



# IceBridge DMS L0 Camera Calibration, Version 1

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## USER GUIDE

### How to Cite These Data

As a condition of using these data, you must include a citation:

Dominguez, R. 2017, updated 2018. *IceBridge DMS L0 Camera Calibration, Version 1*. [Indicate subset used]. Boulder, Colorado USA. NASA National Snow and Ice Data Center Distributed Active Archive Center. <https://doi.org/10.5067/Z65C335BWXC3>. [Date Accessed].

FOR QUESTIONS ABOUT THESE DATA, CONTACT [NSIDC@NSIDC.ORG](mailto:NSIDC@NSIDC.ORG)

FOR CURRENT INFORMATION, VISIT <https://nsidc.org/data/IODCCO>



National Snow and Ice Data Center

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# 1 DETAILED DATA DESCRIPTION

The IceBridge DMS L0 Camera Calibration files contain DMS camera calibration summary reports in PDF format for missions flown over Antarctica and Greenland.

The Camera Calibration Report summary PDF files include the lens characterization of the instrument, i.e., the lens camera-body-specific distortion. DMS is currently on its 23rd camera (late 2016), and there is a new calibration for each camera. The science team found that after about 400,000 exposures, the camera life degraded to the point where even after maintenance the camera was no longer usable for mission purposes, so a new camera was obtained to carry on with the next campaigns. Table 1 lists the calibration reports for each IceBridge DMS campaign. There are one or two calibration summary files per campaign. If the primary camera failed during the campaign and the second camera was used, there are two files for that campaign.

Table 1. DMS Camera Calibration Reports per Campaign

<b>IceBridge DMS Campaign</b>	<b>Calibration Report</b>	<b>Notes</b>
Fall 2009, Antarctic	IODCC0_2009_AN_NASA_DMS01.pdf	All flights
Spring 2010, Arctic	IODCC0_2010_GR_NASA_DMS02.pdf	All flights, both aircraft
Fall 2010, Antarctic	IODCC0_2010_AN_NASA_DMS02.pdf	
Fall 2010, Antarctic	IODCC0_2010_AN_NASA_DMS01.pdf	Flight 10/16/2010 all Flight 10/26/2010; frames 00040-11982
Spring 2011, Arctic	IODCC0_2011_GR_NASA_DMS03.pdf	
Spring 2011, Arctic	IODCC0_2011_GR_NASA_DMS04.pdf	Flight 5/16/2011; frames 10338- 10931
Fall 2011, Antarctic	IODCC0_2011_AN_NASA_DMS04.pdf	
Fall 2011, Antarctic	IODCC0_2011_AN_NASA_DMS05.pdf	Flight 11/03/2011 Flights 11/07/2011 thru 11/17/2011 Flight 11/19/2011; frames 00011-12762 and 14330-14388
Spring 2012, Arctic	IODCC0_2012_GR_NASA_DMS06.pdf	Flights 3/6/2012 thru 4/4/2012
Spring 2012, Arctic	IODCC0_2012_GR_NASA_DMS08.pdf	Flights 4/10/2012 thru 5/17/2012

<b>IceBridge DMS Campaign</b>	<b>Calibration Report</b>	<b>Notes</b>
Fall 2012, Antarctic	IODCC0_2012_AN_NASA_DMS07.pdf	
Fall 2012, Antarctic	IODCC0_2012_AN_NASA_DMS09.pdf	Flight 11/07/2012; frames 13920-17415
Spring 2013, Arctic	IODCC0_2013_GR_NASA_DMS10.pdf	All flights
Fall 2013, Antarctic	IODCC0_2013_AN_NASA_DMS12.pdf	
Fall 2013, Antarctic	IODCC0_2013_AN_NASA_DMS11.pdf	Flight 11/26/2013; frames 10551-16024
Spring 2014, Arctic	IODCC0_2014_GR_NASA_DMS13.pdf	
Spring 2014, Arctic	IODCC0_2014_GR_NASA_DMS14.pdf	Flight 4/24/2014; frames 19842-20330
Fall 2014, Antarctic	IODCC0_2014_AN_NASA_DMS17.pdf	
Fall 2014, Antarctic	IODCC0_2014_AN_NASA_DMS18.pdf	Flight 11/10/2014 all
Spring 2015, Arctic	IODCC0_2015_GR_NASA_DMS19.pdf	
Spring 2015, Arctic	IODCC0_2015_GR_NASA_DMS18.pdf	Flight 3/24/2015; frames 08239-14656 Flight 4/14/2015; frames 00749-22182 Flight 4/18/2015; frames 17050-17089 Flight 4/23/2015; frames 11709-25232
Fall 2015, Antarctic	IODCC0_2015_AN_NASA_DMS16.pdf	
Fall 2015, Antarctic	IODCC0_2015_AN_NASA_DMS15.pdf	Flight 9/26/2015; frames 02114-02857 Flight 10/25/2015; frames 01369-03289
Fall 2015, Arctic	IODCC0_2015_GR_NASA_DMS20.pdf	All Langley Falcon Greenland flights
Spring 2016, Arctic	IODCC0_2016_GR_NASA_DMS21.pdf	All NOAA P3 Greenland flights
Summer 2016 Alaska	IODCC0_2016_GR_NASA_DMS15.pdf	All Langley Falcon Alaska flights

<b>IceBridge DMS Campaign</b>	<b>Calibration Report</b>	<b>Notes</b>
Fall 2016, Antarctic	IODCC0_2016_AN_NASA_DMS22.pdf	
Fall 2016, Antarctic	IODCC0_2016_AN_NASA_DMS23.pdf	Flight 10/15/2016; frames 00006-00939 only
Spring 2017, Arctic	IODCC0_2017_GR_NASA-DMS24.pdf	Flight 3/09/2017 Flight 3/14/2017; frames 7600-12920 Flight 4/10/2017; frames 7040-15139 Flight 4/11/2017 through 5/12/2017
Spring 2017, Arctic	IODCC0_2017_GR_NASA-DMS25.pdf	Flight 2/26/2017 Flight 2/27/2017 Flight 3/10/2017 through 3/12/2017 Flight 3/14/2017; frames 10-7561 Flight 3/20/2017; through 4/07/2017 Flight 4/10/2017; frames 6-7039
Summer 2017, Arctic	IODCC0_2017_GR_NASA_DMS26.pdf	Flight 7/10/2017 though 7/24/2017 Flight 7/25/2017; frames 0006-2390
Summer 2017, Arctic	IODCC0_2017_GR_NASA_DMS22.pdf	Flight 7/25/2017; frames 2391-7471
Fall 2017, Antarctic	IODCC0_2017_AN_NASA_DMS27.pdf	
Fall 2017, Antarctic	IODCC0_2017_AN_NASA_DMS22.pdf	Flight 11/16/2017; frames 0240-2626
Spring 2018, Arctic	IODCC0_2018_GR_NASA_DMS22.pdf	Flight 3/14/2018 through 4/04/2018 Flight 4/05/2018; frames 0014-6661 Flight 4/06/2018 through 4/19/2018
Spring 2018, Arctic	IODCC0_2018_GR_NASA_DMS27.pdf	Flight 4/05/2018; frames 6670-11419

## 1.1 Format

The camera characterization files are in PDF (.pdf) format.

## 1.2 File Naming Convention

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File names:

IODCC0\_2016\_GR\_NASA\_DMS21.pdf

IODCC0\_YYYY\_NN\_NASA\_DMSXX.pdf

Table 2. File Naming Convention

Variable	Description
IODCC0	Short name for IceBridge DMS L0 Camera Calibration
YYYY	Year of campaign
NN_NASA	Location of NASA campaign, e.g. GR_NASA (Greenland), AN_NASA (Antarctica)
DMSXX	XX = DMS camera number, e.g. 21
.nnn	File type extension (.pdf)

## 1.3 Spatial Coverage

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Spatial coverage includes Greenland, Antarctica, and Arctic/Antarctic sea ice areas, representing the two coverages noted below.

Arctic and Greenland:

Southernmost Latitude: 60° N

Northernmost Latitude: 90° N

Westernmost Longitude: 180° W

Easternmost Longitude: 180° E

Antarctic:

Southernmost Latitude: 90° S

Northernmost Latitude: 53° S

Westernmost Longitude: 180° W

Easternmost Longitude: 180° E

## 1.4 Temporal Coverage

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17 September 2009 to 19 April 2018

## 1.4.1 Temporal Resolution

IceBridge campaigns are conducted on an annually repeating basis. Arctic and Greenland campaigns are conducted during March, April, and May, and Antarctic campaigns are conducted during October and November.

## 1.5 Parameter or Variable

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Camera calibration PDF files include:

- PROJECT DETAILS
- METRIC CALIBRATION PARAMETERS
- STANDARD CORRECTION EQUATION
- GAUSSIAN RADIAL DISTORTION CORRECTION PROFILE
- BALANCED RADIAL DISTORTION CORRECTION PROFILE
- GAUSSIAN RADIAL DISTORTION PLOT
- DECENTRING DISTORTION PLOT
- BALANCED RADIAL DISTORTION PLOT

## 2 SOFTWARE AND TOOLS

The camera calibration files can be accessed by any application that opens Adobe PDF files.

## 3 DATA ACQUISITION AND PROCESSING

### 3.1 Data Acquisition Methods

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Camera calibration reports are derived from camera calibration metrics, standard correction equation, and distortion profiles.

### 3.2 Derivation Techniques and Algorithms

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See the [IceBridge DMS L1B Geolocated and Orthorectified Images](#) data set documentation for a discussion of DMS product derivation and processing.

### 3.3 Sensor or Instrument Description

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DMS provides natural color or panchromatic tracking imagery from low and medium altitude research aircraft using a 21-megapixel Canon EOS 5D Mark II digital camera.

## 4 REFERENCES AND RELATED PUBLICATIONS

Farr, T. G., et al. 2007. The Shuttle Radar Topography Mission, Rev. Geophys., 45:RG2004, doi:10.1029/2005RG000183.

### 4.1 Related Data Collections

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[IceBridge DMS L0 Raw Imagery](#)

[IceBridge DMS L1B Geolocated and Orthorectified Images](#)

[IceBridge DMS L3 Photogrammetric DEM](#)

### 4.2 Related Websites

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[NASA Digital Mapping System web page](#)

[IceBridge data website at NSIDC](#)

[IceBridge website at NASA](#)

## 5 DOCUMENT INFORMATION

### 5.1 Publication Date

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30 May 2017

### 5.2 Date Last Updated

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06 June 2018