimes*, 27(2), p.51-52. WDC No. 82000624. CRREL No. 36002217.

Wagstaff, J; King, E.A. (1981) Micrometeorites and possible cometary dust from Antarctic ice cores. (In: *Lunar and Planetary Science Conference, 12th. Abstracts of papers. Houston, Texas*, p.1124-1126.) CRREL No. 37001513.

Wu, X.; Thompson, L.G. (1988) 40-year record in ice core from the Dunde ice cap in China. (In: Oeschger, H., ed. *Symposium on Ice-Core Analysis, Bern, Switzerland, March 30-April 3, 1987. Proceedings. Annals of Glaciology*, vol.10, p.221. Abstract)

Yiou, F.; Raisbeck, G.M. (1987) Cosmic spherules from an Antarctic ice core. *Meteoritics*, 22(4), 539p.

## PHYSICAL AND MECHANICAL PROPERTIES

Ackley, S.F.; Keliher, T.E. (1979) Ice sheet internal radio-echo reflections and associated physical property changes with depth. *Journal of Geophysical Research*, 84(B10), p.5675-5680. WDC No. 80002127. CRREL No. 34000999.

Alley, R.B.; Bolzan, J.F. (1982) Polar firn densification and grain growth. (In: *International Symposium on Antarctic Glaciology, 3rd, Columbus, OH, September 7-12, 1981. Proceedings. Annals of Glaciology*, vol.3, p.7-11.) WDC No. 83000406. CRREL No. 37000238.

Alley, R.B.; Bentley, C.R. (1985) Firn studies at Upstream B, West Antarctica. *Antarctic Journal of the United States*, 20(5), p.65-66. WDC No. 87000719. CRREL No. 41002627.

Alley, R.B.; Bentley, C.R. (1986) Further firn studies on the Siple Coast of West Antactica. *Antarctic Journal of the United States*, 21(5), p.111-112. CRREL No. 43001621.

Alley, R.B.; Perepezko, J.H.; Bentley, C.R. (1986) Grain growth in polar ice: Pts. 1 and 2. *Journal of Glaciology*, 32(112), 415-433. WDC No. 87000682. CRREL No. 41004197.

Alley, R.B.; Bentley, C.R. (1987) Analysis of Siple Coast firn cores. *Antarctic Journal of the United States*, 22(5), p.70-71. CRREL No. 43002738.

Alley, R.B.; Bentley, C.R. (1988) Ice-core analysis of the Siple Coast of West Antarctica. (In: *International Symposium on Antarctic Glaciology, 4th, Bremerhaven, FRG, 7-11 September 1987. Proceedings. Annals of Glaciology, vol.11*, p.1-7.) CRREL No. 43001935.

Allison, I., ed. (1983) *Antarctic climate research; proposals for the implementation of a programme of Antarctic Research contributing to the World Climate Research Programme.* International Council of Scientific Unions. Scientific Committee on Antarctic Research, 65p. WDC No. 84001121.

Aristarain, A.J.; Delmas, R. (1981) First glaciological studies on the James Ross Island Ice Cap, Antarctic Peninsula. *Journal of Glaciology*, 27(97), p.371-379. WDC No. 81002573. CRREL No. 36001502.

Azuma, N.; Higashi, A. (1983) Mechanical properties of Dye 3 Greenland deep ice cores. (In: *Symposium on Ice and Climate Modelling, Northwestern University, Evanston, IL, 27 June-1 July 1983. Proceedings. Annals of Glaciology*, vol.5, p.1-8.) WDC No. 84001918. CRREL No. 39000163.

Barkov, N.I.; Lipenkov, V.Ia.; Petrov, V.N. (1988) Ice structure and crystal fabrics of the 2200 m ice core at Vostok Station, Antarctica. (Abstract only) (In: Oeschger, H., ed. *Symposium on Ice-Core Analysis, Bern, Switzerland, March 30-April 3, 1987. Proceedings. Annals of Glaciology*, vol.10, p.223.)

Blankenship, D.D.; Bentley, C.R. (1987) Crystalline fabric of polar ice sheets inferred from seismic anisotropy. (In: Waddington, E.D.; Walder, J.S., eds. *International Symposium on the Physical Basis of Ice Sheet Modelling, Vancouver, B.C., 9-22 August 1987. Proceedings. International Association of Hydrological Sciences. IAHS-AISH Publication*, no.170, p.17-28.) WDC No. 87002269. CRREL No. 42000303.

Braithwaite, R.J.; Clement, P.; Clausen, H. (1982) Inferences from a 19 m firn core, Nordbogletscher, South Greenland. *Denmark. Gronlands Geologiske Undersogelse. Rapport*, no.110, p.96-98. CRREL No. 37004327.

Craig, H.; Horibe, Y.; Sowers, T. (1988) Gravitational seperation of gases and isotopes in polar ice caps. *Science*, 242(4885), p.1675-1678. CRREL No. 43001202.

## PHYSICAL AND MECHANICAL PROPERTIES (Cont.)

Dahl-Jensen, D.; Gundestrup, N.S. (1988) Flow properties of the inland ice at Camp Century, northeast Greenland. (Abstract only) (In: Oeschger, H., ed. *Symposium on Ice-Core Analysis, Bern, Switzerland, March 30-April 3, 1987. Proceedings. Annals of Glaciology*, vol.10, p.223.)

Dansgaard, W. (1985) Past environmental changes in the North-Atlantic region. (In: *International Conference on Port and Ocean Engineering under Arctic Conditions, 8th Narssarssuaq, Greenland, September 7-14,1985. Proceedings, vol. 1.* Horsholm, Denmark, Danish Hydraulic Institute, p.31-40.) WDC No. 86001657. CRREL No. 40000266.

Dansgaard, W.; Clausen, H.B.; Dahl-Jensen, D.; Gundestrup, N.; Hammer, C.U. (1986) Climatic history from ice core studies in Greenland. Data correction procedures. (In: Ghazi, A.; Fantechi, R. *Current Issues in Climatic Research. European Communities Climatology Programme Symposium, Sophia Antipolis, France, 2-5 October 1984. Proceedings.* D. Reidel Publishing Co., p.45-60.) WDC No. 86001589.

Diurgerov, M.B.; Korolev, P.A.; Manevskii, L.N.; Pukhov, V.A. (1987) Issledovaniia srednemnogoletnei akkumuliatsii atmosfernykh osadkov v raione observatorii Mirnyi. (Study of long period average accumulation of atmospheric precipitation in the Mirnyi Station area.) *Sovetskaia Antarkticheskaia Ekspeditsiia. Informatsionnyi Biulleten*, v.109, p.51-57. CRREL No. 42002280.

Dmitriev, D.N.; Terentev, V.G. (1980) Opredelenie uprugikh kharakteristik lda na Stantsii Vostok. (Calculating elastic properties of ice at Vostok Station.) *Sovetskaia Antarkticheskaia Ekspeditsiia. Informatsionnyi Biulleten*, no.100, p.80-84. WDC No. 82000078. CRREL No. 35002037.

Duval, P.; Lorius, C. (1980) Crystal size and climatic record down to the last ice age from Antarctic ice. *Earth and Planetary Science Letters*, 48(1), p.59-64. WDC No. 80003247. CRREL No. 34003986.

Fisher, D.A. (1987) Enhanced flow of Wisconsin ice related to solid conductivity through strain history and recrystallization. (In: Waddington, E.D.; Walder, J.S., eds. *International Symposium on the Physical Basis of Ice Sheet Modelling, Vancouver, B.C., 9-22 August 1987. Proceedings. International Association of Hydrological Sciences. IAHS-AISH Publication*, no.170, p.45-51.) WDC No. 87002271. CRREL No. 42000305.

Fisher, D.A.; Reeh, N.; Clausen, H.B. (1985) Stratigraphic noise in time series derived from ice cores. (In: *Symposium on Snow and Ice Chemistry and the Atmosphere, Peterborough, Ontario, August 19-24, 1984. Proceedings. Annals of Glaciology*, vol.7, p.76-83.) WDC No. 86000814. CRREL No. 40002401.

Fisher, D.A.; Koerner, R.M. (1986) On the special rheological properties of ancient microparticle-laden Northern Hemisphere ice as derived from borehole and core measurements. *Journal of Glaciology*, vol.32(112), p.501-510. WDC No. 87000690. CRREL No. 41004305.

Frederking, R.; Timco, G.W.; Jeffries, M.O.; Sackinger, W.M. (1988) Initial measurements of physical and mechanical properties of ice from Hobson's ice island. (In: *IAHR Symposium on Ice, 9th, Sapporo, Japan, Aug. 23-27, 1988. Proceedings*, Vol.1, p.188-198. CRREL No. 43002921

Fujii, Y.; Kawada, K.; Yoshida, M.; Matsumoto, S. (1986) Glaciological Research Program in East Queen Maud Land, East Antarctica, Part 4, 1984. *Japanese Antarctic Research Expedition. JARE Data Reports*, no.116, 70p. WDC No. 86001806. CRREL No. 40003882.

Fujino, K. (1988) Characteristics of the massive ground ice body in the western Canadian Arctic (11). (In: Senneset, K., ed. *International Conference on Permafrost, 5th, Trondheim, Norway, 2-5 August 1988. Proceedings, vol.1.* Trondheim, Norway, Tapir Publishers, p.143-147.) CRREL No. 42004000.

Fujita, S.; Nakawo, M.; Mae, S. (1987) Orientation of the 700-m Mizuho core and its strain history. (In: Matsuda, T.; Kawaguchi, S.; Watanabe, O., eds. *Symposium on Polar Meteorology and Glaciology, 9th, National Institute of Polar Research, Tokyo, December 11-12, 1986. Proceedings, vol.1.* Tokyo, National Institute of Polar Research, p.122-131.) CRREL No. 42001185.

Glazyrin, G.E.; Kislov, B.V. (1984) Ispol'zovanie standartnoi meteorologicheskoi informatsii dlia vydeleniia godovykh sloev v firnovo-ledianoi tolshche gornykh lednikov. (Using standard meteorological information in distinguishing annual layers in firn-ice masses of mountain glaciers.) (In: Getker, M.I.; Glazyrin, G.F., eds. *Gliatsiologiia Gornyky Oblastei [Snezhnyi Pokrov, Laviny i Ledniki]. (Glaciology of Mountain Regions [Snow Cover, Avalanches and Glaciers].) Sredneaziatskii Regionalnyi Nauchno-Issledovatel'skii Institut. Trudy*, vol.105, p.79-92.) WDC No. 84002162. CRREL No. 39000638.

Good, W. (1983) Structural investigations of snow and ice on Core III from the drilling on Vernagtferner, Austria, in 1979. *Zeitschrift für Gletscherkunde und Glazialgeologie*, 18(1), p.53-64. WDC No. 84001902. CRREL No. 39000048.

## PHYSICAL AND MECHANICAL PROPERTIES (Cont.)


Goodwin, I.D. (1988) Firn core data from shallow drilling investigations in eastern Wilkes Land, Antarctica. *Australian National Antarctic Research Expeditions. ANARE Research Notes*, no.65, 74p. CRREL No. 43002145

Gow, A.J. (1980) Time-priority studies of deep ice cores. (In: MacKinnon, P., comp. *Ice Cores.* Boulder, Colorado, World Data Center A for Glaciology (Snow and Ice), *Glaciological Data, Report GD*-8, p.91-102.) CRREL No. 34004030.

Graf, W. (1988) Accumulation and ice-core studies on Filchner-Ronne Ice Shelf, Antarctica. (In: *International Symposium on Antarctic Glaciology, 4th, Bremerhaven, FRG, 7-11 September 1987. Proceedings. Annals of Glaciology*, vol.11, p.23-31.) CRREL No. 43001939.

Hammer, C.U. (1988) Continuous and high-resolu-tion ice-core analysis. (Abstract only) (In: Oeschger, H., ed. *Symposium on Ice-Core Analysis, Bern, Switzerland, March 30-April 3, 1987. Proceedings. Annals of Glaciology*, vol.10, p.204.)

Herron, S.L.; Langway, C.C., Jr. (1979) Ice fabrics and flow regime of the Camp Century, Greenland ice core. (In: *Geological Society of America, Northeastern Section, 14th Annual Meeting, Hershey, PA, March 1-3, 1979. Abstract Programs*, 11(1), p.16.)

Herron, S.L. (1980) Identification of Wisconsin ice in polar ice cores. (In: *Geological Society of America, Northeastern Section, 15th Annual Meeting, Philadelphia, PA, March 13-15, 1980. Abstract Programs*, 12(2), p.41.)

Herron, S.L.; Langway, C.C., Jr. (1982) Comparison of ice fabrics and textures at Camp Century, Greenland and Byrd Station, Antarctica. (In: *International Symposium on Antarctic Glaciology, 3rd, Columbus, OH, September 7-12, 1981. Proceedings. Annals of Glaciology*, vol.3, p.118-124.) WDC No. 83000426. CRREL No. 37000258.

Herron, S.L. (1982) *Physical properties of the deep ice core from Camp Century, Greenland.* Buffalo. State University of New York, Ph.D. Dissertation. University Microfilm Order no. 8223976, p.109-116. WDC No. *84000020.* CRREL No. *37000756.*

Herron, S.L.; Langway, C.C., Jr.; Brugger, K.A. (1985) Ultrasonic velocities and crystalline anisotropy in the ice core from Dye 3, Greenland. *American Geophysical Union. Geophysical Monograph Series*, no.33, p.23-31. WDC No. 85001656. CRREL No. 39003563.

Higashi, A.; Shoji, H. (1979) Mechanical tests of Antarctic deep core ice under hydrostatic pressure--instrumentation and preliminary results. Hokkaido University, Sapporo, Japan. *Ice Research Laboratory. Research Paper*, no.40, p.41-47. WDC No. 79001525. CRREL No. 33003298.

Hoji, H.; Langway, C.C., Jr. (1987) Flow velocity profiles and accumulation rates from mechanical tests on ice core samples. (In: Waddington, E.D.; Walder, J.S., eds. *International Symposium on the Physical Basis of Ice Sheet Modelling, Vancouver, B.C., 9-22 August 1987. Proceedings. International Association of Hydrological Sciences. IAHS-AISH Publication*, no.170, p.67-77.) WDC No. 87002273. CRREL No. 42000307.

Hooke, R.L.; Hudleston, P.J. (1980) Ice fabrics in a vertical flow plane, Barnes Ice Cap, Canada. *Journal of Glaciology*, 25(92), p.195-214. WDC No. 81000779. CRREL No. 35001817.

Hooke, R.L.; Huddleston, P.J. (1981) Ice fabrics from a borehole at the top of the South Dome, Barnes Ice Cap, Baffin Island. *Geological Society of America. Bulletin*, 92(5), p.274-281. WDC No. 83000234. CRREL No. 37001131.

Jacoby, G.C., Jr.; Cook, E.R.; Ulan, L.D. (1985) Reconstructed summer degree days in central Alaska and northwestern Canada since 1524. *Quaternary Research*, 23(1), p.18-26.

Kaul, M.K.; Chakraborty, S.K.; Raina, V.K. (1985) Stratigraphic studies of Antarctic ice. *Scientific Report of the Second Indian Antarctic Expedition. Technical Publication*, no.2, p.99-102. CRREL No. 40003541.

Kawada, K.; Yoshida, M.; Naruse, R. (1986) Borehole closure at Mizuho Station, Antarctica. (In: Kawaguchi, S.; Watanabe, O., eds. *Symposium on Polar Meteorology and Glaciology, 8th, Tokyo, 11-12 December 1985. Proceedings. Tokyo. National Institute of Polar Research. Memoirs. Special Issue*, no.45, p.66-73.) WDC No. 87002002. CRREL No. 41003659.

Koerner, R.M. (1987) Arctic ice cores; putting present climate into perspective. *Northern Perspectives*, 15(5), p.10-12.

Koerner, R.M.; Fisher, D.A.; Paterson, W.S.B. (1987) Wisconsinan and pre-Wisconsinan ice thicknesses on Ellesmere Island, Canada: inferences from ice cores. *Canadian Journal of Earth Sciences*, 24(2), p.296-301. CRREL No. 41004079.

Kohnen, H.; Gow, A.J. (1979) Ultrasonic velocity investigations of crystal anisotropy in deep ice cores from Antarctica. *Journal of Geophysical Research*, 84(C8), p.4865-4874. CRREL No. 34000410.

## PHYSICAL AND MECHANICAL PROPERTIES (Cont.)

Kohnen, H.; Gow, A.J. (1979) Ultrasonic velocity investigations of crystal anisotropy in deep ice cores from Antarctica. *U.S. Army Cold Regions Research and Engineering Laboratory. Report*, CR 79-10, 16p.. WDC No. 79002869. CRREL No. 33004204. NTIS No. ADA-071 451

Kotliakov, V.M.; Gordienko, F.G. (1980) Znachenie I zadachi issledovaniia kerna iz lednikovykh skvazhin. (Problems and prospects of studying ice cores from glacier boreholes.) *Akademiia Nauk SSSR. Institut Geografii. Materialy Gliatsiologicheskikh Issledovanii. Khronika Obsuzhdeniia*, vol.38, p.22-26. WDC No. 81000258. CRREL No. 35001222.

Lange, M.A. (1988) Computer-controlled system for ice-fabric analysis on a Rigsby stage. (In: Oeschger, H., ed. *Symposium on Ice-Core Analysis, Bern, Switzerland, March 30-April 3, 1987. Proceedings. Annals of Glaciology*, vol.10, p.92-94.)

Langway, C.C., Jr.; Clausen, H.B.; Hammer, C.U. (1988) Inter-hemispheric volcanic time-marker in ice cores from Greenland and Antarctica. (In: Oeschger, H., ed. *Symposium on Ice-Core Analysis, Bern, Switzerland, March 30-April 3, 1987. Proceedings. Annals of Glaciology*, vol.10, p.102-108.)

Li, J.; Xie, Z.; Huang, M. (1988) Fabrics of the ice cores from BHQ on Law Dome ice cap, Antarctica. *Kexue Tongbao*, 33(3), p.216-220. CRREL No. 42002662.

Lorius, C. (1983) Environnement atmospherique et climat passes a partir des archives glaciaires. (Atmospheric environment and past climate have left a glacial archive.) *France. Centre National de la Recherche Scientifique. Courrierdu CNRS. Supplement*, no.52, p.26-34. WDC No. 84001595.

MacDonald, G.J. (1988) Variations in atmospheric carbon dioxide and ice age climate. (In: *North American Conference on Preparing for Climate Change, 1st: A Cooperative Approach, Washington, DC., October 27-29, 1987. Proceedings*. Rockville, MD. Government Institutes, Inc., p.108-117.) CRREL No. 42003032.

Mayewski, P.A.; Lyons, W.B. (1985) Using an ice core to characterize the climatic history of Antarctica. *Antarctic Journal of the United States*, 20(5), p.71-72. WDC No. 87000723. CRREL No. 41002631.

Mayewski, P.A.; et al. (1988) Climatic record using an ice core from the Transantarctic Mountains, Antarctica. (Abstract only) (In: Oeschger, H., ed. *Symposium on Ice-Core Analysis, Bern, Switzer-land, March 30-April 3, 1987. Proceedings. Annals of Glaciology*, vol.10, p.211.)

McInnes, B.; Radok, U. (1984) Estimated ages and temperatures of South Pole ice. *Antarctic Journal of the United States*, 19(1), p.10-12. WDC No. 84002228.

McInnes, B.; Radok, U. (1985) Steady-state prediction of Dye 3 core features. *American Geophysical Union. Geophysical Monograph Series*, no.33, p.111-117. WDC No. 85001669. CRREL No. 39003576.

Moore, J.C. (1988) Dielectric variability of a 130 m Antarctic ice core: implications for radar sounding. (In: *International Symposium on Antarctic Glaciology, 4th, Bremerhaven, FRG, 7-11 September 1987. Proceedings. Annals of Glaciology*, vol.11, p.95-99.) CRREL No. 43001951.

Nakamura, T.; Abe, O. (1978) Internal friction of Antarctic Mizuho ice cores at low frequency. *Japan. National Institute of Polar Research. Memoirs, Special Issue*, no.10, p.102-113.

Nakawo, M.; Narita, H. (1985) Density profile of a 413.5 m deep fresh core recovered at Mizuho Station, East Antarctica. (In: Kawaguchi, S., ed. *Symposium on Polar Meteorology and Glaciology, 7th, Tokyo, 4-6 December 1984. Proceedings. Tokyo. National Institute of Polar Research. Memoirs. Special Issue*, no.39, p.141-156.) WDC No. 86001195. CRREL No. 40003510.

Nakawo, M. (1986) Volume expansion of a 413.5-m Mizuho core after its recovery. (In: Kawaguchi, S.; Watanabe, O., eds. *Symposium on Polar Meteorology and Glaciology, 8th, Tokyo, 11-12 December 1985. Proceedings. Tokyo. National Institute of Polar Research. Memoirs. Special Issue*, no.45, p.78-85.) WDC No. 87002004. CRREL No. 41003661.

Nakawo, M.; Nagoshi, M.; Mae, S. (1988) Stratigraphic record of an ice core from the Yamato Mountains meteorite ice field, Antarctica. (In: Oeschger, H., ed. *Symposium on Ice-Core Analysis, Bern, Switzerland, March 30-April 3, 1987. Proceedings. Annals of Glaciology*, vol.10, p.126-129.)

Narita, H.; Nakawo, M. (1985) Structure of 413.5-m deep ice core obtained at Mizuho Station, Antarctica. (In: Kawaguchi, S., ed. *Symposium on Polar Meteorology and Glaciology, 7th, Tokyo, 4-6 December 1984. Proceedings. Tokyo. National Institute of Polar Research. Memoirs. Special Issue*, no.39, p.157-164.) WDC No. 86001196. CRREL No. 40003511.

## PHYSICAL AND MECHANICAL PROPERTIES (Cont.)

Narita, H.; Nakawo, M.; Fuji, Y. (1986) Textures and fabrics of 700-m deep ice core obtained at Mizuho Station, East Antarctica. (In: Kawaguchi, S.; Watanabe, O., eds. *Symposium on Polar Meteorology and Glaciology, 8th, Tokyo, 11-12 December 1985. Proceedings. Tokyo. National Institute of Polar Research. Memoirs. Special Issue*, no.45, p.74-77.) WDC No. 87002003. CRREL No. 41003660.

Narita, H.; et al. (1988) Ice-coring at Mizuho Station, Antarctica, and core analyses; a contribution from the Glaciological Research Program in east Dronning Maud Land, Antarctica. (Abstract only) (In: Oeschger, H., ed. *Symposium on Ice-Core Analysis, Bern, Switzerland, March 30-April 3, 1987. Proceedings. Annals of Glaciology*, vol.10, p.213.)

Neftel, A. (1985) Measurements of a kind of DC-conductivity on cores from Dye 3. *American Geophysical Union. Geophysical Monograph Series*, no.33, p.32-38. WDC No. 85001657. CRREL No. 39003564.

Nishio, F. (1984) Stratigraphy and density data from ice core drilled at G2 gridstation. (In: Nishio, F., ed. *Glaciological Research Program in East Queen Maud Land, East Antarctica. Part 1, 1982-1983. Japanese Antarctic Research Expedition. JARE Data Reports*, no.94, p.64-83.) WDC No. 84001044. CRREL No. 38003715.

Paterson, W.S.B.; Waddington, E.D. (1983) Past accumulation rates at Camp Century and Devon Island, deduced from ice-core measurements. (Abstract only) (In: *Symposium on Ice and Climate Modeling, Evanston, IL, June 27-July 1, 1983. Annals of Glaciology*, vol.5, p.222-223.)

Paterson, W.S.B.; Waddington, E.D. (1984) Past precipitation rates derived from ice core measurements: methods and data analysis. *Reviews of Geophysics and Space Physics*, 22(2), p.123-130. WDC No. 84001471. CRREL No. 38003645.

Paterson, W.S.B.; Waddington, E.D. (1986) Estimated basal ice temperatures at Crete, Greenland, throughout a glacial cycle. *Cold Regions Science and Technology*, 12(1), p.99-102. WDC No. 86001126. CRREL No. 40002777.

Petit, J.R.; Duval, P.; Lorius, C. (1987) Long-term climatic changes indicated by crystal growth in polar ice. *Nature*, 326(6108), p.62-64. WDC No. 87001143. CRREL No. 41002750.

Petrov, V.N.; Barkov, N.I.; Lipenkov, V.IA. (1986) Paleoklimaticheskaia interpretatsiia vertikal'noi struktury lednikovogo pokrova Antarktidy. (Paleoclimatological interpretation of the vertical structure of Antarctic ice cover.) (In: *Vsesoiuznyi Simpozium "Meteorologicheskie Issledovaniia v Antarktike," 2nd, Leningrad, October 19-22, 1981. Sbornik Dokladov. [All-Union Symposium "Meteorological Investigations in the Antarctic", 2nd, Leningrad, October 19-22, 1981. Proceedings, vol.2.* Lenin- grad, Gidrometeoizdat, p.4-11.) CRREL No. 42003263

Pimienta, P.; Duval, P.; Lipenkov, V. Ia. (1988) Mechanical behavior of ice along the 2040 m Vostok core, Antarctica. (In: Oeschger, H., ed. *Symposium on Ice-Core Analysis, Bern, Switzerland, March 30-April 3, 1987. Proceedings. Annals of Glaciology*, vol.10, p.137-140.)

Porter, S.C. (1981) Recent glacier variations and volcanic eruptions. *Nature*, 291(5811), p.139-142. WDC No. 81002475. CRREL No. 35003366.

Porter, S.C. (1986) Pattern and forcing of Northern Hemisphere glacier variations during the last millennium. *Quaternary Research*, 26(1), p.27-48.

Portnov, V.G. (1980) Horizontal cracks in deep ice cores from Vostok Station. *Sovetskaia Antarktiches-kaia Ekspeditsiia. Informatsionnyi Biulleten*, v.100, p.75-79. In Russian.

Portnov, V.G.; Barkov, N.I.; Korableva, N.A. (1980) Orientirovka opticheskikh osei zeren lda v lednikovom pokrove na Stantsii Vostok. (Orientation of optical axes of ice crystals from Vostok.) *Sovetskaia Antarkticheskaia Ekspeditsiia. Informatsionnyi Biulleten*, no.100, p.70-74. WDC No. 82000076. CRREL No. 35002035.

Portnov, V.G.; Tarasov, L.S.; Klementev, O.I. (1981) Mikrostruktura lda tsentralnoi chasti Kupola Vavilova. (Microtexture of ice in the central part of the Vavilov Dome.) (In: *Issledovaniia Lednikovogo Pokrova i Perigliatsiala Severnoi Zemli. Leningrad. Arkticheskii i Antarkticheskii Nauchno-Issledovatel-skii Institut. Trudy*, no.367, p.75-80.) WDC No. 81002563. CRREL No. 36001594.

Punning, IA.-M.K.; Martma, T.A.; Tyugu, K.E.; Vaikmiae, R.A.; Purshe, M.; Pinglo, F. (1986) Stratification in an ice core from Vestfonna, Nordaustlandet. *Polar Geography and Geology*, vol.10, p.39-43. WDC No. 87001066. CRREL No. 41001790.

## PHYSICAL AND MECHANICAL PROPERTIES (Cont.)

Putikov, O.F.; Vostretsov, R.N.; Dmitriev, D.N. (1984) Otsenka paleoklimaticheskikh uslovii formirovaniia lednikovogo pokrova po dannym geotermicheskikh izmerenii v gluborkikh skvazhinakh. (Evaluating paleoclimatic conditions of ice cover formation from geothermal measurements in deep wells.) *Akademiia Nauk SSSR. Institut Geografii. Materialy Gliatsiologicheskikh Issledovanii*, vol.51, p.186-191. CRREL No. 40000873.

Raynaud, D.; Lorius, C.; Budd, W.F.; Young, N.W. (1979) Ice flow along an I.A.G.P. flow line and interpretation of data from an ice Core in Terre Adélie, Antarctica. (In: Symposium on Dynamics of Large Ice Masses, Ottawa, 21-25 August 1978. Proceedings. *Journal of Glaciology*, 24(90), p.103-115.) WDC No. 80001819. CRREL No. 34002820.

Reeh, N.; Johnsen, S.J.; Dahl-Jensen, D. (1985) Dating the Dye 3 deep ice core by flow model calculations. *American Geophysical Union. Geophysical Monograph Series*, no.33, p.57 66. WDC No. 85001660. CRREL No. 39003567.

Ritz, C. (1980) Exploitation du profil de températures mesuré dans la calôtte glaciaire au Dome C [Antarctide orientale]. (Using temperature profiles from the ice sheet at Dome C [East Antarctica].) *France. Centre National de la Recherche Scientifique. Laboratoire de Glaciologie. Publication*, no.346, PhD. Dissertation, 129p. CRREL No. 37002162.

Samoilov, O.Iu; Zagorodnov, V.S. (1985) Raspredelenie radiatsionnykh korok v ledianom kerne iz skvazhiny na Stantsii Komsomol'skoi kak pokazatel' paleoklimaticheskikh uslovii. (Distribution of radiation crusts in ice cores from the Komsomol' skaya Station well as indication of paleoclimatic conditions.) *Akademiia Nauk SSSR. Institut Geografii. Materialy Gliatsiologicheskikh Issledovanii*, no.54, p.204-208. WDC No. 86001466. CRREL No. 40003930.

Savigny, K.W. (1979) Method of determining the bulk moisture content of cores and natural exposures of segregated ice. National Research Council, *Canada. Associate Committee on Geotechnical Research. Technical Memorandum*, no.124, p.8-13. CRREL No. 37002949.

Shoji, H. (1978) Stress-strain tests of ice core drilled at Mizuho Station, East Antarctica. *Japan. National Institute of Polar Research. Memoirs, Special Issue*, no.10, p.95-101.

Shoji, H.; Langway, C.C., Jr. (1983) Volume relaxation of air inclusions in a fresh ice core. (In: *International Symposium on the Physics and Chemistry of Ice, 6th, Rolla, Missouri, August 2-6 1982. Journal of Physical Chemistry*, 87(21), p.4111-4114.) WDC No. 84001828. CRREL No. 38001583.

Shoji, H.; Langway, C.C. (1985) Comparison of mechanical tests on the Dye-3, Greenland ice core and artificial laboratory ice. (In: Brown, R.L., ed. *Symposium on Snow and Ice Processes at the Earth's Surface, Sapporo, Japan, September 2-7, 1984. Proceedings. Annals of Glaciology*, vol.6, p.305.) WDC No. 86001058. CRREL No. 40002382.

Shoji, H.; Langway, C.C., Jr. (1985) Ice flow velocity profile for Dye-3, Greenland. *Geophysical Research Letters*, 12(12), p.797-800. WDC No. 86001770. CRREL No. 40002572.

Shoji, H.; Langway, C.C., Jr. (1985) Mechanical properties of fresh ice core from Dye 3, Greenland. *American Geophysical Union. Geophysical Monograph Series*, no.33, p.39-48. WDC No. 85001658. CRREL No. 39003565.

Shoji, H.; Langway, C.C., Jr. (1987) Flow velocity profiles and accumulation rates from mechanical tests on ice core samples. (In: Waddington, E.D.; Walder, J.S., eds. *International Symposium on the Physical Basis of Ice Sheet Modelling, Vancouver, B.C., 9-22 August 1987. Proceedings. International Association of Hydrological Sciences. IAHS-AISH Publication*, no.170, p.67-77.) CRREL No. 42000307.

Shoji, H.; Langway, C.C., Jr. (1988) Flow-law parameters of the Dye 3, Greenland, deep ice core. (In: Oeschger, H., ed. *Symposium on Ice-Core Analysis, Bern, Switzerland, March 30-April 3, 1987. Proceedings. Annals of Glaciology*, vol.10, p.146-150.)

Shumskii, P.A.; Larina, T.B.; Petrov, V.N. (1980) Izmenenie tolshchiny lednikovogo pokrova na stantsiiakh Vostoki Vostok-1. (Variation in ice sheet thickness at Vostok and Vostok-1.) *Sovetskaia Antarkticheskaia Ekspeditsiia. Informatsionnyi Biulleten*, no.100, p.49-53. WDC No. 82000072. CRREL No. 35002031.

Thwaites, R.J.; Wilson, C.J.L.; McCray, A.P. (1984) Relationship between bore-hole closure and crystal fabrics in Antarctic ice core from Cape Folger. *Journal of Glaciology*, vol.30(105), p.171-179. WDC No. 85000195. CRREL No. 39001672.

Tillson, R.A.; Kuivinen, K.C. (1983) Ice core science trench for use by glaciologists on the Greenland ice sheet. (In: *Symposium on Antarctic Logistics, 3rd, Leningrad, 1982. Proceedings.* Scientific Committee on Antarctic Research, p.584-590.) CRREL No. 39002632.

## PHYSICAL AND MECHANICAL PROPERTIES (Cont.)

Vaikmiae, R.A.; Punning, IA. -M.K.; Romanov, V.V.; Barkov, N.I. (1988) Stratigraphy of the Vavilov Ice Dome in Severnaya Zemlya using isotopic geochemical methods. (In: Avsiuk, G.A., ed. *Data of Glaciological Studies: Chronicle Discussions*. New Delhi, Amerind Publishing Co., p.127-135.) CRREL No. 42002717.

Vassoille, R.; Mai, C.; Perez, J.; Tatibouet, J.; Duval, P.; Maccagnan, M. (1980) Anomalous behaviour of Dome C ice core (East Antarctica) studied by mechanical damping measurements. *Annales de Geophysique*, 36(4), p.491-498. WDC No. 83000324. CRREL No. 35002887.

Vassoille, R.; Perez, J.; Tatibouet, J.; Duval, P.; Maccagnan, M. (1982) Amomalous behaviour of Antarctic ice cores studied by electrical and mechanical damping measurements. (In: *International Symposium on Antarctic Glaciology*, 3rd, Columbus, OH, September 7-12, 1981. Proceedings. Annals of Glaciology, vol.3, p.307-311.) WDC No. 83000460. CRREL No. 37000292.

Vincent, C.E.; Davies, T.D.; Brimblecombe, P. (1981) Lewis Glacier (Mt. Kenya) and possible links with tropical climate. (In: Allison, I., ed. *Symposium on Sea Level, Ice and Climate Change, Canberra, 7-8 December 1978. Proceedings. International Association of Hydrological Sciences. IAHS-AISH Publication*, no.131, p.63-78.) WDC No. 81001073. CRREL No. 35003022.

Vostretsov, R.N. **et al.** (1984) Osnovnye rezul'taty geofizicheskikh issledovanii glubokikh skvazhin i ledianogo kerna v Vostochnoi Antarktide. (Basic results of geophysical studies of deep boreholes and ice cores in Eastern Antarctica.) *Akademiia Nauk SSSR. Institut Geografii. Materialy Gliatsiologicheskikh Issledovanii*, vol.51, p.172-178. CRREL No. 40000871.

Vostretsov, R.N.; Dmitriev, D.N. (1979) Rezul'taty termometrii v skvazhinakh na stantsii Vostok. (Results of temperature measurements in Vostok boreholes). *Sovetskaia Antarkticheskaia Ekspeditsiia. Informatsionnyi Biulleten*, no.99, p.25-31. WDC No. 80001457. CRREL No. 34001825.

Waddington, E.D.; Fisher, D.A.; Koerner, R.M.; Paterson, W.S.B. (1986) Flow near an ice divide: Analysis problems and data requirements. (In: *Symposium on Glacier Mapping and Surveying, Reykjavik, August 26-29, 1985. Proceedings. Annals of Glaciology*, vol.8, p.171-174.) WDC No. 86002285. CRREL No. 41000763.

Whillans, I.M. (1981) Dome C glaciology. *Antarctic Journal of the United States*, 16(5), p.82-83. CRREL No. 36003981.

Whillans, I.M.; Bolzan, J.F. (1988) Method for computing shallow ice-core depths. *Journal of Glaciology*, 34(118), p.355-357. CRREL No. 43001993.

Wilkinson, D.S. (1988) Pressure-sintering model for the densification of polar firn and glacier ice. *Journal of Glaciology*, 34(116), p.40-45. CRREL 42003329.

Xie, Z. (1984) Studies of ice formation and ice fabric on the Law Dome, Antarctica. *Journal of Glaciology and Cryopedology*, 6(1), p.1-22. WDC No. 84002181. CRREL No. 39000930.

Yamada, T. (1987) Glaciological characteristics revealed by 37.6-m deep core drilled at the accumulation area of San Rafael Glacier, the Northern Patagonia Icefield. *Bulletin of Glacier Research*, no.4, p.59-67. CRREL No. 41003828.

Young, N.W.; Xie, Z.; Qin, D. (1985) Multilayer crystallographic structure of Law Dome from ice core analysis. *Australian National Antarctic Research Expeditions. ANARE Research Notes*, v.28, p.18-24.

Young, N.W. (1988) Structure and flow in the margin of the Law Dome Ice Cap, Antarctica. (Abstract only) (In: Oeschger, H., ed. *Symposium on Ice-Core Analysis, Bern, Switzerland, March 30-April 3, 1987. Proceedings. Annals of Glaciology*, vol.10, p.222.)

Zotikov, I.A. (1983) Izuchenie ledianogo kerna iz Shel'fovogo Lednika Rossa. (Studying ice cores from the Ross Ice Shelf.) *Akademiia Nauk SSSR. Institut Geografii. Materialy Gliatsiologicheskikh Issledovanii. Khronika Obsuzhdeniia*, vol.47, p.243. WDC No. 84000861. CRREL No. 38003390.

Zotikov, I.A.; Gow, A.J.; Jacobs, S.S. (1985) Stroenie tolshchi tsentral'noi chasti Shel'fovogo Lednika Rossa v Antarktike. (Structure of ice in the central part of the Ross Ice Shelf, Antarctica.) *Akademiia Nauk SSR. Institut Geografii. Materialy Gliatsiologicheskikh Issledovanii*, no.54, p.39-44. WDC No. 86001439. CRREL No. 40003903.

## RADIO ISOTOPES

Ambach, W. (1980) Zur kontamination von firnschichten durch radioaktiven fallout. (Contamination of firn layers by radioactive fallout.) *Polarforschung*, 50(1/2), p.17-22. WDC No. 81001874. CRREL No. 36000774.

Ambach, W.; Rehwald, W. (1982) Measurements of the decay rate of the gross beta activity in firn samples from an alpine glacier, Kesselwandferner, Otztal Alps, Austria. *Arctic and Alpine Research*, 14(2), p.163-166. WDC No. 83000483. CRREL No. 37000319.

## RADIO ISOTOPES (Cont.)

Ambach, W.; Rehwald, W.; Blumthaler, M.; Elsner, H. (1987) Chernobyl fallout on Alpine glaciers: a new reference horizon for dating. *EOS*, vol.68, p.1577.

Andree, M., et al. (1984) 14C dating of polar ice. *Nuclear Instruments and Methods in Physics Research*, B5(2), p.385-388. WDC No. 86001573.

Andree, M. et al. (1986) Dating polar ice by $^{14}C$ accelerator mass spectrometry. *Radiocarbon*, vol.28, p.417-423.

Andrews, J.T., comp. (1983) Radiocarbon data list 5: Baffin Island, N.W.T., Canada. Colorado. University. *Institute of Arctic and Alpine Research. Occasional Paper*, no.40, 22p. WDC No. 84000926. CRREL No. 38002556.

Beer, J.; Siegenthaler, U.; Oeschger, H.; Andree, M.; Bonani, G.; Suter, M.; Wolfli, W.; Finkel, R.C.; Langway, C.C. (1983) Temporal $^{10}Be$ variations. (In: *Cosmic Ray Conference, Bangalore, August 1983*. 4p.) WDC No. 83001335.

Beer, J.; Andree, M.; Oeschger, H.; Stauffer, B.; Balzer, R.; Bonani, G.; Stoller, C.; Suter, M.; Wolfli, W.; Finkel, R.C. (1983) Temporal $^{10}Be$ variations in ice. *Radiocarbon*, 25, 10p. WDC No. 83001336.

Beer, J.; Oeschger, H.; Andree, M.; Bonani, G.; Suter, M.; Wolfli, W.; Langway, C.C., Jr. (1983) Temporal variations in the $^{10}Be$ concentration levels found in the Dye 3 ice core, Greenland. (In: *Symposium on Ice and Climate Modelling, Northwestern University, Evanston, IL, 27 June-1 July 1983. Proceedings. Annals of Glaciology*, vol.5, p.16-17.) WDC No. 84001920. CRREL No. 39000165.

Beer, J., et al. (1984) Camp Century $^{10}Be$ record: Implications for long-term variations of the geomagnetic dipole moment. *Nuclear Instruments and Methods in Physics Research*, B5(2), p.380-384. WDC No. 86001575.

Beer, J. (1985) $^{10}Be$ variations in polar ice cores. *American Geophysical Union. Geophysical Monograph Series*, no.33, p.66-70. WDC No. 85001661. CRREL No. 39003568.

Beer, J.; Oeschger, H.; Bonani, G.; Suter, M.; Wolfli, W. (1988) $^{10}Be$ concentrations in Antarctic ice. (Abstract only) (In: Oeschger, H., ed. *Symposium on Ice-Core Analysis, Bern, Switzerland, March 30-April 3, 1987. Proceedings. Annals of Glaciology*, vol.10, p.200)

Beer, J. (1988) Information on past solar activity and geomagnetism from $^{10}Be$ in the Camp Century ice core. *Nature*, 331(6158), p.675-679. CRREL No. 42002601.

Bhandari, N.; Nijampukar, V.N.; Vohra, C.P. (1983) Radiometric chronology of some Himalayan glaciers. (In: Street-Perrott, A., et al. *Variations in the Global Water Budget*. D. Reidel Publishing Company, p.207-216.) WDC No. 84001210.

Davidson, C.I.; Harrington, J.R.; Stephenson, M.J.; Monaghan, M.C.; Pudykiewicz, J.; Schell, W.R. (1987) Radioactive cesium from the Chernobyl accident in the Greenland Ice Sheet. *Science*, 237(4815), p.633-634.

Elmore, D.; Tubbs, L.E.; Newman, D.; Ma, X.Z.; Finkel, R.; Nishiizumi, K.; Beer, J.; Oeschger, H.; Andree, M. (1982) $^{36}CL$ bomb pulse measured in a shallow ice core from Dye 3, Greenland. *Nature*, 300(5894), p.735-737. WDC No. 83000204.

Elmore, D.; Conard, N.J.; Kubik, P.W.; Gove, H.E.; Wahlen, M.; Beer, J. (1988) Measurements of $^{36}Cl$ in polar ice. (Abstract only) (In: Oeschger, H., ed. *Symposium on Ice-Core Analysis, Bern, Switzerland, March 30-April 3, 1987. Proceedings. Annals of Glaciology*, vol.10, p.202.)

Fireman, E.L.; Norris, T. (1981) $^{14}C$ ages of Antarctic meteorites and ice and the composition of the air trapped in the ice. (In: *Lunar and Planetary Science Conference, 12th. Abstracts of papers*. Houston, Texas, p.282-284.) CRREL No. 37001508.

Fireman, E.L.; Norris, T.L. (1982) Preliminary studies on dating polar ice by $^{14}C$ and $^{81}R$. (In: Currie, L.A., ed. *Nuclear and Chemical Dating Techniques: Interpreting the Environmental Record. American Chemical Society. ACS Symposium Series*, no.176, p.319-329.) CRREL No. 37000758.

Fireman, E.L. (1983) Radioactive dating of Byrd core and Allan Hills ice. *Antarctic Journal of the United States*, 18(5), p.111. WDC No. 84001884. CRREL No. 39000009.

Fireman, E.L. (1984) Dating Antarctic ice by the carbon-14 and uranium-238 series methods. *Antarctic Journal of the United States*, 19(5), p.66-67.

Fisher, D.A. (1982) Carbon-14 production compared to oxygen isotope records from Camp Century, Greenland and Devon Island, Canada. *Climatic Change*, 4(4), p.419-426.

Gaggeler, H.; Gunten, H.R. von; Rossler, E.; Oeschger, H.; Schotterer, U. (1983) $^{210}Pb$-dating of cold alpine firn/ice cores from Colle Gnifetti, Switzerland. *Journal of Glaciology*, 29(101), p.165-177. WDC No. 83002062. CRREL No. 37004261.

Gunten, H.R. von; Rossler, E.; Gaggeler, H. (1983) Dating of ice cores from Verngtferner (Austria) with fission products and Lead-210. *Zeitschrift für Gletscherkunde und Glazialgeologie*, 18(1), p.37-45. WDC No. 84001900. CRREL No. 39000046.

## RADIO ISOTOPES (Cont.)


Haeberli, W.; Gaeggeler, H.; Baltensperger, U.; Jost, D.; Schotterer, U. (1988) Signal from the Chernobyl accident in high-altitude firn areas of the Swiss Alps. (In: Oeschger, H., ed. *Symposium on Ice-Core Analysis, Bern, Switzerland, March 30-April 3, 1987. Proceedings. Annals of Glaciology*, vol.10, p.48-51.)

Hammer, C.U.; Clausen, H.B.; Tauber, H. (1985) Ice-core dating of the Pleistocene/Holocene boundary applied to a calibration of the $^{14}C$ time scale. (In: Stuiver, M.; Dra, R., eds. *International Radiocarbon Conference, 12th, Trondheim, Norway, June 24-28, 1985. Radiocarbon*, 28(2A), p.284-291.)

Holdsworth, G.; Pourchet, M.; Prantl, F.A.; Meyerhof, D.P. (1984) Radioactivity levels in a firn core from the Yukon Territory, Canada. *Atmospheric Environment*, 18(2), p.461-466. WDC No. 84001579.

Holdsworth, G. (1986) Evidence for a link between atmospheric thermonuclear detonations and nitric acid. *Nature*, 324(6097), p.551-553. WDC No. 87000788.

Hooke, R.L.; Clausen, H.B. (1982) Wisconsin and Holocene $\delta$ $^{18}O$ variations, Barnes Ice Cap, Canada. *Geological Society of America. Bulletin*, 93, p.784-789. WDC No. 84000435.

Kato, K. (1981) Records of production rate in the little ice age of cosmic ray product $_{32}Si$ in the arctic ice cores. (In: Kusunoki, K., ed. *Symposium on Polar Meteorology and Glaciology, 3rd, Tokyo, 13-14 January 1981. Proceedings. Tokyo. National Institute of Polar Research. Memoirs. Special Issue*, 19, p.234-242.) WDC No. 82000461. CRREL No. 36002385.

Koide, M.; Goldberg, E.D. (1985) Historical record of artificial radioactive fallout from the atmosphere in polar glaciers. *American Geophysical Union. Geophysical Monograph Series*, no.33, p.95-100. WDC No. 85001666. CRREL No. 39003573.

Lal, D. (1987) $^{10}Be$ in polar ice: data reflect changes in cosmic ray flux or polar meteorology. *Geophysical Research Letters*, 14(8), p.785-788. CRREL No. 42000901.

Monaghan, M.C. (1987) Greenland ice $^{10}Be$ concentrations and average precipitation rates north of 40°N to 45°N. *Earth and Planetary Science Letters*, 84(2/3), p.197-203. CRREL No. 41004279.

Nishiizumi, K.; Arnold, J.R.; Elmore, D.; Ma, X.; Newman, D.; Gove, H.E. (1983) $^{36}Cl$ and $^{53}Mn$ in Antarctic meteorites and $^{10}Be$-$^{36}Cl$ dating of Antarctic ice. *Earth and Planetary Science Letters*, 62(3), p.407-417. CRREL No. 37002942.

Oeschger, H. (1985) Contribution of ice core studies to the understanding of environmental processes. *American Geophysical Union. Geophysical Monograph Series*, no.33, p.9-17. WDC No. 85001654. CRREL No. 39003561.

Peel, D.A. (1981) On Antarctic glaciology; ice cores. *Nature*, 294(5838), p.211-212.

Peel, D.A.; Clausen, H.B. (1982) Oxygen-isotope and total beta-radioactivity measurements on 10m ice cores from the Antarctic Peninsula. *Journal of Glaciology*, 28(98), p.43-55. CRREL No. 36003289.

Pourchet, M.; Pinglot, J.F.; Reynaud, L.; Holdsworth, G. (1988) Identification of Chernobyl fall-out as a new reference level in Northern Hemisphere glaciers. *Journal of Glaciology*, 34(117), p.183-187. CRREL No. 43000162.

Raisbeck, G.M.; Yiou, F. (1980) $^{10}Be$ in polar ice cores as a record of solar activity. (In: Pepin, R.O.; Eddy, J.A.; Merrill, R.B., eds. *Conference on The Ancient Sun; Fossil Record in the Earth, Moon and Meteorites, Boulder, CO, October 16-19, 1979.* Pergamon Press, p.185-190.)

Raisbeck, G.M.; Yiou, F. (1981) $^{10}Be$ as a potential probe of solar variability influence on climate. (In: *International Conference Sun and Climate, Toulouse, 30 September-3 October 1980. Proceedings.* Centre National d'Études Spatiales, p.311-316.) CRREL No. 38000858.

Raisbeck, G.M.; Yiou, F.; Fruneau, M.; Loiseaux, J.M.; Lieuvin, J.; Ravel, J.C.; Lorius, C. (1981) Cosmogenic $^{10}Be$ concentrations in Antarctic ice during the past 30,000 years. *Nature*, 292(5826), p.825-826. WDC No. 81002478.

Raisbeck, G.M.; Yiou, F. (1985) $^{10}Be$ in polar ice and atmospheres. (In: *Symposium on Snow and Ice Chemistry and the Atmosphere, Peterborough, Ontario, August 19-24, 1984. Proceedings. Annals of Glaciology*, vol.7, p.138-140.) WDC No. 86000823. CRREL No. 40002410.

Raisbeck, G.M.; Yiou, F.; Bourles, D.; Lorius, C.; Jouzel, J.; Barkov, N.I. (1987) Evidence for two intervals of enhanced $^{10}Be$ deposition in Antarctic ice during the last glacial period. *Nature*, 326(6110), p.273-277. WDC No. 87001509.

Rauter, R. (1977) *Neutron Activation Analysis Study of Trace Elements in Glacial Ice Cores.* Eidgenoessisches Institut für Reaktorforschung, Wuerenlingen, Switzerland, 107p.

Rood, R.T.; Sarazin, C.L.; Zeller, E.J.; Parker, B.C. (1979) X- or gamma-rays from supernovae in glacial ice. *Nature*, 282(5740), p.701-702. WDC No. 80001432. CRREL No. 34001746.

## RADIO ISOTOPES (Cont.)

Short, S.K., comp. (1983) Radiocarbon data list 2: Labrador and Northern Quebec, Canada. *Colorado. University. Institute of Arctic and Alpine Research. Occasional Paper*, no.40, p.55-71. WDC No. 84000927. CRREL No. 38002557.

Sonett, C.P.; Morfill, G.E.; Jokipii, J.R. (1987) Insterstellar shock waves and $^{10}$Be from ice cores. *Nature*, 330(6147), p.458-460. CRREL No. 42001143.

Williams, L.D.; Wigley, T.M.L. (1983) Comparison of evidence for late Holocene summer temperature variations in the Northern Hemisphere (North America, Greenland, Europe). *Quaternary Research*, 20(3), p.286-307.

Williams, L.D.; Wigley, T.M.L.; Kelly, P.M. (1980) Climatic trends at high northern latitudes during the last 4000 years compared with carbon 14 fluctuations (Alaska, Scandinavia). (In: *Sun and Climate. Centre National d'Étude Spatiales International Conference, Toulouse, 1980. Proceedings.* Centre National d'Étude Spatiales, Toulouse, p.11-20.)

Yiou, F.; Raisbeck, G.M.; Bourles, D.; Lorius, C.; Barkov, N.I. (1985) $^{10}$Be in ice at Vostok Antarctica during the last climatic cycle. *Nature*, 316(6029), p.616-617. WDC No. 85001105.

Yiou, F.; Raisbeck, G.M. (1985) Isotopes cosmogeniques dans la glace polaire. (Isotopes of cosmic origin in polar ice.) (In: *Actes du Colloque sur la Recherche Francaise dans l'Antarctique, Grenoble 19/21 Septembre 1984. [Colloquium on French Research in the Antarctic, Grenoble, 19-21 September 1984. Proceedings.]* Comite National Francais des Recherches Antarctiques, p.42-44.) CRREL No. 40000471.

## STABLE ISOTOPES

Ait Ouahman, A.; Glangeaud, F.; Benoist, J.P. (1983) Evolutive spectral analysis by autoregressive process of isotopic climatic data from Antarctica. (In: Cosnard, M.; Demongeot, J.; LeBreton, A., eds. *Lecture Notes in Biomathematics, No. 49, Rhythms in Biology and Other Fields of Application: Deterministic and Stochastic Approaches. Journees de la Societe Mathematique de France, Luminy, France, 14-18 September 1981. Proceedings.* Berlin, Springer, p.274-294.) CRREL No. 38004499.

Aristarain, A.J.; Jouzel, J.; Pourchet, M. (1986) Past Antarctic Peninsula climate (1850-1980) deduced from an ice core isotope record. *Climatic Change*, 8(1), p.69-89. WDC No. 86001774. CRREL No. 40002708.

Baker, D. (1985) Comparison of the $^{2}$H and $^{18}$O content of ice core from a temperate alpine glacier (Vernagtferner, Austria) with climatic data. (In: Kuhn, M., ed. *Climate and Paleoclimate of Lakes, Rivers and Glaciers. Symposium on Climate and Paleoclimate of Lakes, Rivers and Glaciers, Igls, Austria, June 4-7, 1984. Proceedings. Zeitschrift für Gletscherkunde und Glazialgeologie*, vol.21, p.389-395.) WDC No. 86000712. CRREL No. 40001872.

Barkov, N.I.; Gordienko, F.G. (1980) Origin of McMurdo Sound glaciers from oxygen-isotopic ice analysis data. *Antarktika - Doklady Komissii*, v.19, p118-131. In Russian.

Barkov, N.I.; Gordienko, F.G. (1985) On the origin of the glaciers of the McMurdo Sound region based on the oxygen-isotopic analysis of ice. *Antarctic Committee Reports*, v.90, p.170-188.

Barkov, N.I.; et al. (1987) Antarctic ice core data over the last climatic cycle (150 ka) (In: Waddington, E.D.; Walder, J.S., eds. *International Symposium on the Physical Basis of Ice Sheet Modelling, Vancouver, B.C., 9-22 August 1987. Proceedings. International Association of Hydrological Sciences. IAHS-AISH Publication*, no.170, p.267-268.)

Bender, M.; Labeyrie, L.D.; Raynaud, D.; Lorius, C. (1985) Isotopic composition of atmospheric $O_2$ in ice linked with deglaciation and global primary productivity. *Nature*, 318(6044), p.349-352.

Benoist, J.P.; Jouzel, J.; Lorius, C.; Merlivat, I.; Pourchet, M. (1982) Isotope climate record over the last 2.5 Ka from Dome C, Antarctica ice cores. (In: *International Symposium on Antarctic Glaciology, 3rd, Columbus, OH, September 7-12, 1981. Proceedings. Annals of Glaciology*, vol.3, p.17-22.) WDC No. 83000408. CRREL No. 37000240.

Blanc, P.L.; Fontugne, M.R.; Duplessy, J.C. (1983) Time-transgressive initiation of Boreal ice-caps: continental and oceanic evidence reconciled. *Palaeogeography, Paleoclimatology, Palaeoecology*, 42, p.211-224. WDC No. 84001211.

Bradley, R.S. (1983) Arctic precipitation-temperature relationships and the interpretation of ice core isotopic records. (In: Bradley, R.; et al. *Abstracts of the 12th Arctic Workshop, Amherst, MA, March 16-18, 1983*, p.16)

Broecker, W.S. et al. (1988) Can the Greenland climatie jumps be identified in recoreds from ocean and land? *Quaternary Research*, 30(1), p.1-6.

Budd, W.F.; Corry, M.J.; Jacka, T.H. (1982) Results from the Amery Ice Shelf project. (In: International *Symposium on Antarctic Glaciology, 3rd, Columbus, OH, September 7-12, 1981. Proceedings. Annals of Glaciology*, vol.3, p.36-41.)

## STABLE ISOTOPES (Cont.)

Chappell, J.; Shackleton, N.J. (1986) Oxygen isotopes and sea level. *Nature*, 324(6093), p.137-140. WDC No. 87000040.

Clausen, H.B.; Stauffer, B. (1988) Analyses of two ice cores drilled at the ice-sheet margin in West Greenland. (In: Oeschger, H., ed. *Symposium on Ice-Core Analysis, Bern, Switzerland, March 30-April 3, 1987. Proceedings. Annals of Glaciology*, vol.10, p.23-27.)

Covey, C.; Haagenson, P.L. (1984) Model of oxygen isotope composition of precipitation: implications for paleoclimate data. *Journal of Geophysical Research*, 89(D3), p.4647-4655.

Covey, C.; Schneider, S.H. (1984) Models for reconstructing temperature and ice volume from oxygen isotope data. (In: *NATO Advanced Research Workshop on Milankovitch and Climate, Palisades, NY, November 30-December 4, 1982. Proceedings. NATO ASI Series, Series C: Mathematical and Physical Sciences*, vol.126. Dordrecht, Holland, D. Reidel Publishing, p.699-705.)

Dansgaard, W. (1980) Paleo-climatic studies on ice cores. (In: Oeschger, H.; Messerli, B.; Svilar, M. *Das Klima: Analysen und Modelle; Geschichte und Zukunft. (Climate: Analyses and Models; History and the Future.* Berlin. Springer-Verlag, p.237-245.) WDC No. 84000862. CRREL No. 37001768.

Dansgaard, W. (1981) Paleo-climatic studies on ice cores. (In: Berger, A., ed. *Climatic Variations and Variability: Facts and Theories*. Dordrecht, NE. D. Reidel Publishing Co., p.193-206.) WDC No. 83001023. CRREL No. 36003192.

Dansgaard, W.; Reeh, N. (1982) Climatic interpretation of GISP ice core data. *EOS, Transactions, American Geophysical Union*, 63(18), p.298.

Dansgaard, W.; Clausen, H.B.; Gundestrup, N.; Hammer, C.U.; Johnsen, S.F.; Kristinsdottir, P.M.; Reeh, N. (1982) New Greenland deep ice core. *Science*, 218(4579), p.1273-1277. WDC No. 83000191.

Dansgaard, W.; Oeschger, H.; Langway, C.C. (1983) Ice core indications of abrupt climatic changes. (In: Ghazi, A., ed. *Workshop on Palaeoclimatic Research and Models, Brussels, 1982. Proceedings.* D. Reidel, p.72-73.)

Dansgaard, W.; Johnsen, S.J.; Clausen, H.B.; Dahl-Jensen, D.; Gundestrup, N.; Hammer, C.U.; Oeschger, H. (1984) North Atlantic climatic oscillations revealed by deep Greenland ice cores. (In: Hansen, J.E.; Takahashi, T., eds. *Climate Processes and Climate Sensitivity. Maurice Ewing Symposium, 4th, Palisades, NY, 1982. American Geophysical Union. Geophysical Monograph* no.29, *Maurice Ewing Series*, vol.5, p.288-298.) WDC No. 84001658. CRREL No. 38004253.

Dansgaard, W. (1985) Dating and climatic interpretation of two deep Greenland ice cores. *American Geophysical Union. Geophysical Monograph Series*, no.33, p.71-76. WDC No. 85001662. CRREL No. 39003569.

Dansgaard, W. (1985) Greenland ice core studies. *Palaeogeography, Paleoclimatology, Palaeoecology*, 50(2/3), p.185-187. WDC No. 86000381.

Dansgaard, W. (1987) Ice core evidence of abrupt climatic changes. (In: Berger, W.H.; Labeyrie, L.D., eds. *Abrupt Climatic Changes; Evidence and Implications, St. Hugues de Biviers, France, October 1985. NATO Advanced Study Institutes Series. Series C; Mathematical and Physical Sciences*, vol.216, p.223-233.)

Duplessy, J.-C.; Arnold, M.; Maurice, P.; Bard, E.; Duprat, J.; Moyes, J. (1986) Direct dating of the oxygen-isotope record of the last deglaciation by $^{14}C$ accelerator mass spectrometry. *Nature*, 320(6060), p.350-352. WDC No. 86001591.

Fisher, D.A. (1979) Comparison of $10^5$ years of oxygen isotope and insoluble impurity profiles from the Devon Island and Camp Century ice cores. *Quaternary Research*, 11(3), p.299-305.

Fisher, D.A.; Koerner, R.M. (1981) Some aspects of climatic change in the high Arctic during the Holocene as deduced from ice cores. (In: Mahaney, W.C., ed. *Quaternary Paleoclimate*. GEO Abstracts, Ltd., p.249-271.) WDC No. 84000425.

Fisher, D.A.; Koerner, R.M.; Paterson, W.S.B.; Dansgaard, W.; Gundestrup, N.; Reeh, N. (1983) Effect of wind scouring on climatic records from ice core oxygen-isotope profiles. *Nature*, 310(5897), p.205-209. WDC No. 83001924. CRREL No. 37002470.

Fisher, D.A.; Koerner, R.M. (1983) Ice-core study: a climatic link between the present and future. *Climatic Changes in Canada 3. Syllogeus*, 49, p.50-69. WDC No. 83001925.

Fisher, D.A.; Alt, B.T. (1985) Global oxygen isotope model--semi-empirical, zonally averaged. (In: *Symposium on Snow and Ice Chemistry and the Atmosphere, Peterborough, Ontario, August 19-24, 1984. Proceedings. Annals of Glaciology*, vol.7, p.117-124.) WDC No. 86000820. CRREL No. 40002407.

## STABLE ISOTOPES (Cont.)


Fisher, D.A.; Koerner, R.M. (1988) Effects of wind on $\delta(^{18}O)$ and accumulation give an inferred record of seasonal $\delta$ amplitude from the Agassiz Ice Cap, Ellesmere Island, Canada. (In: Oeschger, H., ed. *Symposium on Ice-Core Analysis, Bern, Switzerland, March 30-April 3, 1987. Proceedings. Annals of Glaciology*, vol.10, p.34-37.)

Frolich, K.; Schutze, H. (1982) Isotopes in Antarctic research. (In: *Isotopes in Antarctic Research. Contributions of teh GDR. DDR. Akademie der Wissenschaften. Zentralinstitut für Isotopen- und Strahlenforschung. ZFI-Mitteilungen*, no.51, p.7-25.) WDC No. 84001513. CRREL No. 38000752.

Gordienko, F.G.; Savatiugin, L.M. (1980) Oxygen-isotope analysis of Novolazarevskaya glacier shelf ice cores. *Sovetskaia Antarkticheskaia Ekspeditsiia, Informatsionnyi Biulleten*, v.100, p.85-90. In Russian.

Gordienko, F.G.; Savatiugin, L.M. (1980) Rezultaty izotopno-kislorodnykh analizov kerna lda shelfovogo lednika Novolazarevskogo. (Oxygen-isotope analysis of Novolazarevskaya glacier shelf ice cores.) *Sovetskaia Antarkticheskaia Ekspeditsiia. Informatsionnyi Biulleten*, no.100, p.85-90. WDC No. 82000079. CRREL No. 35002038.

Gordienko, F.G.; Katliakov, V.M.; Punning, Ia.-K.M.; Vairmae, R. (1981) Study of a 200-m core from the Lomonosov ice plateau on Spitsbergen and the paleoclimatic implications. *Polar Geography and Geology*, 5(4), p.242-251. WDC No. 82001237. CRREL No. 36003696.

Gordienko, F.G.; Kotlyakov, V.M.; Korotkevich, E.S. (1982) Novye rezul'taty izotopnokislorodnykh issledovanii ledianogo kerna iz skvazhiny so Stantsii Vostok Do glubiny 1412 m. (New results of oxygen isotope studies of ice cores from the Vostok Station down to the depth of 1412 m.) *Akademiia Nauk SSR. Institut Geografii. Materialy Gliatsiologicheskikh Issledovanii. Khronika Obsuzhdeniia*, vol. 46, p.168-171. WDC No. 83001605. CRREL No. 37003899.

Gordienko, F.G.; Kotliakov, V.M.; Barkov, N.I.; Korotkevich, E.S. (1982) Results of oxygen-isotope studies on the Vostok core. (In: *IAGP Scientific Session, Leningrad, 6 July 1982*. 3p.) WDC No. 83000216.

Graf, W.; Reinwarth, O.; Moser, H.; Stichler, W. (1988) Investigation of the $^{18}O$ content of a 100 m ice core from the Ronne Ice Shelf, Antarctica. (In: Oeschger, H., ed. *Symposium on Ice-Core Analysis, Bern, Switzerland, March 30-April 3, 1987. Proceedings. Annals of Glaciology*, vol.10, p.43-47.)

Gribbin, J. (1985) New time scale for ice-age cycles. *New Scientist*, no.1474, p.25. WDC No. 85002040.

Grootes, P.M.; Stuiver, M. (1982) Ross Ice Shelf and Dome C oxygen-isotope analysis. *Antarctic Journal of the United States*, 17(5), p.76-78. WDC No. 83002011. CRREL No. 37003948.

Grootes, P.M. (1983) New light on climate from old isotope ratios. *Nature*, 303(5920), p.753-754.) WDC No. 84001774.

Grootes, P.M.; Stuiver, M. (1983) Ross Ice Shelf oxygen isotope profile at J-9. *Antarctic Journal of the United States*, 18(5), p.107-109. WDC No. 84001882. CRREL No. 39000007.

Grootes, P.M.; Stuiver, M. (1986) Oxygen isotope studies and compilation of isotopic dates from Antactica. *Antarctic Journal of the United States*, 21(5), p.122. CRREL No. 43001630.

Grootes, P.M.; Stuiver, M. (1987) Ice sheet elevation changes from isotope profiles. (In: Waddington, E.D.; Walder, J.S., eds. *International Symposium on the Physical Basis of Ice Sheet Modelling, Vancouver, B.C., 9-22 August 1987. Proceedings. International Association of Hydrological Sciences. IAHS-AISH Publication*, no.170, p.269-281.) WDC No. 87002289. CRREL No. 42000323.

Grootes, P.M.; Stuiver, M. (1987) Isotopic alteration of firn cores. *Antarctic Journal of the United States*, 22(5), p.79-80. CRREL No. 43002744.

Grootes, P.M.; Stuiver, M. (1988) Oxygen-isotope records covering the last 2 ka at South Pole. (Abstract only) (In: Oeschger, H., ed. *Symposium on Ice-Core Analysis, Bern, Switzerland, March 30-April 3, 1987. Proceedings. Annals of Glaciology*, vol.10, p.203.)

Grootes, P.M.; Stuiver, M.; Thompson, L.G.; Mosley-Thompson, E. (1989) Oxygen isotope changes in tropical ice, Quelccaya, Peru. *Journal of Geophysical Research*, 94(D1), p.1187-1194.

Grosval'd, M.G. (1982) K interpretatsii novoi izotopno-kislorodnoi krivoi so Stantsiivostok. (Interpretation of the new oxygen-isotope curve from Vostok Station. *Akademiia Nauk SSR. Institut Geografii. Materialy Gliatsiologicheskikh Issledovanii. Khronika Obsuzhdeniia*, vol. 46, p.171-174. WDC No. 83001606. CRREL No. 37003900.

Hibler, W.D., III; Johnsen, S.J. (1979) 20-yr cycle in Greenland ice core records. *Nature*, 280(5722), p.481-483. CRREL No. 34000737.

Higashi, A.; Nakawo, M.; Narita, H.; Fujii, Y.; Nishio, F.; Watanabe, O. (1988) Preliminary results of analyses of 700 m ice cores retrieved at Mizuho Station, Antarctica. (In: Oeschger, H., ed. *Symposium on Ice-Core Analysis, Bern, Switzerland, March 30-April 3, 1987. Proceedings. Annals of Glaciology*, vol.10, p.52-56.)

Hoeller, A.E. (1982) Ice cores. (In: Hoeller, A.E., ed. Role of Environmental and Historical Evidence in Climate Reconstruction: A Preliminary Review and Appraisal. *Canadian Climate Centre. Report*, 82-3, p.29-39.) WDC No. 82001482.

Jeffries, M.O. (1983) Arctic ice shelf studies, Spring 1983. Canada. Defence Research Establishment Pacific. *Contractors Report*, 83-27, 31p. CRREL No. 39002207.

Jeffries, M.O. (1983) Isotope variations in ice cores from Ward Hunt Ice Shelf and Milne Ice Shelf, Ellesmere Island, N.W.T. *Canada. Defence Research Establishment Pacific. Contractors Report*, 83-56, 37p. CRREL No. 39002208.

Joussaume, S.; Jouzel, J.; Petit, J.R.; Sadourny, R. (1985) Modelization de la circulation generale atmospherique en liaison avec les recherches Antarctiques sur la reconstitution des paleoclimats. (Modelling of the general atmospheric circulation in connection with Antarctic research on paleoclimatic reconstruction.) (In: *Actes du Colloque sur la Recherche Francaise dans l'Antarctique, Grenoble 19/21 Septembre 1984. [Colloquium on French Research in the Antarctic, Grenoble, 19-21 September 1984. Proceedings.]* Comite National Francais des Recherches Antarctiques, p.49-50.) CRREL No. 40000573.

Jouzel, J.; Merlivat, L.; Lorius, C.; Pourchet, M. (1981) 30000 yr. climatic record. Main results deduced from $^{18}O$ and deuterium profiles from the Dome C ice core Antarctica. (In: *Symposium on Variations in the Global Water Budget, Oxford, UK, 10 August 1981. Proceedings*, 1p.) CRREL No. 38003810.

Jouzel, J.; Merlivat, L.; Lorius, C. (1982) Deuterium excess in an East Antarctic ice core suggests higher relative humidity at the oceanic surface during the last glacial maximum. *Nature*, 299(5885), p.688-691. WDC No. 83000962. CRREL No. 37001154.

Jouzel, J.; Lorius, C.; Petit, J.R.; Genthon, C.; Barkov, N.I.; Kotlyakov, V.M.; Petrov, V.M. (1987) Vostok ice core: a continuous isotope temperature record over the last climatic cycle (160,000 years) ice cores. *Nature*, 329(6138), p.403-408. WDC No. 87002368. CRREL No. 42000562.

Jouzel, J.; et al. (1988) Climatic interpretation of a continuous deuterium profile obtained from the Vostok, Antarctica, ice core [160 000 year]. (Abstract only) (In: Oeschger, H., ed. *Symposium on Ice-Core Analysis, Bern, Switzerland, March 30-April 3, 1987. Proceedings. Annals of Glaciology*, vol.10, p.206-207.)

Kato, K.; Watanabe, O.; Satow, K.; Okuhira, F. (1979) Rate of snow accumulation determined from oxygen isotope and stratigraphic analyses of the core from Mizuho Station, East Antarctic (extended abstract). (In: Nagata, T., ed. *Symposium on Antarctic Geosciences, 1st, Tokyo, September 27-28th, 1978. Proceedings. Tokyo. National Institute of Polar Research. Memoirs. Special Issue*, no.14, p.88-92.) WDC No. 80001794. CRREL No. 34002500.

Kato, K.; Watanabe, O. (1981) Oxygen isotope profiles in adjacent cores from Mizuho Station, East Antarctica. (In: Kusunoki, K., ed. *Symposium on Polar Meteorology and Glaciology, 3rd, Tokyo, 13-14 January 1981. Proceedings. Tokyo. National Institute of Polar Research. Memoirs. Special Issue*, 19, p.243-252.) WDC No. 82000462. CRREL No. 36002386.

Keigwin, L.D. (1982) Arctic Ocean ice sheet in the Pleistocene? *Nature*, 296(5860), p.808-809. WDC No. 84000442.

Kerr, R.A. (1984) Ice cap of 30 milion years ago detected. *Science*, 224(4645), p.141-142. WDC No. 84001238.

Koerner, R.M.; Fisher, D.A. (1981) Studying climatic change from Canadian high Arctic ice cores. (In: Harington, C.R., ed. *Climatic Change in Canada 2. Canada. National Museum of Natural Sciences. Syllogeus*, no.33, p.195-218.) WDC No. 81002659. CRREL No. 39003282.

Koerner, R.M.; Fisher, D.A. (1985) Devon Island ice core and the glacial record. (In: Andrews, J.T., ed. *Quaternary Environments: Eastern Canadian Arctic, Baffin Bay and Western Greenland*. Boston, Allen and Unwin, p.324-327. CRREL No. 39003935.

Koerner, R.M. (1988) Ice core records of paleoclimate; the late glacial/early Holocene period. (In: *Biennial Meeting of the American Quaternary Association, 10th, Amherst, MA, June 6-8. 1988. Program and Abstracts*, p.29-32.)

Kotliakov, V.M.; Macheret, IU.IA., Gordienko, F.G.; Zhuravlev, A.B. (1980) Geofizicheskie i izotopnye issledovaniia lednikov Shpitsbergena. (Geophysical and isotopic research of the Svalbard glaciers.) *Akademiia Nauk SSSR. Vestnik*, no.4, p.132-138. CRREL No. 37003182.

Kotlinkov, V.M.; Gordienko, F.G.; Barkov, N.I.; Korotkevich, E.S. (1980) Isotopic core investigations from Vostok Station and their paleoglaciological interpretation. *Antarktika - Doklady Komissii*, v.19, p.45-63. In Russian.

Kotliakov, V.M.; Gordienko, F.G.; Barkov, N.I.; Korotkevich, E.S. (1985) Isotopic core investigations from Vostok Station and their paleoglaciological interpretation. *Antarctic Committee Reports*, v.90, p.60-72.

Kotliakov, V.M. (1987) Evoliutsiia termicheskikh uslovii tsentral'noi Antarktidy za 150 tysiach let po izotopno-kislorodnym issledovaniiam kerna so Stantsii Vostok. (Evolution of thermal conditions in Central Antarctica for the last 150,000 years determined from oxygen isotope studies of a core from Vostok Station.) *Akademiia Nauk SSR. Institut Geografii. Materialy Gliatsiologicheskikh Issledovanii*, vol.59, p.30-37. WDC No. 87002448. CRREL No. 42001302.

Lawson, M.P.; Kuivinen, K.C.; Balling, R.C., Jr. (1982) Analysis of the climatic signal in the South Dome, Greenland ice core. *Climatic Change*, 4(4), p.375-384. CRREL No. 37002873.

Lawson, M.P.; Kuivinen, K.C. (1982) Assessment of the climatic information derived from the South Dome, Greenland, ice core. (In: Brubaker, L.B.; Chernicoff, S.E., eds. *Biennial Confernce of the American Quaternary Association; Character and Timing of Rapid Environmental and Climatic Changes, 7th, Seattle, WA, June 28-30, 1982. American Quaternary Association National Conference. Abstract* 7, p.119.)

LeTreut, H.; Portes, J.; Jouzel, J.; Ghil, M. (1988) Isotopic modeling of climatic oscillations; implications for a comparative study of marine and ice core records. *Journal of Geophysical Research*, Atmospheres, 93(D8), p.9365-9383.

Lorius, C. (1978) Climatic changes in Antarctica during the last 30,000 years. (In: *Colloque International: Evolution des Atmospheres Planetaires et Climatologie de la Terre, Nice, France, 16-20 October 1978. Papers.* Toulouse, France, Centre National d'Études Spatiales, p.71-82.)

Lorius, C.; Merlivat, L.; Jouzel, J.; Pourchet, M. (1979) 30,000-yr isotope climatic record from Antarctic ice. *Nature*, 280(5724), p.644-648. WDC No. 80001463. CRREL No. 34001839.

Lorius, C.; Merlivat, L.; Duval, P.; Jouzel, J.; Pourchet, M. (1981) Evidence of climatic change in Antarctica over the last 30,000 years from the Dome C ice core. (In: Allison, I., ed. *Symposium on Sea Level, Ice and Climate Change, Canberra, 7-8 December 1978. Proceedings. International Association of Hydrological Sciences. IAHS-AISH Publication*, no.131, p.217-225.)

Lorius, C. (1983) Data from Antarctic ice cores: climatic and environmental changes since the last glacial maximum. *Bull Inst Geol Bassin Aquitaine (Talence)*, 34, p.37-49.

Lorius, C. (1983) Donnees des carottes de glace de l'Antarctique: evolution du climat et de l'environnement atmospherique depuis le dernier maximum glaciaire. (Data from Antarctic ice cores: climatic and environmental changes since the last glacial maximum.) *France. Centre National de la Recherche Scientifique. Cahiers du Quaternaire. Special Issue*, p.37-49. WDC No. 84001594.

Lorius, C.; Jouzel, J.; Ritz, C.; Merlivat, L.; Barkov, N.I.; Korotkevich, Y.S.; Kotlyakov, V.M. (1985) 150,000-year climatic record from Antarctic ice. *Nature*, 316(6029), p.591-595. WDC No. 85001268.

Lyon, G.L. (1986) Stable isotope stratigraphy of ice cores and the age of the last eruption at Mount Melbourne, Antarctica. *New Zealand Journal of Geology and Geophysics*, 29(1), p.135-138. CRREL No. 41000610.

Mix, A.C.; Ruddiman, W.F. (1984) Oxygen-isotope analyses and Pleistocene ice volumes. *Quaternary Research*, 21, p.1-20. WDC No. 84000456.

Morgan, V.I. (1985) Oxygen isotope-climate record from the Law Dome, Antarctica. *Climatic Change*, 7(4), p.415-426. WDC No. 86000900. CRREL No. 40001924.

Morgan, V.I. (1985) Snow accumulation and oxygen isotope records in two adjacent ice cores. *Australian National Antarctic Research Expeditions. ANARE Research Notes*, v.28, p.25-31.

Nijampurkar, V.N.; Bhandari, N. (1984) Oxygen isotopic ratios of some Himalayan glaciers. *Tellus*, 36B(4), p.300-302. WDC No. 85000328. CRREL No. 39000596.

Nijampurkar, V.N. (1985) Isotopic and TL studies of Antarctic ice samples. (In: *Scientific Report of the 2nd Indian Antarctic Expedition. Technical Pbulication* 2. India, Department of Ocean Development, New Delhi, p.103-106.)

Oerter, H.; Baker, D.; Stichler, W.; Rauert, W. (1985) Isotope studies of ice cores from a temperate alpine glacier (Vernagtferner, Austria) with respect to the meltwater flow. (In: *Symposium on Snow and Ice Chemistry and the Atmosphere, Peterborough, Ontario, August 19-24, 1984. Proceedings. Annals of Glaciology*, vol.7, p.90-93.) WDC No. 86000816. CRREL No. 40002403.

## STABLE ISOTOPES (Cont.)


Oerter, H.; Moser, H.; Rauert, W.; Stichler, W.; Reinwarth, O. (1988) Isotope measurements on an ice core from a temperate Alpine glaicer [Vernagtferner, Austria]. (Abstract only) (In: Oeschger, H., ed. *Symposium on Ice-Core Analysis, Bern, Switzerland, March 30-April 3, 1987. Proceedings. Annals of Glaciology*, vol.10, p.214-215.)

Oeschger, H. (1982) Examples of environmental system information in polar ice cores. *EOS, Transactions, American Geophysical Union*, 63(18), p.297.

Oeschger, H. (1983) Late-glacial climatic history from ice cores. (In: Ghazi, A. *Workshop on Paleoclimatic Research and Models, Brussels, 15-17 December 1982. Report and Proceedings.* Dordrecht, D. Reidel Publishing Co., p.95-107.) CRREL No. 39003146.

Oeschger, H.; Beer, J.; Siegenthaler, U.; Stauffer, B.; Dansgaard, W.; Langway, C.C. (1984) Late glacial climate history from ice cores. (In: Hansen, J.E.; Takahashi, T., eds. *Climate Processes and Climate Sensitivity. Maurice Ewing Symposium, 4th, Palisades, NY, 1982. American Geophysical Union. Geophysical Monograph* no.29, *Maurice Ewing Series*, vol.5, p.299-306.) WDC No. 84001659. CRREL No. 38004254.

Paterson, W.S.B.; Hammer, C.U. (1987) Ice core and other glaciological data. (In: Ruddiman, W.F.; Wright, H.E., Jr., eds. *North America and Adjacent Oceans during the Last Deglaciation. Geology of North America*, vol.K-3, p.91-109.) CRREL No. 42002914.

Peel, D.A.; Mulvaney, R.; Davison, B.M. (1988) Stable-isotope/air-temperature relationships in ice cores from Dolleman Island and the Palmer Land Plateau, Antarctic Peninsula. (In: Oeschger, H., ed. *Symposium on Ice-Core Analysis, Bern, Switzerland, March 30-April 3, 1987. Proceedings. Annals of Glaciology*, vol.10, p.130-136.)

Peltier, W.R.; Hyde, W.T. (1987) Glacial isostasy and the ice age cycle. (In: Waddington, E.D.; Walder, J.S., eds. *International Symposium on the Physical Basis of Ice Sheet Modelling, Vancouver, B.C., 9-22 August 1987. Proceedings. International Association of Hydrological Sciences. IAHS-AISH Publication*, no.170, p.247-260.) WDC No. 87002287. CRREL No. 42000321.

Punning, IA.M.K.; Vaikmiae, R.A.; Kotliakov, V.M.; Gordienko, F.G. (1979) Izotopno-kislorodnye issledovaniia kerna s ledorazdela lednikov Grënford I Frit'of [O. Zapadnyi Shpitsbergen]. (Oxygen isotope studies of ice cores from the ice-divide of Grenfjord and Fritjof Glaciers [West Spitsbergen Island]. *Akademiia Nauk SSSR. Institut Geografii. Materialy Gliatsiologicheskikh Issledovanii. Khronika Obsuzhdeniia*, vol.37, p.173-177. WDC No. 80002721. CRREL No. 34003709.

Reeh, N.; Hojmark, H.; Thomsen, H.H.; Clausen, H.B. (1987) Greenland ice-sheet margin - a mine of ice for paleo- environmental studies. *Palaeogeography, Palaeoclimatology, Palaeoecology*, 58(3/4), p.229-234. WDC No. 87002237. CRREL No. 41003794.

Reinwarth, O.; Graf, W.; Stichler, W.; Moser, H.; Oerter, H. (1985) Investigations of the $^{18}O$ content of samples from snow pits and ice cores from the Filchner-Ronne Ice Shelves and Ekstrom Ice Shelf. (In: *Symposium on Snow and Ice Chemistry and the Atmosphere, Peterborough, Ontario, August 19-24, 1984. Proceedings. Annals of Glaciology*, vol.7, p.49-53.)

Robin, G. de Q. (1977) Ice cores and climatic change. *Royal Society of London, Philosophical Transactions, Series B*, vol.280, p.143-168.

Robin, G. de Q. (1981) Climate into ice: The isotopic record in polar ice sheets. (In: Allison, I., ed. *Symposium on Sea Level, Ice and Climate Change, Canberra, 7-8 December 1978. Proceedings. International Association of Hydrological Sciences. IAHS-AISH Publication*, no.131, p.207-216.)

Robin, G. de Q. (1983) Climatic record from ice cores. (In: Robin, G. d. Q. *Climate Record in Polar Ice Sheets*. Cambridge University Press, p.180-195.)

Robin, G. de Q., ed. (1983) *Climate Record in Polar Ice Sheets: A Study of Isotopic Temperature Profiles in Polar Ice Sheets Based on a Workshop Held in the Scott Polar Research Institute, Cambridge*. Cambridge University Press, 212p.

Robin, G. de Q. (1985) Contrast in Vostok core - Changes in climate or ice volume? *Nature*, 316(6029), p.578-579. WDC No. 85001271.

Rozanski, K.; Sonntag, C.; Munnich, K.O. (1982) Factors controlling stable isotope composition of European precipitation. *Tellus*, 34(2), p.142-150.

Schutze H. (1985) Isotopenforschung in der Antarktis. (Isotope research in Antarctic) *Urania*, 61(12), p.2-5. WDC No. 86001615.

## STABLE ISOTOPES (Cont.)


Shackleton, N.J.; Hall, M.A.; Line, J.; Cang, S. (1983) Carbon isotope data in core V19-30 confirm reduced carbon dioxide concentration in the ice age atmosphere. *Nature*, 306, p.319-322. WDC No. 84000473.

Shackleton, N.J.; Backman, J.; Zimmerman, H.; Kent, D.V.; Hall, M.A.; Roberts, D.G.; Schnitker, D.; Baldauf, J.G.; Desprairies, A., et al. (1984) Oxygen isotope calibration of the onset of ice-rafting and history of glaciation in the North Atlantic region. *Nature*, 307, p.620-623. WDC No. 84000474.

Shumskii, P.A.; Korotkevich, E.S.; Larina, T.B. (1980) Vozrast lda v burovykh skvazhinakh na stantsiiakh Vostok I Vostok-1. (Age of ice in drill holes at Vostok and Vostok-1.) *Sovetskaia Antarkticheskaia Ekspeditsiia. Informatsionnyi Biulleten*, no.100, p.41-48. WDC No. 820071. CRREL No. 35002030.

Siegenthaler U.; et al. (1988) Stable-isotope ratios and concentration of $CO_2$ in air from polar ice cores. (In: Oeschger, H., ed. *Symposium on Ice-Core Analysis, Bern, Switzerland, March 30-April 3, 1987. Proceedings. Annals of Glaciology*, vol.10, p.151-156.)

Souchez, R.; Groote, J.M. de (1985) $\delta\ ^{18}D$-$\delta\ ^{18}O$ relationships in ice formed by subglacial freezing: paleoclimatic implications. *Journal of Glaciology*, vol.31(109), p.229-232.) WDC No. 86001093. CRREL No. 40002677.

Souchez, R.; Tison, J.L.; Jouzel, J. (1987) Freezing rate determination by the isotopic composition of the ice. *Geophysical Research Letters*, 14(6), p.599-602. CRREL No. 42001256.

Souchez, R.; Lorrain, R.; Tison, J.L.; Jouzel, J. (1988) Co-isotopic signature of two mechanisms of basal-ice formation in Actic outlet glaciers. (In: Oeschger, H., ed. *Symposium on Ice-Core Analysis, Bern, Switzerland, March 30-April 3, 1987. Proceedings. Annals of Glaciology*, vol.10, p.163-166.)

Sowers, T.A.; Bender, M.L.; Raynaud, D.; Lorius, C. (1988) Elemental and isotopic composition of $O_2$ and $N_2$ gases in ice cores. (In: Oeschger, H., ed. *Symposium on Ice-Core Analysis, Bern, Switzerland, March 30-April 3, 1987. Proceedings. Annals of Glaciology*, vol.10, p.218.)

Sowers, T.; Bender, M.; Raynaud, D. (1989) Elemental and isotopic composition of occluded $O_2$ and $N_2$ in polar ice. *Journal of Geophysical Research*, 94(D4), p.5137-5150. CRREL No. 43002722.

Stockton, W.L.; Delaca, T.E.; DeNiro, M.J. (1984) Stable isotope analysis of a submarine ice cliff at Explorers Cove, Mcmurdo Sound, Antarctica. *Journal of Glaciology*, vol.30(104), p.112-115. WDC No. 84001987. CRREL No. 39000249.

Stuiver, M.; Yang, I.C.; Denton, G.H.; Kellogg, T.B. (1983) Oxygen isotope ratios of Antarctic permafrost and glacier ice. *American Geophysical Union. Antarctic Research Series*, no.33, p.131-139. WDC No. 84000481.

Sullivan, W. (1981) Ancient ice yielding secrets of climate. *New York Times*, Aug 9, p.1, 15. WDC No. 81001319.

Thompson, L.G.; Hastenrath, S.; Arnar, B.M. (1979) Climatic ice core records from the tropical Quelccaya ice cap. *Science*, v.203, p.1240-1243. WDC No. 79001115.

Thompson, L.G. (1979) Glaciology of the Peruvian Quelccaya Ice Cap. *Sociedad Geologica del Peru. Boletin*, 63, p.149-158. WDC No. 85000998.

Thompson, L.G.; Hastenrath, S.L. (1981) Climatic ice core studies at Lewis Glacier, Mount Kenya. *Zeitschrift für Gletscherkunde und Glazialgeologie*, 17(1), p.115-123. WDC No. 84000482.

Thompson, L.G.; Mosley-Thompson, E. (1987) Evidence of abrupt climatic change during the last 1,500 years recorded in ice cores from the tropical Quelccaya Ice Cap, Peru. (In: Berger, W.H.; Labeyrie, L.D., eds. *Abrupt Climatic Changes; Evidence and Implications, St. Hugues de Biviers, France, October 1985. NATO Advanced Study Institutes Series. Series C; Mathematical and Physical Sciences*, vol.216, p.99-110.)

Vaikmiae, R.A.; Punning, Ia.-M.K. (1982) Izotopno-geokhimicheskie issledovaniia na lednikovom kupole Vavilova, Severnaia Zemlia. (Isotope-geochemical studies on the Vavilov ice dome in Severnaya Zemlya.) *Akademiia Nauk SSR. Institut Geografii. Materialy Gliatsiologicheskikh Issledovanii. Khronika Obsuzhdeniia*, 44, p.145-149. WDC No. 83000647. CRREL No. 37001673.

Vaikmiae, R.; Punning, J.M. (1984) Isotope-geochemical investigations on glaciers in the Eurasian Arctic. (In: Mahaney, W.C., ed. *Correlation of Quaternary Chronologies, Symposium, York University, Toronto*. Geo Books, Norwich, p.385-393.)

Vaikmiae, R.A.; Martma, T.A.; Punning, IA.-M.K.; Tyugu, K.R. (1984) Variatsii isotopa $^{18}O$ i Cl v lednikova kerne zapadnogo ledianogo polia na o. Severo-Vostochnaia Zemlia. (Variation of the $^{18}O$ isotope and Cl ion in ice cores of Vestfonna, Nordaustlandet.) *Akademiia Nauk SSSR. Institut Geografii. Materialy Gliatsiologicheskikh Issledovanii*, vol.51, p.192-195. CRREL No. 40000874.

Vaikmiae, R.A.; Martma, T.A.; Punning, Y.M.K.; Tyugu, K.R. (1985) Variations in $\delta\ ^{18}O$ and $Cl^-$ in an ice core from Vestfonna, Nordaustlandet. *Polar Geography and Geology*, 9(4), p.329-333.

## STABLE ISOTOPES (Cont.)

Watanabe, O.; Kato, K.; Satow, K. (1981) Some results on oxygen isotope and stratigraphic analyses of firn in Mizuho Plateau, East Antarctica. (In: Kusunoki, K., ed. *Symposium on Polar Meteorology and Glaciology, 3rd, Tokyo, 13-14 January 1981. Proceedings. Tokyo. National Institute of Polar Research. Memoirs. Special Issue*, 19, p.264-279.) WDC No. 82000464. CRREL No. 36002388.

Watanabe, O.; Fujii, Y.; Satow, K. (1988) Depositional regime of the katabatic slope from Mizuho Plateau to the coast, East Antarctica. (In: Oeschger, H., ed. *Symposium on Ice-Core Analysis, Bern, Switzerland, March 30-April 3, 1987. Proceedings. Annals of Glaciology*, vol.10, p.188-192.)

White, J.; Johnsen, S.J.; Dansgaard, W. (1988) Origin of Arctic precipitation as deduced from its deuterium excess. (Abstract only) (In: Oeschger, H., ed. *Symposium on Ice-Core Analysis, Bern, Switzerland, March 30-April 3, 1987. Proceedings. Annals of Glaciology*, vol.10, p.219-220.)

Wishart, E.R. (1985) Evidence of Southern Hemisphere warming from oxygen isotope records of Antarctic ice. (In: Jacka, T.H., ed. *Australian Glaciological Research; 1982-1985. Australian Department of Science and Technology. Antarctic Division. Australian National Antarctic Research Expedition. Research Notes*, no.28, p.36-44.) WDC no. 85001757.

Young, N.W. (1981) Climate from ice-core studies. (In: Young, N.W., comp. *Antarctica: Weather and Climate*, 9p.) CRREL No. 37001386.

Young, N.W.; Raynaud, D.; DeAngelis, M.; Petit, J.R.; Lorius, C. (1984) Past changes of the Antarctic ice sheet in Terre Adelie as deduced from ice-core data and ice modelling. (Abstract only) (In: *Symposium on Ice and Climate Modeling, Evanston, IL, June 27-July 1, 1983. Annals of Glaciology*, vol.5, p.239.)

## TRAPPED GAS COMPOSITION

Barnola, J.M.; Raynaud, D.; Neftel, A.; Oeschger, H. (1983) Comparison of $CO_2$ measurements by two laboratories on air from bubbles in polar ice. *Nature*, 302(5916), p.410-413. WDC No. 83001334.

Barnola, J.M.; Raynaud, C.; Lorius, J.; Korotkevitch, Y.S.; Genthon, C. (1987) Atmospheric $CO_2$ variations over the last climatic cycle (160.000 years) deduced from the Vostok ice core. *CEA Centre d'Études Nucleaires de Saclay, Gif-sur-Yvette (France). Dept. de Physico-Chimie. Report*, no.CEA-CONF-9058, 4p. NTIS No. DE88752594.

Barnola, J.M.; Raynaud, D.; Korotkevich, E.S.; Lorius, C. (1987) Vostok ice core provides 160,000-year record of atmospheric $CO_2$. *Nature*, 329(6138), p.408-414. WDC No. 87002369. CRREL No. 42000563.

Barnola, J.M.; Genthon, C.; Raynaud, D.; Jouzel, J.; Korotkevich, E.S.; Lorius, C. (1988) Atmospheric $CO_2$ variations over the last climatic cycle (160 000 years), deduced from the Vostok, Antarctica, ice core. (Abstract only) (In: Oeschger, H., ed. *Symposium on Ice-Core Analysis, Bern, Switzerland, March 30-April 3, 1987. Proceedings. Annals of Glaciology*, vol.10, p.199-200.)

Berner, W.; Stauffer, B.; Oeschger, H. (1978) Past atmospheric composition and climate, gas parameters measured on ice cores. *Nature*, 276(5683), p.53-55.

Breuer, G. (1983) Luftblasen im gletschereis. (Air bubbles in glacier ice.) *Naturwissenschaftliche Rundschau*, 36(6), p.289-290.

Broecker, W.S. (1984) Carbon dioxide circulation through ocean and atmosphere. *Nature*, 308, p.602. WDC No. 84001794.

Broecker, W.S.; Peteet, D.M.; Rind, D. (1985) Does the ocean-atmosphere system have more than one stable mode of operation. *Nature*, 315(6014), p.21-26. WDC No. 85001757. CRREL No. 39003890.

Broecker, W.S.; Peng, T.H. (1987) Role of $CaCO_3$ compensation in the glacial to interglacial atmospheric $CO_2$ change. *Global Biogeochemical Cycles*, 1(1), p.15-29. CRREL No. 42001620.

Budd, W.F. (1980) Importance of the Antarctic regions for studies of the atmospheric carbon dioxide concentration. (In: *Carbon Dioxide and Climate: Australian Research*. Australian Academy of Science, p.115-128.) WDC No. 84000413.

Campbell, P. (1984) New data upset ice age theories. *Nature*, 307, p.688-689. WDC No. 84000414.

Craig, H.; Chou, C.C. (1982) Helium isotopes and gases in Dye 3 ice cores. *EOS, Transactions, American Geophysical Union*, 63(18), p.298.

Craig, H.; Chou, C.C. (1982) Methane: The record in polar ice cores. *Geophysical Research Letters*, 9(11), p.1221-1224. WDC No. 83000903. CRREL No. 37001847.

Craig, H. (1988) Isotopic composition of methane in polar ice cores. *Science*, 242(4885), p.1535-1539. CRREL No. 43001563.

DeAngelis, M.; Barkov, N.I.; Petrov, V.N. (1987) Aerosol concentrations over the last climatic cycle (160 kyr) from an Antarctic ice core. *Nature*, 325(6102), p.318-321. WDC No. 87000046.

## TRAPPED GAS COMPOSITION (Cont.)

Delmas, R. (1980) Gaz carbonique atmospherique du passe. (Atmospheric carbon dioxide of the past.) *Recherche*, 11(114), p.992-994. CRREL No. 38003036.

Delmas, R.J.; Ascencio, J.-M.; Legrand, M. (1980) Polar ice evidence that atmospheric $CO_2$ 20,000 yr bp was 50 percent of present. *Nature*, 284(5752), p.155-157. WDC No. 83000194.

Enting, I.G.; Mansbridge, J.V. (1987) Incompatibility of ice-core $CO_2$ data with reconstructions of biotic $CO_2$ sources. *Tellus*, 39B(3), p.318-325. CRREL No. 41004207.

Etheridge, D.M. (1985) Gas extraction and analysis from Antarctic ice cores. *Australian National Antarctic Research Expeditions. ANARE Research Notes*, v.28, p.32-35.

Etheridge, D.M.; Pearman, G.I.; de Silva, F. (1988) Atmospheric trace-gas variations as revealed by air trapped in an ice core from Law Dome, Antarctica. (In: Oeschger, H., ed. *Symposium on Ice-Core Analysis, Bern, Switzerland, March 30-April 3, 1987. Proceedings. Annals of Glaciology*, vol.10, p.28-33.)

Fireman, E.L.; Norris, T.L. (1982) Ages and composition of gas trapped in Allan Hills and Byrd core ice. *Earth and Planetary Science Letters*, 60(3), p.339-350. WDC No. 83000207. CRREL No. 37000881.

Friedli, H.; Moor, E.; Oeschger, H.; Siegenthaler, U.; Stauffer, B. (1984) C-13/C-12 ratios in $CO_2$ extracted from Antarctic ice. *Geophysical Research Letters*, 11(11), p.1145-1148. WDC No. 85000622. CRREL No. 39001422.

Friedli, H.; Lotscher, H.; Oeschger, H.; Siegenthaler, U.; Stauffer, B. (1986) Ice core record of the 13C/12C ratio of atmospheric $CO_2$ in the past two centuries. *Nature*, 324(6094), p.237-238. WDC No. 87000050.

Genthon, C. (1987) Vostok ice core: climatic response to $CO_2$ and orbital forcing changes over the last climatic cycle. *Nature*, 329(6138), p.414-418. CRREL No. 42000564.

Herron, S.L.; Langway, C.C., Jr. (1987) Derivation of paleoelevations from total air content of two deep Greenland ice cores. (In: Waddington, E.D.; Walder, J.S., eds. *International Symposium on the Physical Basis of Ice Sheet Modelling, Vancouver, B.C., 9-22 August 1987. Proceedings. International Association of Hydrological Sciences. IAHS-AISH Publication*, no.170, p.283-295.) WDC No. 87002290. CRREL No. 42000324.

Higashi, A.; Nakawo, M.; Enomoto, H. (1983) Bubble close-off density of ice in Antarctic ice sheets. (In: Kusunoki, K., ed. *Symposium on Polar Meteorology and Glaciology, 5th, December 7-9, 1982, National Institute of Polar Research, Tokyo. Proceedings. Tokyo. National Institute of Polar Research. Memoirs. Special Issue*, no.29, p.135-158.) WDC No. 84000663. CRREL No. 38002011.

Hondoh, T.; Anzai, H.; Hayakawa, N.; Mae, S.; Higashi, A.; Langway, C.C., Jr. (1988) X-ray structure analyses of air hydrates in a Dye 3, Greenland, deep ice core. (Abstract only) (In: Oeschger, H., ed. *Symposium on Ice-Core Analysis, Bern, Switzerland, March 30-April 3, 1987. Proceedings. Annals of Glaciology*, vol.10, p.205.)

Horibe, Y.; Shigehara, K.; Langway, C.C., Jr. (1985) Chemical and isotopic composition of air inclusions in a Greenland ice core. *Earth and Planetary Science Letters*, 73, p.207-210. WDC No. 85002044.

Jenssen, D.; Radok, U. (1982) On the joint interpretation of total gas contents and stable isotope ratios in ice cores. (In: *International Symposium on Antarctic Glaciology, 3rd, Columbus, OH, September 7-12, 1981. Proceedings. Annals of Glaciology*, vol.3, p.152-155.) WDC No. 83000431. CRREL No. 37000263.

Khalil, M.A.K.; Rasmussen, R.A. (1988) Nitrous oxide; trends and global mass balance over the last 3000 years. (In: Oeschger, H., ed. *Symposium on Ice-Core Analysis, Bern, Switzerland, March 30-April 3, 1987. Proceedings. Annals of Glaciology*, vol.10, p.73-79.)

Lorius, C.; Raynaud, D.; Petit, J.R.; Jouzel, J.; Merlivat, L. (1983) Late-glacial maximum-Holocene atmospheric and ice-thickness changes from Antarctic ice-core studies. (In: *Symposium on Ice and Climate Modelling, Northwestern University, Evanston, IL, 27 June-1 July 1983. Proceedings. Annals of Glaciology*, vol.5, p.88-94.) WDC No. 84001934. CRREL No. 39000179.

Lorius, C.; Raynaud, D. (1983) Record of past atmospheric $CO_2$ from tree-ring and ice core studies. (In: Bach, W., ed. *Carbon Dioxide: Current Views and Developments in Energy/Climate Research*. D. Reidel Publishing Company, p.145-176.) WDC No. 84000452. CRREL No. 38002658.

Lorius, C. (1984) Data from Antarctic ice cores on $CO_2$, climate, aerosols, and changes in ice thickness. *Environment of West Antarctica: Potential $CO_2$-induced changes. Report of a workshop held in Madison, WI, 5-7 July 1983*, National Research Council. Committee on Glaciology Polar Research Board. Washington, DC. National Academy Press, p.49-62.) WDC No. 84001686. CRREL No. 39001499. NTIS No. PB85-110 757

## TRAPPED GAS COMPOSITION (Cont.)


Lorius, C.; et al. (1986) Dernier cycle climatique (150,000 ans) a partir d'une carotte de glace de l'Antarctique. (Last climatic cycle (150,000 years) from an Antarctic ice core.) (In: *Oscillations Climatiques Entre 125 000 ans et le Maximum Glaciaire; Colloque de l'Association Francaise pour l'Étude du Quaternaire, Rennes, France, June 19-21, 1985. Bulletin de l'Association Francaise pour l'Étude du Quaternaire*, 23(25-2), 28p.)

Lorius, C.; et al. (1988) Antaractic ice core; $CO_2$ and climatic change over the last climatic cycle. *EOS, Transactions, American Geophysical Union*, 69(26), p.681, 683-684.

MacKinnon, P.K. (1979) *Paleoclimate as Revealed by Polar Ice Cores*. Unpaged. WDC No. 85002071.

Neftel, A.; Oeschger, H.; Schwander, J.; Stauffer, B.; Zumbrunn, R. (1982) Ice core sample measurements give atmospheric $CO_2$ content during the past 40,000 yr. *Nature*, 295(5846), p.220-223. WDC No. 82000608.

Neftel, A.; Oeschger, H.; Schwander, J.; Stauffer, B. (1983) Carbon dioxide concentration in bubbles of natural cold ice. (In: *International Symposium on the Physics and Chemistry of Ice, 6th, Rolla, Missouri, August 2-6 1982. Journal of Physical Chemistry*, 87(21), p.4116-4120.) WDC No. 84001830. CRREL No. 38001585.

Neftel, A.; Moor, E.; Oeschger, H.; Stauffer, B. (1985) Evidence from polar ice cores for the increase in atmospheric $CO_2$ in the past two centureis. *Nature*, 315(6014), p.45-47. WDC No. 85000981.

Neftel, A.; Oeschger, H.; Staffelbach, T.; Stauffer, B. (1988) $CO_2$ record in the Byrd ice core 50,000-5,000 years BP. *Nature*, 331(6157), p.609-611. CRREL No. 42002600.

Ocampo, J. (1988) Gas diffusion and fractionation in clathrated ice-core samples. (Abstract only) (In: Oeschger, H., ed. *Symposium on Ice-Core Analysis, Bern, Switzerland, March 30-April 3, 1987. Proceedings. Annals of Glaciology*, vol.10, p.214.)

Oeschger, H. (1980) History of atmospheric $CO_2$ as revealed from ice core studies. *World Meteorological Organization, Geneva, WMO Project on Research and Monitoring of Atmospheric $CO_2$, Report*, no.1, Appendix G, 5p.

Oeschger, H.; Stauffer, B.; Neftel, A.; Schwander, J.; Zumbrunn, R. (1982) Atmospheric $CO_2$ content in the past deduced from ice-core analysis. (In: *International Symposium on Antarctic Glaciology, 3rd, Columbus, OH, September 7-12, 1981. Proceedings. Annals of Glaciology*, vol.3, p.227-232.) WDC No. 83000445. CRREL No. 37000277.

Oeschger, H. (1985) North Atlantic deep water formation: information from ice cores. (In: Bennett, T.; et. al., eds. *Symposium on North Atlantic Deep Water Formation, Palisades, NY, February 1985. U.S. National Aeronautics and Space Administration, Goddard Institute for Space Studies*, NASA-CP-2367, p.23-27.)

Oeschger, H.; Stauffer, B.; Finkel, R.; Langway, C.C., Jr. (1985) Variations of the $CO_2$ concentration of occluded air and of anions and dust in polar ice cores. (In: *The Carbon Cycle and Atmospheric $CO_2$: Natural Variations Archean to Present 32*. Washington, DC. American Geophysical Union. Geophysical Monograph, p.132-142.) WDC No. 86001130. CRREL No. 40002798.

Oeschger, H.; Stauffer, B. (1986) Review of the history of atmospheric $CO_2$ recorded in ice cores. (In: *Changing Carbon Cycle: A Global Analysis*. New York, Springer-Verlag, p.89-108.) CRREL No. 41002221.

Oeschger, H.; Neftel, A.; Staffelbach, T.; Stauffer, B. (1988) Dilemma of the rapid variations in $CO_2$ in Greenland ice cores. (Abstract only) (In: Oeschger, H., ed. *Symposium on Ice-Core Analysis, Bern, Switzerland, March 30-April 3, 1987. Proceedings. Annals of Glaciology*, vol.10, p.215-216.)

Pearman, G.I.; Etheridge, D.; DeSilva, F.; Fraser, P.J. (1986) Evidence of changing concentrations of atmospheric $CO_2$, $N^2O$ and $CH^4$ from air bubbles in Antarctic ice. *Nature*, 320(6059), p.248-250. CRREL No. 40002969.

Rasmussen, K.L.; Clausen, H.B.; Risbo, T. (1984) Nitrate in the Greenland Ice sheet in the years following the 1908 Tunguska event. *Icarus*, 58(1), p.101-108. WDC No. 85001807.

Raynaud, D. (1978) Crystal size and total gas content of ice: two indicators of the climatic evolution of polar ice sheets. (In: *Colloque International: Evolution des Atmospheres Planetaires et Climatologie de la Terre, Nice, France, 16-20 October 1978. Papers*. Toulouse, France, Centre National d'Études Spatiales, p.83-94.)

Raynaud, D.; Lebel, B. (1979) Total gas content and surface elevation of polar ice sheets. *Nature*, 281(5729), p.289-291. WDC No. 80001376. CRREL No. 34001426.

Raynaud, D.; Delmas, R.; Ascensio, J.M.; Legrand, M. (1982) Gas extraction from polar ice cores: a critical issue for studying the evolution of atmospheric $CO_2$ and ice-sheet surface elevation. (In: *International Symposium on Antarctic Glaciology, 3rd, Columbus, OH, September 7-12, 1981. Proceedings. Annals of Glaciology*, vol.3, p.265-268.) WDC No. 83000452. CRREL No. 37000284.

## TRAPPED GAS COMPOSITION (Cont.)


Raynaud, D.; Barnola, J.M. (1983) $CO_2$ record in ice cores; a reconstruction of the atmospheric revolution between 18 ka BP and 1850 AD. (Abstract only) (In: *Symposium on Ice and Climate Modelling, Northwestern University, Evanston, IL, 27 June-1 July 1983. Proceedings. Annals of Glaciology*, vol.5, p.224.)

Raynaud, D.; Barnola, J.M. (1985) Antarctic ice core reveals atmospheric $CO_2$ variations over the past few centuries. *Nature*, 315(6017), p.309-311. WDC No. 85000985.

Raynaud, D. (1985) Interactions entre le $CO_2$ atmospherique et le climat: l'approche glaciologique. (Interactions between atmospheric $CO_2$ and climate: glaciological approach.) (In: *Actes du Colloque sur la Recherche Francaise dans l'Antarctique, Grenoble 19/21 Septembre 1984. [Colloquium on French Research in the Antarctic, Grenoble, 19-21 September 1984. Proceedings.]* Comite National Francais des Recherches Antarctiques, p.46-48.) CRREL No. 40000572.

Raynaud, D.; Barnola, J.M. (1986) $CO_2$ and climate: information from Antarctic ice core studies. (In: Ghazi, A.; Fantechi, R. *Current Issues in Climate Research; European Communities Climatology Programme Symposium. Sophia Antipolis, France, 2-5 October 1984. Proceedings.* D. Reidel Publishing Company, p.240. WDC No. 86001613.

Raynaud, D. (1988) Climatic and $CH^4$ cycle implications of glacial-interglacial $CH^4$ change in the Vostok ice core. *Nature*, 333(6174), p.655-657. CRREL No. 42003188.

Saltzman, B.; Maasch, K.A. (1988) Orbital forcing and the Vostok ice core. *Nature*, 333(6169), p.123-124. CRREL No. 42003003.

Santanam, S.; Khalial, M.A.K. (1985) Increasing atmospheric methane; evidence from polar ice core measurements. *EOS, Transactions, American Geophysical Union*, 66(52), p.1362.

Schotterer, U.; Oeschger, H.; Wagenbach, D.; Munnich, K.O. (1985) Information on paleo-precipitation on a high-altitude glacier Monte Rosa, Switzerland. (In: Kuhn, M., ed. *Climate and Paleoclimate of Lakes, Rivers and Glaciers. Symposium on Climate and Paleoclimate of Lakes, Rivers and Glaciers, Igls, Austria, June 4-7, 1984. Proceedings. Zeitschrift für Gletscherkunde und Glazialgeologie*, vol.21, p.379-388.) WDC No. 86000711. CRREL No. 40001871.

Schwander, J. (1984) Age difference between polar ice and the air trapped in its bubbles. *Nature*, 311(5981), p.45-47. WDC No. 84001621.

Shoji, H.; Langway, C.C., Jr. (1982) Air hydrate inclusions in fresh ice core. *Nature*, 298(5874), p.548-550. WDC No. 83000309. CRREL No. 37000413.

Siegenthaler, U.; Wenk, T. (1984) Rapid atmospheric $CO_2$ variations and ocean circulation. *Nature*, 308(5960), p.624-626.

Siegenthaler, U.; Oeschger, H. (1987) Biospheric $CO_2$ emissions during the past 200 years reconstructed by deconvolution of ice core data. *Tellus*, 39B(1-2), p.140-154. WDC No. 87001739. CRREL No. 41003196.

Siegenthaler, U. (1988) On the relationship between $^{18}O/^{16}O$ ratios of precipitation and climate. (Abstract only) (In: Oeschger, H., ed. *Symposium on Ice-Core Analysis, Bern, Switzerland, March 30-April 3, 1987. Proceedings. Annals of Glaciology*, vol.10, p.217.)

Staffelbach, T.; Stauffer, B.; Oeschger, H. (1988) Detailed analysis of the rapid changes in ice-core parameters during the last ice age. (In: Oeschger, H., ed. *Symposium on Ice-Core Analysis, Bern, Switzerland, March 30-April 3, 1987. Proceedings. Annals of Glaciology*, vol.10, p.167-170.)

Stauffer, B.; Berner, W.; Oeschger, H.; Schwander, J. (1981) Atmospheric $CO_2$ history from ice core studies. *Zeitschrift für Gletscherkunde und Glazialgeologie*, 17(1), p.1-15. CRREL No. 37001084.

Stauffer, B.; Hofer, H.; Oeschger, H.; Schwander, J.; Siegenthaler, U. (1983) Atmospheric $CO_2$ concentration during the last glaciation. (In: *Symposium on Ice and Climate Modelling, Northwestern University, Evanston, IL, 27 June-1 July 1983. Proceedings. Annals of Glaciology*, vol.5, p.160-164.) WDC No. 84001946. CRREL No. 39000191.

Stauffer, B.; Schwander, J. (1983) Core processing and analysis of ice cores drilled at the South Pole. *Antarctic Journal of the United States*, 18(5), p.114-116. WDC No. 84001887. CRREL No. 39000012.

Stauffer, B.; Schwander, J. (1984) Core processing and first analysis of ice cores from Siple and South Pole Stations. *Antarctic Journal of the United States*. Special Issue, 19(5), p.59-60. WDC No. 86000962. CRREL No. 40001773.

Stauffer, B. (1985) Composition of ancient atmosphere, based on ice-core analyses. *Antarctic Journal of the United States*, 20(5), p.72-73. WDC No. 87000724. CRREL No. 41002632.

Stauffer, B.; Fischer, G.; Neftel, A.; Oeschger, H. (1985) Increase of atmospheric methane recorded in Antarctic ice core. *Science*, 220(4720), p.1386-1388. WDC No. 85001811.

## TRAPPED GAS COMPOSITION (Cont.)


Stauffer, B.; Neftel, A.; Oeschger, H.; Schwander, J. (1985) $CO_2$ concentration in air extracted from Greenland ice samples. *American Geophysical Union. Geophysical Monograph Series*, no.33, p.85-89. WDC No. 85001664. CRREL No. 39003571.

Stauffer, B.; Oeschger, H. (1985) Gaseous components in the atmosphere and the historic record revealed by ice cores. (In: *Symposium on Snow and Ice Chemistry and the Atmosphere, Peterborough, Ontario, August 19-24, 1984. Proceedings. Annals of Glaciology*, vol.7, p.54-59. WDC No. 86000811. NTIS No. 40002398

Stauffer, B.; Lochbronner, E.; Oeschger, H.; Schwander, J. (1988) Methane concentration in the glacial atmosphere was only half that of the preindustrial Holocene. *Nature*, 332(6167), p.812-814. CRREL No. 42002860.

Strauch, G.; Kowski, P. (1982) Extractive method for obtaining gas inclusions from ice. *DDR. Akademie der Wissenschaften. Zentralinstitut für Isotopen- und Strahlenforschung. ZFI-Mitteilungen*, no.51, p.41-48. WDC No. 84001515. CRREL No. 38000754.

Strauch, G.; Kovsky, P. (1983) Air-bubble composition in ice samples from a deep hole in the vicinity of Novolazarvskaya Station. *Sovetskaia Antarkticheskaia Ekspeditsiia. Informatsionnyi Biulleten*, v.103, p.32-36. CRREL No. 38002841.

Sundquist, E.T. (1987) Global carbon cycle and Quaternary paleoclimates. *Episodes*, 10(1), p.7-10. WDC No. 87002173.

Sundquist, E.T. (1987) Ice core links $CO_2$ to climate. *Nature*, 329(6138), p.389-390. CRREL No. 42000561.

Symposium on ice and climate modelling, Northwestern University, Evanston, IL, 27 June-1 July 1983. Proceedings. (1983) *Annals of Glaciology*, vol.5, 243p. WDC No. 84001917. CRREL No. 39000162.

Thompson, S.L.; Schneider, S.H. (1981) Carbon dioxide and climate: ice and ocean. *Nature*, 290(5801), p.9-10.

Wigley, T.M.L. (1983) Pre-industrial carbon dioxide level (Southern Hemisphere). *Climatic Change*, 5(4), p.315-320.

Zardini, D.; Raynaud, D.; Scharffe, D.; Seiler, W. (1988) $N_2O$ measurements on air extracted from Antarctic ice cores. (Abstract only) (In: Oeschger, H., ed. *Symposium on Ice-Core Analysis, Bern, Switzerland, March 30-April 3, 1987. Proceedings. Annals of Glaciology*, vol.10, p.222.)

Zumbrunn, R.; Neftel, A.; Oeschger, H. (1982) $CO_2$ measurements on 1-$cm^3$ ice samples with an IR laser spectrometer (IRLS) combined with a new dry extraction device. *Earth and Planetary Science Letters*, 60(2), p.318-324.

## AUTHOR LISTING


Ackley, S.F.; Keliher, T.E. (1979) Ice sheet internal radio-echo reflections and associated physical property changes with depth. *Journal of Geophysical Research*, 84(B10), p.5675-5680. WDC No. 80002127. CRREL No. 34000999.

Ageta, Y.; Kikuchi, T.; Kamiyana, K.; Okuhira, F. (1987) Glaciological Research Program in East Queen Maud Land, East Antarctica, Part 5, 1985. *Japanese Antarctic Research Expedition. JARE Data Report*, no.125, 71p. WDC No. 87002007. CRREL No. 41003668.

Ait Ouahman, A.; Glangeaud, F.; Benoist, J.P. (1983) Evolutive spectral analysis by autoregressive process of isotopic climatic data from Antarctica. (In: Cosnard, M.; Demongeot, J.; LeBreton, A., eds. *Lecture Notes in Biomathematics, No. 49, Rhythms in Biology and Other Fields of Application: Deterministic and Stochastic Approaches. Journees de la Societe Mathematique de France, Luminy, France, 14-18 September 1981. Proceedings*. Berlin, Springer, p.274-294.) CRREL No. 38004499.

Alderton, D.H.M.; Coleman, D.O. (1985) Ice cores and snow. *London. University. Monitoring and Assessment Centre. Technical Report*, no.31, p.97-153. WDC No. 86000583. CRREL No. 39003905.

Alley, R.B.; Bolzan, J.F. (1982) Polar firn densification and grain growth. (In: *International Symposium on Antarctic Glaciology, 3rd, Columbus, OH, September 7-12, 1981. Proceedings. Annals of Glaciology*, vol.3, p.7-11.) WDC No. 83000406. CRREL No. 37000238.

Alley, R.B.; Bentley, C.R. (1985) Firn studies at Upstream B, West Antarctica. *Antarctic Journal of the United States*, 20(5), p.65-66. WDC No. 87000719. CRREL No. 41002627.

Alley, R.B.; Bentley, C.R. (1986) Further firn studies on the Siple Coast of West Antactica. *Antarctic Journal of the United States*, 21(5), p.111-112. CRREL No. 43001621.

Alley, R.B.; Perepezko, J.H.; Bentley, C.R. (1986) Grain growth in polar ice: Pts. 1 and 2. *Journal of Glaciology*, 32(112), 415-433. WDC No. 87000682. CRREL No. 41004197.

Alley, R.B.; Bentley, C.R. (1987) Analysis of Siple Coast firn cores. *Antarctic Journal of the United States*, 22(5), p.70-71. CRREL No. 43002738.

Alley, R.B.; Bentley, C.R. (1988) Ice-core analysis of the Siple Coast of West Antarctica. (In: *International Symposium on Antarctic Glaciology, 4th, Bremerhaven, FRG, 7-11 September 1987. Proceedings. Annals of Glaciology*, vol.11, p.1-7.) CRREL No. 43001935.

Allison, I., ed. (1983) *Antarctic climate research; proposals for the implementation of a programme of Antarctic Research contributing to the World Climate Research Programme*. International Council of Scientific Unions. Scientific Committee on Antarctic Research, 65p. WDC No. 84001121.

Ambach, W. (1980) Zur kontamination von firnschichten durch radioaktiven fallout. (Contamination of firn layers by radioactive fallout.) *Polarforschung*, 50(1/2), p.17-22. WDC No. 81001874. CRREL No. 36000774.

Ambach, W.; Rehwald, W. (1982) Measurements of the decay rate of the gross beta activity in firn samples from an alpine glacier, Kesselwandferner, Otztal Alps, Austria. *Arctic and Alpine Research*, 14(2), p.163-166. WDC No. 83000483. CRREL No. 37000319.

Ambach, W.; Rehwald, W.; Blumthaler, M.; Elsner, H. (1987) Chernobyl fallout on Alpine glaciers: a new reference horizon for dating. *EOS*, vol.68, p.1577.

Andree, M., et al. (1984) $^{14}C$ dating of polar ice. *Nuclear Instruments and Methods in Physics Research*, B5(2), p.385-388. WDC No. 86001573.

Andree, M. et al. (1986) Dating polar ice by $^{14}C$ accelerator mass spectrometry. *Radiocarbon*, vol.28, p.417-423.

Andrews, J.T. (1980) Nomenclature applied to ice cores: A geological viewpoint. (In: MacKinnon, P., comp. *Ice Cores*. Boulder, Colorado, World Data Center A for Glaciology (Snow and Ice), *Glaciological Data, Report GD-8*, p.87-89.) CRREL No. 34004029.

Andrews, J.T., comp. (1983) Radiocarbon data list 5: Baffin Island, N.W.T., Canada. *Colorado. University. Institute of Arctic and Alpine Research. Occasional Paper*, no.40, 22p. WDC No. 84000926. CRREL No. 38002556.

Aristarain, A.J.; Delmas, R. (1981) First glaciological studies on the James Ross Island Ice Cap, Antarctic Peninsula. *Journal of Glaciology*, 27(97), p.371-379. WDC No. 81002573. CRREL No. 36001502.

Aristarain, A.J.; Jouzel, J.; Pourchet, M. (1986) Past Antarctic Peninsula climate (1850-1980) deduced from an ice core isotope record. *Climatic Change*, 8(1), p.69-89. WDC No. 86001774. CRREL No. 40002708.

Azuma, N.; Higashi, A. (1983) Mechanical properties of Dye 3 Greenland deep ice cores. (In: *Symposium on Ice and Climate Modelling, Northwestern University, Evanston, IL, 27 June-1 July 1983. Proceedings. Annals of Glaciology*, vol.5, p.1-8.) WDC No. 84001918. CRREL No. 39000163.

Baker, D. (1985) Comparison of the $^{2}H$ and $^{18}O$ content of ice core from a temperate alpine glacier (Vernagt ferner, Austria) with climatic data. (In: Kuhn, M., ed. *Climate and Paleoclimate of Lakes, Rivers and Glaciers. Symposium on Climate and Paleoclimate of Lakes, Rivers and Glaciers, Igls, Austria, June 4-7, 1984. Proceedings. Zeitschrift fur Gletscherkunde und Glazialgeologie*, vol.21, p.389-395.) WDC No. 86000712. CRREL No. 40001872.

Barkov, N.I.; Gordienko, F.G. (1980) Origin of McMurdo Sound glaciers from oxygen-isotopic ice analysis data. *Antarktika - Doklady Komissii*, v.19, p118-131. In Russian.

Barkov, N.I.; Voytylov, V.V.; Spartakov, A.A.; Tolstoy, N.A.; Trusov, A.A.; Gorshkov, E.S. (1984) Izuchenie granulometricheskogo sostava nikrochastits v ledianom kerne Stantsii Vostok elektroopticheskie metodom. (Study of the granulometric composition of ice core trace elements at Vostok Station by an electrooptical method.) *Sovetskaia Antarkticheskaia Ekspeditsiia. Informatsionnyi Builleten*, no.106, p.26-33. WDC No. 85000126. CRREL No. 39001007.

Barkov, N.I.; Gordienko, F.G. (1985) On the origin of the glaciers of the McMurdo Sound region based on the oxygen-isotopic analysis of ice. *Antarctic Committee Reports*, v.90, p.170-188.

Barkov, N.I.; et al. (1987) Antarctic ice core data over the last climatic cycle (150 ka) (In: Waddington, E.D.; Walder, J.S., eds. *International Symposium on the Physical Basis of Ice Sheet Modelling, Vancouver, B.C., 9-22 August 1987. Proceedings. International Association of Hydrological Sciences. IAHS-AISH Publication*, no.170, p.267-268.)

Barkov, N.I.; Lipenkov, V.Ia.; Petrov, V.N. (1988) Ice structure and crystal fabrics of the 2200 m ice core at Vostok Station, Antarctica. (Abstract only) (In: Oeschger, H., ed. *Symposium on Ice-Core Analysis, Bern, Switzerland, March 30-April 3, 1987. Proceedings. Annals of Glaciology*, vol.10, p.223.)

Barnola, J.M.; Raynaud, D.; Neftel, A.; Oeschger, H. (1983) Comparison of $CO_2$ measurements by two laboratories on air from bubbles in polar ice. *Nature*, 302(5916), p.410-413. WDC No. 83001334.

Barnola, J.M.; Raynaud, C.; Lorius, J.; Korotkevitch, Y.S.; Genthon, C. (1987) Atmospheric $CO_2$ variations over the last climatic cycle (160.000 years) deduced from the Vostok ice core. *CEA Centre d'Études Nucleaires de Saclay, Gif-sur-Yvette (France). Dept. de Physico-Chimie. Report*, no.CEA-CONF-9058, 4p. NTIS No. DE88752594.

Barnola, J.M.; Raynaud, D.; Korotkevich, E.S.; Lorius, C. (1987) Vostok ice core provides 160,000-year record of atmospheric $CO_2$. *Nature*, 329(6138), p.408-414. WDC No. 87002369. CRREL No. 42000563.

Barnola, J.M.; Genthon, C.; Raynaud, D.; Jouzel, J.; Korotkevich, E.S.; Lorius, C. (1988) Atmospheric $CO_2$ variations over the last climatic cycle (160 000 years), deduced from the Vostok, Antarctica, ice core. (Abstract only) (In: Oeschger, H., ed. *Symposium on Ice-Core Analysis, Bern, Switzerland, March 30-April 3, 1987. Proceedings. Annals of Glaciology*, vol.10, p.199-200.)

Barrie, L.A.; Fisher, D.; Koerner, R.M. (1985) Twentieth century trends in arctic air pollution revealed by conductivity and acidity observations in snow and ice in the Canadian High Arctic. *Atmospheric Environment*, 19(12), p.2055-2063. WDC No. 86001574.

Barry, R.G.; MacKinnon, P.K. (1980) Status and future of ice core data. (In: MacKinnon, P., comp. *Ice Cores*. Boulder, Colorado, World Data Center A for Glaciology (Snow and Ice), *Glaciological Data, Report GD-8*, p.1-4.) CRREL No. 34004021.

Batifol, F.; Boutron, C.; DeAngelis, M. (1989) Changes in copper, zinc and cadmium concentration in Antarctic ice during the past 40,000 years. *Nature*, 337(6207), p.544-546. CRREL No. 43001775.

Beer, J.; Siegenthaler, U.; Oeschger, H.; Andree, M.; Bonani, G.; Suter, M.; Wolfli, W.; Finkel, R.C.; Langway, C.C. (1983) Temporal $^{10}$Be variations. (In: *Cosmic Ray Conference*, Bangalore, August 1983. 4p.) WDC No. 83001335.

Beer, J.; Andree, M.; Oeschger, H.; Stauffer, B.; Balzer, R.; Bonani, G.; Stoller, C.; Suter, M.; Wolfli, W.; Finkel, R.C. (1983) Temporal $^{10}$Be variations in ice. *Radiocarbon*, 25, 10p. WDC No. 83001336.

Beer, J.; Oeschger, H.; Andree, M.; Bonani, G.; Suter, M.; Wolfli, W.; Langway, C.C., Jr. (1983) Temporal variations in the $^{10}$Be concentration levels found in the Dye 3 ice core, Greenland. (In: *Symposium on Ice and Climate Modelling, Northwestern University, Evanston, IL, 27 June-1 July 1983. Proceedings. Annals of Glaciology*, vol.5, p.16-17.) WDC No. 84001920. CRREL No. 39000165.

Beer, J., et al. (1984) Camp Century $^{10}$Be record: Implications for long-term variations of the geomagnetic dipole moment. *Nuclear Instruments and Methods in Physics Research*, B5(2), p.380-384. WDC No. 86001575.

Beer, J. (1985) $^{10}$Be variations in polar ice cores. *American Geophysical Union. Geophysical Monograph Series*, no.33, p.66-70. WDC No. 85001661. CRREL No. 39003568.

Beer, J. (1988) Information on past solar activity and geomagnetism from $^{10}$Be in the Camp Century ice core. *Nature*, 331(6158), p.675-679. CRREL No. 42002601.

Beer, J.; Oeschger, H.; Bonani, G.; Suter, M.; Wolfli, W. (1988) $^{10}$Be concentrations in Antarctic ice. (Abstract only) (In: Oeschger, H., ed. *Symposium on Ice-Core Analysis, Bern, Switzerland, March 30-April 3, 1987. Proceedings. Annals of Glaciology*, vol.10, p.200.)

Bender, M.; Labeyrie, L.D.; Raynaud, D.; Lorius, C. (1985) Isotopic composition of atmospheric $O_2$ in ice linked with deglaciation and global primary productivity. *Nature*, 318(6044), p.349-352.

Benoist, J.P.; Jouzel, J.; Lorius, C.; Merlivat, I.; Pourchet, M. (1982) Isotope climate record over the last 2.5 Ka from Dome C, Antarctica ice cores. (In: *International Symposium on Antarctic Glaciology, 3rd, Columbus, OH, September 7-12, 1981. Proceedings. Annals of Glaciology*, vol.3, p.17-22.) WDC No. 83000408. CRREL No. 37000240.

Benson, C.S. (1984) Ice core drilling on Mt. Wrangell, Alaska, 1982. (In: Holdsworth, G.; Kuivinen, K.C.; Rand, J.H., eds. *International Workshop/Symposium on Ice Drilling Technology, 2nd, Calgary, Alberta, August 30-31, 1982. Proceedings. U.S. Army. Cold Regions Research and Engineering Laboratory. Special Report*, SR 84-34, p.61-68.) WDC No. 86000625. CRREL No. 40001184. NTIS No. ADA-156 733.

Berner, W.; Stauffer, B.; Oeschger, H. (1978) Past atmospheric composition and climate, gas parameters measured on ice cores. *Nature*, 276(5683), p.53-55.

Bhandari, N.; Nijampukar, V.N.; Vohra, C.P. (1983) Radiometric chronology of some Himalayan glaciers. (In: Street-Perrott, A., et al. *Variations in the Global Water Budget*. D. Reidel Publishing Company, p.207-216.) WDC No. 84001210.

Blanc, P.L.; Fontugne, M.R.; Duplessy, J.C. (1983) Time-transgressive initiation of Boreal ice-caps: continental and oceanic evidence reconciled. *Palaeogeography, Paleoclimatology, Palaeoecology*, 42, p.211-224. WDC No. 84001211.

Blankenship, D.D.; Bentley, C.R. (1987) Crystalline fabric of polar ice sheets inferred from seismic anisotropy. (In: Waddington, E.D.; Walder, J.S., eds. *International Symposium on the Physical Basis of Ice Sheet Modelling, Vancouver, B.C., 9-22 August 1987. Proceedings. International Association of Hydrological Sciences. IAHS-AISH Publication*, no.170, p.17-28.) WDC No. 87002269. CRREL No. 42000303.

Bogorodskii, V.V.; Morev, V.A. (1984) Equipment and technology for core drilling in moderately cold ice. (In: *International Workshop/Symposium on Ice Drilling Technology, 2nd, Calgary, Alberta, 30-31 August 1982. Proceedings. U.S. Army. Cold Regions Research and Engineering Laboratory. Special Report*, SR 84-34, p.129-132.) CRREL No. 40001196.

Bogorodskii, V.V.; Morev, V.A.; Pukhov, V.A.; Iakovlev, V.M. (1984) New equipment and technology for deep core drilling in cold glaciers. (In: Holdsworth, G.; Kuivinen, K.C.; Rand, J.H., eds. *International Workshop/Symposium on Ice Drilling Technology, 2nd, Calgary, Alberta, August 30-31, 1982. Proceedings. U.S. Army. Cold Regions Research and Engineering Laboratory. Special Report*, SR 84-34, p.139-140.) WDC No. 86000640. CRREL No. 40001199. NTIS No. ADA-157 485

Bourgeois, J.C. (1986) Pollen record from the Agassiz Ice Cap, northern Ellesmere Island, Canada. *Boreas*, 15(4), p.345-354. CRREL No. 41003470.

Boutron, C.; Delmas, R.; Lorius, C. (1980) Homme a-t-il pollue l'atmosphere a une echelle globale? (Has man polluted the atmosphere on a global scale?) *Recherche*, 11(109), p.340-343. WDC No. 83000178.

Bourton, C.F. (1986) Atmospheric toxic metals and metalloids in the snow and ice layers deposited in Greenland and Antarctica from prehistoric times to present. (In: Nriagu, J.O.; Davidson, C.I., eds. *Toxic Metals in the Atmosphere. Advances in Environmental Science and Technology*, vol.17, p.467-505.) CRREL No. 41000672.

Boutron, C.F.; Patterson, C.C. (1986) Lead concentration changes in Antarctic ice during the Wisconsin/Holocene transition. *Nature*, 323(6085), p.222-225. WDC No. 86001920.

Boutron, C.F.; Patterson, C.C. (1987) Lead concentration changes in Antarctic ice during the Wisconsin/Holocene transition; corrigendum. *Nature*, 326(6113), p.626. WDC No. 87001467.

Boutron, C.F.; Patterson, C.C.; Petrov, V.N.; Barkov, N.I. (1987) Preliminary data on changes of lead concentrations in Antarctic ice from 155,000 to 26,000 years BP. *Atmospheric Environment*, 21(5), p.1197-1202. WDC No. 87002260. CRREL No. 41004603.

Boutron, C.F.; Patterson, C.C.; Lorius, C.; Petrov, V.N.; Barkov, N.I. (1988) Atmospheric lead in Antarctic ice during the last climatic cycle. (In: Oeschger, H., ed. *Symposium on Ice-Core Analysis, Bern, Switzerland, March 30-April 3, 1987. Proceedings. Annals of Glaciology*, vol.10, p.5-9.)

Bradley, R.S. (1983) Arctic precipitation-temperature relationships and the interpretation of ice core isotopic records. (In: Bradley, R.; et al. *Abstracts of the 12th Arctic Workshop, Amherst, MA, March 16-18, 1983*, p.16.)

Bradley, R.S. (1985) *Quaternary Paleoclimatology. Methods of Paleoclimatic Reconstruction*. Boston, Allen & Unwin, 472p. WDC No. 85001186. CRREL No. 39002885.

Braithwaite, R.J.; Clement, P.; Clausen, H. (1982) Inferences from a 19 m firn core, Nordbogletscher, South Greenland. Denmark. *Gronlands Geologiske Undersogelse. Rapport*, no.110, p.96-98. CRREL No. 37004327.

Breuer, G. (1983) Luftblasen im gletschereis. (Air bubbles in glacier ice.) *Naturwissenschaftliche Rundschau*, 36(6), p.289-290.

Briat, M.; Royer, A.; Petit, J.R.; Lorius, C. (1982) Late glacial input of eolian dust in Dome C ice core: additional evidence from individual microparticle analysis. (In: *International Symposium on Antarctic Glaciology, 3rd, Columbus, OH, September 7-12, 1981. Proceedings. Annals of Glaciology*, vol.3, p.27-31.) WDC No. 83000410. CRREL No. 37000242.

Broecker, W.S. (1981) Glacial and interglacial changes in ocean and atmosphere chemistry. (In: Berger, A. *Climatic Variations and Variability: Facts and Theories*. Dordrecht, Holland, D. Reidel Publishing Co., p.111-121.) CRREL No. 36003191.

Broecker, W.S. (1984) Carbon dioxide circulation through ocean and atmosphere. *Nature*, 308, p.602. WDC No. 84001794.

Broecker, W.S.; Peteet, D.M.; Rind, D. (1985) Does the ocean-atmosphere system have more than one stable mode of operation. *Nature*, 315(6014), p.21-26. WDC No. 85001757. CRREL No. 39003890.

Broecker, W.S.; Peng, T.H. (1987) Role of $CaCO_3$ compensation in the glacial to interglacial atmospheric $CO_2$ change. *Global Biogeochemical Cycles*, 1(1), p.15-29. CRREL No. 42001620.

Broecker, W.S. et al. (1988) Can the Greenland climatic jumps be identified in records from ocean and land? *Quaternary Research*, 30(1), p.1-6

Browning, J.A.; Bigl, R.A.; Somerville, D.A. (1979) Hot-water drilling and coring at Site J-9, Ross Ice Shelf. *Antarctic Journal of the United States*, 14(5), p.60-61. WDC No. 80003388. CRREL No. 35000649.

Budd, W.F. (1980) Importance of the Antarctic regions for studies of the atmospheric carbon dioxide concentra tion. (In: *Carbon Dioxide and Climate: Australian Research*. Australian Academy of Science, p.115-128.) WDC No. 84000413.

Budd, W.F.; Corry, M.J.; Jacka, T.H. (1982) Results from the Amery Ice Shelf project. (In: International *Symposium on Antarctic Glaciology, 3rd, Columbus, OH, September 7-12, 1981. Proceedings. Annals of Glaciology*, vol.3, p.36-41.)

Burckle, L.H.; Gayley, R.I.; Ram, M.; Petit,. J.R. (1988) Diatoms in Antarctic ice cores; some implications for the glacial history of Antarctica. *Geology*, 16(4), p.326-329.

Campbell, P. (1984) New data upset ice age theories. *Nature*, 307, p.688-689. WDC No. 84000414.

Chappell, J.; Shackleton, N.J. (1986) Oxygen isotopes and sea level. *Nature*, 324(6093), p.137-140. WDC No. 87000040.

Chiang, E.; Langway, C.C., Jr. (1978) Antarctic ice core recovery. *Antarctic Journal of the United States*, 13(4), p.59-61.

Clausen, H.B.; Stauffer, B. (1988) Analyses of two ice cores drilled at the ice-sheet margin in West Greenland. (In: Oeschger, H., ed. *Symposium on Ice-Core Analysis, Bern, Switzerland, March 30-April 3, 1987. Proceedings. Annals of Glaciology*, vol.10, p.23-27.)

Clausen, H.B.; Gundestrup, N.S.; Johnsen, S.J.; Bindschadler, R.; Zwally, J. (1988) Glaciological investigations in the Crete area, central Greenland; a search for a new deep-drilling site. (In: Oeschger, H., ed. *Symposium on Ice-Core Analysis, Bern, Switzerland, March 30-April 3, 1987. Proceedings. Annals of Glaciology*, vol.10, p.10-15.)

Clausen, H.B.; Hammer, C.U. (1988) Laki and Tambora eruptions as revealed in Greenland ice cores from 11 locations. (In: Oeschger, H., ed. *Symposium on Ice-Core Analysis, Bern, Switzerland, March 30-April 3, 1987. Proceedings. Annals of Glaciology*, vol.10, p.16-22.)

Clough, J.W. (1979) Ross Ice Shelf project 1978-79. *Antarctic Journal of the United States*, 14(5), p.60. WDC No. 80003387. CRREL No. 35000648.

Cole, D.M.; Gould, L.D.; Burch, W.B. (1985) System for mounting end caps on ice specimens. *Journal of Glaciology*, vol.31(109), p.362-365. WDC No. 86001110. CRREL No. 40002694.

Coleman, D.O.; Alderton, D.H.M.; Burton, M.A.S.; Hutton, M. (1985) Historical monitoring: a technical report. *Monitoring and Assessment Research Centre, Chelsea College, University of London. MARC Report*, 31, 320p.

Covey, C.; Haagenson, P.L. (1984) Model of oxygen isotope composition of precipitation: implications for paleoclimate data. *Journal of Geophysical Research*, 89(D3), p.4647-4655.

Covey, C.; Schneider, S.H. (1984) Models for reconstructing temperature and ice volume from oxygen isotope data. (In: *NATO Advanced Research Workshop on Milankovitch and Climate, Palisades, NY, November 30-December 4, 1982. Proceedings. NATO ASI Series, Series C: Mathematical and Physical Sciences*, vol.126. Dordrecht, Holland, D. Reidel Publishing, p.699-705.)

Cragin, J.H.; Giovinetto, M.B.; Gow, A.J. (1984) Baseline acidity of ancient precipitation from the South Pole. *U.S. Army. Cold Regions Research and Engineering Laboratory. Report*, 84-15, 12p. WDC No. 84001504. CRREL No. 39000387.

Craig, H.; Chou, C.C. (1982) Helium isotopes and gases in Dye 3 ice cores. *EOS, Transactions, American Geophysical Union*, 63(18), p.298.

Craig, H.; Chou, C.C. (1982) Methane: The record in polar ice cores. *Geophysical Research Letters*, 9(11), p.1221-1224. WDC No. 83000903. CRREL No. 37001847.

Craig, H.; Horibe, Y.; Sowers, T. (1988) Gravitational separation of gases and isotopes in polar ice caps. *Science*, 242(4885), p.1675-1678. CRREL No. 43001202.

Craig, H. (1988) Isotopic composition of methane in polar ice cores. *Science*, 242(4885), p.1535-1539. CRREL No. 43001563.

Dahl-Jensen, D.; Gundestrup, N.S. (1988) Flow properties of the inland ice at Camp Century, north-east Greenland. (Abstract only) (In: Oeschger, H., ed. *Symposium on Ice-Core Analysis, Bern, Switzerland, March 30-April 3, 1987. Proceedings. Annals of Glaciology*, vol.10, p.223.)

Danilov, I.D. (1987) Problems of global glaciation during the Quaternary. *Polar Geography and Geology*, 11(2), p.127-140. WDC No. 87002412. CRREL No. 42000814.

Dansgaard, W. (1980) Paleo-climatic studies on ice cores. (In: Oeschger, H.; Messerli, B.; Svilar, M. *Das Klima: Analysen und Modelle; Geschichte und Zukunft. (Climate: Analyses and Models; History and the Future.* Berlin. Springer-Verlag, p.237-245.) WDC No. 84000862. CRREL No. 37001768.

Dansgaard, W. (1981) Greenland ice sheet program (GISP) 1981: deep drilling completed. Denmark. Commission for Scientific Research in Greenland. *Newsletter*, 5, p.11-12. WDC No. 82000640. CRREL No. 36000841.

Dansgaard, W. (1981) Ice core studies: dating the past to find the future. *Nature*, 290(5805), p.360-361. WDC No. 81001402. CRREL No. 35002893.

Dansgaard, W. (1981) Paleo-climatic studies on ice cores. (In: Berger, A., ed. *Climatic Variations and Variability: Facts and Theories*. Dordrecht, NE. D. Reidel Publishing Co., p.193-206.) WDC No. 83001023. CRREL No. 36003192.

Dansgaard, W.; Reeh, N. (1982) Climatic interpretation of GISP ice core data. *EOS, Transactions, American Geophysical Union*, 63(18), p.298.

Dansgaard, W.; Clausen, H.B.; Gundestrup, N.; Hammer, C.U.; Johnsen, S.F.; Kristinsdottir, P.M.; Reeh, N. (1982) New Greenland deep ice core. *Science*, 218(4579), p.1273-1277. WDC No. 83000191.

Dansgaard, W.; Oeschger, H.; Langway, C.C. (1983) Ice core indications of abrupt climatic changes. (In: Ghazi, A., ed. *Workshop on Palaeoclimatic Research and Models, Brussels, 1982. Proceedings.* D. Reidel, p.72-73.)

Dansgaard, W.; Johnsen, S.J.; Clausen, H.B.; Dahl-Jensen, D.; Gundestrup, N.; Hammer, C.U.; Oeschger, H. (1984) North Atlantic climatic oscillations revealed by deep Greenland ice cores. (In: Hansen, J.E.; Takahashi, T., eds. *Climate Processes and Climate Sensitivity. Maurice Ewing Symposium, 4th, Palisades, NY, 1982. American Geophysical Union. Geophysical Monograph no.29, Maurice Ewing Series*, vol.5, p.288-298.) WDC No. 84001658. CRREL No. 38004253.

Dansgaard, W. (1985) Dating and climatic interpretation of two deep Greenland ice cores. American Geophysical Union. *Geophysical Monograph Series*, no.33, p.71-76. WDC No. 85001662. CRREL No. 39003569.

Dansgaard, W. (1985) Greenland ice core studies. *Palaeogeography, Paleoclimatology, Palaeoecology*, 50(2/3), p.185-187. WDC No. 86000381.

Dansgaard, W. (1985) Past environmental changes in the North-Atlantic region. (In: *International Conference on Port and Ocean Engineering under Arctic Conditions, 8th Narssarssuaq, Greenland, September 7-14,1985. Proceedings, vol. 1.* Horsholm, Denmark, Danish Hydraulic Institute, p.31-40.) WDC No. 86001657. CRREL No. 40000266.

Dansgaard, W.; Clausen, H.B.; Dahl-Jensen, D.; Gundestrup, N.; Hammer, C.U. (1986) Climatic history from ice core studies in Greenland. Data correction procedures. (In: Ghazi, A.; Fantechi, R., eds. *Current Issues in Climatic Research. European Communities Climatology Programme Symposium, Sophia Antipolis, France, 2-5 October 1984. Proceedings*. D. Reidel Publishing Co., p.45-60.) WDC No. 86001589.

Dansgaard, W. (1987) Ice core evidence of abrupt climatic changes. (In: Berger, W.H.; Labeyrie, L.D., eds. *Abrupt Climatic Changes; Evidence and Implications, St. Hugues de Biviers, France, October 1985. NATO Advanced Study Institutes Series. Series C; Mathematical and Physical Sciences*, vol.216, p.223-233.)

Davidson, C.I.; Harrington, J.R.; Stephenson, M.J.; Monaghan, M.C.; Pudykiewicz, J.; Schell, W.R. (1987) Radioactive cesium from the Chernobyl accident in the Greenland Ice Sheet. *Science*, 237(4815), p.633-634.

DeAngelis, M.; Jouzel, J.; Lorius, C.; Merlivat, L.; Petit, J.R.; Raynaud, D. (1984) Ice age data for climate modelling from an Antarctic (Dome C) ice core. (In: Berger, A.L.; Nicolis, C. *New Perspectives in Climate Modelling. Developments in Atmospheric Science*, no.16, p.23-45.) WDC No. 84001219.

DeAngelis, M.; Legrand, M.; Petit, J.R.; Barkov, N.I.; Korotkevitch, E.S.; Kotliakov, V.M. (1984) Soluble and insoluble impurities along the 950 m deep Vostok ice core (Antarctica) - Climatic implications. *Journal of Atmospheric Chemistry*, 1, p.215-239. WDC No. 85000050.

DeAngelis, M.; Fehrenbach, L.; Jehanno, C.; Maurette, M. (1985) Micrometre-sized volcanic glasses in polar ices and snows. *Nature*, vol.317, p.52-54. CRREL No. 40001766.

DeAngelis, M.; Barkov, N.I.; Petrov, V.N. (1987) Aerosol concentrations over the last climatic cycle (160 kyr) from an Antarctic ice core. *Nature*, 325(6102), p.318-321. WDC No. 87000046.

Delmas, R.J.; Aristarain, A.; Legrand, M. (1980) Acidity of Antarctic snow: A natural reference level for acid rains. (In: *International Conference on the Ecological Impact of Acid Precipitation, Norway, 1980. Proceedings*. p.104-105.) WDC No. 83000193.

Delmas, R.; Bourton, C. (1980) Are the past variations of the stratospheric sulfate burden recorded in central Antarctic snow and ice layers? *Journal of Geophysical Research*, vol.85, p.5645-5649.

Delmas, R. (1980) Gaz carbonique atmospherique du passe. (Atmospheric carbon dioxide of the past.) *Recherche*, 11(114), p.992-994. CRREL No. 38003036.

Delmas, R.J.; Ascencio, J.-M.; Legrand, M. (1980) Polar ice evidence that atmospheric $CO_2$ 20,000 yr bp was 50 percent of present. *Nature*, 284(5752), p.155-157. WDC No. 83000194.

Discoveries in Antarctica's deepest bedrock drillhole (1987) *New Scientist*, 113(1546), p.44. WDC No. 87000782.

Diurgerov, M.B.; Korolev, P.A. (1981) Gliatsiologicheskie nabliudeniia v pokhode ot Stantsii Mirnyi do Kupola C v 1981 g. (Glaciological observations along the route Mirnyi - Dome C in 1981.) *Akademiia Nauk SSSR. Institut Geografii. Materialy Gliatsiologicheskikh issledovanii. Khronika Obsuzhdeniia*, 42, p.211. WDC No. 82001084. CRREL No. 36003797.

Diurgerov, M.B.; Korolev, P.A.; Manevskii, L.N.; Pukhov, V.A. (1987) Issledovaniia srednemnogoletnei akkumuliatsii atmosfernykh osadkov v raione observatorii Mirnyi. (Study of long period average accumulation of atmospheric precipitation in the Mirnyi Station area.) *Sovetskaia Antarkticheskaia Ekspeditsiia. Informatsionnyi Biulleten*, v.109, p.51-57. CRREL No. 42002280.

Dmitriev, D.N.; Terentev, V.G. (1980) Opredelenie uprugikh kharakteristik lda na Stantsii Vostok. (Calculating elastic properties of ice at Vostok Station.) *Sovetskaia Antarkticheskaia Ekspeditsiia. Informatsionnyi Biulleten*, no.100, p.80-84. WDC No. 82000078. CRREL No. 35002037.

Donnou, D. (1984) Deep core drilling: Electro-mechanical or thermal drill. (In: Holdsworth, G.; Kuivinen, K.C.; Rand, J.H., eds. *International Workshop/Symposium on Ice Drilling Technology, 2nd, Calgary, Alberta, August 30-31, 1982. Proceedings. U.S. Army. Cold Regions Research and Engineering Laboratory. Special Report*, SR 84-34, p.81-84.) WDC No. 86000628. CRREL No. 40001187. NTIS No. ADA-156 733.

Dreschhoff, G.A.M.; Zeller, E.J.; Parker, B.C. (1983) Past solar activity variation reflected in nitrate concentra tions in Antarctic ice. (In: *International Symposium on Solar-Terrestrial Influences on Weather and Climate, 2nd, National Oceanic and Atmospheric Administration, Boulder, CO., August 2-6, 1982, Weather and Climate Response to Solar Variations. Proceedings.* Boulder, Colorado Associated University Press, p.225-236.)

Duplessy, J.-C.; Arnold, M.; Maurice, P.; Bard, E.; Duprat, J.; Moyes, J. (1986) Direct dating of the oxygen-isotope record of the last deglaciation by $^{14}C$ accelerator mass spectrometry. *Nature*, 320(6060), p.350-352. WDC No. 86001591.

Duval, P.; Lorius, C. (1980) Crystal size and climatic record down to the last ice age from Antarctic ice. *Earth and Planetary Science Letters*, 48(1), p.59-64. WDC No. 80003247. CRREL No. 34003986.

Efimov, V.A. (1979) Predvaritel'naia matematicheskaia model; rekonstruktsii klimatov proshlogo po opornoy informatsii gliatsiologicheskikh dannykh antarkticheskogo kontinental'nogo lednika. (Preliminary mathematical model for reconstruction of past climate, based on glaciological reference data on the Antarctic ice sheet.) *Leningrad. Arkticheskii i Antarkticheskii Nauchno-Issledovatel'skii Institut. Trudy*, v.357, p.5-12.

Efimov, V.A.; Govorukha, L.S.; Evseev, M.P. (1981) O matematicheskoi rekonstruktsii paleoklimatov po dannym glubokogo bureniia Antarkticheskogo lednikovogo pokrova. (Mathematical reconstructions of paleoclimates from deep drilling data obtained in the Antarctic Ice Sheet. *Akademiia Nauk SSSR. Institut Geografii. Materialy Gliatsiologicheskikh Issledovanii. Khronika Obsuzhdeniia*, vol.42, p.187-191. CRREL No. 36003790.

Elmore, D.; Tubbs, L.E.; Newman, D.; Ma, X.Z.; Finkel, R.; Nishiizumi, K.; Beer, J.; Oeschger, H.; Andree, M. (1982) $^{36}CL$ bomb pulse measured in a shallow ice core from Dye 3, Greenland. *Nature*, 300(5894), p.735-737. WDC No. 83000204.

Elmore, D.; Conard, N.J.; Kubik, P.W.; Gove, H.E.; Wahlen, M.; Beer, J. (1988) Measurements of $^{36}Cl$ in polar ice. (Abstract only) (In: Oeschger, H., ed. *Symposium on Ice-Core Analysis, Bern, Switzerland, March 30-April 3, 1987. Proceedings. Annals of Glaciology*, vol.10, p.202.)

Enting, I.G.; Mansbridge, J.V. (1987) Incompatibility of ice-core $CO_2$ data with reconstructions of biotic $CO_2$ sources. *Tellus*, 39B(3), p.318-325. CRREL No. 41004207.

Etheridge, D.M. (1985) Gas extraction and analysis from Antarctic ice cores. *Australian National Antarctic Research Expeditions. ANARE Research Notes*, v.28, p.32-35.

Etheridge, D.M.; Pearman, G.I.; de Silva, F. (1988) Atmospheric trace-gas variations as revealed by air trapped in an ice core from Law Dome, Antarctica. (In: Oeschger, H., ed. *Symposium on Ice-Core Analysis, Bern, Switzerland, March 30-April 3, 1987. Proceedings. Annals of Glaciology*, vol.10, p.28-33.)

Fifield, R. (1971) Frozen assets of the ice cores. *New Scientist*, 118(1608), p.28-29.

Finkel, R.C.; Langway, C.C., Jr. (1985) Global and local influences on the chemical composition of snowfall at Dye 3, Greenland: the record between 10Ka B.P. and 40Ka B.P. *Earth and Planetary Science Letters*, 73(2-4), p.196-206. WDC No. 85002036.

Finkel, R.C.; Langway, C.C., Jr.; Clausen, H.B. (1986) Changes in precipitation chemistry at Dye-3, Greenland. *Journal of Geophysical Research*, 91(D9), p.9849-9855. WDC No. 87000350. CRREL No. 41001021.

Fireman, E.L.; Norris, T. (1981) $^{14}C$ ages of Antarctic meteorites and ice and the composition of the air trapped in the ice. (In: *Lunar and Planetary Science Conference, 12th. Abstracts of papers. Houston, Texas*, p.282-

284.) CRREL No. 37001508.

Fireman, E.L.; Norris, T.L. (1982) Ages and composition of gas trapped in Allan Hills and Byrd core ice. *Earth and Planetary Science Letters*, 60(3), p.339-350. WDC No. 83000207. CRREL No. 37000881.

Fireman, E.L.; Norris, T.L. (1982) Preliminary studies on dating polar ice by $^{14}C$ and $^{22}Rn$. (In: Currie, L.A., ed. *Nuclear and Chemical Dating Techniques: Interpreting the Environmental Record. American Chemical Society. ACS Symposium Series*, no.176, p.319-329.) CRREL No. 37000758.

Fireman, E.L. (1983) Radioactive dating of Byrd core and Allan Hills ice. *Antarctic Journal of the United States*, 18(5), p.111. WDC No. 84001884. CRREL No. 39000009.

Fireman, E.L. (1984) Dating Antarctic ice by the carbon-14 and uranium-238 series methods. *Antarctic Journal of the United States*, 19(5), p.66-67.

Fisher, D.A. (1979) Comparison of $10^5$ years of oxygen isotope and insoluble impurity profiles from the Devon Island and Camp Century ice cores. *Quaternary Research*, 11(3), p.299-305.

Fisher, D.A.; Koerner, R.M. (1981) Some aspects of climatic change in the high Arctic during the Holocene as deduced from ice cores. (In: Mahaney, W.C., ed. *Quaternary Paleoclimate*. GEO Abstracts, Ltd., p.249-271.) WDC No. 84000425.

Fisher, D.A. (1982) Carbon-14 production compared to oxygen isotope records from Camp Century, Greenland and Devon Island, Canada. *Climatic Change*, 4(4), p.419-426.

Fisher, D.A.; Koerner, R.M.; Paterson, W.S.B.; Dansgaard, W.; Gundestrup, N.; Reeh, N. (1983) Effect of wind scouring on climatic records from ice core oxygen-isotope profiles. *Nature*, 310(5897), p.205-209. WDC No. 83001924. CRREL No. 37002470.

Fisher, D.A.; Koerner, R.M. (1983) Ice-core study: a climatic link between the present and future. *Climatic Changes in Canada 3. Syllogeus*, 49, p.50-69. WDC No. 83001925.

Fisher, D.A.; Alt, B.T. (1985) Global oxygen isotope model--semi-empirical, zonally averaged. (In: *Symposium on Snow and Ice Chemistry and the Atmosphere, Peterborough, Ontario, August 19-24, 1984. Proceedings. Annals of Glaciology*, vol.7, p.117-124.) WDC No. 86000820. CRREL No. 40002407.

Fisher, D.A.; Reeh, N.; Clausen, H.B. (1985) Stratigraphic noise in time series derived from ice cores. (In: *Symposium on Snow and Ice Chemistry and the Atmosphere, Peterborough, Ontario, August 19-24, 1984. Proceedings. Annals of Glaciology*, vol.7, p.76-83.) WDC No. 86000814. CRREL No. 40002401.

Fisher, D.A.; Koerner, R.M. (1986) On the special rheological properties of ancient microparticle-laden Northern Hemisphere ice as derived from bore-hole and core measurements. *Journal of Glaciology*, vol.32(112), p.501-510. WDC No. 87000690. CRREL No. 41004305.

Fisher, D.A. (1987) Enhanced flow of Wisconsin ice related to solid conductivity through strain history and recrystallization. (In: Waddington, E.D.; Walder, J.S., eds. *International Symposium on the Physical Basis of Ice Sheet Modelling, Vancouver, B.C., 9-22 August 1987. Proceedings. International Association of Hydrological Sciences. IAHS-AISH Publication*, no.170, p.45-51.) WDC No. 87002271. CRREL No. 42000305.

Fisher, D.A.; Koerner, R.M. (1988) Effects of wind on $\delta(^{18}O)$ and accumulation give an inferred record of seasonal $\delta$ amplitude from the Agassiz Ice Cap, Ellesmere Island, Canada. (In: Oeschger, H., ed. *Symposium on Ice-Core Analysis, Bern, Switzerland, March 30-April 3, 1987. Proceedings. Annals of Glaciology*, vol.10, p.34-37.)

Fomin, S.A.; Chistiakov, V.K. (1985) Ob optimalnom raspredelenii temperatury na rabochei poverkhnosti termobura pri burenii-plavlenii. (Optimal temperature distribution over the drilling-bit surface during drilling-melting.) *Problemy Arktiki i Antarktiki*, vol.59, p.111-113. CRREL No. 40003740.

Frederking, R. (1981) Ice coring and testing, Issungnak 1980--results of NRC's data collection. *Arctic Petroleum Operators Association, Calgary, Alta. Report*, APOA NO.171-1V6, 5p. WDC No. 87001260. CRREL No. 41003554.

Frederking, R.; Timco, G.W.; Jeffries, M.O.; Sackinger, W.M. (1988) Initial measurements of physical and mechanical properties of ice from Hobson's ice island. (In: *IAHR Symposium on Ice, 9th, Sapporo, Japan, Aug. 23-27, 1988. Proceedings, Vol.1.*, p.188-198.) CRREL No. 43002921.

Fredston, J.A. (1982) *Ice Cores as Indicators of Environmental Change*. Cambridge. University. Darwin College. M. Phil. Thesis, 101p. WDC No. 85000920.

French, H.M. (1983) Short term environmental effects of surface disposal of waste drilling fluids: Panarctic et al surface disposal experiment, Ellef Ringnes Island, N.W.T. (In: Duerden, F., ed. *Annual Applied Geography Conference, 6th, 12-15 October 1983. Proceedings*. Toronto, Ontario. Ryerson Polytechnical Institute, p.163-200.) CRREL No. 40001234.

Friedli, H.; Moor, E.; Oeschger, H.; Siegenthaler, U.; Stauffer, B. (1984) C-13/C-12 ratios in $CO_2$ extracted from Antarctic ice. *Geophysical Research Letters*, 11(11), p.1145-1148. WDC No. 85000622. CRREL No. 39001422.

Friedli, H.; Lotscher, H.; Oeschger, H.; Siegenthaler, U.; Stauffer, B. (1986) Ice core record of the 13C/12C ratio of atmospheric $CO_2$ in the past two centuries. *Nature*, 324(6094), p.237-238. WDC No. 87000050.

Frolich, K.; Schutze, H. (1982) Isotopes in Antarctic research. (In: *Isotopes in Antarctic Research. Contributions of the GDR. DDR. Akademie der Wissenschaften. Zentralinstitut fur Isotopen- und Strahlenforschung. ZFI-Mitteilungen*, no.51, p.7-25.) WDC No. 84001513. CRREL No. 38000752.

Fujii, Y.; Ohata, T. (1982) Possible causes of variation in microparticle concentration in an ice core from Mizuho Station, Antarctica. (In: *International Symposium on Antarctic Glaciology, 3rd, Columbus, OH, September 7-12, 1981. Proceedings. Annals of Glaciology*, vol.3, p.107-112.) WDC No. 83000424. CRREL No. 37000256.

Fujii, Y. (1983) Past 30-year Ph record in a firn core from the Brunt Ice Shelf, Antarctica, and its relationship to volcanic events. (In: Kusunoki, K., ed. *Symposium on Polar Meteorology and Glaciology, 5th, December 7-9, 1982, National Institute of Polar Research, Tokyo. Proceedings. Tokyo. National Institute of Polar Research. Memoirs. Special Issue*, no.29, p.176-184.) WDC No. 84000667. CRREL No. 38002015.

Fujii, Y. (1983) Preliminary report of glaciological study at Brunt Ice Shelf near Halley Base, Antarctica in January 1982. *Antarctic Record*, no.77, p.144-152. WDC No. 83001235. CRREL No. 37002926.

Fujii, Y.; Kawada, K.; Yoshida, M.; Matsumoto, S. (1986) Glaciological Research Program in East Queen Maud Land, East Antarctica, Part 4, 1984. *Japanese Antarctic Research Expedition. JARE Data Reports*, no.116, 70p. WDC No. 86001806. CRREL No. 40003882.

Fujii, Y.; Watanabe, O. (1988) Microparticle concentration and electrical conductivity of a 700m ice core from Mizuho Station, Antarctica. (In: Oeschger, H., ed. *Symposium on Ice-Core Analysis, Bern, Switzerland, March 30-April 3, 1987. Proceedings. Annals of Glaciology*, vol.10, p.38-42.)

Fujino, K.; Horiguchi, K.; Shinbori, K.; Kato, K. (1982) Analysis and characteristics of cores from a massive ice body in Mackenzie Delta, N.W.T., Canada. *Low Temperature Science (Teion Kagaku). Series A Physical Science*, vol.41, p.143-150. WDC No. 83001529. CRREL No. 37003420.

Fujino, K.; Horiguchi, K.; Shinbori, M.; Kato, K. (1983) Analysis and characteristics of cores from a massive ice body in Mackenzie Delta, N.W.T., Canada. (In: Brown, J., ed. *International Conference on Permafrost, 4th, Fairbanks, Alaska, July 17-22, 1983. Proceedings*. Washington, DC. National Academy Press, p.316-321.) WDC No. 84000195. CRREL No. 38001157.

Fujino, K. (1988) Characteristics of the massive ground ice body in the western Canadian Arctic (11). (In: Senneset, K., ed. *International Conference on Permafrost, 5th, Trondheim, Norway, 2-5 August 1988. Proceedings*, vol.1. Trondheim, Norway, Tapir Publishers, p.143-147.) CRREL No. 42004000.

Fujita, S.; Nakawo, M.; Mae, S. (1987) Orientation of the 700-m Mizuho core and its strain history. (In: Matsuda, T.; Kawaguchi, S.; Watanabe, O., eds. *Symposium on Polar Meteorology and Glaciology, 9th, National Institute of Polar Research, Tokyo, December 11-12, 1986. Proceedings, vol.1.* Tokyo, National Institute of Polar Research, p.122-131.) CRREL No. 42001185.

Funder, S. (1984) Chronology of the last interglacial/glacial cycle in Greenland: first approximation. (In: Mahaney, W.C, ed. *Correlation of Quaternary Chronologies. Symposium held May 1983, Toronto, Canada.* p.261-278.) CRREL No. 41004324.

Gaggeler, H.; Gunten, H.R. von; Rossler, E.; Oeschger, H.; Schotterer, U. (1983) $^{210}$Pb-dating of cold alpine firn/ice cores from Colle Gnifetti, Switzerland. *Journal of Glaciology*, 29(101), p.165-177. WDC No. 83002062. CRREL No. 37004261.

Ganapathy, R. (1983) Tunguska explosion of 1908: discovery of meteorite debris near the explosion site and at the South Pole. *Science*, 220(4602), p.1158-1161. CRREL No. 37003308.

Gaudichet, A.; Petit, J.R.; LeFevre, R.; Lorius, C. (1986) Investigation by analytical transmission electron microscopy of individual insoluble microparticles from Antarctic (Dome C) ice core samples. *Tellus*, 38B(3-4), p.250-261. WDC No. 87001061. CRREL No. 41001755.

Gaudichet, A. (1988) Mineralogy of insoluble particles in the Vostok Antarctic ice core over the last climatic cycle (150 kyr). *Geophysical Research Letters*, 15(13), p.1471-1474. CRREL No. 43001483.

Gayley, R.I.; Ram, M. (1985) Atmospheric dust in polar ice and the background aerosol. *Journal of Geophysical Research*, 90(D7), p.12,921-12,925. WDC No. 86002094. CRREL No. 40004620.

Genthon, C. (1987) Vostok ice core: climatic response to $CO_2$ and orbital forcing changes over the last climatic cycle. *Nature*, 329(6138), p.414-418. CRREL No. 42000564.

Gillet, F.; Rado, C. (1979) 180-meter core drilling at Dome C and measurements in the 905-meter drill hole. *Antarctic Journal of the United States*, 14(5), p.101. WDC No. 80003411. CRREL No. 35000672.

Gillet, F.; Lorius, C. (1982) French field activities at Dome C. *Antarctic Journal of the United States*, 17(5), p.75-76. WDC No. 83002010. CRREL No. 37003947.

Gillet, F. (1984) "Climatopic" thermal probe. (In: *International Workshop/Symposium on Ice Drilling Technology, 2nd, Calgary, Alberta, 30-31 August 1982. Proceedings. U.S. Army. Cold Regions Research and Engineering Laboratory. Special Report*, SR 84-34, p.95-99.) CRREL No. 40001190.

Gillet, F.; Legrand, M. (1984) French glaciological activities at the South Pole. *Antarctic Journal of the United States*, 19(5), p.61. CRREL No. 40001774.

Gillet, F. (1984) Ice core quality in electro-mechanical drilling. (In: Holdsworth, G.; Kuivinen, K.C.; Rand, J.H., eds. *International Workshop/Symposium on Ice Drilling Technology, 2nd, Calgary, Alberta, August 30-31, 1982. Proceedings. U.S. Army. Cold Regions Research and Engineering Laboratory. Special Report*, SR 84-34, p.73-80.) WDC No. 86000627. CRREL No. 40001186. NTIS No. ADA-156 733.

Glazyrin, G.E.; Kislov, B.V. (1984) Ispol'zovanie standartnoi meteorologicheskoi informatsii dlia vydeleniia godovykh sloev v firnovo-ledianoi tolshche gornykh lednikov. (Using standard meteorological information in distinguishing annual layers in firn-ice masses of mountain glaciers.) (In: Getker, M.I.; Glazyrin, G.F., eds. *Gliatsiologiia Gornyky Oblastei [Snezhnyi Pokrov, Laviny i Ledniki]. (Glaciology of Mountain Regions [Snow Cover, Avalanches and Glaciers].) Sredneaziatskii Regionalnyi Nauchno-Issledovatel'skii Institut. Trudy*, vol.105, p.79-92.) WDC No. 84002162. CRREL No. 39000638.

Good, W. (1983) Structural investigations of snow and ice on Core III from the drilling on Vernagtferner, Austria, in 1979. *Zeitschrift fur Gletscherkunde und Glazialgeologie*, 18(1), p.53-64. WDC No. 84001902. CRREL No. 39000048.

Goodwin, I.D. (1988) Firn core data from shallow drilling investigations in eastern Wilkes Land, Antarctica. *Australian National Antarctic Research Expeditions. ANARE Research Notes*, no.65, 74p. CRREL No. 43002145

Gordienko, F.G. (1979) Issledovanie pyli v lednikovykh pokrovakh I ispol'zovanie ee pri opredelenii vozrasta l'da. (Studying dust in ice covers and using it in ice age determination.) *Akademiia Nauk SSSR. Institut Geografii. Materialy Gliatsiologicheskikh Issledovanii. Khronika Obsuzhdeniia*, vol.36, p.259-268. WDC No. 80002633. CRREL No. 34003151.

Gordienko, F.G.; Savatiugin, L.M. (1980) Rezultaty izotopno-kislorodnykh analizov kerna lda shelfovogo lednika Novolazarevskogo. (Oxygen-isotope analysis of Novolazarevskaya glacier shelf ice cores.) *Sovetskaia Antarkticheskaia Ekspeditsiia. Informatsionnyi Biulleten*, no.100, p.85-90. WDC No. 82000079. CRREL No. 35002038.

Gordienko, F.G.; Kotliakov, V.M.; Punning, Ia.-K.M.; Vaikmaie, R. (1981) Study of a 200-m core from the Lomonosov ice plateau on Spitsbergen and the paleoclimatic implications. *Polar Geography and Geology*, 5(4), p.242-251. WDC No. 82001237. CRREL No. 36003696.

Gordienko, F.G.; Kotlyakov, V.M.; Korotkevich, E.S. (1982) Novye rezul'taty izotopno-kislorodnykh issledovanii ledianogo kerna iz skvazhiny so Stantsii Vostok Do glubiny 1412 m. (New results of oxygen isotope studies of ice cores from the Vostok Station down to the depth of 1412 m.) *Akademiia Nauk SSR. Institut Geografii. Materialy Gliatsiologicheskikh Issledovanii. Khronika Obsuzhdeniia*, vol. 46, p.168-171. WDC No. 83001605. CRREL No. 37003899.

Gordienko, F.G.; Kotliakov, V.M.; Barkov, N.I.; Korotkevich, E.S. (1982) Results of oxygen-isotope studies on the Vostok core. (In: *IAGP Scientific Session, Leningrad, 6 July 1982*, 3p.) WDC No. 83000216.

Gorlach, U.; Wagenbach, D.; Kipfstuhl, J.; Stuckenberg, U. (1985) Spurenstoffglaziologische Untersuchungen an den deutschen Antarktisstationen. (Glaciological trace element investigations at German Antarctic stations.) (In: Kohnen, H., ed. *Filchner-Ronne Ice Shelf Programme: Report 2. Bremerhaven. Alfred Wegener Institute for Polar Research*, p.42-49.)

Goss, E.; Mayewski, P.A.; Lyons, W.B. (1985) Examination of selected microparticles from the Sentik Glacier core, Ladakh, Himalaya, India. *Journal of Glaciology*, vol.31(108), p.196-197. WDC No. 86000780. CRREL No. 40001331.

Gow, A.J.; Kohnen, H. (1978) Ultrasonic measurements on deep ice cores from Antarctica. *Antarctic Journal of the United States*, 13(4), p.48-50.

Gow, A.J.; Epstein, S.; Sheehy, W. (1979) On the origin of stratified debris in ice cores from the bottom of the Antarctic ice sheet. *Journal of Glaciology*, 23(89), p.185-192. CRREL No. 34002231.

Gow, A.J. (1980) Time- priority studies of deep ice cores. (In: MacKinnon, P., comp. *Ice Cores*. Boulder, Colorado, World Data Center A for Glaciology (Snow and Ice), *Glaciological Data, Report GD*-8, p.91-102.) CRREL No. 34004030.

Graf, W. (1988) Accumulation and ice-core studies on Filchner-Ronne Ice Shelf, Antarctica. (In: International *Symposium on Antarctic Glaciology, 4th, Bremerhaven, FRG, 7-11 September 1987. Proceedings. Annals of Glaciology*, vol.11, p.23-31.) CRREL No. 43001939.

Graf, W.; Reinwarth, O.; Moser, H.; Stichler, W. (1988) Investigation of the $^{18}O$ content of a 100 m ice core from the Ronne Ice Shelf, Antarctica. (In: Oeschger, H., ed. *Symposium on Ice-Core Analysis, Bern, Switzerland, March 30-April 3, 1987. Proceedings. Annals of Glaciology*, vol.10, p.43-47.)

Gribbin, J. (1985) New time scale for ice-age cycles. *New Scientist*, no.1474, p.25. WDC No. 85002040.

Grootes, P.M.; Stuiver, M. (1982) Ross Ice Shelf and Dome C oxygen-isotope analysis. *Antarctic Journal of the United States*, 17(5), p.76-78. WDC No. 83002011. CRREL No. 37003948.

Grootes, P.M. (1983) New light on climate from old isotope ratios. *Nature*, 303(5920), p.753-754.) WDC No. 84001774.

Grootes, P.M.; Stuiver, M. (1983) Ross Ice Shelf oxygen isotope profile at J-9. *Antarctic Journal of the United States*, 18(5), p.107-109. WDC No. 84001882. CRREL No. 39000007.

Grootes, P.M.; Stuiver, M. (1986) Oxygen isotope studies and compilation of isotopic dates from Antactica. *Antarctic Journal of the United States*, 21(5), p.122. CRREL No. 43001630.

Grootes, P.M.; Stuiver, M. (1987) Ice sheet elevation changes from isotope profiles. (In: Waddington, E.D.; Walder, J.S., eds. *International Symposium on the Physical Basis of Ice Sheet Modelling, Vancouver, B.C., 9-22 August 1987. Proceedings. International Association of Hydrological Sciences. IAHS-AISH Publication*, no.170, p.269-281.) WDC No. 87002289. CRREL No. 42000323.

Grootes, P.M.; Stuiver, M. (1987) Isotopic alteration of firn cores. *Antarctic Journal of the United States*, 22(5), p.79-80. CRREL No. 43002744.

Grootes, P.M.; Stuiver, M. (1988) Oxygen-isotope records covering the last 2 ka at South Pole. (Abstract only) (In: Oeschger, H., ed. *Symposium on Ice-Core Analysis, Bern, Switzerland, March 30-April 3, 1987. Proceedings. Annals of Glaciology*, vol.10, p.203.)

Grootes, P.M.; Stuiver, M.; Thompson, L.G.; Mosley-Thompson, E. (1989) Oxygen isotope changes in tropical ice, Quelccaya, Peru. *Journal of Geophysical Research*, 94(D1), p.1187-1194.

Grosval'd, M.G. (1982) K interpretatsii novoi izotopno-kislorodnoi krivoi so Stantsiivostok. (Interpretation of the new oxygen-isotope curve from Vostok Station.) *Akademiia Nauk SSR. Institut Geografii. Materialy Gliatsiologicheskikh Issledovanii. Khronika Obsuzhdeniia*, vol. 46, p.171-174. WDC No. 83001606. CRREL No. 37003900.

Grzes, M. (1980) Non-cored hot point drills on Hans Glacier (Spitsbergen), method and first results. *Polish Polar Research*, 1(2/3), p.75-85. CRREL No. 36003686.

Gundestrup, N.S.; Hansen, B.L. (1984) Bore-hole survey at Dye 3, South Greenland. *Journal of Glaciology*, vol.30(106), p.282-288. WDC No. 85001739. CRREL No. 39003776.

Gundestrup, N.S.; Johnsen, S.J.; Reeh, N. (1984) ISTUK--a deep ice core drill system. (In: Holdsworth, G.; Kuivinen, K.C.; Rand, J.H., eds. *International Workshop/Symposium on Ice Drilling Technology, 2nd, Calgary, Alberta, August 30-31, 1982. Proceedings. U.S. Army. Cold Regions Research and Engineering Laboratory. Special Report*, SR 84-34, p.7-19.) WDC No. 86000618. CRREL No. 40001177. NTIS No. ADA-156 733

Gundestrup, N.S.; Johnsen, S.J. (1985) Battery powered, instrumented deep ice core drill for liquid filled holes. *American Geophysical Union. Geophysical Monograph Series*, no.33, p.19-22. CRREL No. 39003562.

Gunten, H.R. von; Rossler, E.; Gaggeler, H. (1983) Dating of ice cores from Verngtferner (Austria) with fission products and Lead-210. *Zeitschrift fur Gletscherkunde und Glazialgeologie*, 18(1), p.37-45. WDC No. 84001900. CRREL No. 39000046.

Haeberli, W.; Gaeggeler, H.; Baltensperger, U.; Jost, D.; Schotterer, U. (1988) Signal from the Chernobyl accident in high-altitude firn areas of the Swiss Alps. (In: Oeschger, H., ed. *Symposium on Ice-Core Analysis, Bern, Switzerland, March 30-April 3, 1987. Proceedings. Annals of Glaciology*, vol.10, p.48-51.)

Hamley, T.C.; Morgan, V.I.; Thawaites, R.J.; Gao, X.Q. (1986) Ice-core drilling site at Law Dome Summit, Wilkes Land, Antarctica. *Australian National Antarctic Research Expeditions. ANARE Research Notes*, no.37, 34p. WDC No. 86002036. CRREL No. 41000459.

Hammer, C.U. (1980) Acidity of polar ice cores in relation to absolute dating, past volcanism, and radio echoes. *Journal of Glaciology*, 25(93), p.359-372. WDC No. 81000298. CRREL No. 35001500.

Hammer, C.U.; Clausen, H.B.; Dansgaard, W. (1980) Greenland ice sheet evidence of post-glacial volcanism and its climatic impact. *Nature*, 288(5788), p.230-235. WDC No. 81000370.

Hammer, C.U.; Clausen, H.B.; Dansgaard, W. (1981) Past volcanism and climate revealed by Greenland ice. *Journal of Volcanology and Geothermal Research*, 11, p.3-10. WDC No. 82000225. CRREL No. 36001200.

Hammer, C.U. (1982) History of atmospheric composition as recorded in ice sheets. (In: *Dahlem Workshop on Atmospheric Chemistry, Berlin, W. Germany, May 2-7, 1982, Reports.* New York, Springer- Verlag, p.119-134.)

Hammer, C.U. (1983) Initial direct current in the buildup of space charges and the acidity of ice cores. (In: *International Symposium on the Physics and Chemistry of Ice, 6th, Rolla, Missouri, August 2-6 1982. Journal of Physical Chemistry*, 87(21), p.4099-4103.) WDC No. 84001826. CRREL No. 38001581.

Hammer, C.U.; Clausen, H.B.; Langway, C.C., Jr. (1985) Byrd ice core: continuous acidity measurements and solid electrical conductivity measurements. (In: *Symposium on Snow and Ice Chemistry and the Atmosphere, Peterborough, Ontario, August 19-24, 1984. Proceedings. Annals of Glaciology*, vol.7, p.214.) WDC No. 86000836. CRREL No. 40002423.

Hammer, C.U. (1985) Continuous impurity analysis along the Dye 3 deep core. *American Geophysical Union. Geophysical Monograph Series*, no.33, p.90-94. WDC No. 85001665. CRREL No. 39003572.

Hammer, C.U.; Clausen, H.B.; Tauber, H. (1985) Ice-core dating of the Pleistocene/Holocene boundary applied to a calibration of the $^{14}C$ time scale. (In: Stuiver, M.; Dra, R., eds. *International Radiocarbon Conference, 12th, Trondheim, Norway, June 24-28, 1985. Radiocarbon*, 28(2A), p.284-291.)

Hammer, C.U. (1985) Influence on atmospheric composition of volcanic eruptions as derived from ice-core analysis. (In: *Symposium on Snow and Ice Chemistry and the Atmosphere, Peterborough, Ontario, August 19-24, 1984. Proceedings. Annals of Glaciology*, vol.7, p.125-129.) WDC No. 86000821. CRREL No. 40002408.

Hammer, C.U.; Clausen, H.B.; Friedrich, W.L; Tauber, H. (1987) Minoan eruption of Santorini in Greece dated to 1645 BC? *Nature*, 328(6130), p.517-519.

Hammer, C.U. (1988) Continuous and high-resolution ice-core analysis. (Abstract only) (In: Oeschger, H., ed. *Symposium on Ice-Core Analysis, Bern, Switzerland, March 30-April 3, 1987. Proceedings. Annals of Glaciology*, vol.10, p.204.)

Hansen, B.L. (1984) Overview of ice drilling technology. (In: Holdsworth, G.; Kuivinen, K.C.; Rand, J.H., eds. *International Workshop/Symposium on Ice Drilling Technology, 2nd, Calgary, Alberta, August 30-31, 1982. Proceedings. U.S. Army. Cold Regions Research and Engineering Laboratory. Special Report*, SR 84-34, p.1-6.) WDC No. 86000617. CRREL No. 40001176. NTIS No. ADA-156 733

Harwood, D.M. (1986) Do diatoms beneath the Greenland ice sheet indicate interglacials warmer than present? *Arctic*, 39(4), p.304-308. WDC No. 87000543. CRREL No. 41002688.

Hastenrath, S. (1984) Tropical glacier and climate variations. (In: Lauer, W., ed. *Natur- und Mench in Okosystemen Tropischer Hochgebirge. (Natural Environment and Man in Tropical Mountain Ecosystems.) Erdwissenschaftliche Forschung*, 18, p.235-248.) WDC No. 86001931.

Heintzenberg, J.; Kallstrom, M.; Hansson, H.C.; Jonsson, S. (1988) Chemical composition of insoluble particles in an ice cap on Storoya, Svalbard. (Abstract only) (In: Oeschger, H., ed. *Symposium on Ice-Core Analysis, Bern, Switzerland, March 30-April 3, 1987. Proceedings. Annals of Glaciology*, vol.10, p.204.)

Herron, M.M.; Langway, C.C., Jr. (1979) Dating of Ross Ice Shelf cores by chemical analysis. (In: Glen, J.W.; Adie, R.J.; Johnson, D.M.; Homer, D.R.; MacQueen, A.D., eds. *Symposium on Dynamics of Large Ice Masses, Ottawa, 21-25 August 1978. Proceedings. Journal of Glaciology*, 24(90), p.345-357.) WDC No. 80001836. CRREL No. 34002837.

Herron, M.M. (1980) *Impact of Volcanism on the Chemical Composition of Greenland Ice Sheet Precipitation.* Buffalo, NY. State University of New York. Ph.D. Dissertation. University Microfilm Order no. 8027608, 158p. WDC No. 83000088. CRREL No. 37001178.

Herron, M.M.; Herron, S.L.; Langway, C.C., Jr. (1981) Climatic signal of ice melt features in Southern Greenland. *Nature*, 293(5831), p.389-391. WDC No. 82000944.

Herron, M.M. (1982) Glaciochemical dating techniques. (In: Currie, L.A., ed. Nuclear and Chemical Dating Techniques: Interpreting the Environmental Record. *American Chemical Society. ACS Symposium Series*, no.176, p.303-318.) WDC No. 84000433. CRREL No. 37000757.

Herron, M.M.; Herron, S.L. (1983) Past atmospheric environments revealed by polar ice core studies. *Hydrological Sciences Journal*, 28(1), p.139-153. WDC No. 84001307. CRREL No. 38000567.

Herron, M.M.; Langway, C.C., Jr. (1985) Chloride, nitrate, and sulfate in the Dye 3 and Camp Century, Greenland ice cores. *American Geophysical Union. Geophysical Monograph Series*, no.33, p.77-84. WDC No. 85001663. CRREL No. 39003570.

Herron, S.; Langway, C.C., Jr. (1979) Debris-laden ice at the bottom of the Greenland ice sheet. (In: Glen, J.W.; Adie, R.J.; Johnson, D.M.; Homer, D.R.; MacQueen, A.D., eds. *Symposium on Glacier Beds: The Ice-Rock Interface, Ottawa, 15-19 August 1978. Proceedings. Journal of Glaciology*, 23(89), p.193-207.) WDC No. 80002221. CRREL No. 34002232.

Herron, S.L.; Langway, C.C., Jr. (1979) Ice fabrics and flow regime of the Camp Century, Greenland ice core. (In: *Geological Society of America, Northeastern Section, 14th Annual Meeting, Hershey, PA, March 1-3, 1979. Abstract Programs*, 11(1), p.16.)

Herron, S.L. (1980) Identification of Wisconsin ice in polar ice cores. (In: *Geological Society of America, Northeastern Section, 15th Annual Meeting, Philadelphia, PA, March 13-15, 1980. Abstract Programs*, 12(2), p.41.)

Herron, S.L.; Langway, C.C., Jr. (1982) Comparison of ice fabrics and textures at Camp Century, Greenland and Byrd Station, Antarctica. (In: *International Symposium on Antarctic Glaciology, 3rd, Columbus, OH, September 7-12, 1981. Proceedings. Annals of Glaciology*, vol.3, p.118-124.) WDC No. 83000426. CRREL No. 37000258.

Herron, S.L. (1982) *Physical Properties of the Deep Ice Core from Camp Century, Greenland*. Buffalo. State University of New York, Ph.D. Dissertation. University Microfilm Order no. 8223976. 146p. WDC No. 84000020. CRREL No. 37000756.

Herron, S.L.; Langway, C.C., Jr.; Brugger, K.A. (1985) Ultrasonic velocities and crystalline anisotropy in the ice core from Dye 3, Greenland. *American Geophysical Union. Geophysical Monograph Series*, no.33, p.23-31. WDC No. 85001656. CRREL No. 39003563.

Herron, S.L.; Langway, C.C., Jr. (1987) Derivation of paleoelevations from total air content of two deep Greenland ice cores. (In: Waddington, E.D.; Walder, J.S., eds. *International Symposium on the Physical Basis of Ice Sheet Modelling, Vancouver, B.C., 9-22 August 1987. Proceedings. International Association of Hydrological Sciences. IAHS-AISH Publication*, no.170, p.283-295.) WDC No. 87002290. CRREL No. 42000324.

Hibler, W.D., III; Johnsen, S.J. (1979) 20-yr cycle in Greenland ice core records. *Nature*, 280(5722), p.481-483. CRREL No. 34000737.

Higashi, A.; Shoji, H. (1979) Mechanical tests of Antarctic deep core ice under hydrostatic pressure--instrument ation and preliminary results. *Hokkaido University, Sapporo, Japan. Ice Research Laboratory. Research Paper*, no.40, p.41-47. WDC No. 79001525. CRREL No. 33003298.

Higashi, A.; Nakawo, M.; Enomoto, H. (1983) Bubble close-off density of ice in Antarctic ice sheets. (In: Kusunoki, K., ed. *Symposium on Polar Meteorology and Glaciology, 5th, December 7-9, 1982, National Institute of Polar Research, Tokyo. Proceedings. Tokyo. National Institute of Polar Research. Memoirs. Special Issue*, no.29, p.135-148.) WDC No. 84000663. CRREL No. 38002011.

Higashi, A.; Nakawo, M.; Narita, H.; Fujii, Y.; Nishio, F.; Watanabe, O. (1988) Preliminary results of analyses of 700 m ice cores retrieved at Mizuho Station, Antarctica. (In: Oeschger, H., ed. *Symposium on Ice-Core Analysis, Bern, Switzerland, March 30-April 3, 1987. Proceedings. Annals of Glaciology*, vol.10, p.52-56.)

Hoeller, A.E. (1982) Ice cores. (In: Hoeller, A.E., ed. Role of Environmental and Historical Evidence in Climate Reconstruction: A Preliminary Review and Appraisal. *Canadian Climate Centre. Report*, 82-3, p.29-39.) WDC No. 82001482.

Hogan, A.; Kebschull, K.; Townsend, R.; Murphey, B.; Samson, J.; Barnard, S. (1984) Particle concentrations at the South Pole, on meteorological and climatological time scales; is the difference important? *Geophysical Research Letters*, 11(9), p.850-853.

Hoji, H.; Langway, C.C., Jr. (1987) Flow velocity profiles and accumulation rates from mechanical tests on ice core samples. (In: Waddington, E.D.; Walder, J.S., eds. *International Symposium on the Physical Basis of Ice Sheet Modelling, Vancouver, B.C., 9-22 August 1987. Proceedings. International Association of Hydrological Sciences. IAHS-AISH Publication*, no.170, p.67-77.) WDC No. 87002273. CRREL No. 42000307.

Holdsworth, G. (1984) Canadian Rufli-Rand electro-mechanical core drill and reaming devices. (In: Holdsworth, G.; Kuivinen, K.C.; Rand, J.H., eds. *International Workshop/Symposium on Ice Drilling Technology, 2nd, Calgary, Alberta, August 30-31, 1982. Proceedings. U.S. Army. Cold Regions Research and Engineering Laboratory. Special Report*, SR 84-34, p.21-32.) WDC No. 86000619. CRREL No. 40001178. NTIS No. ADA-156 733.

Holdsworth, G. (1984) Glaciological reconnaissance of an ice core drilling site, Penny Ice Cap, Baffin Island. *Journal of Glaciology*, vol.30(104), p.3-15. WDC No. 84001974. CRREL No. 39000236.

Holdsworth, G., ed.; Kuivinen, K.C., ed.; Rand, J.H., ed. (1984) Ice Drilling Technology. International Work shop/Symposium on Ice Drilling Technology, 2nd, Calgary, Alberta, Canada, 30-31 August 1982. Proceedings. *U.S. Army. Cold Regions Research and Engineering Laboratory. Special Report*, 84-34, 142p. WDC No. 85000365.

Holdsworth, G.; Pourchet, M.; Prantl, F.A.; Meyerhof, D.P. (1984) Radioactivity levels in a firn core from the Yukon Territory, Canada. *Atmospheric Environment*, 18(2), p.461-466. WDC No. 84001579.

Holdsworth, G. (1986) Evidence for a link between atmospheric thermonuclear detonations and nitric acid. *Nature*, 324(6097), p.551-553. WDC No. 87000788.

Holdsworth, G.; Krouse, H.R.; Peake, E. (1988) Trace-acid ion content of shallow snow and ice cores from mountain sites in Western Canada. (In: Oeschger, H., ed. *Symposium on Ice-Core Analysis, Bern, Switzerland, March 30-April 3, 1987. Proceedings. Annals of Glaciology*, vol.10, p.57-62.)

Hondoh, T.; Anzai, H.; Hayakawa, N.; Mae, S.; Higashi, A.; Langway, C.C., Jr. (1988) X-ray structure analyses of air hydrates in a Dye 3, Greenland, deep ice core. (Abstract only) (In: Oeschger, H., ed. *Symposium on Ice-Core Analysis, Bern, Switzerland, March 30-April 3, 1987. Proceedings. Annals of Glaciology*, vol.10, p.205.)

Hooke, R.L.; Hudleston, P.J. (1980) Ice fabrics in a vertical flow plane, Barnes Ice Cap, Canada. *Journal of Glaciology*, 25(92), p.195-214. WDC No. 81000779. CRREL No. 35001817.

Hooke, R.L.; Huddleston, P.J. (1981) Ice fabrics from a borehole at the top of the South Dome, Barnes Ice Cap, Baffin Island. *Geological Society of America. Bulletin*, 92(5), p.274-281. WDC No. 83000234. CRREL No. 37001131.

Hooke, R.L.; Clausen, H.B. (1982) Wisconsin and Holocene $\delta O^{18}$ variations, Barnes Ice Cap, Canada. *Geological Society of America. Bulletin*, 93, p.784-789. WDC No. 84000435.

Horibe, Y.; Shigehara, K.; Langway, C.C., Jr. (1985) Chemical and isotopic composition of air inclusions in a Greenland ice core. *Earth and Planetary Science Letters*, 73, p.207-210. WDC No. 85002044.

Ice cores available for research. (1984) *Antarctic Journal of the United States*, 19(1), p.16-17. WDC No. 84002229.

Imbrie, J.; Hays, J.D. (1980) *Evaluation of Climatic Research on Ice Cores*. 21p. WDC No. 85002046.

Jacka, T.H., ed. (1985) Australian Glaciological Research; 1982-1983. *Australia. Department of Science and Technology. Antarctic Division. Australian National Antarctic Research Expeditions. Research Notes*, no.28, 206p. WDC No. 85001759.

Jacoby, G.C., Jr.; Cook, E.R.; Ulan, L.D. (1985) Reconstructed summer degree days in central Alaska and northwestern Canada since 1524. *Quaternary Research*, 23(1), p.18-26.

Jeffries, M.O. (1983) Arctic ice shelf studies, Spring 1983. *Canada. Defence Research Establishment Pacific. Contractors Report*, 83-27, 31p. CRREL No. 39002207.

Jeffries, M.O. (1983) Isotope variations in ice cores from Ward Hunt Ice Shelf and Milne Ice Shelf, Ellesmere Island, N.W.T. *Canada. Defence Research Establishment Pacific. Contractors Report*, 83-56, 37p. CRREL No. 39002208.

Jenssen, D.; Radok, U. (1982) On the joint interpretation of total gas contents and stable isotope ratios in ice cores. (In: *International Symposium on Antarctic Glaciology, 3rd, Columbus, OH, September 7-12, 1981. Proceedings. Annals of Glaciology*, vol.3, p.152-155.) WDC No. 83000431. CRREL No. 37000263.

Jessberger, H.L.; Dorr, R. (1984) Recent experiences with a modified Rufli ice drill. (In: Holdsworth, G.; Kuivinen, K.C.; Rand, J.H., eds. *International Workshop / Symposium on Ice Drilling Technology, 2nd, Calgary, Alberta, August 30-31, 1982. Proceedings. U.S. Army. Cold Regions Research and Engineering Laboratory. Special Report*, SR 84-34, p.45-49.) WDC No. 86000622. CRREL No. 40001181. NTIS No. ADA-156 733.

Jessberger, H.L.; Bassler, K.-H. (1985) Ice core drilling and drill hole investigations on the Filchner and Ronne Ice Shelves, Antarctica. (In: Kohnen, H., comp. *Filchner-Ronne Ice Shelf Programme, Report 2. Bremerhaven, Alfred Wegener Institute for Polar Research*, p.32-41. CRREL No. 39002803.

Jezek, K.C.; Roefloffs, E.A.; Greischar, L.L. (1985) Geophysical survey of subglacial geology around the deep-drilling site at Dye 3, Greenland. (In: Langway, C.C., Jr.; Oeschger, H.; Dansgaard, W., eds. *Greenland Ice Core; Geophysics, Geochemistry, and the Environment. Geophysical Monograph*, vol.33, p.105-110.)

Johnsen, S.J. (1980) Fast light-weight core drill. *Journal of Glaciology*, 25(91), p.169-174. CRREL No. 34003808.

Johnson, B.B. (1981) Dating of the Dome summit core, Law Dome, Antarctica, by chemical analysis. (In: Young, N.W., comp. *Antarctica: Weather and Climate*, 8p.) CRREL No. 37001382.

Johnson, B.B.; Chamberlain, J.M. (1981) Sodium, magnesium, potassium and calcium concentrations in ice cores from the Law Dome, Antarctica. *Geochimica et Cosmochimica Acta*, 45(5), p.771-776. WDC No. 81002439. CRREL No. 35002885.

Josephson, J. (1982) Air pollutant baselines from glacial studies. *Environmental Science and Technology*, 16(8), -437A-441A.

Joussaume, S.; Jouzel, J.; Petit, J.R.; Sadourny, R. (1985) Modelization de la circulation generale atmospherique en liaison avec les recherches Antarctiques sur la reconstitution des paleoclimats. (Modelling of the general atmospheric circulation in connection with Antarctic research on paleoclimatic reconstruction.) (In: *Actes du Colloque sur la Recherche Francaise dans l'Antarctique, Grenoble 19/21 Septembre 1984. [Colloquium on French Research in the Antarctic, Grenoble, 19-21 September 1984. Proceedings.]* Comite National Francais des Recherches Antarctiques, p.49-50.) CRREL No. 40000573.

Jouzel, J.; Merlivat, L.; Lorius, C.; Pourchet, M. (1981) 30000 yr. climatic record. Main results deduced from $^{18}O$ and deuterium profiles from the Dome C ice core Antarctica. (In: *Symposium on Variations in the Global Water Budget, Oxford, UK, 10 August 1981. Proceedings*, 1p.) CRREL No. 38003810.

Jouzel, J.; Merlivat, L.; Lorius, C. (1982) Deuterium excess in an East Antarctic ice core suggests higher relative humidity at the oceanic surface during the last glacial maximum. *Nature*, 299(5885), p.688-691. WDC No. 83000962. CRREL No. 37001154.

Jouzel, J.; Lorius, C.; Petit, J.R.; Genthon, C.; Barkov, N.I.; Kotlyakov, V.M.; Petrov, V.M. (1987) Vostok ice core: a continuous isotope temperature record over the last climatic cycle (160,000 years) ice cores. *Nature*, 329(6138), p.403-408. WDC No. 87002368. CRREL No. 42000562.

Jouzel, J.; et al. (1988) Climatic interpretation of a continuous deuterium profile obtained from the Vostok, Antarctica, ice core [160 000 year]. (Abstract only) (In: Oeschger, H., ed. *Symposium on Ice-Core Analysis, Bern, Switzerland, March 30-April 3, 1987. Proceedings. Annals of Glaciology*, vol.10, p.206-207.)

Kallemeyn, G.W.; Rasmussen, K.L. (1985) Composition of terrestrial and cosmic dust components in Greenland ice cores. *Meteoritics*, 20(4), p.678-679.

Kaminuma, K. (1983) Core drilling at Showa Station, Antarctica. *Antarctic Record*, no.77, p.134-143. CRREL No. 37002925.

Kanamori, S. (1987) Preliminary report on the contamination control for chemical analyses of Antarctic ice samples. (In: Matsuda, T.; Kawaguchi, S.; Watanabe, O., eds. *Symposium on Polar Meteorology and Glaciology, 9th, National Institute of Polar Research, Tokyo, December 11-12, 1986. Proceedings, vol.1.* Tokyo, National Institute of Polar Research, p.132-139.) CRREL No. 42001186.

Kato, K.; Watanabe, O.; Satow, K.; Okuhira, F. (1979) Rate of snow accumulation determined from oxygen isotope and stratigraphic analyses of the core from Mizuho Station, East Antarctic (extended abstract). (In: Nagata, T., ed. *Symposium on Antarctic Geosciences, 1st, Tokyo, September 27-28th, 1978. Proceedings. Tokyo. National Institute of Polar Research. Memoirs. Special Issue*, no.14, p.88-92.) WDC No. 80001794. CRREL No. 34002500.

Kato, K.; Watanabe, O. (1981) Oxygen isotope profiles in adjacent cores from Mizuho Station, East Antarctica. (In: Kusunoki, K., ed. *Symposium on Polar Meteorology and Glaciology, 3rd, Tokyo, 13-14 January 1981. Proceedings. Tokyo. National Institute of Polar Research. Memoirs. Special Issue*, 19, p.243-252.) WDC No. 82000462. CRREL No. 36002386.

Kato, K. (1981) Records of production rate in the little ice age of cosmic ray product $_{32}$Si in the arctic ice cores. (In: Kusunoki, K., ed. *Symposium on Polar Meteorology and Glaciology, 3rd, Tokyo, 13-14 January 1981. Proceedings. Tokyo. National Institute of Polar Research. Memoirs. Special Issue*, 19, p.234-242.) WDC No. 82000461. CRREL No. 36002385.

Kaul, M.K.; Chakraborty, S.K.; Raina, V.K. (1985) Stratigraphic studies of Antarctic ice. *Scientific Report of the Second Indian Antarctic Expedition. Technical Publication*, no.2, p.99-102. CRREL No. 40003541.

Kawada, K.; Yoshida, M.; Naruse, R. (1986) Borehole closure at Mizuho Station, Antarctica. (In: Kawaguchi, S.; Watanabe, O., eds. *Symposium on Polar Meteorology and Glaciology, 8th, Tokyo, 11-12 December 1985. Proceedings. Tokyo. National Institute of Polar Research. Memoirs. Special Issue*, no.45, p.66-73.) WDC No. 87002002. CRREL No. 41003659.

Kawaguchi, S., ed.; Watanabe, O., ed. (1986) Symposium on Polar Meteorology and Glaciology, 8th, Tokyo, 11-12 December 1985. Proceedings. *Tokyo. National Institute of Polar Research. Memoirs. Special Issue*, no.45, 113p. WDC No. 87001996. CRREL No. 41003653.

Kawamura, T. (1988) Ice core drilling operation of the Japanese Arctic Glaciological Expedition in 1987. (In Japanese). *Seppyo*, 50(3), p.151-154. CRREL No. 43002402

Kazarian, R. (1981) Scientists obtain longest ice core in Arctic after drilling to bedrock in Greenland. *National Science Foundation News*, 81(58), 2p.

Kerr, R.A. (1984) Ice cap of 30 milion years ago detected. *Science*, 224(4645), p.141-142. WDC No. 84001238.

Khalil, M.A.K.; Rasmussen, R.A. (1988) Nitrous oxide; trends and global mass balance over the last 3000 years. (In: Oeschger, H., ed. *Symposium on Ice-Core Analysis, Bern, Switzerland, March 30-April 3, 1987. Proceedings. Annals of Glaciology*, vol.10, p.73-79.)

King, E.A.; Wagstaff, J. (1980) Search for cometary dust in the Antarctic ice. *Antarctic Journal of the United States*, 15(5), p.78-79. CRREL No. 35003184.

King, E.A.; Wagstaff, J. (1981) Micrometeorites from Antarctic ice cores. *Antarctic Journal of the United States*, 16(5), p.92-93. CRREL No. 36003987.

King, E.A.; Wagstaff, J. (1982) Extraterrestrial microparticles from Antarctic ice cores and the search for cometary dust. *Antarctic Journal of the United States*, 17(5), p.61-62.

Kirchner, S.; Delmas, R.J. (1988) 1000 year glaciochemical study at the South Pole. (In: Oeschger, H., ed. *Symposium on Ice-Core Analysis, Bern, Switzerland, March 30-April 3, 1987. Proceedings. Annals of Glaciology*, vol.10, p.80-84.)

Koci, B.R. (1984) Hot water drilling in Antarctic firn, and freezing rates in water-filled boreholes. (In: *International Workshop/Symposium on Ice Drilling Technology, 2nd, Calgary, Alberta, 30-31 August 1982. Proceedings. U.S. Army. Cold Regions Research and Engineering Laboratory. Special Report*, SR 84-34, p.101-103.) CRREL No. 40001191.

Koci, B.R. (1984) Lightweight hand coring auger. (In: Holdsworth, G.; Kuivinen, K.C.; Rand, J.H., eds. *International Workshop/Symposium on Ice Drilling Technology, 2nd, Calgary, Alberta, August 30-31, 1982. Proceedings. U.S. Army. Cold Regions Research and Engineering Laboratory. Special Report*, SR 84-34, p.55-59.) WDC No. 86000624. CRREL No. 40001183. NTIS No. ADA-156 733

Koci, B.R. (1984) New horizons in drill development. (In: Holdsworth, G.; Kuivinen, K.C.; Rand, J.H., eds. *International Workshop/Symposium on Ice Drilling Technology, 2nd, Calgary, Alberta, August 30-31, 1982. Proceedings. U.S. Army. Cold Regions Research and Engineering Laboratory. Special Report*, SR 84-34, p.51-54.) WDC No. 86000623. CRREL No. 40001182. NTIS No. ADA-156 733

Koci, B.R. (1985) Ice-core drilling at 5700 m powered by a solar voltaic array. *Journal of Glaciology*, 31(109), p.360-361. WDC No. 86001109. CRREL No. 40002693.

Koci, B.R.; Kuivinen, K.C. (1986) PICO drilling activities at Siple Station and on the Siple Coast. *Antarctic Journal of the United States*, 21(5), p.117. CRREL No. 43001627.

Koerner, R.M.; Fisher, D.A. (1981) Studying climatic change from Canadian high Arctic ice cores. (In: Harington, C.R., ed. *Climatic Change in Canada 2. Canada. National Museum of Natural Sciences. Syllogeus*, no.33, p.195-218.) WDC No. 81002659. CRREL No. 39003282.

Koerner, R.M.; Fisher, D.A. (1985) Devon Island ice core and the glacial record. (In: Andrews, J.T., ed. *Quaternary Environments: Eastern Canadian Arctic, Baffin Bay and Western Greenland*. Boston, Allen and Unwin, p.324-327. CRREL No. 39003935.

Koerner, R.M. (1987) Arctic ice cores; putting present climate into perspective. *Northern Perspectives*, 15(5), p.10-12.

Koerner, R.M.; Fisher, D.A.; Paterson, W.S.B. (1987) Wisconsinan and pre-Wisconsinan ice thicknesses on Ellesmere Island, Canada: inferences from ice cores. *Canadian Journal of Earth Sciences*, 24(2), p.296-301. CRREL No. 41004079.

Koerner, R.M. (1988) Ice core records of paleoclimate; the late glacial/early Holocene period. (In: *Biennial Meeting of the American Quaternary Association, 10th, Amherst, MA, June 6-8. 1988. Program and Abstracts*, p.29-32.)

Koerner, R.M.; Bourgeois, J. C.; Fisher, D.A. (1988) Pollen analysis and discussion of time-scales in Canadian ice cores. (In: Oeschger, H., ed. *Symposium on Ice-Core Analysis, Bern, Switzerland, March 30-April 3, 1987. Proceedings. Annals of Glaciology*, vol.10, p.85-91.)

Koerner, R.M. (1989) Ice core evidence for extensive melting of the Greenland Ice Sheet in the last interglacial. *Science*, 244(4907), p.964-968. CRREL No. 43002859.

Kohnen, H.; Gow, A.J. (1979) Ultrasonic velocity investigations of crystal anisotropy in deep ice cores from Antarctica. *Journal of Geophysical Research*, 84(C8), p.4865-4874. CRREL No. 34000410.

Kohnen, H.; Gow, A.J. (1979) Ultrasonic velocity investigations of crystal anisotropy in deep ice cores from Antarctica. *U.S. Army Cold Regions Research and Engineering Laboratory. Report*, CR 79-10, 16p. WDC No. 79002869. CRREL No. 33004204. NTIS No. ADA-071 451.

Koide, M.; Goldberg, E.D. (1985) Historical record of artificial radioactive fallout from the atmosphere in polar glaciers. *American Geophysical Union. Geophysical Monograph Series*, no.33, p.95-100. WDC No. 85001666. CRREL No. 39003573.

Kornilov, N.A.; Kozlovskii, A.M. (1985) Itogi rabot sezonnogo sostava dvadtsat' piatoi Sovetskoi Antarkticheskoi Ekspeditsii [1979/80 G.]. (Report of the 25th Soviet Antarctic Expedition for 1979-1980.) *Sovetskaia Antarkticheskaia Ekspeditsiia. Informatsionnyi Biulleten'*, no.107, p.10-16. WDC No. 86001084. CRREL No. 40002627.

Korotkevich, E.S.; Savtiugin, L.M.; Morev, V.A. (1979) Through drilling a shelf glacier in the region of Novolazarev Station. *Sovetskaia Antarkticheskaia Ekspeditsiia. Informatsionnyi Builleten*, no.98, 5p. WDC No. 81001417. CRREL No. 35001057.

Korotkevich, E.S. (1985) Stratigrafiia tsentral'noi chasti Lednika Vavilova [Severnaia Zemlia]. (Stratigraphy of the central part of Vavilov Glacier [Severnaya Zemlya].) *Problemy Arktiki i Antarktiki*, vol.59, p.5-21. WDC No. 86001417. CRREL No. 40003721.

Korotkevich, E.S. (1989) Stratigraphy of the central part of Vavilov Glacier (Severnaya Zemlya). *Problems of the Arctic and the Antarctic*, v.59, p.1-20. CRREL No. 43002042.

Kotliakov, V.M.; Macheret, IU.IA., Gordienko, F.G.; Zhuravlev, A.B. (1980) Geofizicheskie i izotopnye issledo vaniia lednikov Shpitsbergena. (Geophysical and isotopic research of the Svalbard glaciers.) *Akademiia Nauk SSSR. Vestnik*, no.4, p.132-138. CRREL No. 37003182.

Kotliakov, V.M.; Gordienko, F.G.; Barkov, N.I.; Korotkevich, E.S. (1980) Isotopic core investigations from Vostok Station and their paleoglaciological interpretation. *Antarktika - Doklady Komissii*, v.19, p.45-63. In Russian.

Kotliakov, V.M.; Gordienko, F.G. (1980) Znachenie I zadachi issledovaniia kerna iz lednikovykh skvazhin. (Problems and prospects of studying ice cores from glacier boreholes.) *Akademiia Nauk SSSR. Institut Geografii. Materialy Gliatsiologicheskikh Issledovanii. Khronika Obsuzhdeniia*, vol.38, p.22-26. WDC No. 81000258. CRREL No. 35001222.

Kotliakov, V.M.; Gordienko, F.G.; Barkov, N.I.; Korotkevich, E.S. (1985) Isotopic core investigations from Vostok Station and their paleoglaciological interpretation. *Antarctic Committee Reports*, v.90, p.60-72.

Kotliakov, V.M. (1987) Evoliutsiia termicheskikh uslovii tsentral'noi Antarktidy za 150 tysiach let po izotopno-kislorodnym issledovaniiam kerna so Stantsii Vostok. (Evolution of thermal conditions in Central Antarctica for the last 150,000 years determined from oxygen isotope studies of a core from Vostok Station.) *Akademiia Nauk SSR. Institut Geografii. Materialy Gliatsiologicheskikh Issledovanii*, vol.59, p.30-37. WDC No. 87002448. CRREL No. 42001302.

Kovalenko, V.I.; Moiseev, B.S.; Zagrivnyi, E.A. (1981) Burenie-protaivanie skvazhiny na Stantsii Vostok-1. (Thermal core drilling at Vostok-1 Station.) *Sovetskaia Antarkticheskaia Ekspeditsiia. Trudy*, no.73, p.112-116. CRREL No. 36003733.

Kubik, P.W.; Elmore, D.; Gove, H.E.; Conard, N.J. (1988) $^{36}$Cl depth profile in the 1966 Camp Century deep ice core covering the Wolf, the Spoerer, and the Maunder sunspot minima periods. (Abstract only) (In: *V.M. Goldschmidt Conference, Baltimore, MD. May 11-13, 1988.* Pennsylvania State University. Geochemistry Society of America, p.54.)

Kudriashov, B.B.; Chistiakov, V.K.; Morev, V.A. (1983) Burenie lednikovogo pokrova Antarktidy teplovym sposobom. (Thermal drilling of Antarctic Ice cover.) (In: Korotkevich, E.S., ed. *25 Let Sovetskoi Antarkticheskoi Ekspeditsii. (25 Years of Soviet Antarctic Expeditions.) Leningrad, Gidrometeoizdat*, p.138-149.) WDC No. 85001856. CRREL No. 38002709.

Kudriashov, B.B.; Chistiakov, V.K.; Morev, V.A. (1983) Results of and future prospects for the development of ice core drilling equipment and technology. (In: *Symposium on Antarctic Logistics, 3rd, Leningrad, 1982. Scientific Committee on Antarctic Research*, p.574-583.) CRREL No. 39002631.

Kudriashov, B.B.; Chistiakov, V.K.; Zagrivnii, E.A.; Lipenkov, V.Ia. (1984) Preliminary results of deep drilling at Vostok Station, Antarctica, 1981-82. (In: Holdsworth, G.; Kuivinen, K.C.; Rand, J.H., eds. *International Workshop/Symposium on Ice Drilling Technology, 2nd, Calgary, Alberta, August 30-31, 1982. Proceedings. U.S. Army. Cold Regions Research and Engineering Laboratory. Special Report*, SR 84-34, p.123-124.) WDC No. 86000635. CRREL No. 40001194. NTIS No. ADA-156 733.

Kudriashov, B.B.; Chistiakov, V.K.; Bobin, N.E. (1984) Problema bureniia glubokikh skvazhin v tsentral'nykh raionakh Antarktidy. (Problems of drilling deep wells in central parts of Antarctica.) *Akademiia Nauk SSSR. Institut Geografii. Materialy Gliatsiologicheskikh Issledovanii*, vol.51, p.168-172. CRREL No. 40000870.

Kudriashov, B.B.; Chistiakov, V.K.; Pashkevich, V.M.; Petrov, V.N. (1984) Selection of a low temperature filler for deep holes in the Antarctic Ice Sheet. (In: *International Workshop/Symposium on Ice Drilling Technology, 2nd, Calgary, Alberta, 30-31 August 1982. Proceedings. U.S. Army. Cold Regions Research and Engineering Laboratory. Special Report*, SR 84-34, p.137-138.) CRREL No. 40001198.

Kuivinen, K.C.; Koci, B.R. (1980) Polar Ice Coring Office ice drill status report. (In: MacKinnon, P., comp. *Ice Cores*. Boulder, Colorado, World Data Center A for Glaciology (Snow and Ice), *Glaciological Data, Report GD-8*, p.77-85.) CRREL No. 34004028.

Kuivinen, K.C.; Marshall, P.S.; Koci, B.R. (1980) Polar Ice Coring Office (PICO) drilling activities, 1979-80. *Antarctic Journal of the United States*, 15(5), p.76-77. CRREL No. 35003183.

Kuivinen, K.C. (1981) Ice core drilling, 1980-1981. *Antarctic Journal of the United States*, 16(5), p.78. CRREL No. 36003978.

Kuivinen, K.C.; Koci, B.R.; Holdsworth, G.W.; Gow, A.J. (1982) South Pole ice core drilling, 1981-1982. Antarctic *Journal of the United States*, 17(5), p.89-91. WDC No. 83002018. CRREL No. 37003955.

Kuivinen, K.C. (1983) 237-meter ice core from South Pole Station. *Antarctic Journal of the United States*, 18(5), p.113-114. WDC No. 84001886. CRREL No. 39000011.

Kuivinen, K.C.; Koci, B.R. (1984) Hot-water drilling on the Siple Coast and ice core drilling at Siple and South Pole Stations. *Antarctic Journal of the United States*, 19(5), p.58-59. CRREL No. 40001772.

Kuivinen, K.C.; Koci, B.R. (1987) Polar Ice Coring Office activties in East and West Antarctica. *Antarctic Journal of the United States*, 22(5), p.84-85. CRREL No. 43002747

Kumai, M.; Langway, C.C., Jr. (1988) Scanning electron-microscope analysis of aerosols in snow and ice cores from Greenland. (Abstract only) (In: Oeschger, H., ed. *Symposium on Ice-Core Analysis, Bern, Switzerland, March 30-April 3, 1987. Proceedings. Annals of Glaciology*, vol.10, p.208.)

Kusunoki, K.; Suzuki, Y. (1978) Ice-coring project at Mizuho Station, East Antarctica, 1970-75. *Japan. National Institute of Polar Research. Memoirs, Special Issue*, no.10, 172p.

Kusunoki, K. (1981) Progress of Japanese glaciological research in Antarctica. *Seppyo*, 43(1), p.55-61.

Kyle, P.R.; Jezek, P.A.; Mosley-Thompson, E.; Thompson, L.G. (1981) Tephra layers in the Byrd Station ice core and the Dome C ice core, Antarctica and their climatic importance. *Journal of Volcanology and Geothermal Research*, 11(1), p.29-39. WDC No. 82000237. CRREL No. 36001332.

Kyle, P.; Palais, J.; Delmas, R. (1982) Volcanic record of Antarctic ice cores: Preliminary results and potential for future investigations. (In: *International Symposium on Antarctic Glaciology, 3rd, Columbus, OH, September 7-12, 1981. Proceedings. Annals of Glaciology*, vol.3, p.172-177.) WDC No. 83000435. CRREL No. 37000267.

Kyle, P.R.; Palais, J.; Thomas, E. (1984) Vostok Tephra--an important englacial stratigraphic marker? *Antarctic Journal of the United States. Special Issue*, 19(5), p.64-65. WDC No. 86000965. CRREL No. 40001776.

Laird, C.M. (1982) Solar activity and nitrate deposition in South Pole snow. *Geophysical Research Letters*, 9(10), p.1195-1198.

Laird, C.M. (1983) Solar particle flux and nitrate in South Pole snow. (In: *International Symposium on Solar-Terrestrial Influences on Weather and Climate, 2nd, National Oceanic and Atmospheric Administration, Boulder, CO., August 2-6, 1982, Weather and Climate Response to Solar Variations. Proceedings.* Boulder, Colorado Associated University Press, p.237-242.)

Laird, C.M. (1985) Nitrate deposition in Antarctica: temporal and spatial variations. *Quaternary Science Reviews*, 4(4), p.333-355. CRREL No. 41003155.

Laird, C.M.; Zeller, E.J.; Dreschhoff, G.A.M. (1987) Nitrate variability in South Pole ice sequences and fossil surface effects. *Antarctic Journal of the United States*, 22(5), p.80-83. CRREL No. 43002745

Lal, D. (1987) $^{10}$Be in polar ice: data reflect changes in cosmic ray flux or polar meteorology. *Geophysical Research Letters*, 14(8), p.785-788. CRREL No. 42000901.

Landy, M.P.; Peel, D.A. (1981) Short-term fluctuations in heavy metal concentrations in Antarctic snow. *Nature*, 291(5811), p.144-146.

Lange, M.A. (1988) Computer-controlled system for ice-fabric analysis on a Rigsby stage. (In: Oeschger, H., ed. *Symposium on Ice-Core Analysis, Bern, Switzerland, March 30-April 3, 1987. Proceedings. Annals of Glaciology*, vol.10, p.92-94.)

Langway, C.C., Jr.; Chiang, E. (1980) Central ice core storage facility and information exchange. (In: MacKinnon, P., comp. *Ice Cores.* Boulder, Colorado, World Data Center A for Glaciology (Snow and Ice), *Glaciological Data, Report GD-8*, p.65-70.)

Langway, C.C., Jr., ed.; Oeschger, H., ed.; Dansgaard, W., ed. (1985) Greenland ice core: geophysics, geochemistry, and the environment. *American Geophysical Union. Geophysical Monograph*, no.33, 118p. WDC No. 85000439.

Langway, C.C., Jr.; Oeschger, H.; Dansgaard, W. (1985) Greenland ice sheet program in perspective. *American Geophysical Union. Geophysical Monograph Series*, no.33, p.1-8. WDC No. 85001653. CRREL No. 39003560.

Langway, C.C., Jr.; Shoji, H; Azuma, N. (1988) Crystal size and orientation patterns in the Wisconsin-age ice from Dye 3, Greenland. (In: Oeschger, H., ed. *Symposium on Ice-Core Analysis, Bern, Switzerland, March 30-April 3, 1987. Proceedings. Annals of Glaciology*, vol.10, p.109-115.)

Langway, C.C., Jr.; Clausen, H.B.; Hammer, C.U. (1988) Inter-hemispheric volcanic time-marker in ice cores from Greenland and Antarctica. (In: Oeschger, H., ed. *Symposium on Ice-Core Analysis, Bern, Switzerland, March 30-April 3, 1987. Proceedings. Annals of Glaciology*, vol.10, p.102-108.)

Langway, C.C., Jr.; Goto-Azuma, K. (1988) Temporal variations in the deep ice-core chemistry record from Dye 3, Greenland. (Abstract only) (In: Oeschger, H., ed. *Symposium on Ice-Core Analysis, Bern, Switzerland, March 30-April 3, 1987. Proceedings. Annals of Glaciology*, vol.10, p.209.)

Lawson, M.P.; Kuivinen, K.C.; Balling, R.C., Jr. (1982) Analysis of the climatic signal in the South Dome, Greenland ice core. *Climatic Change*, 4(4), p.375-384. CRREL No. 37002873.

Lawson, M.P.; Kuivinen, K.C. (1982) Assessment of the climatic information derived from the South Dome, Greenland, ice core. (In: Brubaker, L.B.; Chernicoff, S.E., eds. *Biennial Conference of the American Quaternary Association; Character and Timing of Rapid Environmental and Climatic Changes, 7th, Seattle, WA, June 28-30, 1982. American Quaternary Association National Conference. Abstract* 7, p.119.)

Legrand, M. (1980) Mesure de l'acidité et de la conductivité électrique des précipitations Antarctiques. (Measuring acidity and electrical conductivity in Antarctic precipitation.) *France. Centre National de la Recherche Scientifique. Laboratoire de Glaciologie. Publication*, no.316, PhD. Dissertation, 109p. CRREL No. 37002158.

Legrand, M.; Delmas, R.J. (1987) 220-year continuous record of volcanic $H_2SO_4$ in the Antarctic ice sheet. *Nature*, 327(6124), p.671-676. WDC No. 87002013. CRREL No. 41004325.

Legrand, M.; Delmas, R.J. (1987) Environmental changes during last deglaciation inferred from chemical analysis of the Dome C ice core. (In: Berger, W.H.; Labeyrie, L.D., eds. *Abrupt Climatic Changes; Evidence and Implications, St. Hugues de Biviers, France, October 1985. NATO Advanced Study Institutes Series. Series C; Mathematical and Physical Sciences*, vol.216, p.247-259.)

Legrand, M.R.; Delmas, R.J.; Charlson, R.J. (1988) Climate forcing implications from Vostok ice-core sulphate data. *Nature*, 334(6181), p.418-420.

Legrand, M.; Saigne, C. (1988) Formate, acetate and methanesulfonate measurements in Antarctic ice: some geochemical implications. *Atmospheric Environment*, 22(5), p.1011-1017. CRREL No. 42003708.

Legrand, M.; Delmas, R.J. (1988) Soluble impurities in four Antarctic ice cores over the last 30,000 years. (In: Oeschger, H., ed. *Symposium on Ice-Core Analysis, Bern, Switzerland, March 30-April 3, 1987. Proceedings. Annals of Glaciology*, vol.10, p.116-120.)

Legrand, M.R.; Lorius, C.; Barkov, N.I.; Petrov, V.N. (1988) Vostok (Antarctica) ice core: atmospheric chemistry changes over the last climatic cycle (160,000 years). *Atmospheric Environment*, 22(2), p.317-331. CRREL No. 42003171.

LeTreut, H.; Portes, J.; Jouzel, J.; Ghil, M. (1988) Isotopic modeling of climatic oscillations; implications for a comparative study of marine and ice core records. *Journal of Geophysical Research, Atmospheres*, 93(D8), p.9365-9383.

Li, J.; Xie, Z.; Huang, M. (1988) Fabrics of the ice cores from BHQ on Law Dome ice cap, Antarctica. *Kexue Tongbao*, 33(3), p.216-220. CRREL No. 42002662.

Litwak, J.; Kersten, L.; Kuivinen, K. (1984) PICO intermediate drill system. (In: Holdsworth, G.; Kuivinen, K.C.; Rand, J.H., eds. *International Workshop/Symposium on Ice Drilling Technology, 2nd, Calgary, Alberta, August 30-31, 1982. Proceedings. U.S. Army. Cold Regions Research and Engineering Laboratory. Special Report*, SR 84-34, p.41-44.) WDC No. 86000621. CRREL No. 40001180. NTIS No. ADA-156 733.

Liu, Y.G. (1988) Analysis of trace elements in the BHQ ice core, Law Dome, Antarctica. *Journal of Glaciology*, 34(118), p.297-300. CRREL 43001985.

Lopez, B. (1989) Our frail planet in cold, clear view: the South Pole as global laboratory. *Harper's Magazine*, 278(1668), p.43-49. CRREL No. 43002729.

Lorius, C. (1978) Climatic changes in Antarctica during the last 30,000 years. (In: *Colloque International: Evolution des Atmospheres Planetaires et Climatologie de la Terre, Nice, France, 16-20 October 1978. Papers.* Toulouse, France, Centre National d'Études Spatiales, p.71-82.)

Lorius, C.; Merlivat, L.; Jouzel, J.; Pourchet, M. (1979) 30,000-yr isotope climatic record from Antarctic ice. *Nature*, 280(5724), p.644-648. WDC No. 80001463. CRREL No. 34001839.

Lorius, C.; Merlivat, L.; Duval, P.; Jouzel, J.; Pourchet, M. (1981) Evidence of climatic change in Antarctica over the last 30,000 years from the Dome C ice core. (In: Allison, I., ed. *Symposium on Sea Level, Ice and Climate Change, Canberra, 7-8 December 1978. Proceedings. International Association of Hydrological Sciences. IAHS-AISH Publication*, no.131, p.217-225.)

Lorius, C. (1983) Data from Antarctic ice cores: climatic and environmental changes since the last glacial maximum. *Bull Inst Geol Bassin Aquitaine (Talence)*, 34, p.37-49.

Lorius, C. (1983) Donnees des carottes de glace de l'Antarctique: evolution du climat et de l'environnement atmospherique depuis le dernier maximum glaciaire. (Data from Antarctic ice cores: climatic and environmental changes since the last glacial maximum.) *France. Centre National de la Recherche Scientifique. Cahiers du Quaternaire. Special Issue*, p.37-49. WDC No. 84001594.

Lorius, C. (1983) Environnement atmospherique et climat passes a partir des archives glaciaires. (Atmospheric environment and past climate have left a glacial archive.) *France. Centre National de la Recherche Scientifique. Courrierdu CNRS. Supplement*, no.52, p.26-34. WDC No. 84001595.

Lorius, C.; Raynaud, D.; Petit, J.R.; Jouzel, J.; Merlivat, L. (1983) Late-glacial maximum-Holocene atmospheric and ice-thickness changes from Antarctic ice-core studies. (In: *Symposium on Ice and Climate Modelling, Northwestern University, Evanston, IL, 27 June-1 July 1983. Proceedings. Annals of Glaciology*, vol.5, p.88-94.) WDC No. 84001934. CRREL No. 39000179.

Lorius, C.; Raynaud, D. (1983) Record of past atmospheric $CO_2$ from tree-ring and ice core studies. (In: Bach, W., ed. *Carbon Dioxide: Current Views and Developments in Energy/Climate Research*. D. Reidel Publishing Company, p.145-176.) WDC No. 84000452. CRREL No. 38002658.

Lorius, C. (1984) Data from Antarctic ice cores on $CO_2$, climate, aerosols, and changes in ice thickness. (In: *Environment of West Antarctica: Potential $CO_2$-induced changes. Report of a workshop held in Madison, WI, 5-7 July 1983, National Research Council. Committee on Glaciology Polar Research Board*. Washington, DC. National Academy Press, p.49-62.) WDC No. 84001686. CRREL No. 39001499. NTIS No. PB85-110 757.

Lorius, C. (1985) International Antarctic Glaciological Program activities at South Pole Station and Vostok. *Antarctic Journal of the United States*, 20(5), p.73-74. WDC No. 87000725. CRREL No. 41002633.

Lorius, C.; Jouzel, J.; Ritz, C.; Merlivat, L.; Barkov, N.I.; Korotkevich, Y.S.; Kotlyakov, V.M. (1985) 150,000-year climatic record from Antarctic ice. *Nature*, 316(6029), p.591-595. WDC No. 85001268.

Lorius, C.; et al. (1986) Dernier cycle climatique (150,000 ans) a partir d'une carotte de glace de l'Antarctique. (Last climatic cycle (150,000 years) from an Antarctic ice core.) (In: *Oscillations Climatiques Entre 125 000 ans et le Maximum Glaciaire; Colloque de l'Association Francaise pour l'Étude du Quaternaire, Rennes, France, June 19-21, 1985. Bulletin de l'Association Francaise pour l'Étude du Quaternaire*, 23(25-2), 28p.)

Lorius, C.; et al. (1988) Antarctic ice core; $CO_2$ and climatic change over the last climatic cycle. *EOS, Transactions, American Geophysical Union*, 69(26), p.681, 683-684.

Lyon, G.L. (1986) Stable isotope stratigraphy of ice cores and the age of the last eruption at Mount Melbourne, Antarctica. *New Zealand Journal of Geology and Geophysics*, 29(1), p.135-138. CRREL No. 41000610.

Lyons, W.B.; Mayewski, P.A. (1983) Nitrate plus nitrite concentrations in a Himalayan ice core. *Geophysical Research Letters*, 10(12), p.1160-1163. WDC No. 85002102. CRREL No. 38001534.

Maccagnan, M.; Barnola, J.M.; Delmas, R.; Duval, P. (1981) Static electrical conductivity as an indicator of the sulfate content of polar ice cores. *Geophysical Research Letters*, 8(9), p.970-972. WDC No. 82000597. CRREL No. 36001131.

Maccagnan, M.; Duval, P. (1982) Electrical behavior of Antarctic ice and radio echo layers in ice sheets. (In: *International Symposium on Antarctic Glaciology, 3rd, Columbus, OH, September 7-12, 1981. Proceedings. Annals of Glaciology*, vol.3, p.195-198.) WDC No. 83000439. CRREL No. 37000271.

MacDonald, G.J. (1988) Variations in atmospheric carbon dioxide and ice age climate. (In: *North American Conference on Preparing for Climate Change, 1st: A Cooperative Approach, Washington, DC., October 27-29, 1987. Proceedings*. Rockville, MD. Government Institutes, Inc., p.108-117.) CRREL No. 42003032.

MacKinnon, P.K. (1979) *Paleoclimate as Revealed by Polar Ice Cores*. Unpaged. WDC No. 85002071.

MacKinnon, P. (1980) Ice core inventory. 1. Survey of North American ice core studies. 2. International summary. 3. Ice core tables and core site maps. (In: MacKinnon, P., comp. *Ice Cores*. Boulder, Colorado, World Data Center A for Glaciology (Snow and Ice), *Glaciological Data, Report GD-8*, p.15-57.) CRREL No. 34004023.

Mae, S.; Hondoh, T.; Nakawo, M.; Langway, C.C., Jr. (1988) Dielectric properties of deep ice cores with air-hydrate inclusions. (Abstract only) (In: Oeschger, H., ed. *Symposium on Ice-Core Analysis, Bern, Switzerland, March 30-April 3, 1987. Proceedings. Annals of Glaciology*, vol.10, p.210.)

Marshall, P.S. (1981) Coring in Antarctica. *Explorers Journal*, 59(3), p.130-134. WDC No. 82000963. CRREL No. 36002837.

Marshall, P.S.; Kuivinen, K.C. (1981) Greenland ice sheet program 1980. *Polar Record*, 20(129), p.562-565. WDC No. 82000719. CRREL No. 36000913.

Marshall, P.S.; Kuivinen, K.C. (1981) Polar Ice Coring Office Antarctic field activities, 1979-80. *Polar Record*, 20(129), p.561-562. WDC No. 82000718. CRREL No. 36000912.

Matsuda, T.; Kawaguchi, S.; Watanabe, O., eds. (1987) *Symposium on Polar Meteorology and Glaciology, 9th, National Institute of Polar Research, Tokyo, December 11-12, 1986. Proceedings, vol.1*. Tokyo, National Institute of Polar Research, 159P. WDC No. 87002059.

Mayewski, P.A.; Lyons, W.B.; Ahmad, N. (1981) Reconaissance glaciochemistry studies in the Indian Himalaya. (In: *Eastern Snow Conference, 38th, Syracuse, NY, 4-5 June, 1981. Proceedings*, p.45-48.)

Mayewski, P.A.; Lyons, W.B. (1982) Source and climatic implication of the reactive iron and reactive silicate concentration found in a core from Meserve Glacier, Antarctica. *Geophysical Research Letters*, 9(3), p.190-192. WDC No. 84001081. CRREL No. 36003589.

Mayewski, P.A.; Lyons, W.B.; Ahmad, N.; Smith, G.; Pourchet, M. (1984) Interpretation of the chemical and physical time-series retrieved from Sentik Glacier, Ladakh Himalaya, India. *Journal of Glaciology*, vol.30(104), p.66-76. WDC No. 84001982. CRREL No. 39000244.

Mayewski, P.A.; Lyons, W.B. (1985) Can high-altitude ice masses in temperate areas provide useful climatic records? (Abstract only) (In: *Symposium on Snow and Ice Chemistry and the Atmosphere, Peterborough, Ontario, August 19-24, 1984. Proceedings. Annals of Glaciology*, vol.7, p.89.)

Mayewski, P.A.; Lyons, W.B.; Spencer, M.J.; Twickler, M.; Dansgaard, W.; Clausen, H. (1985) *Detailed (1869-1984) record of sulfate and nitrate concentrations from South Greenland*. p.168-185. WDC No. 85002053.

Mayewski, P.A.; Lyons, W.B. (1985) Using an ice core to characterize the climatic history of Antarctica. *Antarctic Journal of the United States*, 20(5), p.71-72. WDC No. 87000723. CRREL No. 41002631.

Mayewski, P.A. (1986) Dominion Range ice core. *Antarctic Journal of the United States*, 21(5), p.120-121. CRREL NO. 43001629.

Mayewski, P.A.; Lyons, W.B.; Spencer, M.J.; Twickler, M.; Dansgaard, W.; Koci, B.; Davidson, C.I.; Honrath, R.E. (1986) Sulfate and nitrate concentrations from a South Greenland ice core. *Science*, 232(4753), p.975-977. WDC No. 86001607.

Mayewski, P.A. (1987) Transantarctic Mountains ice core study. *Antarctic Journal of the United States*, 22(5), p.78. CRREL No. 43002742.

Mayewski, P.A.; et al. (1988) Climatic record using an ice core from the Transantarctic Mountains, Antarctica. (Abstract only) (In: Oeschger, H., ed. *Symposium on Ice-Core Analysis, Bern, Switzerland, March 30-April 3, 1987. Proceedings. Annals of Glaciology*, vol.10, p.211.)

McAndrews, J.H. (1984) Pollen analysis of the 1973 ice core from Devon Island glacier, Canada. *Quaternary Research*, 22(1), p.68-76. WDC No. 87001540. CRREL No. 39002062.

McGinnis, L.D.; Osby, D.R.; Kohout, F.A. (1981) Paleohydrology inferred from salinity measurements on Dry Valley Drilling Project cores from Taylor Valley, Antarctica. (In: Craddock, C., ed. *Antarctic Geoscience. Symposium on Antarctic Geology and Geophysics, Madison, WI, 22-27 August 1977. Proceedings. International Union of Geological Sciences*, B(4), p.1133-1137.) WDC No. 82000733. CRREL No. 36003140.

McInnes, B.; Radok, U. (1984) Estimated ages and temperatures of South Pole ice. *Antarctic Journal of the United States*, 19(1), p.10-12. WDC No. 84002228.

McInnes, B.; Radok, U. (1985) Steady-state prediction of Dye 3 core features. *American Geophysical Union. Geophysical Monograph Series*, no.33, p.111-117. WDC No. 85001669. CRREL No. 39003576.

Mercer, J.H.; Ager, T.A. (1983) Glacial and floral changes in Southern Argentina since 14,000 years ago. *National Geographic Society. Research Reports*, 15, p.457-477. WDC No. 84000454.

Miklishanskii, A.Z.; Iakovlev, Iu.V.; Savelev, B.V.; Zvev, A.P. (1980) Levels and composition of the mineral components in ice cores from Central Antarctica. *Geochemistry International*, 17(1), p.152-158. WDC No. 82000250. CRREL No. 35004148.

Monaghan, M.C. (1987) Greenland ice $^{10}$Be concentrations and average precipitation rates north of 40°N to 45°N. *Earth and Planetary Science Letters*, 84(2/3), p.197-203. CRREL No. 41004279.

Moore, J.C. (1988) Dielectric variability of a 130 m Antarctic ice core: implications for radar sounding. (In: *International Symposium on Antarctic Glaciology, 4th, Bremerhaven, FRG, 7-11 September 1987. Proceedings. Annals of Glaciology*, vol.11, p.95-99.) CRREL No. 43001951.

Morev, V.A.; Raikovskii, Iu.V. (1979) Burenie antarkticheskogo lednikovogo pokrova v raione Stantsii Novolazarevskaia. (Drilling of the Antarctic ice sheet in the Novolazarevskaya Station area.) *Akademiia Nauk SSSR. Institut Geografii. Materialy Gliatsiologicheskikh Issledovanii. Khronika Obsuzhdeniia*, vol.37, p.198-200. WDC No. 80002726. CRREL No. 34003714.

Morev, V.A.; Pukhov, V.A. (1981) Eksperimental'nye raboty po bureniiu kholodnykh pokrovnykh lednikov termoburovymi snariadami AANII. (Using AANII thermodrills in experimental drilling of cold ice sheets.) *Leningrad. Arkticheskii I Antarkticheskii Nauchno-Issledovatel'skii Institut. Trudy*, vol.367, p.64-68. CRREL No. 36001592.

Morev, V.A.; Pukhov, V.A.; IAkovlev, V.M.; Zagorodnov, V.A. (1984) Equipment and technology for drilling in temperate glaciers. (In: *International Workshop/Symposium on Ice Drilling Technology, 2nd, Calgary, Alberta, 30-31 August 1982. Proceedings. U.S. Army. Cold Regions Research and Engineering Laboratory. Special Report*, SR 84-34, p.125-127.) CRREL No. 40001195.

Morev, V.A.; Yakovlev, V.A. (1984) Liquid fillers for bore holes in glaciers. (In: *International Workshop/Sym posium on Ice Drilling Technology, 2nd, Calgary, Alberta, Canada, 30-31 August 1982. Proceedings*, p.133-135.) CRREL No. 40001197.

Morgan, V.I.; McCray, A.P.; Wehrle, E. (1984) Ice drilling at Cape Folger, Antarctica. (In: *International Workshop/Symposium on Ice Drilling Technology, 2nd, Calgary, Alberta, 30-31 August 1982. Proceedings. U.S. Army. Cold Regions Research and Engineering Laboratory. Special Report*, SR 84-34, p.85-86.) CRREL No. 40001188.

Morgan, V.I.; Davis, E.R.; Wehrle, E. (1984) Rigsby stage with remote computer compatible output. *Cold Regions Science and Technology*, 10(1), p.89-92. WDC No. 84002238. CRREL No. 39001625.

Morgan, V.I. (1985) Oxygen isotope-climate record from the Law Dome, Antarctica. *Climatic Change*, 7(4), p.415-426. WDC No. 86000900. CRREL No. 40001924.

Morgan, V.I. (1985) Snow accumulation and oxygen isotope records in two adjacent ice cores. *Australian National Antarctic Research Expeditions. ANARE Research Notes*, v.28, p.25-31.

Mosley-Thompson, E.; Thompson, L.G. (1979) Microparticle deposition at South Pole. *Antarctic Journal of the United States*, 14(5), p.91-93. WDC No. 80003404. CRREL No. 35000665.

Mosley-Thompson, E.M. (1979) *911 years of microparticle deposition at the South Pole: A climatic interpretation.* Columbus. Ohio State University. Ph.D Dissertation. UM Order no. 7916035, 200p. WDC No. 81001444. CRREL No. 34002455.

Mosley-Thompson, E.; Thompson, L.G. (1980) Glaciological interpretation of the microparticle concentration in the 905-meter Dome C core. *Antarctic Journal of the United States*, 15(5), p.71-75. CRREL No. 35003180.

Mosley-Thompson, E. (1980) 911 years of microparticle deposition at the south pole: A climatic interpretation. *Ohio. State University. Institute of Polar Studies. Report*, no.73, 134p. WDC No. 81001819.

Mosley-Thompson, E.M. (1980) Tales the ice can tell. *Mosaic*, 9(5), p.15-21. WDC No. 81002501. CRREL No. 35000401.

Mosley-Thompson, E.; Thompson, L.G. (1981) Microparticle record from Q-13: preliminary report. *Antarctic Journal of the United States*, 16(5), p.89-90. CRREL No. 36003985.

Mosley-Thompson, E.; Thompson, L.G. (1982) Microparticle analysis of the Ross Ice Shelf Q-13 core and preliminary results from the J-9 Core. (In: *International Symposium on Antarctic Glaciology, 3rd, Columbus, OH, September 7-12, 1981. Proceedings. Annals of Glaciology*, vol.3, p.211-215.) WDC No. 83000442. CRREL No. 37000274.

Mosley-Thompson, E.; Thompson, L.G. (1982) Nine centuries of microparticle deposition at the South Pole. *Quaternary Research*, 17, p.1-13. WDC No. 82000605.

Mosley-Thompson, E.; Thompson, L.G. (1983) South Pole ice core processing and microparticle analysis. *Antarctic Journal of the United States*, 18(5), p.118-119. WDC No. 84001889. CRREL No. 39000014.

Mosley-Thompson, E.; Kruss, P.D.; Bain, T. (1983) South Pole pit stratigraphic studies. *Antarctic Journal of the United States*, 18(5), p.116-118. WDC No. 84001888. CRREL No. 39000013.

Mosley-Thompson, E.; Gow, A.J.; Herron, M.M.; Jezek, K.; Kamb, B. (1985) *Scientific Plan for Deep Ice Core Drilling in Central Greenland (GISP 2 - Greenland Ice Sheet Project).* National Science Foundation, 108p. NTIS PB86-123197.

Mosley-Thompson, E.; Mountain, K.R.; Paskievitch, J.F. (1986) Paleoclimatic ice core program at Siple Station. *Antarctic Journal of the United States*, 21(5), p.115-117.

Mosley-Thompson, E.; Paskievitch, J.F.; Gross, S.M. (1987) Ice-core drilling for paleoclimatic information at plateau remote. *Antarctic Journal of the United States*, 22(5), p.78-79. CRREL No. 43002743.

Mosley-Thompson, E.; Thompson, L.G.; Paskievitch, J.; Grootes, P.M. (1988) Shallow-core analysis and pit studies at Siple Station, Antarctica; implications for extraction of a 500 year proxy climate record. (Abstract only) (In: Oeschger, H., ed. *Symposium on Ice-Core Analysis, Bern, Switzerland, March 30-April 3, 1987. Proceedings. Annals of Glaciology*, vol.10, p.212.)

Mulvaney, R.; Peel, D.A. (1988) Anions and cations in ice cores from Dolleman Island and the Palmer Land Plateau, Antarctic Peninsula. (In: Oeschger, H., ed. *Symposium on Ice-Core Analysis, Bern, Switzerland, March 30-April 3, 1987. Proceedings. Annals of Glaciology*, vol.10, p.121-125.)

Mumford, J.W.; Peel, D.A. (1982) Microparticles, marine salts and stable isotopes in a shallow firn core from the Antarctic Peninsula. *British Antarctic Survey. Bulletin*, no.56, p.37-47. WDC No. 83000732. CRREL No. 37000023.

Murozumi, M.; Nakamura, S.; Yoshida, Y. (1978) Compiled data of chemical compositions in ice cores drilled at Mizuho Station. *Japan. National Institute of Polar Research. Memoirs, Special Issue*, no.10, p.67-168.

Nagata, T., ed. (1979) Symposium on Antarctic Geosciences, 1st, 1978, Proceedings. *Tokyo. National Institute of Polar Research. Special Issue*, no.14, 229p. WDC No. 84001173.

Nakahara, J.; Shigesato, Y.; Higashi, A.; Hondoh, T.; Langway, C.C., Jr. (1988) Raman spectra of natural clathrates in deep ice cores. *Philosophical Magazine B*, 57(3), p.421-430. CRREL No. 42003165.

Nakamura, T.; Abe, O. (1978) Internal friction of Antarctic Mizuho ice cores at low frequency. *Japan. National Institute of Polar Research. Memoirs, Special Issue*, no.10, p.102-113.

Nakawo, M.; Narita, H. (1985) Density profile of a 413.5 m deep fresh core recovered at Mizuho Station, East Antarctica. (In: Kawaguchi, S., ed. *Symposium on Polar Meteorology and Glaciology, 7th, Tokyo, 4-6 December 1984. Proceedings. Tokyo. National Institute of Polar Research. Memoirs. Special Issue*, no.39, p.141-156.) WDC No. 86001195. CRREL No. 40003510.

Nakawo, M. (1986) Volume expansion of a 413.5-m Mizuho core after its recovery. (In: Kawaguchi, S.; Watanabe, O., eds. *Symposium on Polar Meteorology and Glaciology, 8th, Tokyo, 11-12 December 1985. Proceedings. Tokyo. National Institute of Polar Research. Memoirs. Special Issue*, no.45, p.78-85.) WDC No. 87002004. CRREL No. 41003661.

Nakawo, M.; Nagoshi, M.; Mae, S. (1988) Stratigraphic record of an ice core from the Yamato Mountains meteorite ice field, Antarctica. (In: Oeschger, H., ed. *Symposium on Ice-Core Analysis, Bern, Switzerland, March 30-April 3, 1987. Proceedings. Annals of Glaciology*, vol.10, p.126-129.)

Nakawo, M.; Ageta, Y.; Koshima, S.; Jiankang, H. (1989) Climatic information by a mid-latitude ice core - a case study with a 10 metre coare from the Chongce Ice Cap, West Kun Lun, China. *Annals of Glaciology*, vol.14, in press.

Nakawo, M.; Nakayama, Y.; Kohshima, S.; Nishimura, T.; Han, J.; Zhou, T. (1989) Ice coring operation at high altitudes in West Kunlun Mountains, China. *Bulletin of Glacier Research*, no.7, p.15-19.

Narita, H.; Nakawo, M. (1985) Structure of 413.5-m deep ice core obtained at Mizuho Station,Antarctica. (In: Kawaguchi, S., ed. *Symposium on Polar Meteorology and Glaciology, 7th, Tokyo, 4-6 December 1984. Proceedings. Tokyo. National Institute of Polar Research. Memoirs. Special Issue*, no.39, p.157-164.) WDC No. 86001196. CRREL No. 40003511.

Narita, H.; Nakawo, M.; Fuji, Y. (1986) Textures and fabrics of 700-m deep ice core obtained at Mizuho Station, East Antarctica. (In: Kawaguchi, S.; Watanabe, O., eds. *Symposium on Polar Meteorology and Glaciology, 8th, Tokyo, 11-12 December 1985. Proceedings. Tokyo. National Institute of Polar Research. Memoirs. Special Issue*, no.45, p.74-77.) WDC No. 87002003. CRREL No. 41003660.

Narita, H.; et al. (1988) Ice-coring at Mizuho Station, Antarctica, and core analyses; a contribution from the Glaciological Research Program in east Dronning Maud Land, Antarctica. (Abstract only) (In: Oeschger, H., ed. *Symposium on Ice-Core Analysis, Bern, Switzerland, March 30-April 3, 1987. Proceedings. Annals of Glaciology*, vol.10, p.213.)

National Research Council. Polar Research Board. Committee on Glaciology. (1984) *Environment of West Antarctica: Potential $CO_2$-induced changes. Report of a workshop held in Madison, Wisconsin 5-7 July 1983.* 236p. WDC No. 84001487.

National Science Foundation. Directorate for Geoscience. (1987) *FY 1988 Global Geosciences Program*. 27p. WDC No. 87002070.

Neftel, A.; Oeschger, H.; Schwander, J.; Stauffer, B.; Zumbrunn, R. (1982) Ice core sample measurements give atmospheric $CO_2$ content during the past 40,000 yr. *Nature*, 295(5846), p.220-223. WDC No. 82000608.

Neftel, A.; Oeschger, H.; Schwander, J.; Stauffer, B. (1983) Carbon dioxide concentration in bubbles of natural cold ice. (In: *International Symposium on the Physics and Chemistry of Ice, 6th, Rolla, Missouri, August 2-6 1982. Journal of Physical Chemistry*, 87(21), p.4116-4120.) WDC No. 84001830. CRREL No. 38001585.

Neftel, A.; Moor, E.; Oeschger, H.; Stauffer, B. (1985) Evidence from polar ice cores for the increase in atmospheric $CO_2$ in the past two centureis. *Nature*, 315(6014), p.45-47. WDC No. 85000981.

Neftel, A. (1985) Measurements of a kind of DC-conductivity on cores from Dye 3. *American Geophysical Union. Geophysical Monograph Series*, no.33, p.32-38. WDC No. 85001657. CRREL No. 39003564.

Neftel, A.; Beer, J.; Oeschger, H.; Zurcher, F.; Finkel, R.C. (1985) Sulphate and nitrate concentrations in snow from South Greenland 1895-1978. *Nature*, 314(6012), p.611-613. CRREL No. 40001003.

Neftel, A.; Jacob, P.; Klockow, D. (1986) Long-term record of $H_2O_2$ in polar ice cores. *Tellus*, 38B(3-4), p.262-270. WDC No. 87001062. NTIS No. 41001756

Neftel, A.; Oeschger, H.; Staffelbach, T.; Stauffer, B. (1988) $CO_2$ record in the Byrd ice core 50,000-5,000 years BP. *Nature*, 331(6157), p.609-611. CRREL No. 42002600.

New York. State University, Buffalo. Ice Core Storage Facility and Information Exchange. (1983) *Ice core samples from Greenland and Antarctica*. 49p. WDC No. 83002101.

Ng, A.; Patterson, C. (1981) Natural concentrations of lead in ancient Arctic and Antarctic ice. *Geochimica et Cosmochimica Acta*, 45(11), p.2109-2121. WDC No. 82000609. CRREL No. 36001675.

Nijampurkar, V.N.; Bhandari, N. (1984) Oxygen isotopic ratios of some Himalayan glaciers. *Tellus*, 36B(4), p.300-302. WDC No. 85000328. CRREL No. 39000596.

Nijampurkar, V.N. (1985) Isotopic and TL studies of Antarctic ice samples. (In: *Scientific Report of the 2nd Indian Antarctic Expedition. Technical Publication 2*. India, Department of Ocean Development, New Delhi, p.103-106.)

Nishiizumi, K.; Arnold, J.R.; Elmore, D.; Ma, X.; Newman, D.; Gove, H.E. (1983) $^{36}Cl$ and $^{53}Mn$ in Antarctic meteorites and $^{10}Be$-$^{36}Cl$ dating of Antarctic ice. *Earth and Planetary Science Letters*, 62(3), p.407-417. CRREL No. 37002942.

Nishio, F. (1984) Stratigraphy and density data from ice core drilled at G2 gridstation. (In: Nishio, F., ed. *Glaciological Research Program in East Queen Maud Land, East Antarctica. Part 1, 1982-1983. Japanese Antarctic Research Expedition. JARE Data Reports*, no.94, p.64-83.) WDC No. 84001044. CRREL No. 38003715.

Nishio, F.; Ohmae, H.; Ishikawa, M. (1986) Glaciological research program in East Queen Maud Land, East Antarctica, part 3, 1982. *Japanese Antarctic Research Expedition. JARE Data Reports*, v.110, 36p.

Nishio, F. (1986) Volcanic activities recorded in the Antarctic ice sheet. *Polar News*, no.43, p.2-9. CRREL No. 42001502.

Ocampo, J. (1988) Gas diffusion and fractionation in clathrated ice-core samples. (Abstract only) (In: Oeschger, H., ed. *Symposium on Ice-Core Analysis, Bern, Switzerland, March 30-April 3, 1987. Proceedings. Annals of Glaciology*, vol.10, p.214.)

Oerter, H.; Rauert, W. (1983) Core drilling on Vernagtferner (Oetztal Alps, Austria) in 1979: tritium contents. *Zeitschrift fur Gletscherkunde und Glazialgeologie*, 18(1), p.13-22. WDC No. 84001898. CRREL No. 39000044.

Oerter, H.; Reinwarth, O.; Rufli, H. (1983) Core drilling through a temperate alpine glacier (Vernagtferner, Oetztal Alps) in 1979. *Zeitschrift fur Gletscherkunde und Glazialgeologie*, 18(1), p.1-11. WDC No. 84001897. CRREL No. 39000043.

Oerter, H.; Baker, D.; Stichler, W.; Rauert, W. (1985) Isotope studies of ice cores from a temperate alpine glacier (Vernagtferner, Austria) with respect to the meltwater flow. (In: *Symposium on Snow and Ice Chemistry and the Atmosphere, Peterborough, Ontario, August 19-24, 1984. Proceedings. Annals of Glaciology*, vol.7, p.90-93.) WDC No. 86000816. CRREL No. 40002403.

Oerter, H.; Moser, H.; Rauert, W.; Stichler, W.; Reinwarth, O. (1988) Isotope measurements on an ice core from a temperate Alpine glaicer [Vernagtferner, Austria]. (Abstract only) (In: Oeschger, H., ed. *Symposium on Ice-Core Analysis, Bern, Switzerland, March 30-April 3, 1987. Proceedings. Annals of Glaciology*, vol.10, p.214-215.)

Oeschger, H. (1980) History of atmospheric $CO_2$ as revealed from ice core studies. World Meteorological Organization, Geneva, *WMO Project on Research and Monitoring of Atmospheric $CO_2$, Report*, no.1, Appendix G, 5p.

Oeschger, H. (1980) In der natur gespeicherte Geschichte von Umweltsvorgangen. (History of environmental processes stored in nature.) (In: Oeschger, H.; Messerli, B.; Svilar, M., eds. *Das Klima: Analysen und Modelle Geschichte und Zukunft*. Springer-Verlag, p.209-236.)

Oeschger, H.; Stauffer, B.; Neftel, A.; Schwander, J.; Zumbrunn, R. (1982) Atmospheric $CO_2$ content in the past deduced from ice-core analysis. (In: *International Symposium on Antarctic Glaciology, 3rd, Columbus, OH, September 7-12, 1981. Proceedings. Annals of Glaciology*, vol.3, p.227-232.) WDC No. 83000445. CRREL No. 37000277.

Oeschger, H. (1982) Examples of environmental system information in polar ice cores. *EOS, Transactions, American Geophysical Union*, 63(18), p.297.

Oeschger, H. (1983) Late-glacial climatic history from ice cores. (In: Ghazi, A. *Workshop on Paleoclimatic Research and Models, Brussels, 15-17 December 1982. Report and Proceedings.* Dordrecht, D. Reidel Publishing Co., p.95-107.) CRREL No. 39003146.

Oeschger, H.; Beer, J.; Siegenthaler, U.; Stauffer, B.; Dansgaard, W.; Langway, C.C. (1984) Late glacial climate history from ice cores. (In: Hansen, J.E.; Takahashi, T., eds. *Climate Processes and Climate Sensitivity. Maurice Ewing Symposium, 4th, Palisades, NY, 1982. American Geophysical Union. Geophysical Monograph no.29, Maurice Ewing Series*, vol.5, p.299-306.) WDC No. 84001659. CRREL No. 38004254.

Oeschger, H. (1985) Contribution of ice core studies to the understanding of environmental processes. *American Geophysical Union. Geophysical Monograph Series*, no.33, p.9-17. WDC No. 85001654. CRREL No. 39003561.

Oeschger, H. (1985) North Atlantic deep water formation: information from ice cores. (In: Bennett, T.; et. al., eds. *Symposium on North Atlantic Deep Water Formation, Palisades, NY, February 1985. U.S. National Aeronautics and Space Administration, Goddard Institute for Space Studies*, NASA-CP-2367, p.23-27.)

Oeschger, H.; Stauffer, B.; Finkel, R.; Langway, C.C., Jr. (1985) Variations of the $CO_2$ concentration of occluded air and of anions and dust in polar ice cores. (In: *The Carbon Cycle and Atmospheric $CO_2$: Natural Variations Archean to Present 32. Washington, DC. American Geophysical Union. Geophysical Monograph*, p.132-142.) WDC No. 86001130. CRREL No. 40002798.

Oeschger, H.; Stauffer, B. (1986) Review of the history of atmospheric $CO_2$ recorded in ice cores. (In: *Changing Carbon Cycle: A Global Analysis*. New York, Springer-Verlag, p.89-108.) CRREL No. 41002221.

Oeschger, H.; Neftel, A.; Staffelbach, T.; Stauffer, B. (1988) Dilemma of the rapid variations in $CO_2$ in Greenland ice cores. (Abstract only) (In: Oeschger, H., ed. *Symposium on Ice-Core Analysis, Bern, Switzerland, March 30-April 3, 1987. Proceedings. Annals of Glaciology*, vol.10, p.215-216.)

Palais, J.M.; Kyle, P.R.; Delmas, R. (1983) Detailed studies of tephra layers in the Byrd Station ice core: preliminary results and interpretation. *Antarctic Journal of the United States*, 18(5), p.109-110.

Palais, J.M. (1985) Particle morphology, composition and associated ice chemistry of tephra layers in the Byrd ice core: evidence for hydrovolcanic eruptions. (In: *Symposium on Snow and Ice Chemistry and the Atmosphere, Peterborough, Ontario, August 19-24, 1984. Proceedings. Annals of Glaciology*, vol.7, p.42-48.)

Palais, J.M.; Legrand, M. (1985) Soluble impurities in the Byrd Station ice core, Antarctica: their origin and sources. *Journal of Geophysical Research*, 90(C1), p.1143-1154. WDC No. 85000805. CRREL No. 39002365.

Palais, J.M. (1985) *Tephra Layers and Ice Chemistry in the Byrd-Station Ice Core, Antarctica*. Columbus. Ohio State University, Ph.D. Dissertation, 545p.

Palais, J.M.; Kyle, P.R.; McIntosh, W.C.; Seward. D. (1986) Magmatic and phreatomagmatic volcanic activity at Mt. Takahe, West Antarctica, based on tephra layers in the Byrd ice core and field observations at Mt. Takahe. *EOS, Transactions, American Geophysical Union*, 67(44), p.1250-1251.

Palais, J.M.; Kyle, P.R.; Mosley-Thompson, E.; Thomas, E. (1987) Correlation of a 3,200 year old tephra in ice cores from Vostok and South Pole stations, Antarctica. *Geophysical Research Letters*, 14(8), p.804-807.

Palais, J.M. (1987) Polar ice cores. *Oceanus*, 29(4), p.55-60. WDC No. 87000030.

Palais, J.M.; Kyle, P.R. (1988) Chemical composition of ice containing tephra layers in the Byrd Station ice core, Antarctica. *Quaternary Research*, 30(3), p.315-330. CRREL No. 43002006.

Paterson, W.S.B.; Waddington, E.D. (1983) Past accumulation rates at Camp Century and Devon Island, deduced from ice-core measurements. (Abstract only) (In: *Symposium on Ice and Climate Modeling, Evanston, IL, June 27-July 1, 1983. Annals of Glaciology*, vol.5, p.222-223.)

Paterson, W.S.B.; Waddington, E.D. (1984) Past precipitation rates derived from ice core measurements: methods and data analysis. *Reviews of Geophysics and Space Physics*, 22(2), p.123-130. WDC No. 84001471. CRREL No. 38003645.

Paterson, W.S.B.; Waddington, E.D. (1986) Estimated basal ice temperatures at Crete, Greenland, throughout a glacial cycle. *Cold Regions Science and Technology*, 12(1), p.99-102. WDC No. 86001126. CRREL No. 40002777.

Paterson, W.S.B.; Hammer, C.U. (1987) Ice core and other glaciological data. (In: Ruddiman, W.F.; Wright, H.E., Jr., eds. *North America and Adjacent Oceans during the Last Deglaciation. Geology of North America*, vol.K-3, p.91-109.) CRREL No. 42002914.

Patterson, C.C.; Boutron, C.; Flegal, R. (1985) Present status and future of lead studies in polar snow. (In: Langway, C.C., Jr.; Oeschger, H.; Dansgaard, W., eds. *Greenland Ice Core; Geophysics, Geochemistry, and the Environment. Geophysical Monograph*, 33, p.101-104.)

Pearman, G.I.; Etheridge, D.; DeSilva, F.; Fraser, P.J. (1986) Evidence of changing concentrations of atmospheric $CO_2$, $N^2O$ and $CH^4$ from air bubbles in Antarctic ice. *Nature*, 320(6059), p.248-250. CRREL No. 40002969.

Peel, D.A. (1981) On Antarctic glaciology; ice cores. *Nature*, 294(5838), p.211-212.

Peel, D.A.; Clausen, H.B. (1982) Oxygen-isotope and total beta-radioactivity measurements on 10m ice cores from the Antarctic Peninsula. *Journal of Glaciology*, 28(98), p.43-55. CRREL No. 36003289.

Peel, D.A. (1983) Antarctic ice: The frozen time capsule. *New Scientist*, 98(1358), p.476-483. WDC No. 84001467. CRREL No. 38003325.

Peel, D.A. (1986) Ice core drilling on Dolleman Island. (In: *Workshop on Filchner-Ronne Ice Shelf Programme, 4th, Scott Polar Research Institute, Cambridge, UK, 5-6 June 1986. Filchner-Ronne-Ice-Schelf-Programme-Report, Bremerhaven*, 3, p.58-61.)

Peel, D.A.; Mulvaney, R.; Davison, B.M. (1988) Stable-isotope/air-temperature relationships in ice cores from Dolleman Island and the Palmer Land Plateau, Antarctic Peninsula. (In: Oeschger, H., ed. *Symposium on Ice-Core Analysis, Bern, Switzerland, March 30-April 3, 1987. Proceedings. Annals of Glaciology*, vol.10, p.130-136.)

Peltier, W.R.; Hyde, W.T. (1987) Glacial isostasy and the ice age cycle. (In: Waddington, E.D.; Walder, J.S., eds. *International Symposium on the Physical Basis of Ice Sheet Modelling, Vancouver, B.C., 9-22 August 1987. Proceedings. International Association of Hydrological Sciences. IAHS-AISH Publication*, no.170, p.247-260.) WDC No. 87002287. CRREL No. 42000321.

Petit, J.-R.; Briat, M.; Royer, A. (1981) Ice age aerosol content from East Antarctic ice core samples and past wind strength. *Nature*, 293(5831), p.391-394.

Petit, J.R.; Duval, P.; Lorius, C. (1987) Long-term climatic changes indicated by crystal growth in polar ice. *Nature*, 326(6108), p.62-64. WDC No. 87001143. CRREL No. 41002750.

Petrov, V.N.; Barkov, N.I.; Lipenkov, V.IA. (1986) Paleoklimaticheskaia interpretatsiia vertikal'noi struktury lednikovogo pokrova Antarktidy. (Paleoclimatological interpretation of the vertical structure of Antarctic ice cover.) (In: *Vsesoiuznyi Simpozium "Meteorologicheskie Issledovaniia v Antarktike," 2nd, Leningrad, October 19-22, 1981. Sbornik Dokladov. [All-Union Symposium "Meteorological Investigations in the Antarctic", 2nd, Leningrad, October 19-22, 1981. Proceedings, vol.2.* Leningrad, Gidrometeoizdat, p.4-11.) CRREL No. 42003263.

Pimienta, P.; Duval, P.; Lipenkov, V. Ia. (1988) Mechanical behavior of ice along the 2040 m Vostok core, Antarctica. (In: Oeschger, H., ed. *Symposium on Ice-Core Analysis, Bern, Switzerland, March 30-April 3, 1987. Proceedings. Annals of Glaciology*, vol.10, p.137-140.)

Porter, S.C. (1981) Recent glacier variations and volcanic eruptions. *Nature*, 291(5811), p.139-142. WDC No. 81002475. CRREL No. 35003366.

Porter, S.C. (1985) Glaciological evidence of Holocene climatic change. (In: Wigley, T.M.L.; et al., eds. *Climate and History*, Cambridge University Press, p.82-110.)

Porter, S.C. (1986) Pattern and forcing of Northern Hemisphere glacier variations during the last millennium. *Quaternary Research*, 26(1), p.27-48.

Portnov, V.G. (1980) Horizontal cracks in deep ice cores from Vostok Station. *Sovetskaia Antarkticheskaia Ekspeditsiia. Informatsionnyi Biulleten*, v.100, p.75-79. In Russian.

Portnov, V.G.; Barkov, N.I.; Korableva, N.A. (1980) Orientirovka opticheskikh osei zeren lda v lednikovom pokrove na Stantsii Vostok. (Orientation of optical axes of ice crystals from Vostok.) *Sovetskaia Antarkticheskaia Ekspeditsiia. Informatsionnyi Biulleten*, no.100, p.70-74. WDC No. 82000076. CRREL No. 35002035.

Portnov, V.G.; Tarasov, L.S.; Klementev, O.I. (1981) Mikrostruktura lda tsentralnoi chasti Kupola Vavilova. (Microtexture of ice in the central part of the Vavilov Dome.) (In: *Issledovaniia Lednikovogo Pokrova i Perigliatsiala Severnoi Zemli. Leningrad. Arkticheskii i Antarkticheskii Nauchno-Issledovatelskii Institut. Trudy*, no.367, p.75-80.) WDC No. 81002563. CRREL No. 36001594.

Pourchet, M.; Pinglot, J.F.; Reynaud, L.; Holdsworth, G. (1988) Identification of Chernobyl fall-out as a new reference level in Northern Hemisphere glaciers. *Journal of Glaciology*, 34(117), p.183-187. CRREL No. 43000162.

Punning, IA.M.K.; Vaikmiae, R.A.; Kotliakov, V.M.; Gordienko, F.G. (1979) Izotopno-kislorodnye issledovaniia kerna s ledorazdela lednikov Grënford I Frit'of [O. Zapadnyi Shpitsbergen]. (Oxygen isotope studies of ice cores from the ice-divide of Grenfjord and Fritjof Glaciers [West Spitsbergen Island]. *Akademiia Nauk SSSR. Institut Geografii. Materialy Gliatsiologicheskikh Issledovanii. Khronika Obsuzhdeniia*, vol.37, p.173-177. WDC No. 80002721. CRREL No. 34003709.

Punning, IA.-M.K.; Martma, T.A.; Tyugu, K.E.; Vaikmiae, R.A.; Purshe, M.; Pinglo, F. (1986) Stratification in an ice core from Vestfonna, Nordaustlandet. *Polar Geography and Geology*, vol.10, p.39-43. WDC No. 87001066. CRREL No. 41001790.

Putikov, O.F.; Vostretsov, R.N.; Dmitriev, D.N. (1984) Otsenka paleoklimaticheskikh uslovii formirovaniia lednikovogo pokrova po dannym geotermicheskikh izmerenii v gluborkikh skvazhinakh. (Evaluating paleoclimatic conditions of ice cover formation from geothermal measurements in deep wells.) *Akademiia Nauk SSSR. Institut Geografii. Materialy Gliatsiologicheskikh Issledovanii*, vol.51, p.186-191. CRREL No. 40000873.

Qin, D.H. (1988) Development of China's research on Antarctic glaciology. (In Chinese). *Journal of Glaciology and Geocryology*, 10(3), p.250-255. CRREL No. 43002864.

Qin, D.H. (1989) Physical and chemical characteristics of ice cores collected from Qiaogeli (K2 North) Glacier, Karakoram. *Annals of Glaciology*, vol.14, in press.

Radok, U. (1978) Climatic roles of ice: a contribution to the International Hydrological Programmme (IHP). *International Association of Hydrological Sciences. Bulletin*, 23(3), p.333-354.

Radok, U. (1980) Ice core sampling. (In: MacKinnon, P., comp. *Ice Core*, Boulder, Colorado, World Data Center A for Glaciology (Snow and Ice), *Glaciological Data, Report GD-8*, p.71-76.) CRREL No. 34004027.

Raisbeck, G.M.; Yiou, F. (1980) $^{10}$Be in polar ice cores as a record of solar activity. (In: Pepin, R.O.; Eddy, J.A.; Merrill, R.B., eds. *Conference on The Ancient Sun; Fossil Record in the Earth, Moon and Meteorites, Boulder, CO, October 16-19, 1979*. Pergamon Press, p.185-190.)

Raisbeck, G.M.; Yiou, F.; Fruneau, M.; Loiseaux, J.M.; Lieuvin, J.; Ravel, J.C.; Lorius, C. (1981) Cosmogenic $^{10}$Be concentrations in Antarctic ice during the past 30,000 years. *Nature*, 292(5826), p.825-826. WDC No. 81002478.

Raisbeck, G.M.; Yiou, F. (1981) $^{10}$Be as a potential probe of solar variability influence on climate. (In: *International Conference Sun and Climate, Toulouse, 30 September - 3 October 1980. Proceedings*. Centre National d'Études Spatiales, p.311-316.) CRREL No. 38000858.

Raisbeck, G.M.; Yiou, F. (1985) $^{10}$Be in polar ice and atmospheres. (In: *Symposium on Snow and Ice Chemistry and the Atmosphere, Peterborough, Ontario, August 19-24, 1984. Proceedings. Annals of Glaciology*, vol.7, p.138-140.) WDC No. 86000823. CRREL No. 40002410.

Raisbeck, G.M.; Yiou, F.; Bourles, D.; Lorius, C.; Jouzel, J.; Barkov, N.I. (1987) Evidence for two intervals of enhanced $^{10}$Be deposition in Antarctic ice during the last glacial period. *Nature*, 326(6110), p.273-277. WDC No. 87001509.

Rampino, M.R.; Self, S.; Stothers, R. (1983) Volcanoes, climate and Greenland ice cores; eruption volatiles provide key to climate impact. (In: *Geological Society of America; Northeastern Section, 19th Annual Meeting, Kiamesha Lake, NY, March 23-25, 1983. Abstracts with Programs - Geological Society of America*, 15(3), p.19.)

Rampino, M.R.; Self, S. (1984) Sulphur-rich volcanic eruptions and stratospheric aerosols. *Nature*, 310(5979), p.677-679.

Rand, J. (1980) Danish deep drill. Progress report: February-March 1979. *U.S. Army. Cold Regions Research and Engineering Laboratory. Special Report*, 80-3, 37p. WDC No. 80003109.

Rand, J.H.; Mellor, M. (1985) Ice-coring augers for shallow depth sampling. *U.S. Army. Cold Regions Research and Engineering Laboratory. Report*, CR 85-21. 22p. CRREL No. 40003273.

Rasmussen, K.L.; Clausen, H.B.; Risbo, T. (1984) Nitrate in the Greenland Ice sheet in the years following the 1908 Tunguska event. *Icarus*, 58(1), p.101-108. WDC No. 85001807.

Rasmussen, R.A.; Khalil, M.A.K. (1984) Atmospheric methane in the recent and ancient atmospheres: concentrations, trends, and interhemispheric gradient. *Journal of Geophysical Research. Atmospheres*, 89(D7), p.11,599-11,605. WDC No. 85002025.

Rauter, R. (1977) *Neutron Activation Analysis Study of Trace Elements in Glacial Ice Cores*. Eidgenoessisches Institut fur Reaktorforschung, Wuerenlingen, Switzerland, 107p.

Raynaud, D. (1978) Crystal size and total gas content of ice: two indicators of the climatic evolution of polar ice sheets. (In: *Colloque International: Evolution des Atmospheres Planetaires et Climatologie de la Terre, Nice, France, 16-20 October 1978. Papers.* Toulouse, France, Centre National d'Études Spatiales, p.83-94.)

Raynaud, D.; Lorius, C.; Budd, W.F.; Young, N.W. (1979) Ice flow along an I.A.G.P. flow line and interpretation of data from an ice core in Terre Adélie, Antarctica. (In: *Symposium on Dynamics of Large Ice Masses, Ottawa, 21-25 August 1978. Proceedings. Journal of Glaciology*, 24(90), p.103-115.) WDC No. 80001819. CRREL No. 34002820.

Raynaud, D.; Lebel, B. (1979) Total gas content and surface elevation of polar ice sheets. *Nature*, 281(5729), p.289-291. WDC No. 80001376. CRREL No. 34001426.

Raynaud, D. (1980) Ice core work at the Laboratoire de Glaciologie, CNRS, Grenoble. (In: MacKinnon, P., comp. *Ice Cores.* Boulder, Colorado, World Data Center A for Glaciology (Snow and Ice), *Glaciological Data, Report GD-8*, p.103-107.) CRREL No. 34004031.

Raynaud, D.; Whillans, I.M. (1982) Air content of the Byrd core and past changes in the West Antarctic ice sheet. (In: *International Symposium on Antarctic Glaciology, 3rd, Columbus, OH, September 7-12, 1981. Proceedings. Annals of Glaciology*, vol.3, p.269-273.) WDC No. 83000453. CRREL No. 37000285.

Raynaud, D.; Delmas, R.; Ascensio, J.M.; Legrand, M. (1982) Gas extraction from polar ice cores: a critical issue for studying the evolution of atmospheric $CO_2$ and ice-sheet surface elevation. (In: *International Symposium on Antarctic Glaciology, 3rd, Columbus, OH, September 7-12, 1981. Proceedings. Annals of Glaciology*, vol.3, p.265-268.) WDC No. 83000452. CRREL No. 37000284.

Raynaud, D.; Barnola, J.M. (1983) $CO_2$ record in ice cores; a reconstruction of the atmospheric revolution between 18 ka BP and 1850 AD. (Abstract only) (In: *Symposium on Ice and Climate Modelling, Northwestern University, Evanston, IL, 27 June-1 July 1983. Proceedings. Annals of Glaciology*, vol.5, p.224.)

Raynaud, D.; Barnola, J.M. (1985) Antarctic ice core reveals atmospheric $CO_2$ variations over the past few centuries. *Nature*, 315(6017), p.309-311. WDC No. 85000985.

Raynaud, D. (1985) Interactions entre le $CO_2$ atmospherique et le climat: l'approche glaciologique. (Interactions between atmospheric $CO_2$ and climate: glaciological approach.) (In: *Actes du Colloque sur la Recherche Francaise dans l'Antarctique, Grenoble 19/21 Septembre 1984. [Colloquium on French Research in the Antarctic, Grenoble, 19-21 September 1984. Proceedings.]* Comite National Francais des Recherches Antarctiques, p.46-48.) CRREL No. 40000572.

Raynaud, D.; Barnola, J.M. (1986) $CO_2$ and climate: information from Antarctic ice core studies. (In: Ghazi, A.; Fantechi, R. *Current Issues in Climate Research; European Communities Climatology Programme Symposium. Sophia Antipolis, France, 2-5 October 1984. Proceedings.* D. Reidel Publishing Company, p.240.) WDC No. 86001613.

Raynaud, D. (1988) Climatic and $CH^4$ cycle implications of glacial-interglacial $CH^4$ change in the Vostok ice core. *Nature*, 333(6174), p.655-657. CRREL No. 42003188.

Reeh, N. (1984) Antitorque leaf springs: a design guide for ice-drill antitorque leaf springs. (In: *International Workshop/Symposium on Ice Drilling Technology, 2nd, Calgary, Alberta, 30-31 August 1982. Proceedings. U.S. Army. Cold Regions Research and Engineering Laboratory. Special Report*, SR 84-34, p.69-72.) CRREL No. 40001185.

Reeh, N.; Johnsen, S.J.; Dahl-Jensen, D. (1985) Dating the Dye 3 deep ice core by flow model calculations. *American Geophysical Union. Geophysical Monograph Series*, no.33, p.57-66. WDC No. 85001660. CRREL No. 39003567.

Reeh, N.; Hojmark, H.; Thomsen, H.H.; Clausen, H.B. (1987) Greenland ice-sheet margin - a mine of ice for paleo-environmental studies. *Palaeogeography, Palaeoclimatology, Palaeoecology*, 58(3/4), p.229-234. WDC No. 87002237. CRREL No. 41003794.

Reinwart, C.; Lange, M.; Bassler, K.-H. (1984) Programm und vorlaufige Ergebnisse der glaziologischen Arbeiten auf dem Filchner-Schelfeis 1983/84. (Program and preliminary data of glaciological studies of the Filchner Ice Shelf 1983/84.) (In: Kohnen, H., ed. *Expedition Antarktis-II mit FS POLARSTERN 1983/84; Bericht Vomfahrtabschnitt 4 Punta Arenas - Kapstadt (ANT-II/4. Berichte zur Polarforschung*, no.19, p.37-52.) WDC No. 85000172. CRREL No. 39001600.

Reinwarth, O.; Graf, W.; Stichler, W.; Moser, H.; Oerter, H. (1985) Investigations of the $^{18}O$ content of samples from snow pits and ice cores from the Filchner-Ronne Ice Shelves and Ekstrom Ice Shelf. (In: *Symposium on Snow and Ice Chemistry and the Atmosphere, Peterborough, Ontario, August 19-24, 1984. Proceedings. Annals of Glaciology*, vol.7, p.49-53.)

Risbo, T.; Clausen, H.B.; Rasmussen, K.L. (1981) Supernovae and nitrate in the Greenland Ice Sheet. *Nature*, 294(5842), p.637-639. CRREL No. 36002218.

Ritz, C. (1980) Exploitation du profil de températures mesuré dans la calôtte glaciaire au Dome C [Antarctide orientale]. (Using temperature profiles from the ice sheet at Dome C [East Antarctica].) *France. Centre National de la Recherche Scientifique. Laboratoire de Glaciologie. Publication*, no.346, PhD. Dissertation, 129p. CRREL No. 37002162.

Robin, G. de Q. (1977) Ice cores and climatic change. *Royal Society of London, Philosophical Transactions, Series B*, vol.280, p.143-168.

Robin, G. de Q. (1981) Climate into ice: The isotopic record in polar ice sheets. (In: Allison, I., ed. *Symposium on Sea Level, Ice and Climate Change, Canberra, 7-8 December 1978. Proceedings. International Association of Hydrological Sciences. IAHS-AISH Publication*, no.131, p.207-216.)

Robin, G. de. Q. (1983) Climate record from ice cores. (In: Robin, G. d. Q. *Climate Record in Polar Ice Sheets*. Cambridge University Press, p.180-195.)

Robin, G. de Q., ed. (1983) *Climate Record in Polar Ice Sheets: A Study of Isotopic Temperature Profiles in Polar Ice Sheets Based on a Workshop Held in the Scott Polar Research Institute, Cambridge*. Cambridge University Press, 212p. CRREL No. 38000569

Robin, G. de Q. (1985) Contrast in Vostok core - Changes in climate or ice volume? *Nature*, 316(6029), p.578-579. WDC No. 85001271.

Rood, R.T.; Sarazin, C.L.; Zeller, E.J.; Parker, B.C. (1979) X- or gamma-rays from supernovae in glacial ice. *Nature*, 282(5740), p.701-702. WDC No. 80001432. CRREL No. 34001746.

Royer, A.; DeAngelis, M.; Petit, J.R. (1983) Thirty-thousand-year record of physical and optical properties of microparticles from an East Antarctic ice core and implications for paleoclimate reconstruction models. *Climatic Change*, 5(4), p.381-412. WDC No. 84001463. CRREL No. 38002838.

Rozanski, K.; Sonntag, C.; Munnich, K.O. (1982) Factors controlling stable isotope composition of European precipitation. *Tellus*, 34(2), p.142-150.

Saigne, C.; Legrand, M. (1987) Measurements of methanesulphonic acid in Antarctic ice. *Nature*, 330(5145), p.240-242. CRREL No. 42001145.

Saltzman, B.; Maasch, K.A. (1988) Orbital forcing and the Vostok ice core. *Nature*, 333(6169), p.123-124. CRREL No. 42003003.

Samoilov, O.IU.; Zagorodnov, V.S. (1985) Raspredelenie radiatsionnykh korok v ledianom kerne iz skvazhiny na Stantsii Komsomol'skoi kak pokazatel' paleoklimaticheskikh uslovii. (Distribution of radiation crusts in ice cores from the Komsomol'skaya Station well as indication of paleoclimatic conditions.) *Akademiia Nauk SSSR. Institut Geografii. Materialy Gliatsiologicheskikh Issledovanii*, no.54, p.204-208. WDC No. 86001466. CRREL No. 40003930.

Sanderson, T.J.O. (1979) Deviation of a bore hole during drilling. *Journal of Glaciology*, 22(86), p.195-197. CRREL No. 33004531.

Santanam, S.; Khalil, M.A.K. (1985) Increasing atmospheric methane; evidence from polar ice core measurements. *EOS, Transactions, American Geophysical Union*, 66(52), p.1362.

Savigny, K.W. (1979) Method of determining the bulk moisture content of cores and natural exposures of segregated ice. *National Research Council, Canada. Associate Committee on Geotechnical Research. Technical Memorandum*, no.124, p.8-13. CRREL No. 37002949.

Schotterer, U.; Oeschger, H.; Wagenbach, D.; Munnich, K.O. (1985) Information on paleo-precipitation on a high-altitude glacier Monte Rosa, Switzerland. (In: Kuhn, M., ed. *Climate and Paleoclimate of Lakes, Rivers and Glaciers. Symposium on Climate and Paleoclimate of Lakes, Rivers and Glaciers, Igls, Austria, June 4-7, 1984. Proceedings. Zeitschrift fur Gletscherkunde und Glazialgeologie*, vol.21, p.379-388.) WDC No. 86000711. CRREL No. 40001871.

Schove, D.J. (1981) Aurorae, sunspots and weather, mainly since A.D. 1200. (In: Deehr, C.S.; Holtet, J.A., eds. *Exploration of the Polar Upper Atmosphere. Nato Advanced Study Institute, Norway, May 1980. Proceedings.* D. Reidel, p.421-430.)

Schutze H. (1985) Isotopenforschung in der Antarktis. (Isotope research in Antarctica.) *Urania*, 61(12), p.2-5. WDC No. 86001615.

Schwander, J. (1984) Age difference between polar ice and the air trapped in its bubbles. *Nature*, 311(5981), p.45-47. WDC No. 84001621.

Scientific Committee for Antarctic Research. SCAR (1981) *SCAR Action Plan for Antarctic Climate Research*. 62p. WDC No. 82000330.

Sellman, P.V.; Rand, J.H. (1984) Ice drilling and coring systems--a retrospective view. (In: Workshop on Penetration Technology, Hanover, NY, 12-13 June 1984. Proceedings. *U.S. Army. Cold Regions Research and Engineering Laboratory. Special Report*, SR 84-33, p.125-127.) CRREL No. 40001966.

Shoji, H. (1978) Stress-strain tests of ice core drilled at Mizuho Station, East Antarctica. *Japan. National Institute of Polar Research. Memoirs, Special Issue*, no.10, p.95-101.

Shoji, H.; Langway, C.C., Jr. (1982) Air hydrate inclusions in fresh ice core. *Nature*, 298(5874), p.548-550. WDC No. 83000309. CRREL No. 37000413.

Shoji, H.; Langway, C.C., Jr. (1983) Volume relaxation of air inclusions in a fresh ice core. (In: *International Symposium on the Physics and Chemistry of Ice, 6th, Rolla, Missouri, August 2-6 1982. Journal of Physical Chemistry*, 87(21), p.4111-4114.) WDC No. 84001828. CRREL No. 38001583.

Shoji, H.; Langway, C.C. (1985) Comparison of mechanical tests on the Dye-3, Greenland ice core and artificial laboratory ice. (In: Brown, R.L., ed. *Symposium on Snow and Ice Processes at the Earth's Surface, Sapporo, Japan, September 2-7, 1984. Proceedings. Annals of Glaciology*, vol.6, p.305.) WDC No. 86001058. CRREL No. 40002382.

Shoji, H.; Langway, C.C., Jr. (1985) Ice flow velocity profile for Dye-3, Greenland. *Geophysical Research Letters*, 12(12), p.797-800. WDC No. 86001770. CRREL No. 40002572.

Shoji, H.; Langway, C.C., Jr. (1985) Mechanical properties of fresh ice core from Dye 3, Greenland. *American Geophysical Union. Geophysical Monograph Series*, no.33, p.39-48. WDC No. 85001658. CRREL No. 39003565.

Shoji, H.; Langway, C.C., Jr. (1987) Flow velocity profiles and accumulation rates from mechanical tests on ice core samples. (In: Waddington, E.D.; Walder, J.S., eds. *International Symposium on the Physical Basis of Ice Sheet Modelling, Vancouver, B.C., 9-22 August 1987. Proceedings. International Association of Hydrological Sciences. IAHS-AISH Publication*, no.170, p.67-77.) CRREL No. 42000307.

Shoji, H.; Langway, C.C., Jr. (1988) Flow-law parameters of the Dye 3, Greenland, deep ice core. (In: Oeschger, H., ed. *Symposium on Ice-Core Analysis, Bern, Switzerland, March 30-April 3, 1987. Proceedings. Annals of Glaciology*, vol.10, p.146-150.)

Short, S.K., comp. (1983) Radiocarbon data list 2: Labrador and Northern Quebec, Canada. *Colorado. University. Institute of Arctic and Alpine Research. Occasional Paper*, no.40, p.55-71. WDC No. 84000927. CRREL No. 38002557.

Short, S.K.; Holdsworth, G. (1985) Pollen, oxygen isotope content and seasonality in an ice core from the Penny Ice Cap, Baffin Island. *Arctic*, 38(3), p.214-218. WDC No. 86000789. CRREL No. 40001348.

Shumskii, P.A.; Larina, T.B.; Petrov, V.N. (1980) Izmenenie tolshchiny lednikovogo pokrova na stantsiiakh Vostok i Vostok-1. (Variation in ice sheet thickness at Vostok and Vostok-1.) *Sovetskaia Antarkticheskaia Ekspeditsiia. Informatsionnyi Biulleten*, no.100, p.49-53. WDC No. 82000072. CRREL No. 35002031.

Shumskii, P.A.; Korotkevich, E.S.; Larina, T.B. (1980) Vozrast lda v burovykh skvazhinakh na stantsiiakh Vostok i Vostok-1. (Age of ice in drill holes at Vostok and Vostok-1.) *Sovetskaia Antarkticheskaia Ekspeditsiia. Informatsionnyi Biulleten*, no.100, p.41-48. WDC No. 820071. CRREL No. 35002030.

Siegenthaler, U.; Wenk, T. (1984) Rapid atmospheric $CO_2$ variations and ocean circulation. *Nature*, 308(5960), p.624-626.

Siegenthaler, U.; Oeschger, H. (1987) Biospheric $CO_2$ emissions during the past 200 years reconstructed by deconvolution of ice core data. *Tellus*, 39B(1-2), p.140-154. WDC No. 87001739. CRREL No. 41003196.

Siegenthaler, U. (1988) On the relationship between $^{18}O/^{16}O$ ratios of precipitation and climate. (Abstract only) (In: Oeschger, H., ed. *Symposium on Ice-Core Analysis, Bern, Switzerland, March 30-April 3, 1987. Proceedings. Annals of Glaciology*, vol.10, p.217.)

Siegenthaler U.; et al. (1988) Stable-isotope ratios and concentration of $CO_2$ in air from polar ice cores. (In: Oeschger, H., ed. *Symposium on Ice-Core Analysis, Bern, Switzerland, March 30-April 3, 1987. Proceedings. Annals of Glaciology*, vol.10, p.151-156.)

Sigg, A.; Neftel, A. (1988) Seasonal variations in hydrogen peroxide in polar ice cores. (In: Oeschger, H., ed. *Symposium on Ice-Core Analysis, Bern, Switzerland, March 30-April 3, 1987. Proceedings. Annals of Glaciology*, vol.10, p.157-162.)

Sonett, C.P.; Morfill, G.E.; Jokipii, J.R. (1987) Insterstellar shock waves and $^{10}Be$ from ice cores. *Nature*, 330(6147), p.458-460. CRREL No. 42001143.

Souchez, R.; Groote, J.M. de (1985) $\delta\ ^{18}D$-$\delta\ ^{18}O$ relationships in ice formed by subglacial freezing: paleoclimatic implications. *Journal of Glaciology*, vol.31(109), p.229-232. WDC No. 86001093. CRREL No. 40002677.

Souchez, R.; Tison, J.L.; Jouzel, J. (1987) Freezing rate determination by the isotopic composition of the ice. *Geophysical Research Letters*, 14(6), p.599-602. CRREL No. 42001256.

Souchez, R.; Lorrain, R.; Tison, J.L.; Jouzel, J. (1988) Co-isotopic signature of two mechanisms of basal-ice formation in Arctic outlet glaciers. (In: Oeschger, H., ed. *Symposium on Ice-Core Analysis, Bern, Switzerland, March 30-April 3, 1987. Proceedings. Annals of Glaciology*, vol.10, p.163-166.)

Sowers, T.A.; Bender, M.L.; Raynaud, D.; Lorius, C. (1988) Elemental and isotopic composition of $O_2$ and $N_2$ gases in ice cores. (In: Oeschger, H., ed. *Symposium on Ice-Core Analysis, Bern, Switzerland, March 30-April 3, 1987. Proceedings. Annals of Glaciology*, vol.10, p.218.)

Sowers, T.; Bender, M.; Raynaud, D. (1989) Elemental and isotopic composition of occluded $O_2$ and $N_2$ in polar ice. *Journal of Geophysical Research*, 94(D4), p.5137-5150. CRREL No. 43002722

Spindler, M., ed. (1989) Expedition Arctic V/1a, 1b, and 2 with 'RV POLARSTERN 1988. *Berichte zur Polarforsch ung*, no. No.159, 197p. CRREL No. 43003077.

Staffelbach, T.; Stauffer, B.; Oeschger, H. (1988) Detailed analysis of the rapid changes in ice-core parameters during the last ice age. (In: Oeschger, H., ed. *Symposium on Ice-Core Analysis, Bern, Switzerland, March 30-April 3, 1987. Proceedings. Annals of Glaciology*, vol.10, p.167-170.)

Stauffer, B.; Berner, W.; Oeschger, H.; Schwander, J. (1981) Atmospheric $CO_2$ history from ice core studies. *Zeitschrift fur Gletscherkunde und Glazialgeologie*, 17(1), p.1-15. CRREL No. 37001084.

Stauffer, B.; Hofer, H.; Oeschger, H.; Schwander, J.; Siegenthaler, U. (1983) Atmospheric $CO_2$ concentration during the last glaciation. (In: *Symposium on Ice and Climate Modelling, Northwestern University, Evanston, IL, 27 June-1 July 1983. Proceedings. Annals of Glaciology*, vol.5, p.160-164.) WDC No. 84001946. CRREL No. 39000191.

Stauffer, B.; Schwander, J. (1983) Core processing and analysis of ice cores drilled at the South Pole. *Antarctic Journal of the United States*, 18(5), p.114-116. WDC No. 84001887. CRREL No. 39000012.

Stauffer, B.; Schwander, J. (1984) Core processing and first analysis of ice cores from Siple and South Pole Stations. *Antarctic Journal of the United States. Special Issue*, 19(5), p.59-60. WDC No. 86000962. CRREL No. 40001773.

Stauffer, B. (1985) Composition of ancient atmosphere, based on ice-core analyses. *Antarctic Journal of the United States*, 20(5), p.72-73. WDC No. 87000724. CRREL No. 41002632.

Stauffer, B.; Neftel, A.; Oeschger, H.; Schwander, J. (1985) $CO_2$ concentration in air extracted from Greenland ice samples. *American Geophysical Union. Geophysical Monograph Series*, no.33, p.85-89. WDC No. 85001664. CRREL No. 39003571.

Stauffer, B.; Oeschger, H. (1985) Gaseous components in the atmosphere and the historic record revealed by ice cores. (In: *Symposium on Snow and Ice Chemistry and the Atmosphere, Peterborough, Ontario, August 19-24, 1984. Proceedings vol.7. Annals of Glaciology*, p.54-59.) WDC No. 86000811. NTIS No. 40002398.

Stauffer, B.; Fischer, G.; Neftel, A.; Oeschger, H. (1985) Increase of atmospheric methane recorded in Antarctic ice core. *Science*, 220(4720), p.1386-1388. WDC No. 85001811.

Stauffer, B.; Lochbronner, E.; Oeschger, H.; Schwander, J. (1988) Methane concentration in the glacial atmosphere was only half that of the preindustrial Holocene. *Nature*, 332(6167), p.812-814. CRREL No. 42002860.

Steffensen, J.P. (1985) Microparticles in snow from the south Greenland ice sheet. *Tellus, Series B, Chemical and Physical Meteorology*, 37(4/5), p.286-295.

Steffensen, J.P. (1988) Analysis of the seasonal variation in dust, $Cl^-$, $NO_3^-$, and $SO_4^{2-}$ in two central Greenland firn cores. (In: Oeschger, H., ed. *Symposium on Ice-Core Analysis, Bern, Switzerland, March 30-April 3, 1987. Proceedings. Annals of Glaciology*, vol.10, p.171-177.)

Stichler, W.; Baker, D.; Oerter, H.; Trimborn, P. (1983) Core drilling on Vernagtferner (Oetztal Alps, Austria) in 1979: deuterium and $^{18}O$ contents. *Zeitschrift fur Gletscherkunde und Glazialgeologie*, 18(1), p.23-35. WDC No. 84001899. CRREL No. 39000045.

Stockton, W.L.; Delaca, T.E.; DeNiro, M.J. (1984) Stable isotope analysis of a submarine ice cliff at Explorers Cove, McMurdo Sound, Antarctica. *Journal of Glaciology*, vol.30(104), p.112-115. WDC No. 84001987. CRREL No. 39000249.

Stolle, D.F.E.; Killeavy, M.S. (1986) Determination of particle paths using the finite-element method. *Journal of Glaciology*, vol.32(111), p.219-223. WDC No. 86002237. CRREL No. 41000681.

Strauch, G.; Kowski, P. (1982) Extractive method for obtaining gas inclusions from ice. *DDR. Akademie der Wissenschaften. Zentralinstitut fur Isotopen- und Strahlenforschung. ZFI-Mitteilungen*, no.51, p.41-48. WDC No. 84001515. CRREL No. 38000754.

Strauch, G.; Kovsky, P. (1983) Air-bubble composition in ice samples from a deep hole in the vicinity of Novolazarvskaya Station. *Sovetskaia Antarkticheskaia Ekspeditsiia. Informatsionnyi Biulleten*, v.103, p.32-36. CRREL No. 38002841.

Strothers, R. (1980) Giant solar flares in Antarctic ice. (1980) *Nature*, 287(5780), p.365. CRREL No. 35001076.

Strothers, R.B.; Rampino, M.R. (1983) Historic volcanism, European dry fog, and Greenland acid precipitation, 1500 B.C. to A.D. 1500. *Science*, 222(4622), p.411-413. CRREL No. 38002235.

Stuiver, M.; Yang, I.C.; Denton, G.H.; Kellogg, T.B. (1983) Oxygen isotope ratios of Antarctic permafrost and glacier ice. *American Geophysical Union. Antarctic Research Series*, no.33, p.131-139. WDC No. 84000481.

Sullivan, W. (1981) Ancient ice yielding secrets of climate. *New York Times*, Aug 9, p.1, 15. WDC No. 81001319.

Sundquist, E.T. (1987) Global carbon cycle and Quaternary paleoclimates. *Episodes*, 10(1), p.7-10. WDC No. 87002173.

Sundquist, E.T. (1987) Ice core links $CO_2$ to climate. *Nature*, 329(6138), p.389-390. CRREL No. 42000561.

Suzuki, Y. (1984) Light weight electro-mechanical drills. (In: Holdsworth, G.; Kuivinen, K.C.; Rand, J.H., eds. *International Workshop/Symposium on Ice Drilling Technology, 2nd, Calgary, Alberta, August 30-31, 1982. Proceedings. U.S. Army. Cold Regions Research and Engineering Laboratory. Special Report*, SR 84-34, p.33-40.) WDC No. 86000620. CRREL No. 40001179. NTIS No. ADA-156 733.

Suzuki, Y.; Shimbori, K. (1984) Mechanical drill systems for the 25th Japanese Antarctic Research Expedition. *Tokyo. National Institute of Polar Research. Memoirs. Special Issue*, no.34, p.188-196. CRREL No. 39003461.

Suzuki, Y. (1985) Outlook of ice excavation techniques. *Antarctic Record*, no.85, p.24-38. CRREL No. 39003954.

Suzuki, Y.; Shimbori, K. (1986) Development of an ice core drill for liquid-filled holes. (In: Kawaguchi, S.; Watanabe, O., eds. *Symposium on Polar Meteorology and Glaciology, 8th, Tokyo, 11-12 December 1985. Proceedings. Tokyo. National Institute of Polar Research. Memoirs. Special Issue*, no.45, p.86-92.) CRREL No. 41003662.

Symposium on ice and climate modelling, Northwestern University, Evanston, IL, 27 June-1 July 1983. Proceedings. (1983) *Annals of Glaciology*, vol.5, 243p. WDC No. 84001917. CRREL No. 39000162.

Thompson, J.M.; MacKinnon, P.K. (1980) An ice core and information storage and exchange system. (In: MacKinnon, P., comp. *Ice Cores*. Boulder, Colorado, World Data Center A for Glaciology (Snow and Ice), *Glaciological Data, Report GD-8*, p.59-63.) CRREL No. 34004024.

Thompson, L.G.; Hastenrath, S.; Arnar, B.M. (1979) Climatic ice core records from the tropical Quelccaya ice cap. *Science*, v.203, p.1240-1243. WDC No. 79001115.

Thompson, L.G.; Mosley-Thompson, E.; Petit, J.R. (1979) Glaciological and climatological implications of microparticle concentrations over the past 25,000 years in three deep ice cores. (In: *International Union of Geodesy and Geophysics, 17th General Assembly; Inter-disciplinary Symposia, Canberra, Australia, December 3-15, 1979. International Union of Geodesy and Geophysics, General Assembly, Abstract*, 17, p.61.)

Thompson, L.G. (1979) Glaciology of the Peruvian Quelccaya Ice Cap. *Sociedad Geologica del Peru. Boletin*, 63, p.149-158. WDC No. 85000998.

Thompson, L.G. (1979) Ice core records from tropical regions; Mt. Kenya, Africa and the Quelccaya Ice Cap, Peru. (In: *International Union of Geodesy and Geophysics, 17th General Assembly; Inter-disciplinary Symposia, Canberra, Australia, December 3-15, 1979. International Union of Geodesy and Geophysics, General Assembly, Abstract*, 17, p.63.)

Thompson, L.G. (1980) Glaciological investigations of the tropical Quelccaya Ice Cap, Peru. *Journal of Glaciology*, 25(91), p.69-84. WDC No. 80002771. CRREL No. 34003799.

Thompson, L.G.; Hastenrath, S.L. (1981) Climatic ice core studies at Lewis Glacier, Mount Kenya. *Zeitschrift fur Gletscherkunde und Glazialgeologie*, 17(1), p.115-123. WDC No. 84000482.

Thompson, L.G.; Mosley-Thompson, E.; Petit, J.-R. (1981) Glaciological interpretation of microparticle concentrations from the French 905-m Dome C, Antarctica, core. (In: Allison, I., ed. *General Assembly of IUGG, 17th, Symposium on Sea Level, Ice and Climate Change, Canberra, 7-8 December 1978. Proceedings. International Association of Hydrological Sciences. IAHS-AISH Publication*, no.131, p.227-234.) WDC No. 81001084. CRREL No. 35003033.

Thompson, L.G. (1981) Ice core studies from Mt. Kenya, Africa, and their relationship to the other tropical ice core studies. (In: Allison, I., ed. *General Assembly of IUGG, 17th, Symposium on Sea Level, Ice and Climate Change, Canberra, 7-8 December 1978. Proceedings. International Association of Hydrological Sciences. IAHS-AISH Publication*, no.131, p.55-62.) WDC No. 81001072. CRREL No. 35003021.

Thompson, L.G.; Mosley-Thompson, E. (1981) Microparticle concentration variations linked with climatic change: evidence from polar ice cores. *Science*, v.212, p.812-815. WDC No. 81001323.

Thompson, L.G.; Mosley-Thompson, E. (1981) Temporal variability of microparticle properties in polar ice sheets. *Journal of Volcanology and Geothermal Research*, 11(1), p.11-27.

Thompson, L.G.; Bolzan, J.F.; Brecher, H.H.; Kruss, P.D.; Mosley-Thompson, E.; Jezek, K.C. (1982) Geophysical investigations of the tropical Quelccaya Ice Cap, Peru. *Journal of Glaciology*, 28(98), p.57-69. CRREL No. 36003290.

Thompson, L.G.; Mosley-Thompson, E. (1982) Microparticle concentration and size-distribution determinations from the J-9 core, Ross Ice Shelf. *Antarctic Journal of the United States*, 17(5), p.83-85. WDC No. 83002015. CRREL No. 37003952.

Thompson, L.G.; Mosley-Thompson, E. (1982) Spherical particles in Antarctic ice cores. (In: Bull, C.; Lipschutz, M.E., eds. *Workshop on Antarctic Glaciology and Meteorites, Houston, TX, April 19-21, 1982. Lunar and Planetary Institute. Technical Report*, 82-03, p.54-55.)

Thompson, L.G. (1984) Analysis of microparticles in ice cores: an indicator of past environments. *Journal of Glaciology and Cryopedology*, 6(1), p.25-32. WDC No. 84002182. CRREL No. 39000931.

Thompson, L.G.; Mosley-Thompson, E.; Arnao, B.M. (1984) El Nino-Southern Oscillation events recorded in the stratigraphy of the tropical Quelccaya Ice Cap, Peru. *Science*, 226(4670), p.50-53.

Thompson, L.G.; Mosley-Thompson, E.; Grootes, P.M.; Pourchet, M.; Hastenrath, S. (1984) Tropical glaciers: potential for ice core paleoclimatic reconstructions. *Journal of Geophysical Research*, 81(7), p.4638-4646. WDC No. 85000333. CRREL No. 39000759.

Thompson, L.G.; Mosley-Thompson, E.; Bolzan, J.F.; Koci, B.R. (1985) 1500-year record of tropical precipitation in ice cores from the Quelccaya Ice Cap, Peru. *Science*, 299(4717), p.971-973. WDC No. 85001812.

Thompson, L.G.; Mosley-Thompson, E.; Dansgaard, W.; Grootes, P.M. (1986) Little ice age as recorded in the stratigraphy of the tropical Quelccaya Ice Cap. *Science*, 234(4774), p.361-364. WDC No. 86001958.

Thompson, L.G. (1986) Overview of 1000 years of tropical climatic variability from ice cores from the Andes of Southern Peru. (In: *Workshop on Climate Variability of the Eastern North Pacific and Western North America, 3rd, Pacific Grove, CA, March 25-28, 1986.* 29p.)

Thompson, L.G.; Mosley-Thompson, E. (1987) Evidence of abrupt climatic change during the last 1,500 years recorded in ice cores from the tropical Quelccaya Ice Cap, Peru. (In: Berger, W.H.; Labeyrie, L.D., eds. *Abrupt Climatic Changes; Evidence and Implications, St. Hugues de Biviers, France, October 1985. NATO Advanced Study Institutes Series. Series C; Mathematical and Physical Sciences*, vol.216, p.99-110.)

Thompson, L.G.; Wu, X.; Mosley-Thompson, E.; Xie, Z. (1988) Climatic records from the Dunde Ice Cap, China. (In: Oeschger, H., ed. *Symposium on Ice-Core Analysis, Bern, Switzerland, March 30-April 3, 1987. Proceedings. Annals of Glaciology*, vol.10, p.178-182.)

Thompson, L.G.; Davis, M.E.; Mosley-Thompson, E.; Liu, K.-b. (1988) Pre-Incan agricultural activity recorded in dust layers in two tropical ice cores. *Nature*, 336(6201), p.761-765.

Thompson, L.G.; Mosley-Thompson, E.; Paskievitch, J.; Grootes, P. (1988) Shallow core analysis and pit studies at Siple Station: implications for extraction of a 500-year proxy climate record. (In: Oeschger, H., ed. *Symposium on Ice-Core Analysis, Bern, Switzerland, March 30-April 3, 1987. Proceedings. Annals of Glaciology*, vol.10, p.178-182.)

Thompson, L.G.; Mosley-Thompson, E.; Wu, X.; Xie, Z. (1988) Wisconsin/Würm glacial stage ice in the subtropical Dunde Ice Cap, China. *GeoJournal*, 17(4), p.517-523.

Thompson, S.L.; Schneider, S.H. (1981) Carbon dioxide and climate: ice and ocean. *Nature*, 290(5801), p.9-10.

Thwaites, R.J.; Wilson, C.J.L.; McCray, A.P. (1984) Relationship between bore-hole closure and crystal fabrics in Antarctic ice core from Cape Folger. *Journal of Glaciology*, vol.30(105), p.171-179. WDC No. 85000195. CRREL No. 39001672.

Tillson, R.A.; Kuivinen, K.C. (1983) Ice core science trench for use by glaciologists on the Greenland ice sheet. (In: *Symposium on Antarctic Logistics, 3rd, Leningrad, 1982. Proceedings. Scientific Committee on Antarctic Research*, p.584-590.) CRREL No. 39002632.

Torii, T. (1981) Review of the Dry Valley drilling project, 1971-76. *Polar Record*, 20(129), p.533-541. WDC No. 82000716. CRREL No. 36000910.

Turner, M.D.; McKenzie, G.D. (1982) Polar research. *Geotimes*, 27(2), p.51-52. WDC No. 82000624. CRREL No. 36002217.

U.S. National Research Council. Polar Research Board. Committee on Glaciology. (1986) *Recommendations for a U.S. Ice Coring Program*. Washington, DC. National Academy Press, 67p. WDC No. 87000760.

U.S. National Science Foundation. Division of Polar Programs. (1980) Central ice core storage facility--ice core sampling procedures. (In: MacKinnon, P., comp. *Ice Cores*. Boulder, Colorado, World Data Center A for Glaciology (Snow and Ice), *Glaciological Data, Report GD-8*, p.66-68.) CRREL No. 34004025.

U.S. National Science Foundation. Division of Polar Programs. (1980) Specimen and core-sample distribution policy. (In: MacKinnon, P., comp. *Ice Cores*. Boulder, Colorado, World Data Center A for Glaciology (Snow and Ice), *Glaciological Data, Report GD-8*, p.69-70.) CRREL No. 34004026.

Vaikmiae, R.A.; Punning, IA.-M.K. (1982) Izotopno-geokhimicheskie issledovaniia na lednikovom kupole Vavilova, Severnaia Zemlia. (Isotope-geochemical studies on the Vavilov ice dome in Severnaya Zemlya.) *Akademiia Nauk SSR. Institut Geografii. Materialy Gliatsiologicheskikh Issledovanii. Khronika Obsuzhdeniia*, 44, p.145-149. WDC No. 83000647. CRREL No. 37001673.

Vaikmiae, R.; Punning, J.M. (1984) Isotope- geochemical investigations on glaciers in the Eurasian Arctic. (In: Mahaney, W.C., ed. *Correlation of Quaternary Chronologies, Symposium, York University, Toronto*. Geo Books, Norwich, p.385-393.)

Vaikmiae, R.A.; Martma, T.A.; Punning, IA.-M.K.; Tyugu, K.R. (1984) Variatsii isotopa $^{18}O$ i Cl v lednikova kerne zapadnogo ledianogo polia na o. Severo-Vostochnaia Zemlia. (Variation of the $^{18}O$ isotope and Cl ion in ice cores of Vestfonna, Nordaustlandet.) *Akademiia Nauk SSSR. Institut Geografii. Materialy Gliatsiologicheskikh Issledovanii*, vol.51, p.192-195. CRREL No. 40000874.

Vaikmiae, R.A.; Martma, T.A.; Punning, Y.M.K.; Tyugu, K.R. (1985) Variations in $\delta\ ^{18}O$ and $Cl^-$ in an ice core from Vestfonna, Nordaustlandet. *Polar Geography and Geology*, 9(4), p.329-333.

Vaikmiae, R.A.; Punning, IA. -M.K.; Romanov, V.V.; Barkov, N.I. (1988) Stratigraphy of the Vavilov Ice Dome in Severnaya Zemlya using isotopic geochemical methods. (In: Avsiuk, G.A., ed. *Data of Glaciological Studies: Chronicle Discussions*. New Delhi, Amerind Publishing Co., p.127-135.) CRREL No. 42002717.

Vassoille, R.; Mai, C.; Perez, J.; Tatibouet, J.; Duval, P.; Maccagnan, M. (1980) Anomalous behaviour of Dome C ice core (East Antarctica) studied by mechanical damping measurements. *Annales de Geophysique*, 36(4), p.491-498. WDC No. 83000324. CRREL No. 35002887.

Vassoille, R.; Perez, J.; Tatibouet, J.; Duval, P.; Maccagnan, M. (1982) Amomalous behaviour of Antarctic ice cores studied by electrical and mechanical damping measurements. (In: *International Symposium on Antarctic Glaciology, 3rd, Columbus, OH, September 7-12, 1981. Proceedings. Annals of Glaciology*, vol.3, p.307-311.) WDC No. 83000460. CRREL No. 37000292.

Verrall, R.; Baade, D. (1984) Simple hot-water drill for penetrating ice shelves. (In: *International Workshop/Symposium on Ice Drilling Technology, 2nd, Calgary, Alberta, 30-31 August 1982. Proceedings. U.S. Army. Cold Regions Research and Engineering Laboratory. Special Report*, SR 84-34, p.87-94.) CRREL No. 40001189.

Vincent, C.E.; Davies, T.D.; Brimblecombe, P. (1981) Lewis Glacier (Mt. Kenya) and possible links with tropical climate. (In: Allison, I., ed. *Symposium on Sea Level, Ice and Climate Change, Canberra, 7-8 December 1978. Proceedings. International Association of Hydrological Sciences. IAHS-AISH Publication*, no.131, p.63-78.) WDC No. 81001073. CRREL No. 35003022.

Vostretsov, R.N.; Dmitriev, D.N. (1979) Rezul'taty termometrii v skvazhinakh na stantsii Vostok. (Results of temperature measurements in Vostok boreholes). *Sovetskaia Antarkticheskaia Ekspeditsiia. Informatsionnyi Biulleten*, no.99, p.25-31. WDC No. 80001457. CRREL No. 34001825.

Vostretsov, R.N. et al. (1984) Osnovnye rezul'taty geofizicheskikh issledovanii glubokikh skvazhin i ledianogo kerna v Vostochnoi Antarktide. (Basic results of geophysical studies of deep boreholes and ice cores in Eastern Antarctica.) *Akademiia Nauk SSSR. Institut Geografii. Materialy Gliatsiologicheskikh Issledovanii*, vol.51, p.172-178. CRREL No. 40000871.

Waddington, E.D.; Fisher, D.A.; Koerner, R.M.; Paterson, W.S.B. (1986) Flow near an ice divide: analysis problems and data requirements. (In: *Symposium on Glacier Mapping and Surveying, Reykjavik, August 26-29, 1985. Proceedings. Annals of Glaciology*, vol.8, p.171-174.) WDC No. 86002285. CRREL No. 41000763.

Wagenbach, D.; Muennich, K.O.; Schotterer, U.; Oeschger, H. (1988) Anthropogenic impact on snow chemistry of Colle Gnifetti, Swiss Alps. (In: Oeschger, H., ed. *Symposium on Ice-Core Analysis, Bern, Switzerland, March 30-April 3, 1987. Proceedings. Annals of Glaciology*, vol.10, p.183-187.)

Wagstaff, J; King, E.A. (1981) Micrometeorites and possible cometary dust from Antarctic ice cores. (In: *Lunar and Planetary Science Conference, 12th. Abstracts of papers.* Houston, Texas, p.1124-1126.) CRREL No. 37001513.

Wake, C. (1987) Snow accumulation studies in the central Karakoram. (In: *Eastern Snow Conference, 44th, Fredericton, New Brunswick, 3-4 June 1987. Proceedings*, p.19-33.)

Wake, C. (1989) Glaciochemistry as a tooll to delineate the spatial variation of snow accumulation in the Karakoram Himalaya, northern Pakistan. *Annals of Glaciology*, vol.13, p.279-284.

Watanabe, O.; Kato, K.; Satow, K. (1981) Some results on oxygen isotope and stratigraphic analyses of firn in Mizuho Plateau, East Antarctica. (In: Kusunoki, K., ed. *Symposium on Polar Meteorology and Glaciology, 3rd, Tokyo, 13-14 January 1981. Proceedings. Tokyo. National Institute of Polar Research. Memoirs. Special Issue*, 19, p.264-279.) WDC No. 82000464. CRREL No. 36002388.

Watanabe, O.S., et al. (1984) First results from Himalayan Glacier Boring Project in 1981-82. *Bulletin of Glacier Research*, 2, p.7-23.

Watanabe, O.; Fujii, Y.; Satow, K. (1988) Depositional regime of the katabatic slope from Mizuho Plateau to the coast, East Antarctica. (In: Oeschger, H., ed. *Symposium on Ice-Core Analysis, Bern, Switzerland, March 30-April 3, 1987. Proceedings. Annals of Glaciology*, vol.10, p.188-192.)

Watanabe, O; Fujii, Y. (1988) Outlines of the Japanese Arctic Glaciological Expedition in 1987. *Bulletin of Glacier Research*, no.6, p.47-50. CRREL No. 42003622.

Watroba, D.A.; Langway, C.C., Jr. (1979) Chemical investigation of two ice cores taken from the Ross Ice Shelf, Antarctica. (In: *Geological Society of America, Northeastern Section, 14th Annual Meeting, Hershey, PA., March 1-3, 1979. Geological Society of America, Abstracts and Programs*, 11(1), p.58.)

Watroba, D.A. (1980) Chemical investigation of two ice cores taken from the Ross Ice Shelf, Antarctica. (In: *Geological Society of America, Northeastern Section, 15th Annual Meeting, Philadelphia, PA, March 13-15, 1980. Geological Society of America. Abstracts and Programs*, 12(2), p.88.)

Webb, T., III; Kutzbach, J.E.; Street-Perrott, F.A. (1985) 20,000 years of global climatic change; paleoclimatic research plan. (In: Malone, T.F.; Roederer, J.G., eds. *Global Change*. Cambridge University Press, p.182-218.)

Weertman, J.; Peel, D.A. (1981) On Antarctic glaciology: ice sheets and ice cores. *Nature*, 294(5838), p.210-212. WDC No. 82000630. CRREL No. 36001621.

Weiner, J. (1989) Glacier bubbles are telling us what was in ice age air. *Smithsonian*, v.20(2), p.78-87.

Wehrle, E. (1985) Shallow-core collecting mechanical ice drill. *Australian National Antarctic Research Expeditions. ANARE Research Notes*, no.28, p.196-201. CRREL No. 40000757.

Whillans, I.M. (1981) Dome C glaciology. *Antarctic Journal of the United States*, 16(5), p.82-83. CRREL No. 36003981.

Whillans, I.M.; Bolzan, J.F. (1988) Method for computing shallow ice-core depths. *Journal of Glaciology*, 34(118), p.355-357. CRREL No. 43001993.

White, J.; Johnsen, S.J.; Dansgaard, W. (1988) Origin of Arctic precipitation as deduced from its deuterium excess. (Abstract only) (In: Oeschger, H., ed. *Symposium on Ice-Core Analysis, Bern, Switzerland, March 30-April 3, 1987. Proceedings. Annals of Glaciology*, vol.10, p.219-220.)

Wigley, T.M.L. (1983) Pre-industrial carbon dioxide level (Southern Hemisphere). *Climatic Change*, 5(4), p.315-320.

Wilkinson, D.S. (1988) Pressure-sintering model for the densification of polar firn and glacier ice. *Journal of Glaciology*, 34(116), p.40-45. CRREL 42003329.

Williams, L.D.; Wigley, T.M.L.; Kelly, P.M. (1980) Climatic trends at high northern latitudes during the last 4000 years compared with carbon 14 fluctuations (Alaska, Scandinavia). (In: *Sun and Climate. Centre National d'Étude Spatiales International Conference, Toulouse, 1980. Proceedings.* Centre National d'Étude Spatiales, Toulouse, p.11-20.)

Williams, L.D.; Wigley, T.M.L. (1983) Comparison of evidence for late Holocene summer temperature variations in the Northern Hemisphere (North America, Greenland, Europe). *Quaternary Research*, 20(3), p.286-307.

Wilson, A.T.; Hendy, C.H. (1981) Chemical stratigraphy of polar ice sheets -- a method of dating ice cores. *Journal of Glaciology*, 27(95), p.3-9. WDC No. 82001255. CRREL No. 36003330.

Wishart, E.R. (1985) Evidence of Southern Hemisphere warming from oxygen isotope records of Antarctic ice. (In: Jacka, T.H., ed. *Australian Glaciological Research; 1982-1983. Australian Department of Science and Technology. Antarctic Division. Australian National Antarctic Research Expeditions. Research Notes*, no.28, p.36-44.) WDC no. 85001757.

Wolff, E.W.; Peel, D.A. (1985) Record of global pollution in polar snow and ice. *Nature*, 313(6003), p.535-540. CRREL No. 39002927.

Wolff, E.W. (1986) Climate, pollution and ice. Great Britain. National Environment Research Council. *NERC News Journal*, 3(9), p.4-7. WDC No. 87000189. CRREL No. 40002999.

Wolff, E. (1987) The answer lies in the ice. *Geographical Magazine*, v.59(2), p.73-77.

Wolff, E.W.; Peel, D.A. (1988) Concentrations of cadmium, copper, lead and zinc in snow from near Dye 3 in South Greenland. (In: Oeschger, H., ed. *Symposium on Ice-Core Analysis, Bern, Switzerland, March 30-April 3, 1987. Proceedings. Annals of Glaciology*, vol.10, p.193-197.)

Workshop on the status and future of ice core research and ice core data, Boulder, Colorado, 24-26 September 1979. (1980) (In: MacKinnon, P., comp. *Ice Cores*. Boulder, Colorado, World Data Center A for Glaciology (Snow and Ice), *Glaciological Data, Report GD-8*, p.5-14.) CRREL No. 34004022.

Wu, X.; Thompson, L.G. (1988) 40 year record in an ice core from the Dunde Ice Cap, China. (Abstract only) (In: Oeschger, H., ed. *Symposium on Ice-Core Analysis, Bern, Switzerland, March 30-April 3, 1987. Proceedings. Annals of Glaciology*, vol.10, p.221.)

Xie, Z. (1984) Studies of ice formation and ice fabric on the Law Dome, Antarctica. *Journal of Glaciology and Cryopedology*, 6(1), p.1-22. WDC No. 84002181. CRREL No. 39000930.

Yamada, T. (1987) Glaciological characteristics revealed by 37.6-m deep core drilled at the accumulation area of San Rafael Glacier, the Northern Patagonia Icefield. *Bulletin of Glacier Research*, no.4, p.59-67. CRREL No. 41003828.

Yamada, T.; Kondo, H.; Fukuzawa, T. (1987) Ice core drilling operations in the Northern Patagonia Icefield. *Bulletin of Glacier Research*, no.4, p.151-155. CRREL No. 41003840.

Yiou, F.; Raisbeck, G.M.; Bourles, D.; Lorius, C.; Barkov, N.I. (1985) $^{10}$Be in ice at Vostok Antarctica during the last climatic cycle. *Nature*, 316(6029), p.616-617. WDC No. 85001105.

Yiou, F.; Raisbeck, G.M. (1985) Isotopes cosmogeniques dans la glace polaire. (Isotopes of cosmic origin in polar ice.) (In: *Actes du Colloque sur la Recherche Francaise dans l'Antarctique, Grenoble 19/21 Septembre 1984. [Colloquium on French Research in the Antarctic, Grenoble, 19-21 September 1984. Proceedings.]* Comite National Francais des Recherches Antarctiques, p.42-44.) CRREL No. 40000471.

Yiou, F.; Raisbeck, G.M. (1987) Cosmic spherules from an Antarctic ice core. *Meteoritics*, 22(4), 539p.

Young, N.W. (1981) Climate from ice-core studies. (In: Young, N.W., comp. *Antarctica: Weather and Climate*, 9p.) CRREL No. 37001386.

Young, N.W.; Raynaud, D.; DeAngelis, M.; Petit, J.R.; Lorius, C. (1984) Past changes of the Antarctic ice sheet in Terre Adelie as deduced from ice-core data and ice modelling. (Abstract only) (In: *Symposium on Ice and Climate Modeling, Evanston, IL, June 27-July 1, 1983. Annals of Glaciology*, vol.5, p.239.)

Young, N.W.; Xie, Z.; Qin, D. (1985) Multilayer crystallographic structure of Law Dome from ice core analysis. *Australian National Antarctic Research Expeditions. ANARE Research Notes*, v.28, p.18-24.

Young, N.W. (1988) Structure and flow in the margin of the Law Dome Ice Cap, Antarctica. (Abstract only) (In: Oeschger, H., ed. *Symposium on Ice-Core Analysis, Bern, Switzerland, March 30-April 3, 1987. Proceedings. Annals of Glaciology*, vol.10, p.222.)

Yukutake, H.; Ito, K. (1984) Velocities of P and S waves for drilling core rocks at Syowa Station, Antarctica. (In: Nagata, T., ed. *Symposium on Antarctic Geosciences, 4th Tokyo, 28-29 October 1983. Proceedings. Tokyo. National Institute of Polar Research. Memoirs. Special Issue*, no.33, p.17-27.) WDC No. 84002194. CRREL No 39001087.

Zagorodnov, V.S.; Zotikov, I.A. (1988) Core drilling at Spitsbergen. (In: Avsiuk, G.A., ed. *Data of Glaciological Studies: Chronicle Discussions*. New Delhi, Amerind Publishing Co., p.257-266.) CRREL No. 42002729.

Zagorodnov, V.S. (1988) Recent Soviet activities on ice core drilling and core investigations in Arctic region. *Bulletin of Glacier Research*, no.6, p.81-84. CRREL No. 42003627.

Zagrivnyi, E.A.; Zemtsov, A.A.; Vostretsov, R.N.; Shkurko, A.M. (1980) Eksperimental'noe burenie skvazhiny, zalitol nezamerzaiushehei zhidkost'iu. (Drilling experiments with drilling fluids.) *Sovetskaia Antarkticheskaia Ekspeditsiia. Informatsionnyi Biulleten*, no.100, p.119-123. CRREL No. 35002045.

Zanolini, F. (198?) Conductimetrie et chimie de la glace a D57 (Terre Adelie); application a la recherche du paleovolcanisme. (Conductivity and chemical measurements along the ice core from D57 (Adelie Coast); application at the study of the paleovolcanism.) *Bulletin - Programme Interdisciplinaire de Recherche sur la Prevision et la Surveillance des Eruptions Volcanique*, vol.76, 84p. CNRS-RS 19497.

Zanolini, F.; Delmas, R.J.; Legrand, M. (1985) Sulphuric and nitric acid concentrations and spikes along a 200 m deep ice core at D57 (Terre Adelie, Antarctica). (In: *Symposium on Snow and Ice Chemistry and the Atmosphere, Peterborough, Ontario, 19-24 August, 1984. Proceedings. Annals of Glaciology*, vol.7, p.70-75.) WDC No. 86000813. CRREL No. 40002400.

Zardini, D.; Raynaud, D.; Scharffe, D.; Seiler, W. (1988) $N_2O$ measurements on air extracted from Antarctic ice cores. (Abstract only) (In: Oeschger, H., ed. *Symposium on Ice-Core Analysis, Bern, Switzerland, March 30-April 3, 1987. Proceedings. Annals of Glaciology*, vol.10, p.222.)

Zheng, B.; Chen, J.; Ageta, Y. (1988) Preliminary report of Sino-Japanese Joint Glaciological Expedition in West Kunlun Mountains 1987. *Bulletin of Glacier Research*, no.6, p.75-80. CRREL No. 42003626.

Zotikov, I.A. (1979) Antifreeze-thermodrilling for core through the central part of the Ross Ice Shelf (J-9 Camp), Antarctica. *U.A. Army Cold Regions Research and Engineering Laboratory. Report*, CR79-24, 12p. WDC No. 80001380. CRREL No. 34001577. NTIS No. ADA-078 748.

Zotikov, I.A.; Zagorodnov, V.S.; Raikovskii, J.V. (1979) Core drilling through Ross Ice Shelf. *Antarctic Journal of the United States*, 14(5), p.63-64. WDC No. 80003390. CRREL No. 35000651.

Zotikov, I.A.; Zagorodnov, V.S.; Raikovski, J.V. (1980) Core drilling through the Ross Ice Shelf (Antarctica) confirmed basal freezing. *Science*, 207(4438), p.1463-1465. WDC No. 80002585. CRREL No. 34002485.

Zotikov, I.A.; Zagorodnov, V.S.; Raikovskii, Iu.V.; Morev, V.A. (1981) Kernovoe burenie na shelfovom Lednike Rossa. (Core drilling on the Ross Ice Shelf.) *Sovetskaia Antarkticheskaia Ekspeditsiia. Informatsionnyi Builleten*, no.102, p.68-74. WDC No. 82000711. CRREL No. 36000453.

Zotikov, I.A. (1983) Izuchenie ledianogo kema iz Shel'fovogo Lednika Rossa. (Studing ice cores from the Ross Ice Shelf.) *Akademiia Nauk SSSR. Institut Geografii. Materialy Gliatsiologicheskikh Issledovanii. Khronika Obsuzhdeniia*, vol.47, p.243. WDC No. 84000861. CRREL No. 38003390.

Zotikov, I.A.; Gow, A.J.; Jacobs, S.S. (1985) Stroenie tolshchi tsentral'noi chasti Shel'fovogo Lednika Rossa v Antarktike. (Structure of ice in the central part of the Ross Ice Shelf, Antarctica.) *Akademiia Nauk, SSSR. Institut Geografii. Materialy Gliatsiologicheskikh Issledovanii*, no.54, p.39-44. WDC No. 86001439. CRREL No. 40003903.

Zumbrunn, R.; Neftel, A.; Oeschger, H. (1982) $CO_2$ measurements on 1-$cm^3$ ice samples with an IR laser spectrometer (IRLS) combined with a new dry extraction device. *Earth and Planetary Science Letters*, 60(2), p.318-324.

## NOTES

### GREENLAND ICE SHEET PROJECT (GISP2)

The National Snow and Ice Data Center (NSIDC) has received a small grant from the National Science Foundation Division of Polar Programs to provide data management services for the Greenland Ice Sheet Project (GISP2). GISP2 represents the renewal of the seven year GISP1 program which ended in 1983 and produced a 2037 m deep ice core (70,000 year record) at the location Dye 3 in southeastern Greenland. The GISP2 drill site is located in central Greenland where the depth to bedrock is estimated to be 3100 m which could provide a stratigraphic record of 200,000 or more years. The first field season for GISP2 was successfully completed during the summer of 1989.

### THE STUDY OF NATURAL CLIMATE VARIABILITY: A NOAA PROGRAM IN PALEOCLIMATOLOGY

The National Oceanic and Atmospheric Administration (NOAA)/National Geophysical Data Center (NGDC) program has two components (1) establish and build the global paleoclimate database, and (2) carry on a research program to use the developing data base for the study of global climate change. NGDC has already made significant progress on the first component. To date numerous data sets of paleoclimate information have been assembled from ice cores, lake and marine sediments, tree rings, and historical information. Building the global database will continue to be important during the life of the program. The task of intercomparing and merging these various data sets for global climate reconstructions is just beginning and will become an increasing focus of the program during FY90 and FY91. In cooperation with other NOAA line offices and U.S. academia, within 3-5 years we expect to achieve significant improvements in the global description of the effects of annual- to century-scale climate change; to identify and better understand the causes of the climate change; and to do a significantly better job of separating man-induced climate change from the natural variability.

The FY90 program will achieve its objectives by: recruiting a senior paleoclimatologist; a visiting scientist program; sponsoring one or more relevant workshops; establishment of a newsletter and a publications series; and sponsoring an extramural program. NGDC proposes to implement a data management system and facility that will allow the rapid retrieval and superposition of data sets of various kinds, and provide a much needed resource to the paleoclimate research community.

The FY90 program provides resources to the university community to encourage them to "clean up" data sets collected over the years under various projects so that the data can be made available to the whole community through NGDC. Most of these proposed activities are leveraged and several are combined with "good science" focused primarily on the study of climate fluctuations of the Holocene of North America. Working with the National Science Foundation and other agencies, NOAA will complement activities funded by those agencies by supporting more applied research, and data validation and documentation tasks, so as to benefit the whole community, and help the overall mission of the NOAA Climate and Global Change Program.

# ICE CORE DATA

## DATA ANNOUNCEMENT 87-GLA-41

### ICE CORE DIGITAL DATA SETS

**1. Dye 3 $\Delta^{18}O$.**

$\Delta^{18}O$ versus depth data are available for the 2000-meter ice core drilled at Dye 3 in Southern Greenland during 1979-1981. In this data set, produced by the Geophysical Institute at the University of Copenhagen, $\Delta^{18}O$ values recorded are the mean of all samples between a given depth and the previous data point, towards the surface of the ice sheet. All depths are measured along the core according to the main core log; depths are not corrected for topographic effects upstream.

The data are archived on one IBM PC-type double-sided, double-density diskette, in one file containing 16770 ASCII characters. The data format is five columns of depth - $\Delta^{18}O$ pairs, with a physical record length of 100 characters. The data are available on one diskette, on one computer-compatible magnetic tape, or as a paper listing.

**References:**


Dansgaard, W., et al. (1985) Dating and climatic interpretation of two deep Greenland ice cores. (In: Langway, C.C. Jr., et al., eds. Greenland Ice Core: Geophysics, Geochemistry, and the Environment. Washington, DC: *American Geophysical Union. Geophysical Monograph* 33, p.71-76.)

Gundestrup, N.S. and B.L. Hansen (1984) Bore-hole survey at Dye-3, South Greenland. *Journal of Glaciology*, 30(106), p.282-288.

World Data Center-A for Glaciology [Snow and Ice] (1980) Ice Cores. *Glaciological Data, Report GD-8*. Boulder, CO, 139p. (Includes bibliography, pages 111-136.)


**2. Ice Core Microparticle Analysis.**

Microparticle analyses were performed on ice samples obtained by core drilling at locations in Peru, on Mount Kenya, in Antarctica, and in Greenland. Data include number of particles in each of 15 size ranges. Each file contains data for a different ice core: Quelccaya Ice Cap 1976; Quelccaya Ice Cap 1977; Lewis Glacier, Mount Kenya; Byrd Station 2164-meter core; Camp Century 1387-meter core.

Data are archived on one reel of computer-compatible tape.

**References:**


Thompson, L.G. (1980) Glaciological investigations of the tropical Quelccaya Ice Cap, Peru. *Journal of Glaciology*, 25(91), p.69-84.



**January 1987 (rev. 10/89)**



**World Data Center-A for Glaciology [Snow and Ice]/National Snow and Ice Data Center**
**National Geophysical Data Center, NOAA**
**Boulder, Colorado 80303**

Thompson, L.G. (1979) Ice core studies from Mt. Kenya, Africa and their relationship to other tropical ice core studies. (In: Sea Level, Ice and Climatic Change. *IAHS Publication*, no. 131, p.55-62.

Thompson, L.G. (1977) Microparticles, ice sheets and climate. Ohio State *University. Institute of Polar Studies. Report*, no. 64, 148p.

Thompson, L.G., W.L. Hamilton and C. Bull (1975) Climatological implications of microparticle concentrations in the ice core from Byrd Station, Western Antarctica. *Journal of Glaciology*, 14(72), p.433-444.

## 3. Svalbard (Spitsbergen) Cores: Chemical Analyses and Stratigraphy.

Svalbard ice core data received from the Institute of Geography, Soviet Academy of Sciences, are now available on IBM PC-compatible diskette. The data are stored in three text (ASCII) files and contain annual layer thickness and chemical analysis data.

A. Lomonosovfonna Ice Core, West Spitsbergen

Borehole location: 78° 44'N, 17° 34'E
Surface elevation: 1020 m a.s.l.

This file contains the annual layer thicknesses measured in Lomonosovfonna ice core (West Spitsbergen) in 1982. The borehole drilled by V. Zagorodnov reached bedrock at 135 meters. Annual layers were determined by the stratigraphic method; all thicknesses are in centimeters of ice (0.90 g/cc) The second column contains the original values measured in the ice core. The third column contains values corrected for thinning with depth and density changes, smoothed to a three-year mean.

B. Austfonna Ice Core, Nordaustlandet, Svalbard

Borehole location: 79° 51'N, 24° 08'E
Surface elevation: 750 m a.s.l.

The borehole was drilled by V.Zagorodnov at the summit of the Austfonna at Nordaustlandet, Svalbard, in July 1987. Bedrock was reached at 566.7 meters. The first column contains depths by one meter steps. The second column contains ice age calculated by measurements of thinning of infiltration ice layers with depth. The third contains percentage of infiltration ice content, that correlates well with mean summer (June - August) temperature. The lowermost 60 meters of the core consist of 100% infiltration ice.

C. Austfonna Ice Core Chemical Data, Nordaustlandet, Svalbard

This file contains data on chemical composition of ice samples from the 1987 Austfonna core (566 meters from surface to bottom), drilled by V.Zagorodnov and processed by S.Arkhipov (both from Institute of Geography). All concentrations are in milligrams per liter of water. Values given are depth (meters), pH, $HCO^3$, and Cl.

### References

Morev, V.A.; Pukhov, V.A.; Iakovlev, V.M.; Zagorodnov, V.A. (1984) Equipment and technology for drilling in temperate glaciers. (In: *International Workshop/Symposium on Ice Drilling Technology, 2nd, Calgary, Alberta, August 30-31, 1982. Proceedings. Holdsworth, G.; Kuivinen, K.C.; Rand, J.H., eds. U.S. Army Cold Regions Research and Engineering Laboratory. Special Report*. SR 84-34, p.125-127.) NTIS no. ADA-156 733. WDC. no. 86000636.

Zagorodnov, V.S. (1988) Recent Soviet activities on ice core drilling and core investigations in arctic region. *Bulletin of Glacier Research*, no.6, p.81-84. WDC no. 88001026.

Zagorodnov, V.S. (1984) Glubinnoe stroenie lednikovogo plato Lomonosova na o. zap. Shpitsbergen. (Structure of the glacial Lomonosov Plateau on western Spitsbergen.) *Akademiia Nauk SSSR. Institut Geografii. Materialy Gliatsiologicheskikh Issledovanii. Khronika Obsuzhdeniia*, vol.50, p.119-126. WDC no. 85000860.

Zagorodnov, V.S. (1981) Issledovanie stroeniia i temperaturnogo rezhima Shpitsbergenski kh lednikov s pomoshchiu termobyreniia. (Using thermal drills in studying temperature regime of Spitsbergen glaciers.) *Akademiia Nauk SSSR. Institut Geografii. Materialy Gliatsiologicheskikh Issledovanii. Khronika Obsuzhdeniia*, vol. 41, p.196-199. WDC no. 82000899.

Zagorodnov, V.S.; Samoilov, O.IU. (1982) Glubinnoe stroenie Shpitsbergenskikh lednikov. (Internal structure of Spitsbergen glaciers.) *Akademiia Nauk SSSR. Institut Geografii. Materialy Gliatsiologicheskikh Issledovanii. Khronika Obsuzhdeniia*, vol. 44, p.58-64. WDC no. 83000634.

Zagorodnov, V.S.; Samoilov, O. IU. (1981) Metodicheskie razrabotki dlia izucheniia struktury i svoistv lednikovogo l'da. (Developing methods for studying structure and properties of glacier ice.) *Akademiia Nauk SSSR. Institut Geografii. Materialy Gliatsiologicheskikh Issledovanii. Khronika Obsuzhdeniia*, vol. 43, p.103-108. WDC no. 82001030.

Zagorodnov, V.S.; Zotikov, I.A. (1981) Vnutrilednikovye kanali. (Channels inside glacier ice.) *Akademiia Nauk SSSR. Institut Geografii. Materialy Gliatsiologicheskikh Issledovanii. Khronika Obsuzhdeniia*, vol. 41, p.200-202. WDC no. 82000900.

**DISTRIBUTION AND COST**

Computer tapes are available at a cost of $60.00 per reel. Tapes are 9-track, unlabelled, and may be requested as 1600 or 6250 bpi, ASCII or EBCDIC. IBM-PC compatible diskettes containing ASCII files are available at a cost of $26.00 per diskette. Paper listings of the Dye 3 $\Delta^{18}O$ data are available for $25.00 each.

**To Order Data**

Prices shown are effective through September 30, 1990; please inquire for a current price quote. Prepayment, or a written purchase order, is required. Please make check or money order, in U.S. dollars, payable to *University of Colorado, WDC/NSIDC*. Telephone orders are accepted with written confirmation.

For further information, or to place an order for data, call or write:

World Data Center-A for Glaciology (Snow and Ice)
National Snow and Ice Data Center
CIRES, Box 449
University of Colorado
Boulder, Colorado 80309
U.S.A.
Telephone: (303) 492-1834 or (303) 492-5171
Telex: 7401426 WDCA UC
Telemail: [NSIDC/OMNET] MAIL/USA (Attn: Data Request Services)
VAX Mail KRYOS::NSIDC via SPAN
FAX: (303) 492-2468

# WORKSHOP ON PERMAFROST DATA AND INFORMATION

## TRONDHEIM, NORWAY, 2 AUGUST 1988

## 1. OVERVIEW

Information on permafrost phenomena is collected for a wide range of purposes by many different groups of specialists. The vast extent of the published literature — 4400 entries appear in the 1978-82 bibliography compiled for the Fourth International Conference on Permafrost and an additional 4000 citations in the update prepared for the Fifth — is illustrative of the potential magnitude of the related data sets. Measurements range from field observations of permafrost-related features, to surface and borehole data on physical properties of frozen ground and geophysical surveys, and laboratory experiments or tests. Remote sensing is now adding new types of data on frozen ground conditions.

Up to now, there are only isolated examples of organized national programs to collect, standardize and archive permafrost-related data. Planning for new international activities such as the International Geosphere Biosphere Programme (IGBP) calls for monitoring global change in areas sensitive to climatic or anthropogenic disturbances. The sensitivity of permafrost conditions to such changes is well recognized. However, the IGBP requirements imply a need to develop integrated global archives of permafrost-related variables suitable for use in multi-disciplinary research. In an attempt to assess the current status of bibliographic and numerical data bases on permafrost, ground ice, and thermal regimes, a *Workshop on Permafrost Data and Information* was organized by the World Data Center-A for Glaciology (Snow and Ice) in conjunction with the Fifth International Conference on Permafrost held in Trondheim, Norway. Approximately 50 participants from nine countries discussed the availability of, and needs for, inventories and catalogs of existing data sets and developed recommendations for future activities in these areas. A summary of the reports contributed to the Workshop and the list of recommendations is presented here.

R. G. Barry

## 2. PARTICIPANTS


Michel Allard
Universite Laval
Centre D'Etudes Nordiques
Sainte-Foy
Quebec G1K 7P4, CANADA

Carol Attwood
Department of Geography
University of Bristol
University Road
Bristol, BS8 1SS, UK

Sally Baker
Department of Geography
University of Reading
Whiteknights
Reading RG6 2AB, UK

Roger Barry
University of Colorado
CIRES/NSIDC
WDC-A Glaciology
Boulder, CO 80309-0449, USA

Mark Berrisford
University College
Department of Geology
PO Box 78
Cardiff CF1 1XL, UK

Jerry Brown
National Science Foundation
Division of Polar Programs
Washington, DC 20550, USA

Robert Carlson
University of Alaska
Fairbanks, AK 99775, USA

L. David Carter
USGS
4200 University Drive
Anchorage, AK 99508-4667,
USA

Guodong Cheng
Lanzhou Institute of
Glaciology & Geocryology
Academia Sinica, CHINA

Michael J. Clark
GeoData Institute
Southampton University
Southampton S09 5NH, UK

Ronald Edwards
Department of Energy, Mines
and Resources
580 Booth Street
5th Floor
Ottawa, CANADA

E. Ershov
Department of Permafrost
Studies
Geocryology
Moscow State University
Moscow 119899, USSR

David Etkin
Environment Canada
4905 Dufferin Street
Downsview
Ontario M3H 5T4, CANADA

Ian Fenwick
Department of Geography
University of Reading
Whiteknights
Reading RG6 2AB, UK

Oscar J. Ferrians, Jr.
USGS
4200 University Drive
Anchorage, AK 99508, USA

Joan Gosink
Geophysical Institute
University of Alaska
Fairbanks, AK 99775-0800,
USA

Nikolai Grave
USSR National Permafrost
Committee
117312 Moscow, USSR

Wilfried Haeberli
VAW/AG/ETH
ETH-Zentrum
8092 Zürich, SWITZERLAND

Bernard Hallet
Quaternary Research Center
AK-60
University of Washington
Seattle, WA 98195 USA

Charles Harris
University of College Cardiff
Geology Department
P.O. Box 78
Cardiff CF1 1XL, UK

Alan Heginbottom
Geological Survey of Canada
601 Booth Street
Ottawa, Ontario K1A 0E8,
CANADA

Larry N. Knapman
BLM
Kobuk District
Fairbanks, AK 99703, USA

Ruth J. Knapman
1280 Gilmore Trail
Fairbanks, AK 99712, USA

N. R. Kolushev
GAZ SU
Moscow 411467. USSR

I. Konuk
Canada Oil and Gas, Lands
Administration
355 River Road, 15th Floor
Ottawa, Ontario K1A 0E4,
CANADA

Edward Koster
University of Utrecht
Geographical Institute
P.O. Box 80.115
3508 TC Utrecht
THE NETHERLANDS

William B. Krantz
Department of Chemical Engineering
University of Colorado
Boulder, CO 80309-0424, USA

N. P. Krivonogova
Gidrotechnicke Institut
Leningrad 182242, USSR

I. M. Kutasov
Louisiana Tech University
College of Engineering
P.O. Box 10380
Ruston, LA 71272-0046, USA

Arthur H. Lachenbruch
USGS
345 Middlefield Road, MS/923
Menlo Park, CA 94025, USA

Richard Levesque
Laval University
Centre D'Etudes Nordiques
Sainte-Foy
Quebec G1K 7P4, CANADA

Lewis E. Link
CRREL
72 Lyme Road
Hanover, NH 03755-1290, USA

C. W. Lovell
School of Civil Engineering
Grissom Hall
Purdue University
W. Lafayette, IN 47906, USA

Andreas Lueck
Geographisches Institut
University of Bonn
Martinstrasse 7
5270 Gummersbach
F. R. GERMANY

Virgil Lunardini
CRREL
72 Lyme Road
Hanover, NH 03755, USA

J. C. McDougall
ESSO Resources Canada, Ltd.
237 4th Avenue, S.W.
Calgary, Alberta T2P 0H6,
CANADA

Pavel Melnikov
Permafrost Institute
Siberian Branch USSR
Academy of Science
Yakutsk, USSR

Vladimir Melnikov
The Northern Development Institute
Siberian Branch
Academy of Science
Yakutsk, USSR

Bruce F. Molnia
USGS
917 National Center
Reston, VA 22092, USA

Rune Ødegärd
Institute of Geography
University of Oslo
Oslo, NORWAY

Tom Osterkamp
Institute of Marine Science/Geophysical Institute
University of Alaska
Fairbanks, AK 99701, USA

Guoqing Qiu
Lanzhou Institute of Glaciology and Geocryology
Academia Sinica, Lanzhou
CHINA

Katherine Sambles
Department of Geography
University of Bristol
University Road
Bristol BS8 1SS, UK

Bruce Tart
Dames & Moore
5761 Silverado Way, Step
Anchorage, AK 99518, USA

Fiorenzo C. Ugolini
College of Forest Resources
AR-10
University of Washington
Seattle, WA 98195, USA

Ted S. Vinson
Department of Civil Engineering
Oregon State University
Corvallis, OR 97331, USA

A. L. Washburn
Quaternary Research Center
AK-60
University of Washington
Seattle, WA 98195, USA

Tahoe Washburn
Quaternary Research Center
AK-60
Univeristy of Washington
Seattle, WA 98195, USA

## 3. REPORT SUMMARIES

### 3.1 Permafrost Research and Global Change
**A. Lachenbruch, USGS, Menlo Park**

Data are collected with regard to a problem: A key problem is "Global Change". Study of changing permafrost regimes involves:

1) observation of the thermal regime in permafrost — various data types,
2) extraction of information to develop models,
3) prediction.

The necessary observations are air, surface interface, ground temperatures and heat fluxes across the boundaries. Data are required with approximately 50 km spacing. Measurements should include:

1) 20 m temperature ($\Theta_{20}$) record. Below 15 m there is no annual cycle, therefore, this indicates long-term trends and approximates the mean annual air temperature. The 20 m temperature record contains lags due to past climatic events. A precision of 0.1°C is required in the measurements of $\Theta_{20}$.

2) Depth $\Delta Z$ to bottom of permafrost = 0°C depth ($\Theta_0$). This is required to obtain a linear approximation to surface temperature, Ts ($\Delta$ 0.1°C ~ 3 m depth of permafrost). A precision of 0.1°C in $\Theta_o$ is required, i.e., three measurements $\Theta_0$, $\Theta_{20m}$, and $\Delta Z$ are essential.

For climatic change determinations, temperature observations at 10 m intervals are needed to get $\Delta T/\Delta t$. Note that a borehole takes time to drill, and attainment of the equilibrium temperature requires time = $\ln (1 + 1/\tau)$, where $\tau$ = time in years.

Water content of materials provides information on thermal properties and is easier to measure; thermal conductivity is very important for heat flux.

For monitoring purposes: borehole temperatures are required at successive times to 0.01°C precision.

#### Reference

Lachenbruch, A.H.; Cladouhos, T.T.; Saltus, R.W. (1988) Permafrost temperature and the changing climate. (In: Senneset, K., ed. *International Conference on Permafrost, 5th, 2-5 August 1988*, Trondheim, Norway, Vol.3, p.9-17.)

## 3.2 Permafrost Studies in China
**Dr. Qui, Lanzhou**

Recent activities in permafrost research in China include:

1. Current research involves field observations, airphotos, and Landsat images. On this basis, a map of snow, ice and permafrost in China (1:4 m scale) has just been published.
2. A new station has been established in Xinghai Xizang (Western foot of Kunlun Mountains); its program will involve: monitoring frozen ground trends related to environmental factors, frozen ground dynamics and periglacial features, and engineering problems.
3. A new Laboratory of Frozen Soils and Engineering is to be established by 1992; it will be open to all scientists. Research will address heat/mass transfer, frost heave, strength, rheology of permafrost, and engineering models.
4. A data library will be established at the Station and in the Laboratory.
5. The Chinese Society of Glaciology and Cryopedology held conferences in 1978 and 1981 in Lanzhou and 1986 in Harbin; approximately 450 papers were presented of which approximately 200 were published; the 4th Congress at Lanzhou was held in Fall 1988. The Journal of Glaciology/Cryopedology has to date published 600 papers of which approximately 300 are permafrost-related.

Future Plans:

1. Establishment of a National Permafrost Data Center*;
2. Standardization of data collection, processing, and terminology;
3. Organization of data banks;
4. Enlargement of international cooperation.

*Editor's note: World Data Center-D for Glaciology (Snow & Ice) and Geocryology, directed by Professor Xie Zichu, has been formed at the Lanzhou Institute of Glaciology and Geocryology.

### 3.3 Permafrost Studies in the USSR
**Dr. N. Grave**

Research in the USSR includes preparation of permafrost maps and collection of geotechnical data. Seasonal layer temperatures are being used to determine heat balance on site.

The difficulty presented by the publication of data and information in many languages is recognized. The USSR plans to publish a new Geocryology quarterly journal, in English, part of which will be devoted to data aspects.

The lack of a common system of data collection is also a concern. Soviet workers will be glad to participate in such a system when it is established. They are already cooperating with WDC-A for Glaciology in bibliographic activities on permafrost literature.

### 3.4 A review of permafrost data in Canada
**A. Heginbottom, Geological Survey of Canada**

It is important to understand the distribution of permafrost and ground ice with regard to geology, geography and other environmental factors. How do we map permafrost? This task is less amenable to the direct application of numerical data, since it requires interpretation. These are problems of access to information — especially for the USSR and China.

Issues: 1. a data base - comprises a machine-compatible spatial collation (latitude, longitude, altitude) - retrievable by computer searches.

2. data collection - typically paper records; labor intensive and less well indexed - but the technology does not run the risk of becoming outdated.

Examples for Canada: A summary is presented in Table 1. Several points may be noted.

Temperature data: Are held in a data bank at Geological Survey of Canada. Data up to 1983 (published as lists also) are in the public domain.

Geotechnical data: Archived (in 1970s) but not well indexed. Published, then withdrawn, and not re-issued.

Canadian Private Sector: Geotechnical data, most in CCT format. These are largely proprietary systems, ("Corporate Gold"); ownership of the data may be crucial for future resource exploitation

needs. These collections include seismic data, EM sounding, georadar profiles, acoustic data, and geology/geomorphology information, not easily handled, or distributed.

Site Specific Data — for routes, sites. Often proprietary and different systems, so data cannot be readily exchanged.

Defunct Projects - For example, the Mackenzie Valley pipeline consortium collapsed. In theory the data are held by the Arctic Institute of North America (AINA) but are not well indexed.

Individual researchers - Some data are held by Atmospheric Environment Service (AES), and could be made accessible.

Adequacy of Bibliographic Information

Permafrost Conference - The Conference volumes are valuable sources because they include papers not just proceedings; there is a problem of locating thematic information across the different volumes - Heginbottom provided an index to 1983 but this needs extending as there are now many other national conferences.

*RECOMMENDATION - Prepare a listing of current Permafrost reports (on a worldwide basis).

Bibliographies are provided by Glaciological Data, GD 14 & 21, and earlier by the Arctic/Antarctic Bibliographies, but GD 14 (1983) was not very conveniently indexed and a similar system was used for GD 21; specifically, the user has to identify the correct key-word or search by author. The GDs and other publications should provide a regional index, but will this effort be cost effective. Is this a possible role for the International Permafrost Association?

Translations - In Canada this is an increasing problem. Funds/staff have dried-up except for the private sector. The former National Research Council (NRC) staff Technical Translator retired. As a result, North American papers cite few Russian/Chinese references - or only old pre-WWII ones. There is a need for better indexing, and storing of permafrost information and data, both national and international, for the major languages; there is also a need to develop protocols for data and information formats.

## Reference

Heginbottom, J.A.; Sinclair, M. (1985) A cumulative index to Permafrost Conference Proceedings, 1958-1983. Geological Survey of Canada. Open File Report 1135, 157p.

**Table 1. PERMAFROST DATA IN CANADA**

| | | |
|---|---|---|
| Type of Data Collected | Bibliographic; Terminological; Geographical; Geological; Field; Geothermal; Mechanical; Chemical; Laboratory; etc. | |
| Purpose of Data Collection | Design/Construction Planning; Environmental Assessment; Research; Reference; Combinations of the above. | |
| Ownership of Data Collections | Federal Government Department/Agencies; Provincial/Territorial Government Agencies; Universities; Consultants: commercial/university; Oil Companies; Mining Companies. | Energy Mines and Resources; Ministry of Transport; Gov't. of the Northwest Territories/Dept. of Public Works; Yukon Territory; Arctic Institute of North America; National Research Council; Quebec/Ministry of Transport. |
| Availability of or Access to Data | Published; Public Domain; Proprietary: available at a price or not available; Inactive: available or not available. | |
| Form of Data Storage | Machine Readable: magnetic tape or disks/diskettes; Paper Copies. | |
| Specifications of Data Collections | Format; Content; Age; Currentness; Indexing; Reliability. | Variable: to be assessed case by case. |

## 3.5 Permafrost data at the U.S. Geological Survey

**B. Molnia, USGS, Reston, VA**

The USGS is clearing house in order to systematize and make available data from its various divisions. It is also spearheading the Arctic Environmental Data Directory project.

The USGS was established in 1880. Today there are approximately 200 personnel involved in Arctic research, but only 70-100 active in Arctic fieldwork. Where are the results of this 100 years of data collection? - most have disappeared!

Each of the major Divisions of USGS: Geologic, National Mapping, Water Resources - has its own philosophy and system for data handling. The National Mapping Division operates the National Digital Cartographic Data Base and the National Cartographic Information Center for topographic and geologic maps. Water Resources Division provides annual reports for drainage basins, etc. that are incorporated in a digital data base called WATSTORE. The Geological Division - has most data, including hundreds of holdings, but these are least well identified. Data Levels are defined as 0 = Rock Samples, up to level 4 = digital spatial arrays.

ACTIVITIES:

1. USGS is compiling a Data Directory, the Earth Science Data Directory (ESDD). The contents will include type, time of collection, number of records, contact person and telephone number.
2. There is a parallel activity by the Interagency Policy Group. A plan is in effect to use the Earth Science Data Directory (ESDD) and NOAA/NEDRES as components of a Directory for all Arctic environmental information (Laughlin, 1988). It will provide interactive access to the Directory; PC-compatible software is available for the ESDD.

### Reference

Laughlin, T.L. (1988) Report of the Arctic Environmental Data Workshop, Boulder, Colorado, 21-24 March 1988. U.S. National Oceanic and Atmospheric Administration, 24p. plus appendices.

## 3.6 Permafrost data at the Cold Regions Research and Engineering Laboratory (CRREL)

**V. Lunardini, U.S. Army, CRREL**

There is not only a data explosion from many recent laboratory and field strides but also a data implosion into archives. Once deposited in the archives the data are often virtually useless. CRREL permafrost data are buried in files - which would require a huge effort to locate and to interpret.

Engineering aspects. We need: 1. measurements; and, 2. theory on the thermal conductivity (K) — in contrast to metals, and other engineering materials permafrost is hard to characterize. We need a comprehensive data base of K as functions of temperature and soil systems incorporating the known data and highlighting the gaps. The value of thermal conductivity near the freezing point is particularly sensitive to temperature and difficult to characterize for purposes of design or calculation.

Statistics have been compiled on the CRREL bibliography which contains 160,000 (160 K) titles (80 K English, 46 K Russian, 5 K German, 3 K French, 1 K Spanish, 1 K Chinese). Of these, Permafrost accounts for 13 K items (8.5 K Russian, 4.5 K English). For major subtopics, the total numbers are as follows: temperature, 1545; thermal properties, 878; climate, 300; area, 555; depth, 928; frozen ground, 4986.

## 3.7 Field Measurements

**T. Osterkamp, Geophysical Institute, University of Alaska**

A number of questions need to be addressed.

1. We need to determine how permafrost has responded, and is responding, to climate change. In relation to this question, what are the rates of change of the permafrost thickness, areal extent, etc. in places where permafrost is actively changing? Numerous factors are involved: a) climate; b) ecology; c) hydrology; d) oceanography; e) others. How are they coupled? e.g., sea level change affects subsea permafrost; thawing affects tundra lakes, anthropogenic - resource extraction modifies permafrost. An evaluation of available data is required, e.g., Alaskan data exist from late 19th Century. We need to determine rates of change of permafrost thickness and areal extent, in places undergoing active change.

2. What are the fluxes of heat, moisture, nutrients and other chemicals, and gases in the active layer and permafrost? How are these fluxes coupled?

3. New methods will be required for in situ measurements of unfrozen water content, salt content, and thermal properties in drillholes.

4. We still need to develop analytical and numerical methods for interpreting temperature and other flux measurements in the active layer and permafrost.

Equipment needs include a reliable continuous field logger, plus long-term automatic measurements (ideally, we should be able to service instruments 1/year in July). Remote plus in situ methods for borehole observations; properties - water, salt content. Can we get active layer thickness remotely; date of freezing, etc.?

Problems:

1. Cooling observed 1983-87 at Prudhoe Bay dock is possibly a result of temperatures declining from the 1981 high. The change in temperature profile in degrading permafrost is because of the latent heat effects associated with the presence of unfrozen water. Current analytical models are inadequate.

2. Shallow permafrost - appears to be thawing from the top down. Societal effects include the effects of thaw on roads and buildings - research is needed to minimize such effects.

3. Soil salinities in Alaska are 5-10 times greater than expected. Offshore permafrost in particular is more complex due to salt effects. Active layer may be 2-3 m thick, in contrast to adjacent land locations. What is the role of salt fingers?

### 3.8 Engineering Aspects

**T. Vinson, School of Engineering, Oregon State University, Corvallis**

Climate related aspects involve: boundary conditions of site, snow depth, vegetation, and hydrology.

Engineering-related aspects involve particularly density and ice content. Mechanics - We need a classification for N. America and elsewhere concerning chemistry of pore ice, fluid, thermal characteristics and creep characteristics [a standard test procedure is required], creep strength. One test procedure has been standardized - but previous measurements may not reflect that standard, therefore it is difficult to use them from an engineering point of view; active layer - frost - heave, thaw imply weakening of soil strength.

Researchers need:

1. a recognized classification system;
2. test procedure standards (recognized/referenced);
3. collection/transmission of data - (costs aspect needs to be resolved);
4. information on the statistical significance of measurements.

## 3.9 Data Design Questions

**M. J. Clark, Department of Geography, University of Southampton**

There are several data analysis issues. Post-acquisition processing and analysis often incorporates a model. Calibration is a concern; we need to know the representativity of any data collected. Sampling design questions have received little attention.

Possible solutions:

1. Ideally, we desire instrumental observations as they give better data archives.
2. We need to create an interest in methodology and aim for realistic targets.
3. Existing data sets must be assembled - codify and amplify how collected; Can IPA "standards"/guidelines be developed?
4. For data assembly - WDC-A for Glaciology should play an important role. It is preferable to leaving the task to individual agencies with their own special interests.
5. Finally, as a personal concern, IPA/WDC should record ideas of 'classical' workers who laid the foundations of permafrost research by collecting audio/video records of their methods, sites, etc.

## 4. RECOMMENDATIONS

The International Permafrost Association (IPA), through its working groups should seek:

1. to define the key variables needed for:

   a) global baseline information on current permafrost conditions,

   b) monitoring of global change in the geosphere-biosphere system,

   c) understanding the thermophysical and mechanical properties of ground and permafrost.

   An associated task will be to determine the appropriate minimum set of variables and boundary conditions, and sampling strategies to ensure representative observations.

2. to ensure security of all key historical information and data records by:

   a) depositing in national archives, aural and/or written records of senior scientists who have made significant or unrepeatable studies,

   b) re-recording of observations and data onto new media as technologies change,

   c) duplication of valuable data sets at more than one centre, or off-site, to avoid catastrophic data loss.

3. to play a coordination role for data standards in collaboration with the appropriate FAGS and WDCs of International Council of Scientific Unions, and to encourage scientists and national agencies to support data archiving (management) activities through recognized data centres.

4. to identify standardized procedures for testing and measurement of physical properties and classification of permafrost for the archiving of fully documented quality controlled data sets. Such documentation should specify the observational and analytical procedures applied to the data.

5. to facilitate the development of user-friendly hardware/software data systems in the form of:

   a) data directories with interactive remote access and cross-referenced guidance to permafrost-related data and information,

   b) hardware independent access-software to data sets.

In addition, a proposal was submitted to the Council of the International Permafrost Association to form a Working Group on Permafrost Data. Formation of this Working Group has since been approved. See Appendix 1.

**Appendix 1.**

## WORKING GROUP ON PERMAFROST DATA

PURPOSE: To improve and standardize the collection, archiving, documentation and dissemination of permafrost data.

The Working Group will collaborate with the Working Group on Permafrost Terminology and with other national and international committees and agencies concerned with relevant data.


Chairman: Michael J. Clark (U.K.)
Geodata Institute
Southampton University
Southampton, SO9 5NH
U.K.
FAX: 44-703-592849
Telex: 47661

Secretary: Roger G. Barry (U.S.A.)
WDC/NSIDC
CIRES
University of Colorado
Boulder, CO 80309-0449
USA
FAX: (303) 492-2468
Telex: 7401426 WDCA UC


Proposed Members:


Bangjun Wu, Senior Engineer
Lanzhou Institute of Glaciology and Geocryology
Academia Sinica
Lanzhou, P.R. China

Professor N. Grave
U.S.S.R. National Permafrost Committee
117312 Moscow, U.S.S.R.

Mr. A. Heginbottom
Geological Survey of Canada
602 Booth Street
Ottawa, Ontario K1A 0E8
Canada
FAX: (613) 992-9468

Dr. B. Molnia
U.S. Geological Survey
917 National Center
Reston, Virginia 22092
U.S.A.
FAX: (703) 648-4227
Telex: 248418 GEOINT UR

**Appendix 2.**

## ENVIRONMENTAL DATA DIRECTORY—DEEP GROUND TEMPERATURES, MEAN ANNUAL GROUND SURFACE TEMPERATURES AND PERMAFROST THICKNESS DETERMINATIONS NORTHERN AND ARCTIC CANADA

Alan Judge
Energy, Mines and Resources, Canada

For over twenty years the Permafrost Research Section, Terrain Sciences Division of the Geological Survey of Canada, has acquired ground temperature measurements and related data for northern Canada through in-house projects, cooperation with the hydrocarbon and mineral industry and contracted research to Canadian consulting companies. The total data collection consists of 6 individual data files with differing levels of sophistication. Here I will describe each file individually.

1. Precise (0.01 - 0.1K) ground temperatures, from surface to depths of hundreds to a thousand metres or so, at 140 petroleum and mining exploration holes in Arctic Canada. Temperatures are measured sequentially so as to assess the drilling disturbance and determine equilibrium values. Estimates of permafrost thickness to accuracies of several metres are made at these wells. This data set has formed the basis of a series of reports published regularly as *Canadian Geothermal Data Collection — Northern Wells* and the data is separately available in a computer-compatible form on a CDC Cyber with EMR.

2. As subsets to the above files and also available on the EMR Cyber and through *Open-File Reports*, precise ground surface temperature is collected for 100 drillholes to 20m depth along the 800km Norman Wells pipeline in discontinuous permafrost. The majority of the sites both in the disturbed right-of-way and in adjacent undisturbed terrain are read at monthly intervals although at six sites automated data loggers have increased frequency to 4X daily. One site is operated jointly at which Atmospheric Environment Service is collecting automatic meteorological data.

3. Deep ground temperatures at sub-permafrost depths to 4km were derived from bottom hole temperatures and drill stem test data for most of the 500 petroleum exploration wells in Arctic Canada. Generally, the precision is to several degrees. The data set extends that of file 1. above to a larger area and a larger number of wells to greater depths but with much lower

precision. The data collection has been acquired through contracted studies and data are released through *Open-File Reports*. Some data are available on magnetic tape but not in easily accessed formats or routines at present. The data set is useful in establishing the deep boundary conditions including ground water circulation in permafrost growth.

4. Thickness of ice-bonded permafrost and occurrence of gas-hydrates has been derived from downhole geophysical logs collected for 700 petroleum exploration wells in Arctic Canada. Precise temperatures collected (file 1. above) have been used to calibrate the geophysical responses. This data set expands in volume and region the permafrost thickness determination in 1. above, although generally with a lesser precision of 1 to 10m. The results are published as *Open-File Reports* and some preliminary maps have been prepared.

5. Permafrost thicknesses totalling 1000 values have been assembled for Canada using published sources and 1. and 4. above. The data have been assembled as a research tool and are available on floppy discs using Lotus 1-2-3 format on an IBM-PC.

6. Mean annual ground surface temperature data have been collected for Northern Canada. The collection gathers together mean annual ground surface temperature, as determined by frequent readings on short cables or from surface intercepts of deeper temperature data, from 305 locations. The reports are available as *Open-Files* and the basic numeric data were assembled as a research tool and are available on floppy discs using Lotus 1-2-3 format on an IBM-PC.

**Appendix 3.**

## CANADIAN GEOTHERMAL DATA BIBLIOGRAPHY


1. Canadian Geothermal Data Collection

Taylor, A.E. and Judge, A.S. 1974. Canadian Geothermal Data Collection - Northern Wells, 1955 to February 1974. Geothermal Series Number 1, Earth Physics Br., EMR, 171p.

Taylor, A.E. and Judge, A.S. 1975. Canadian Geothermal Data Collection - Northern Wells, 1974. Geothermal Series Number 3, Earth Physics Br., EMR, 127p.

Taylor, A.E. and Judge, A.S. 1976. Canadian Geothermal Data Collection - Northern Wells, 1975. Geothermal Series Number 6, Earth Physics Br., EMR, 142p.

Taylor, A.E. and Judge, A.S. 1977. Canadian Geothermal Data Collection - Northern Wells, 1976-77. Geothermal Series Number 10, Earth Physics Br., EMR, 194p.

Judge, A.S., Taylor, A.E., Burgess, M. 1979. Canadian Geothermal Data Collection - Northern Wells, 1977-78. Geothermal Series Number 11, Earth Physics Br., EMR, 187p.

Judge, A.S., Taylor, A.E., Burgess, M., Allen, V.S. 1981. Canadian Geothermal Data Collection - Northern Wells, 1978-80. Geothermal Series Number 12, Earth Physics Br., EMR, 190p.

Taylor, A.E., Burgess, M., Judge, A.S., Allen, V.S. 1982. Canadian Geothermal Data Collection - Northern Wells, 1981. Geothermal Series Number 13, Earth Physics Br., EMR, 153p.

2. Sources of other deep temperature data

Norquay, I.P., D&S Petrophysical Co., 1983. Study of well logs in the Mackenzie Delta - Beaufort Sea area to outline permafrost thickness and/or gas hydrate occurrence. Earth Physics Br., Open File 83-10, 242p.

Geotech Engineering, Ltd., 1983. Subsurface temperature data from Arctic wells. Earth Physics Br., Open File 83-11, 401p.

Geotech Engineering, Ltd., 1984. Subsurface temperature data from wells north of sixty, Yukon - Northwest Territories. Earth Physics Branch, Open File 84-28, 557p.

Hardy and Assoc., Ltd. 1984. Study of well logs in the Arctic Islands to outline permafrost thickness and/or gas hydrate occurrence. Earth Physics Branch Open File 84-8, 215 + 159p.

Hardy and Assoc., Ltd. 1984. A study of well logs in the Western Northwest Territories and Yukon to outline permafrost thickness and/or gas hydrate occurrence. Earth Physics Branch Open File 84-27, 290p.

## BOOK NOTES

Ershov, E. D. (1988-89) *Geokriologiia SSSR*. (Geocryology of the USSR.) Moscow, "Nedra." 5 volumes. In Russian.

This five volume set is a detailed study of the geocryology of the Soviet Union. Each volume focuses on a broad geographic region: 1) European USSR, 2) Western Siberia, 3) Central Siberia, 4) Eastern Siberia and the Far East, 5) Mountain regions.

Each of these volumes has three major divisions with regionally-based information and data:

1. Principles of frozen ground formation and current geocryological conditions;
2. Geocryological characteristics - by more localized regions with data;
3. Geocryological forecasting and use and preservation of the natural environment.

Each volume offers an extensive list of references and includes many figures, maps and tables.

Harris, S. A. et al. (1988) Glossary of Permafrost and Related Ground Ice Terms. *National Research Council Canada. Technical Memorandum* no. 142, 156 p. Available in English or French language editions.

This glossary is "a list of definitions related to permafrost science and permafrost engineering. The primary objective is to present terms that enjoy common usage in the current literature, with special reference to Canada and Canadian conditions."

The volume contains definitions for 201 terms, numerous cross references and indications of terms not recommended. One third of the volume is given over to material that supplements the Glossary. An extensive reference list provides sources for more detailed information on specific topics. Diagrams and photographs are provided to illustrate various permafrost phenomena.

☆U.S. GOVERNMENT PRINTING OFFICE:1990 -775 -002/ 11020

# GLACIOLOGICAL DATA SERIES

***Glaciological Data***, which supercedes ***Glaciological Notes***, is published by the World Data Center-A for Glaciology (Snow and Ice) several times per year. It contains bibliographies, inventories, and survey reports relating to snow and ice data, specially prepared by the Center, as well as invited articles and brief, unsolicited statements on data sets, data collection and storage, methodology, and terminology in glaciology. Contributions are edited, but not refereed or copyrighted. There is a $5 shelf stock charge for back copies.

Scientific Editor: Roger G. Barry
Technical Editor: Ann M. Brennan

The following issues have been published to date:

GD- 1, ***Avalanches***, 1977

GD- 2, ***Arctic Sea Ice***, 1978

GD- 3, ***World Data Center Activities***, 1978

GD- 4, ***Glaciological Field Stations***, 1979, Out of Print

GD- 5, ***Workshop on Snow Cover and Sea Ice Data***, 1979

GD- 6, ***Snow Cover***, 1979

GD- 7, ***Inventory of Snow Cover and Sea Ice Data***, 1979

GD- 8, ***Ice Cores***, 1980, Out of Print

GD- 9, ***Great Lakes Ice***, 1980, Out of Print

GD-10, ***Glaciology in China***, 1981

GD-11, ***Snow Watch 1980***, 1981

GD-12, ***Glacial Hydrology***, 1982

GD-13, ***Workshop Proceedings: Radio Glaciology; Ice Sheet Modeling***, 1982

GD-14, ***Permafrost Bibliography, 1978-1982***, 1983

GD-15, ***Workshop on Antarctic Climate Data***, 1984

GD-16, ***Soviet Avalanche Research; Avalanche Bibliography Update: 1977-1983***, 1984

GD-17, ***Marginal Ice Zone Bibliography***, 1985 Out of Print (Microfiche available)

GD-18, ***Snow Watch '85***, 1986

GD-19, ***Tenth Anniversary Seminar; Passive Microwave Users Workshop; Microwave Radiometry Bibliography***, 1987

GD-20, ***Workshop on the U.S. Antarctic Meteorological Data Delivery System***, March 1988

GD-21, ***Permafrost Bibliography Update, 1983-1987***, April 1988

GD-22, ***Northern Libraries Colloquy***, August 1988

Contributions or correspondence should be addressed to:

World Data Center-A for Glaciology (Snow and Ice)
CIRES, Box 449
University of Colorado
Boulder, Colorado 80309
U.S.A.
Telephone (303) 492-5171
Telex 7401426 WDCA UC
Telemail [NSIDC/OMNET] Mail/USA
VAX Mail via SPAN - KRYOS::NSIDC