**GLAS Atmosphere Data Dictionary**

| Updated | Reason |
|---|---|
| August 2011 | Release-33 |
| September 2008 | Release-29 |
| October 2006 | Release-28 |
| March 2006 | Release-26 |
| December 2005 | Release-24 |
| January 2005 | Release-19 |

**Is element of: GLA02 Record**

**Short Description: 532 nm Laser Transmit Energy at 1 Hz**

**Product Data Type: i4b**

**Total Bytes: 4**

**Product Units: Joules * 1.0d5**

**Invalid Value/Flag: i_APID_AvFlg**

**Is Correction Flag?: NA**

**Is Unsigned?: No**

**Product Minimum: 0**

**Product Maximum: 4500**

**Description: The 532 nm transmitted pulse energy in energy units, converted from the counts from the transmitted energy monitor. Averaged over 40 shots.Comments:**

**Product Var Name: i1_g_bg**

**Is element of: GLA02 Record, GLA07 Record**

**Short Description: 532nm Background at 1 Hz**

**Product Data Type: i4b (4)**

**Total Bytes: 16**

**Product Units: photons/bin * 100**

**Invalid Value/Flag: i_APID_AvFlg**

**Is Correction Flag?: NA**

**Is Unsigned?: No**

**Product Minimum: 0**

**Product Maximum: 100000**

**Description: The normalized 532 nm background counts from upper (1) and lower (2) integration intervals. (3) is background used to compute NRB. Averaged over 40 shots.**

**Comments: Not valid if APID15 is missing.**

**Product Var Name: i1_g_lid**

**Is element of: GLA02 Record**

**Short Description: 532 nm LIDAR Data from 40 KM to 20 KM**

**Product Data Type: i4b (268)**

**Total Bytes: 1072**

**Product Units: ((pe/bin)KM^2)/J)/1000**

**Invalid Value/Flag: gi_invalid_i4b**

**Is Correction Flag?: NA**

**Is Unsigned?: No**

**Product Minimum: -10000**

**Product Maximum: 100000000**

**Description: The normalized lidar signal from the 532 nm photon counting channel for the 40 KM to 20 KM segment of the atmosphere. Background subtraction, range squared, and dead time correction is applied.Comments:**

**Product Var Name: i1_g_sat_f**

**Is element of: GLA02 Record**

**Short Description: 532 nm Saturation Flag for 40 to 20 KM Segment**

**Product Data Type: i1b (36)**

**Total Bytes: 36**

**Product Units: n/a**

**Invalid Value/Flag: No**

**Is Correction Flag?: NA**

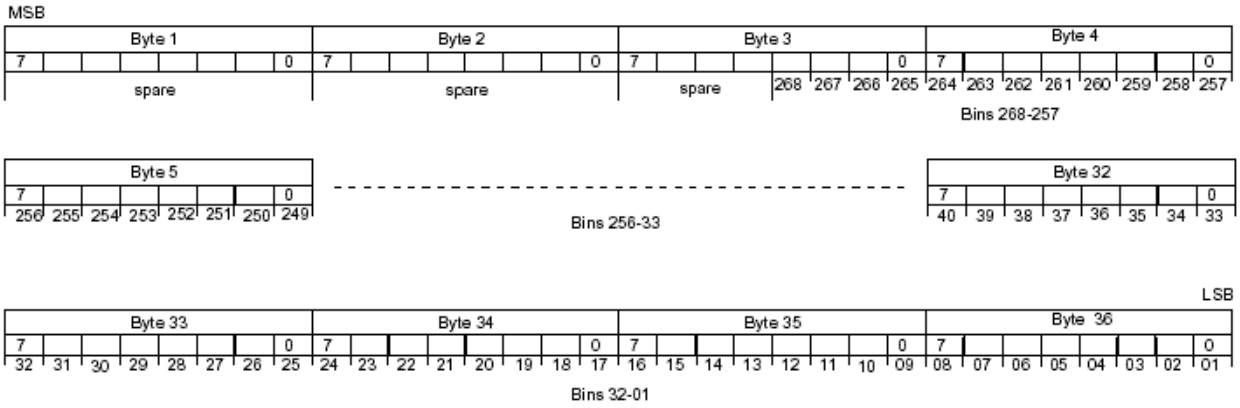
**Is Unsigned?: Yes**

**Product Minimum: 0**

**Product Maximum: 1**

**Description: Bit flag indicating whether the 532 nm signal is saturated or not for the 40 to 20 KM Segment. 0 = not saturated, 1 = saturated. There is one flag per each bin in the profile. There are 268 bins in a profile and the profile is summed over the 40 shots in a second for a total of 268 flags (268 * 1) per second. The upper 20 bits are spares.**

i1_g_sat_f [GLA02]: Bit flag indicating whether the 532 nm signal is saturated or not for the 40 to 20 KM Segment. 1 bit per each sum of 40 shots per bin (268); 0 = not saturated, 1 = saturated.




**Comments:**

**Product Var Name: i1_int_ret**

**Is element of: GLA07 Record**

**Short Description: 532 nm integrated return from 40 to 20 km**

**Product Data Type: i4b**

**Total Bytes: 4**

**Product Units: e11/(m-sr)**

**Invalid Value/Flag: gi_invalid_i4b**

**Is Correction Flag?: NA**

**Is Unsigned?: No**

**Product Minimum: 200000**

**Product Maximum: 100000000**

**Description: The integrated or summed 532 attenuated backscatter profile from 40 to 20 km. When normalized by the sum of the molecular backscatter for the same interval, gives an indication of data qualityComments:**

**Product Var Name: i1_pred_lat**

**Is element of: GLA02 Record**

**Short Description: Predicted geodetic Latitude of the laser footprint**

**Product Data Type: i4b**

**Total Bytes: 4**

**Product Units: microdegrees**

**Invalid Value/Flag: gi_invalid_i4b**

**Is Correction Flag?: NA**

**Is Unsigned?: No**

**Product Minimum: -90000000**

**Product Maximum: 90000000**

**Description: The geodetic Latitude of the laser footprint; obtained from the predicted orbit; assuming the laser is nadir pointing.**

**Comments:**

**Product Var Name: i1_pred_lon**

**Is element of: GLA02 Record**

**Short Description: Predicted geodetic Longitude of the laser footprint**

**Product Data Type: i4b**

**Total Bytes: 4**

**Product Units: microdegrees**

**Invalid Value/Flag: gi_invalid_i4b**

**Is Correction Flag?: NA**

**Is Unsigned?: No**

**Product Minimum: 0**

**Product Maximum: 360000000**

**Description: The geodetic Longitude of the laser footprint; obtained from the predicted orbit; assuming the laser is nadir pointing.**

**Comments:**

**Product Var Name: i20_aer_bot**

**Is element of: GLA08 Record**

**Short Description: 20-40 KM Aerosol Layer Bottom at 532 nm**

**Product Data Type: i2b (3)**

**Total Bytes: 6**

**Product Units: deka-meters**

**Invalid Value/Flag: i20_aer_af**

**Is Correction Flag?: NA**

**Is Unsigned?: No**

**Product Minimum: 1000**

**Product Maximum: 4000**

**Description: The aerosol layer bottoms (20 - 40 KM in atmosphere) for up to 3 layers at 1 per 4 sec.**

**Comments:**

**Product Var Name: i20_aer_pct**

**Is element of: GLA08 Record**

**Short Description: Percentage of Saturated Bins in 20-40 KM Aerosol Layers at 532 nm**

**Product Data Type: i1b (3)**

**Total Bytes: 3**

**Product Units: unitless**

**Invalid Value/Flag: i20_aer_af**

**Is Correction Flag?: NA**

**Is Unsigned?: No**

**Product Minimum: 0**

**Product Maximum: 100**

**Description: Percentage of Saturated Bins in 20-40 KM Aerosol Layers at 532 nm**

**Comments:**

**Product Var Name: i20_aer_top**

**Is element of: GLA08 Record**

**Short Description: 20-40 KM Aerosol Layer Top at 532 nm**

**Product Data Type: i2b (3)**

**Total Bytes: 6**

**Product Units: deka-meters**

**Invalid Value/Flag: i20_aer_af**

**Is Correction Flag?: NA**

**Is Unsigned?: No**

**Product Minimum: 1000**

**Product Maximum: 4000**

**Description: The aerosol layer tops (20 - 40 KM in atmosphere) for up to 3 layers at 1 per 4 sec.**

**Comments:**

**Product Var Name: i40_g_TxNrg_EU**

**Is element of: GLA02 Record, GLA07 Record**

**Short Description: 532 nm Laser Transmit Energy at 40 Hz**

**Product Data Type: i4b ( 40)**

**Total Bytes: 160**

**Product Units: Joules * 1.0d5**

**Invalid Value/Flag: i_APID_AvFlg**

**Is Correction Flag?: NA**

**Is Unsigned?: No**

**Product Minimum: 0**

**Product Maximum: 4500**

**Description: The 532 nm transmitted pulse energy in energy units, converted from the counts from the transmitted energy monitor.Comments: Not valid if APID19 is missing.**

**Product Var Name: i40_g_bg**

**Is element of: GLA02 Record, GLA07 Record**

**Short Description: 532 nm Background at 40 Hz**

**Product Data Type: i4b (4, 40)**

**Total Bytes: 640**

**Product Units: photons/bin * 100**

**Invalid Value/Flag: i_APID_AvFlg**

**Is Correction Flag?: NA**

**Is Unsigned?: No**

**Product Minimum: 0**

**Product Maximum: 100000**

**Description: The normalized 532 nm background counts from upper (1) and lower (2) integration intervals.(3) is background used to compute NRB.Comments: Not valid if APID15 is missing.**

**Product Var Name: i40_g_bscs**

**Is element of: GLA07 Record**

**Short Description: 532 nm Merged Attenuated Backscatter Profile 10 to -1 km**

**Product Data Type: i4b (148, 40)**

**Total Bytes: 23680**

**Product Units: e11/(m-sr)**

**Invalid Value/Flag: gi_invalid_i4b**

**Is Correction Flag?: NA**

**Is Unsigned?: No**

**Product Minimum: -1000**

**Product Maximum: 1000000000**

**Description: For the 10 KM to -1 KM vertical segment, the atmosphere 532 nm calibrated, attenuated backscatter profile at the 40 per 1 second rate. When the 532 nm data becomes saturated the 1064 nm data is converted to 532 data and merged into the data set.**

**Comments:**

**Product Var Name: i40_g_lid**

**Is element of: GLA02 Record**

**Short Description: 532 nm LIDAR Data from 10 KM to -1 KM**

**Product Data Type: i4b (148, 40)**

**Total Bytes: 23680**

**Product Units: ((pe/bin)KM^2)/J)/1000**

**Invalid Value/Flag: gi_invalid_i4b**

**Is Correction Flag?: NA**

**Is Unsigned?: No**

**Product Minimum: -10000**

**Product Maximum: 100000000**

**Description: The normalized lidar signal from the 532 nm photon counting channel for the 10 KM to -1 segment of the atmosphere. Background subtraction, range squared, and dead time correction is applied. NOTES: pe = photons; J = Joules.Comments:**

**Product Var Name: i40_g_sat_f**

**Is element of: GLA02 Record**

**Short Description: 532 nm Saturation Flag for 10 to -1 KM Segment**

**Product Data Type: i1b (740)**

**Total Bytes: 740**

**Product Units: n/a**

**Invalid Value/Flag: No**

**Is Correction Flag?: NA**

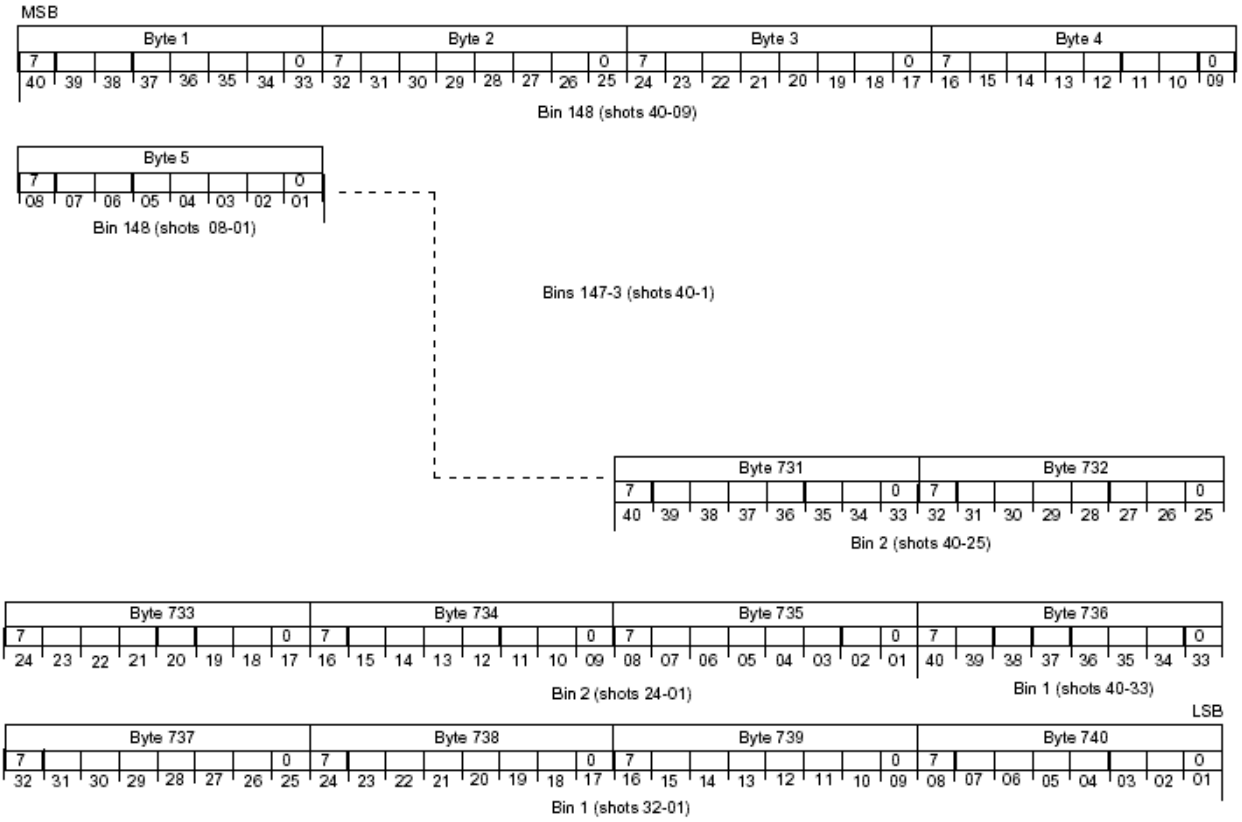
**Is Unsigned?: Yes**

**Product Minimum: 0**

**Product Maximum: 1**

**Description: Bit flag indicating whether the 532 nm signal is saturated or not for the 10 to -1 KM profile. 0 = not saturated, 1 = saturated. 1 bit flag per each bin in the profile. There are 148 bins in the profile and the profiles occur at 40 per second for a total of 5920 flags (148 * 40) per second. Bits 0-147 are the flags for shot 1, Bits 148-295 are the flags for shot 2, etc.**

i40_g_sat_f [GLA02]: Bit flag indicating whether the 532 nm signal is saturated or not for the 10 to -1 KM Segment.
1 bit per each shot(40) per bin (148); 0 = not saturated, 1 = saturated.




**Comments:**

**Product Var Name: i40_g_sat_prof**

**Is element of: GLA07 Record**

**Short Description: 532 nm Saturation Flag Profile 10 to -1 km**

**Product Data Type: i1b ( 740)**

**Total Bytes: 740**

**Product Units: NA**

**Invalid Value/Flag: No**

**Is Correction Flag?: NA**

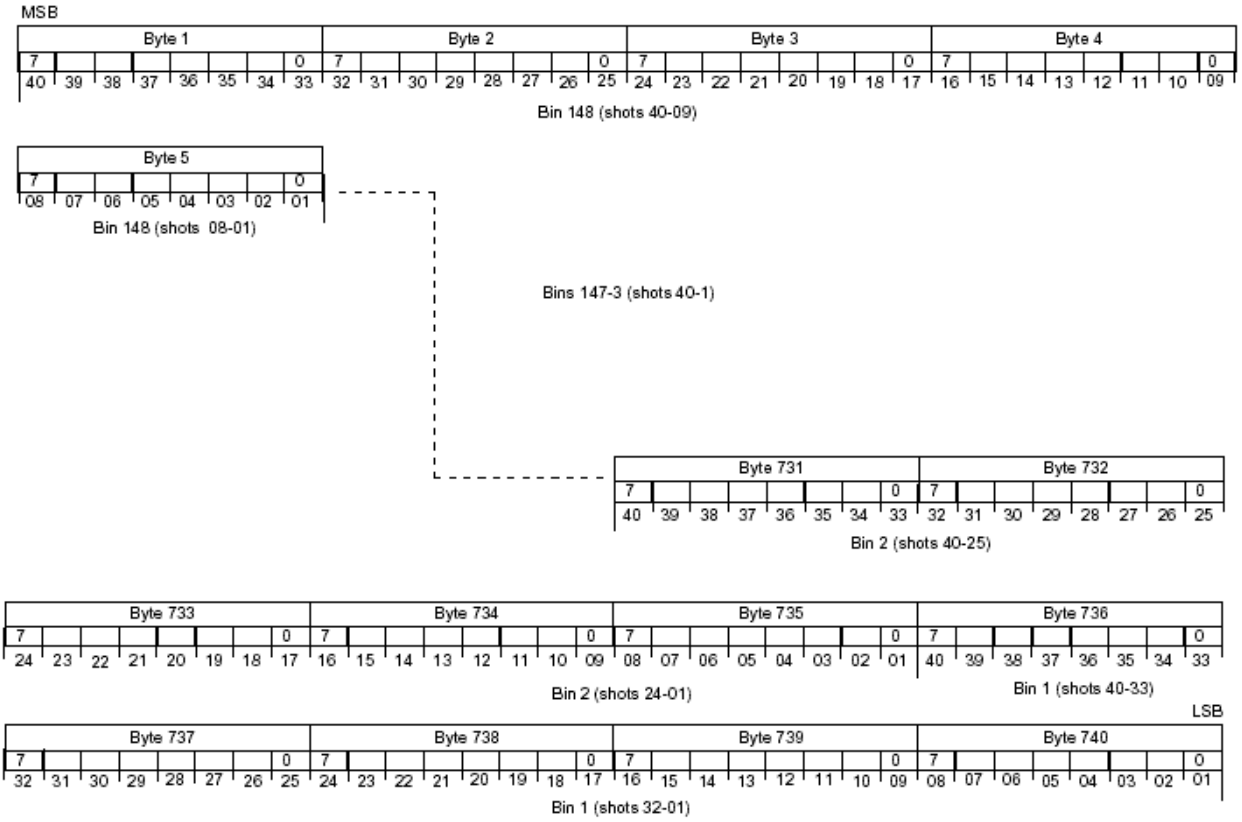
**Is Unsigned?: No**

**Product Minimum: 0**

**Product Maximum: 1**

**Description: 532 nm Saturation Flag Profile from 10 to -1 km. Indicates whether the 532 data were saturated and therefore whether the value is converted from the 1064 data. 0 = not saturated, 1 = saturated.**

i40_g_sat_f [GLA02]: Bit flag indicating whether the 532 nm signal is saturated or not for the 10 to -1 KM Segment.
1 bit per each shot(40) per bin (148); 0 = not saturated, 1 = saturated.




**Comments:**

**Product Var Name: i40_ir_TxNrgEU**

**Is element of: GLA02 Record, GLA07 Record**

**Short Description: 1064 nm Laser Transmit Energy at 40 Hz**

**Product Data Type: i4b ( 40)**

**Total Bytes: 160**

**Product Units: Joules * 1.0d5**

**Invalid Value/Flag: i_APID_AvFlg**

**Is Correction Flag?: NA**

**Is Unsigned?: No**

**Product Minimum: 0**

**Product Maximum: 9000**

**Description: The 1064 nm laser pulse energy, computed from the digitized outgoing pulse and the detector temperature.Comments: Not valid if APID19 and APID12 or APID13 are missing.**

**Product Var Name: i40_ir_bg**

**Is element of: GLA02 Record, GLA07 Record**

**Short Description: 1064 nm Background at 40 Hz**

**Product Data Type: i4b (4, 40)**

**Total Bytes: 640**

**Product Units: W*1.0d17**

**Invalid Value/Flag: i_APID_AvFlg**

**Is Correction Flag?: NA**

**Is Unsigned?: No**

**Product Minimum: -100000000**

**Product Maximum: 100000000**

**Description: The normalized 1064 nm background counts from upper (1) and lower (2) integration intervals.(3) is background used to compute NRB.**

**Comments: Not valid if APID17 is missing.**

**Product Var Name: i40_ir_bscs**

**Is element of: GLA07 Record**

**Short Description: 1064 nm Attenuated Backscatter Profile 10 to -1 km**

**Product Data Type: i4b (148, 40)**

**Total Bytes: 23680**

**Product Units: e11/(m-sr)**

**Invalid Value/Flag: gi_invalid_i4b**

**Is Correction Flag?: NA**

**Is Unsigned?: No**

**Product Minimum: -1000**

**Product Maximum: 1000000000**

**Description: Atmosphere 1064 nm calibrated, attenuated backscatter profile (-1 to 10 km) at the rate of 40 per 1 second.**

**Comments:**

**Product Var Name: i40_ir_lid**

**Is element of: GLA02 Record**

**Short Description: 1064 nm LIDAR Data from 10 KM to -1 KM**

**Product Data Type: i4b (148, 40)**

**Total Bytes: 23680**

**Product Units: (W*KM^2)/J)*1.0d8**

**Invalid Value/Flag: gi_invalid_i4b**

**Is Correction Flag?: NA**

**Is Unsigned?: No**

**Product Minimum: -1000000000**

**Product Maximum: 1000000000**

**Description: The normalized lidar signal from the 1064 nm cloud digitizer data for the 10 KM to -1 KM atmospheric segment. Background subtraction, and range squared correction is applied.**

**Comments:**

**Product Var Name: i4_aer_bot**

**Is element of: GLA08 Record**

**Short Description: Below 20 KM Aerosol Layer Bottom at 532 nm**

**Product Data Type: i2b (5)**

**Total Bytes: 10**

**Product Units: deka-meters**

**Invalid Value/Flag: i4_aer_af**

**Is Correction Flag?: NA**

**Is Unsigned?: No**

**Product Minimum: -100**

**Product Maximum: 2000**

**Description: The aerosol layer bottoms (below 20 KM in atmosphere) for up to 5 layers at 1 per 4 sec.**

**Comments:**

**Product Var Name: i4_aer_pct**

**Is element of: GLA08 Record**

**Short Description: Percentage of Saturated Bins in Below 20 KM Aerosol Layers at 532 nm**

**Product Data Type: i1b (5)**

**Total Bytes: 5**

**Product Units: unitless**

**Invalid Value/Flag: i4_aer_af**

**Is Correction Flag?: NA**

**Is Unsigned?: No**

**Product Minimum: 0**

**Product Maximum: 100**

**Description: Percentage of Saturated Bins in Below 20 KM Aerosol Layers at 532 nm**

**Comments:**

**Product Var Name: i4_aer_top**

**Is element of: GLA08 Record**

**Short Description: Below 20 KM Aerosol Layer Top at 532 nm**

**Product Data Type: i2b (5)**

**Total Bytes: 10**

**Product Units: deka-meters**

**Invalid Value/Flag: i4_aer_af**

**Is Correction Flag?: NA**

**Is Unsigned?: No**

**Product Minimum: -100**

**Product Maximum: 2000**

**Description: The aerosol layer tops (below 20 KM in atmosphere) for up to 5 layers at 1 per 4 sec.**

**Comments:**

**Product Var Name: i5_g_TxNrg_EU**

**Is element of: GLA02 Record, GLA07 Record**

**Short Description: 532 nm Laser Transmit Energy at 5 Hz**

**Product Data Type: i4b ( 5)**

**Total Bytes: 20**

**Product Units: Joules * 1.0d5**

**Invalid Value/Flag: i_APID_AvFlg**

**Is Correction Flag?: NA**

**Is Unsigned?: No**

**Product Minimum: 0**

**Product Maximum: 4500**

**Description: The 532 nm transmitted pulse energy in energy units, converted from the counts from the transmitted energy monitor. Averaged over 8 shots.Comments: Not valid if APID19 is missing.**

**Product Var Name: i5_g_bg**

**Is element of: GLA02 Record, GLA07 Record**

**Short Description: 532 nm Background at 5 Hz**

**Product Data Type: i4b (4, 5)**

**Total Bytes: 80**

**Product Units: photons/bin * 100**

**Invalid Value/Flag: i_APID_AvFlg**

**Is Correction Flag?: NA**

**Is Unsigned?: No**

**Product Minimum: 0**

**Product Maximum: 100000**

**Description: The normalized 532 nm background counts from upper (1) and lower (2) integration intervals.(3) is background used to compute NRB. Averaged over 8 shots.Comments: Not valid if APID15 is missing.**

**Product Var Name: i5_g_bscs**

**Is element of: GLA07 Record**

**Short Description: 532 nm Merged Attenuated Backscatter Profile 40 to -1 km**

**Product Data Type: i4b (548, 5)**

**Total Bytes: 10960**

**Product Units: e11/(m-sr)**

**Invalid Value/Flag: gi_invalid_i4b**

**Is Correction Flag?: NA**

**Is Unsigned?: No**

**Product Minimum: -1000**

**Product Maximum: 1000000000**

**Description: For the full vertical atmospheric profile (-1 to 41 km), the atmosphere 532 nm calibrated, attenuated backscatter profile at the rate of 5 per 1 second. When the 532 nm data becomes saturated the 1064 nm data is converted and merged into the data set. The Level 1A data that occurs at 40/second, every 8 shots are averaged and stored in the profile and the 1/second is replicated to get the full 5 Hz rate on this product.**

**Comments:**

**Product Var Name: i5_g_lid**

**Is element of: GLA02 Record**

**Short Description: 532 nm LIDAR Data from 20 KM to 10 KM**

**Product Data Type: i4b (132, 5)**

**Total Bytes: 2640**

**Product Units: ((pe/bin)KM^2)/J)/1000**

**Invalid Value/Flag: gi_invalid_i4b**

**Is Correction Flag?: NA**

**Is Unsigned?: No**

**Product Minimum: -10000**

**Product Maximum: 100000000**

**Description: The normalized lidar signal from the 532 nm photon counting channel for the 20 KM to 10 KM segment of the atmosphere. Background subtraction, range squared, and dead time correction is applied. Sums of 8 samples.Comments:**

**Product Var Name: i5_g_sat_f**

**Is element of: GLA02 Record**

**Short Description: 532 nm Saturation Flag for 20 to 10 KM Segment**

**Product Data Type: i1b (84)**

**Total Bytes: 84**

**Product Units: n/a**

**Invalid Value/Flag: No**

**Is Correction Flag?: NA**

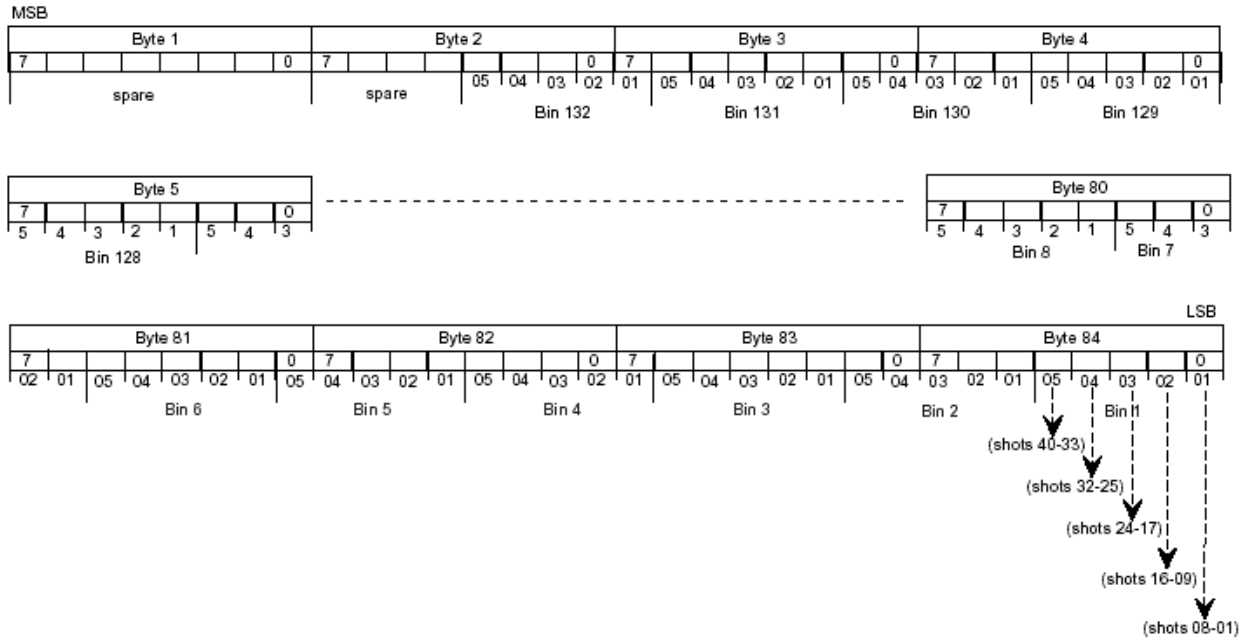
**Is Unsigned?: Yes**

**Product Minimum: 0**

**Product Maximum: 1**

**Description: Bit flag indicating whether the 532 nm signal is saturated or not for the 20 to 10 KM Profile. 0 = not saturated, 1 = saturated. There is one flag per each bin in the profile. There are 132 bins in a profile and the profiles are summed over 8 shots for a total of 660 flags (132 * 5) per second. Bits 0-131 are the flags for shots 1-8, Bits 132-263 are the flags for shots 9-16, etc. The upper 12 bits are spares.**

i5_g_sat_f [GLA02]: Bit flag indicating whether the 532 nm signal is saturated or not for the 20 to 10 KM Segment.
1 bit per each sum of 8 shot(40) per bin (132); 0 = not saturated, 1 = saturated.




**Comments:**

**Product Var Name: i5_g_sat_prof**

**Is element of: GLA07 Record**

**Short Description: 532 nm Saturation Flag Profile 40 to -1 km**

**Product Data Type: i1b ( 343)**

**Total Bytes: 343**

**Product Units: NA**

**Invalid Value/Flag: No**

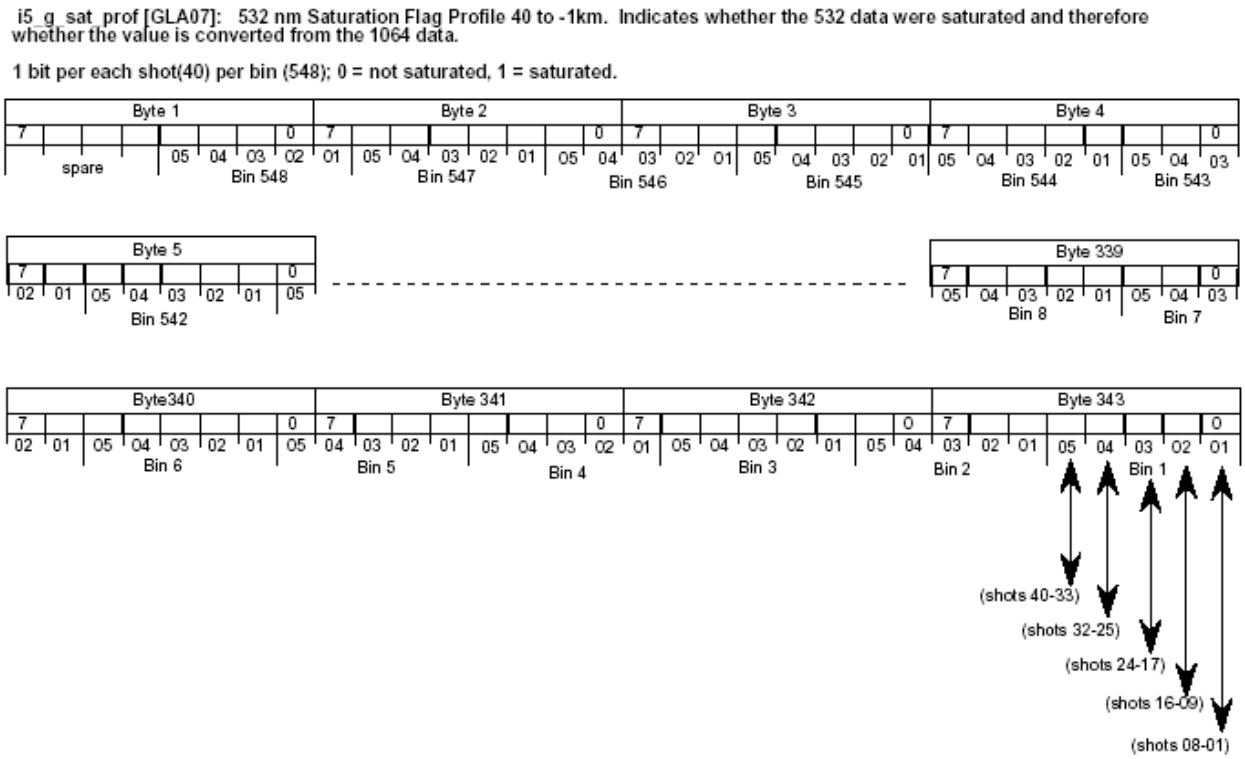
**Is Correction Flag?: NA**

**Is Unsigned?: No**

**Product Minimum: 0**

**Product Maximum: 1**

**Description: 532 nm Saturation Flag Profile from 41 to -1 km. Indicates whether the 532 data were saturated and therefore whether the value is converted from the 1064 data. 0 = not saturated, 1 = saturated.**




**Comments:**

**Product Var Name: i5_ir_TxNrgEU**

**Is element of: GLA02 Record, GLA07 Record**

**Short Description: 1064 nm Laser Transmit Energy at 5 Hz**

**Product Data Type: i4b ( 5)**

**Total Bytes: 20**

**Product Units: Joules * 1.0d5**

**Invalid Value/Flag: i_APID_AvFlg**

**Is Correction Flag?: NA**

**Is Unsigned?: No**

**Product Minimum: 0**

**Product Maximum: 9000**

**Description: The 1064 nm laser pulse energy, computed from the digitized outgoing pulse and the detector temperature. Averaged over 8 shots.Comments: Not valid if APID19 and APID12 or APID13 are missing.**

**Product Var Name: i5_ir_bg**

**Is element of: GLA02 Record, GLA07 Record**

**Short Description: 1064 nm Background at 5 Hz**

**Product Data Type: i4b (4, 5)**

**Total Bytes: 80**

**Product Units: W*1.0d17**

**Invalid Value/Flag: i_APID_AvFlg**

**Is Correction Flag?: NA**

**Is Unsigned?: No**

**Product Minimum: -100000000**

**Product Maximum: 100000000**

**Description: The normalized 1064 nm background counts from upper (1) and lower (2) integration intervals.(3) is background used to compute NRB. Averaged over 8 shots.**

**Comments: Not valid if APID15 is missing.**

**Product Var Name: i5_ir_bscs**

**Is element of: GLA07 Record**

**Short Description: 1064 nm Attenuated Backscatter Profile 20 to -1 km**

**Product Data Type: i4b (280, 5)**

**Total Bytes: 5600**

**Product Units: e11/(m-sr)**

**Invalid Value/Flag: gi_invalid_i4b**

**Is Correction Flag?: NA**

**Is Unsigned?: No**

**Product Minimum: -1000**

**Product Maximum: 1000000000**

**Description: Atmosphere 1064 nm calibrated, attenuated backscatter profile (-1 to 20 km) at the rate of 5 per 1 second. Averages of 8 shots are used for the Level 1A data that occurs at 40/second rate.**

**Comments:**

**Product Var Name: i5_ir_lid**

**Is element of: GLA02 Record**

**Short Description: 1064 nm LIDAR Data from 20 KM to 10 KM**

**Product Data Type: i4b (132, 5)**

**Total Bytes: 2640**

**Product Units: (W*KM^2)/J)*10^8**

**Invalid Value/Flag: gi_invalid_i4b**

**Is Correction Flag?: NA**

**Is Unsigned?: No**

**Product Minimum: -1000000000**

**Product Maximum: 1000000000**

**Description: The normalized lidar signal from the 1064 nm cloud digitizer data for the 20 KM to 10 KM atmospheric segment. Background subtraction, and range squared correction is applied.**

**Comments:**

**Product Var Name: i_1064AttBS_Flag**

**Is element of: GLA07 Record**

**Short Description: 1064 nm Attenuated Backscatter Vertical Profile Flag**

**Product Data Type: i1b ( 18)**

**Total Bytes: 18**

**Product Units: NA**

**Invalid Value/Flag: No**

**Is Correction Flag?: NA**

**Is Unsigned?: No**

**Product Minimum: 0**

**Product Maximum: 3**

**Description: Composite Flag - see Breakout for details**

i_1064AttBS_Flag [GLA07]: 1064 nm Attenuated Backscatter Vertical Profile Flag

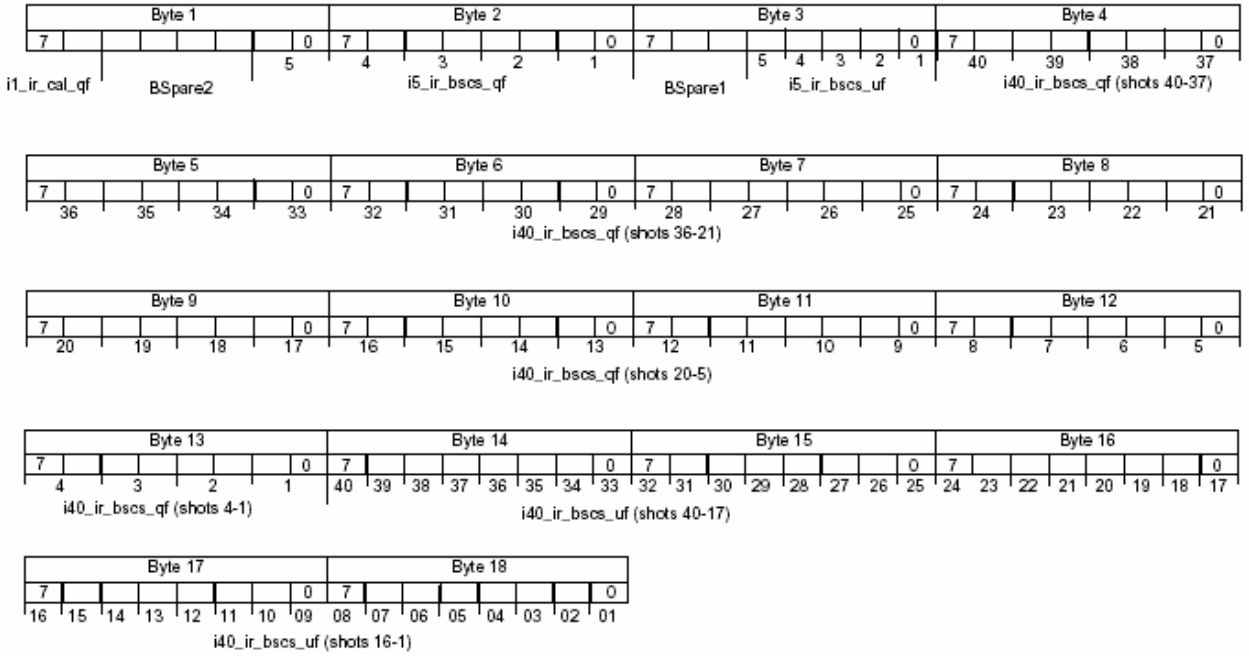
i40_ir_bscs_uf = use flag: not used

i40_ir_bscs_qf = quality flag at 40Hz: value 0 = good data; value 1 = if 1064 nm laser energy flag equals 3

i5_ir_bscs_uf = use flag: not used

i5_ir_bscs_qf = quality flag at 5Hz: value 0 = good data; value 1 = if 1064 nm laser energy flag equals 3

i1_ir_cal_qf = quality flag: value 0 = good quality; value 2 = if no records left after elimination tests, value before elimination tests used instead




**Comments:**

**Product Var Name: i_4nsBgMean**

**Is element of: GLA02 Record**

**Short Description: 4ns Background Mean Value**

**Product Data Type: i4b ( 40)**

**Total Bytes: 160**

**Product Units: counts**

**Invalid Value/Flag: i_APID_AvFlg**

**Is Correction Flag?: No**

**Is Unsigned?: No**

**Product Minimum: 0**

**Product Maximum: 65536**

**Description: 4ns Filter Background mean**

**Comments:**

**Product Var Name: i_4nsBgSDev**

**Is element of: GLA02 Record**

**Short Description: 4ns Background Standard Deviation**

**Product Data Type: i4b ( 40)**

**Total Bytes: 160**

**Product Units: counts**

**Invalid Value/Flag: i_APID_AvFlg**

**Is Correction Flag?: No**

**Is Unsigned?: No**

**Product Minimum: 0**

**Product Maximum: 65536**

**Description: 4ns filter background standard deviation.**

**Comments:**

**Product Var Name: i_532AttBS_Flag**

**Is element of: GLA07 Record**

**Short Description: 532 nm Attenuated Backscatter Vertical Profile Flag**

**Product Data Type: i1b ( 18)**

**Total Bytes: 18**

**Product Units: NA**

**Invalid Value/Flag: No**

**Is Correction Flag?: NA**

**Is Unsigned?: No**

**Product Minimum: 0**

**Product Maximum: 3**

**Description: Composite Flag - see Breakout for details**

**i_532AttBS_Flag [GLA07]: 532 nm Attenuated Backscatter Vertical Profile Flag**

i40_g_bscs_uf = use flag at 40Hz: value 0 = no, saturated bins were replaced; value 1 = yes, saturated bins were replaced

i40_g_bscs_qf = quality flag at 40Hz: value 0 = good data; value 1 = if 532 nm laser energy flag equals 3; value 2 = if 1064 nm quality flag equals 1 and 1064 nm backscatter value replaced 532 nm backscatter value

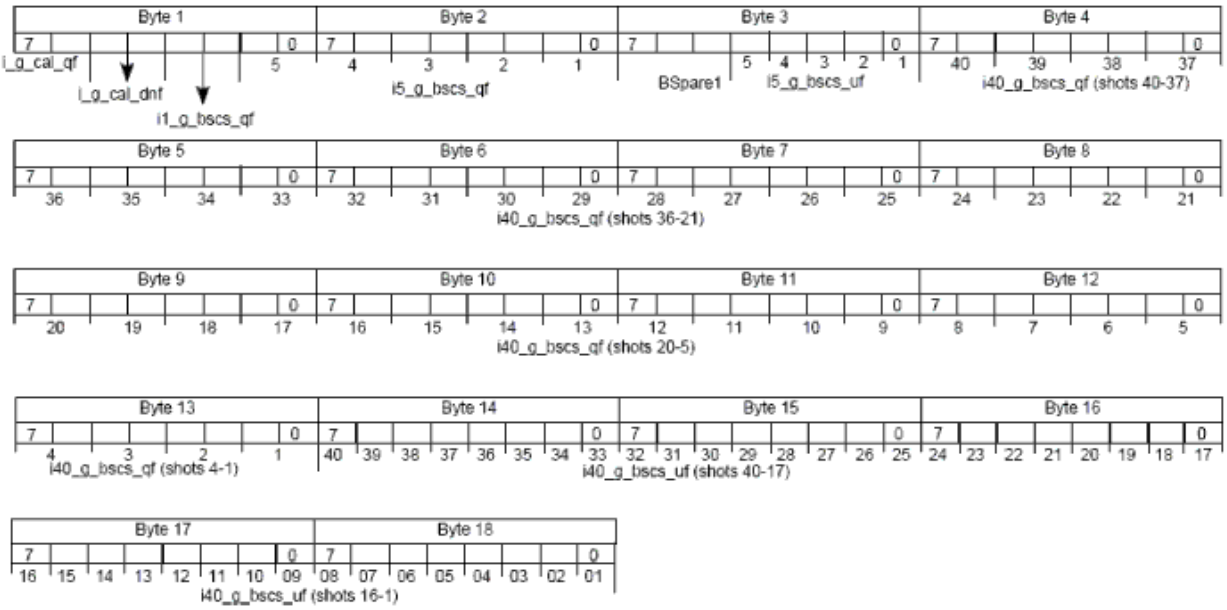
i5_g_bscs_uf = use flag at 5Hz: value 0 = no, saturated bins were replaced; value 1 = yes, saturated bins were replaced

i5_g_bscs_qf = quality flag at 5Hz: value 0 = good data; value 1 = if 532 nm laser energy flag equals 3; value 2 = if 1064 nm quality flag equals 1 and 1064 nm backscatter value replaced 532 nm backscatter value

il_g_bscs_qf = quality flag at 1 sec: value 0 = good quality; value 2 = 532 nm integrated return is bad; value 3 = ratio of integrated return to molecular integrated return is bad

i_g_cal_qf = quality flag: value 0 = good quality; value 2 = if no records left after elimination tests, value before elimination tests used instead

i_g_cal_dnf = day/night flag: value 0 = indeterminate; value 1 = night; value 2 = day




**Comments:**

**Product Var Name: i_APID_AvFlg**

**Is element of: GLA02 Record, GLA07 Record**

**Short Description: APID Data Availability Flag**

**Product Data Type: i1b (8)**

**Total Bytes: 8**

**Product Units: n/a**

**Invalid Value/Flag: No**

**Is Correction Flag?: NA**

**Is Unsigned?: No**

**Product Minimum: -127**

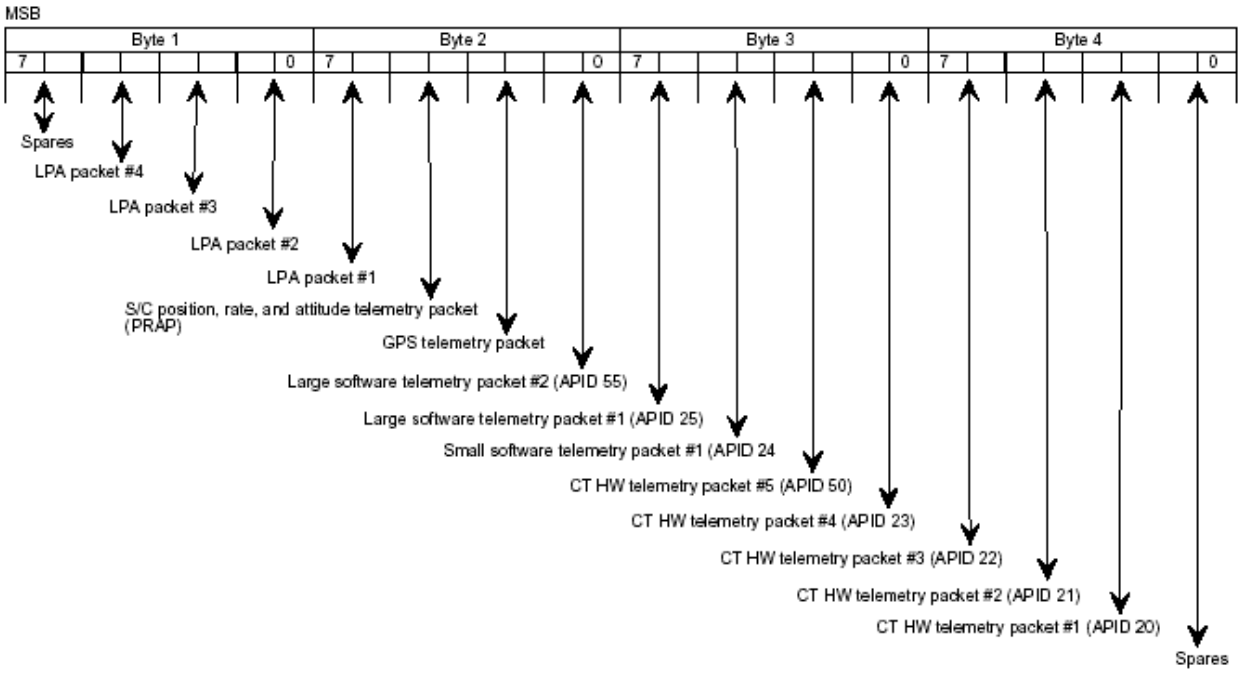
**Product Maximum: 127**

**Description: Flag indicating which packets (APIDs) for each second are available missing, or filled. APID 19 is broken down further into Altimeter Digitizer, Photon Counter, Cloud Digitizer, GPS/DEM, and C&T sections.**

i_APID_AvFlg [1/sec for GLA01, 02, 04-07, 12-15], [1/16 sec for GLA03]: APID Data Availability Flag



2 bit sets of values; 0= present, 1=filled at EDOS, 2=never received - ISIPS filled




**Comments:**

**Product Var Name: i_Aer_PBL_LR_pres**

**Is element of: GLA08 Record, GLA11 Record**

**Short Description: Pressure of Low Resolution Planetary Boundary Layer Top at 532 nm**

**Product Data Type: i2b**

**Total Bytes: 2**

**Product Units: millibars * 10**

**Invalid Value/Flag: gi_invalid_i2b**

**Is Correction Flag?: NA**

**Is Unsigned?: No**

**Product Minimum: 0**

**Product Maximum: 20000**

**Description: Pressure of Low Resolution Planetary Boundary Layer Top at 532 nm**

**Comments:**

**Product Var Name: i_Aer_PBL_LR_relh**

**Is element of: GLA08 Record, GLA11 Record**

**Short Description: Relative Humidity of Low Resolution Planetary Boundary Layer Top at 532 nm**

**Product Data Type: i2b**

**Total Bytes: 2**

**Product Units: percentage * 100**

**Invalid Value/Flag: gi_invalid_i2b**

**Is Correction Flag?: NA**

**Is Unsigned?: No**

**Product Minimum: 0**

**Product Maximum: 10000**

**Description: Relative Humidity of Low Resolution Planetary Boundary Layer Top at 532 nm**

**Comments:**

**Product Var Name: i_Aer_PBL_LR_temp**

**Is element of: GLA08 Record, GLA11 Record**

**Short Description: Temperature of Low Resolution Planetary Boundary Layer Top at 532 nm**

**Product Data Type: i2b**

**Total Bytes: 2**

**Product Units: degrees Celsius * 100**

**Invalid Value/Flag: gi_invalid_i2b**

**Is Correction Flag?: NA**

**Is Unsigned?: No**

**Product Minimum: -10000**

**Product Maximum: 10000**

**Description: Temperature of Low Resolution Planetary Boundary Layer Top at 532 nm**

**Comments:**

**Product Var Name: i_Aer_bot_a20_pres**

**Is element of: GLA08 Record**

**Short Description: Pressure of Bottom of Aerosol Layers Above 20km of Atmosphere at 532 nm**

**Product Data Type: i2b ( 3)**

**Total Bytes: 6**

**Product Units: millbars * 10**

**Invalid Value/Flag: gi_invalid_i2b**

**Is Correction Flag?: NA**

**Is Unsigned?: No**

**Product Minimum: 0**

**Product Maximum: 20000**

**Description: Pressure of Bottom of Aerosol Layers Above 20km of Atmosphere at 532 nm**

**Comments:**

**Product Var Name: i_Aer_bot_a20_relh**

**Is element of: GLA08 Record**

**Short Description: Relative Humidity of Bottom of Aerosol Layers Above 20km of Atmosphere at 532 nm**

**Product Data Type: i2b ( 3)**

**Total Bytes: 6**

**Product Units: percentage * 100**

**Invalid Value/Flag: gi_invalid_i2b**

**Is Correction Flag?: NA**

**Is Unsigned?: No**

**Product Minimum: 0**

**Product Maximum: 10000**

**Description: Relative Humidity of Bottom of Aerosol Layers Above 20km of Atmosphere at 532 nm**

**Comments:**

**Product Var Name: i_Aer_bot_a20_temp**

**Is element of: GLA08 Record**

**Short Description: Temperature of Bottom of Aerosol Layers Above 20km of Atmosphere at 532 nm**

**Product Data Type: i2b ( 3)**

**Total Bytes: 6**

**Product Units: degrees Celsius * 100**

**Invalid Value/Flag: gi_invalid_i2b**

**Is Correction Flag?: NA**

**Is Unsigned?: No**

**Product Minimum: -10000**

**Product Maximum: 10000**

**Description: Temperature of Bottom of Aerosol Layers Above 20km of Atmosphere at 532 nm**

**Comments:**

**Product Var Name: i_Aer_bot_b20_pres**

**Is element of: GLA08 Record**

**Short Description: Pressure of Bottom of Aerosol Layers in Bottom 20km of Atmosphere at 532 nm**

**Product Data Type: i2b ( 5)**

**Total Bytes: 10**

**Product Units: millibars * 10**

**Invalid Value/Flag: gi_invalid_i2b**

**Is Correction Flag?: NA**

**Is Unsigned?: No**

**Product Minimum: 0**

**Product Maximum: 20000**

**Description: Pressure of Bottom of Aerosol Layers in Bottom 20km of Atmosphere at 532 nm**

**Comments:**

**Product Var Name: i_Aer_bot_b20_relh**

**Is element of: GLA08 Record**

**Short Description: Relative Humidity of Bottom of Aerosol Layers in Bottom 20km of Atm at 532 nm**

**Product Data Type: i2b ( 5)**

**Total Bytes: 10**

**Product Units: percentage * 100**

**Invalid Value/Flag: gi_invalid_i2b**

**Is Correction Flag?: NA**

**Is Unsigned?: No**

**Product Minimum: 0**

**Product Maximum: 10000**

**Description: Relative Humidity of Bottom of Aerosol Layers in Bottom 20km of Atmosphere at 532 nm**

**Comments:**

**Product Var Name: i_Aer_bot_b20_temp**

**Is element of: GLA08 Record**

**Short Description: Temperature of Bottom of Aerosol Layers in Bottom 20km of Atmosphere at 532 nm**

**Product Data Type: i2b ( 5)**

**Total Bytes: 10**

**Product Units: degrees Celsius * 100**

**Invalid Value/Flag: gi_invalid_i2b**

**Is Correction Flag?: NA**

**Is Unsigned?: No**

**Product Minimum: -10000**

**Product Maximum: 10000**

**Description: Temperature of Bottom of Aerosol Layers in Bottom 20km of Atmosphere at 532 nm**

**Comments:**

**Product Var Name: i_Aer_bot_pres**

**Is element of: GLA10 record, GLA11 Record**

**Short Description: Aerosol Layers Pressure at Bottom of Layer at 532 nm**

**Product Data Type: i2b ( 9)**

**Total Bytes: 18**

**Product Units: millibars * 10**

**Invalid Value/Flag: gi_invalid_i2b**

**Is Correction Flag?: NA**

**Is Unsigned?: No**

**Product Minimum: 0**

**Product Maximum: 20000**

**Description: Aerosol Layers Pressure at Bottom of Layer at 532 nm**

**Comments:**

**Product Var Name: i_Aer_bot_relh**

**Is element of: GLA10 record, GLA11 Record**

**Short Description: Aerosol Layers Relative Humidity at Bottom of Layer at 532 nm**

**Product Data Type: i2b ( 9)**

**Total Bytes: 18**

**Product Units: percentage * 100**

**Invalid Value/Flag: gi_invalid_i2b**

**Is Correction Flag?: NA**

**Is Unsigned?: No**

**Product Minimum: 0**

**Product Maximum: 10000**

**Description: Aerosol Layers Relative Humidity at Bottom of Layer at 532 nm**

**Comments:**

**Product Var Name: i_Aer_bot_temp**

**Is element of: GLA10 record, GLA11 Record**

**Short Description: Aerosol Layers Temperature at Bottom of Layer at 532 nm**

**Product Data Type: i2b ( 9)**

**Total Bytes: 18**

**Product Units: degrees Celsius * 100**

**Invalid Value/Flag: gi_invalid_i2b**

**Is Correction Flag?: NA**

**Is Unsigned?: No**

**Product Minimum: -10000**

**Product Maximum: 10000**

**Description: Aerosol Layers Temperature at Bottom of Layer at 532 nm**

**Comments:**

**Product Var Name: i_Aer_ir_OD**

**Is element of: GLA11 Record**

**Short Description: Aerosol Optical Depth at 1064 nm**

**Product Data Type: i2b ( 2)**

**Total Bytes: 4**

**Product Units: Unknown**

**Invalid Value/Flag: gi_invalid_i2b**

**Is Correction Flag?: NA**

**Is Unsigned?: No**

**Product Minimum: 0**

**Product Maximum: 0**

**Description: Aerosol Optical Depth at 1064 nm**

**Comments:**

**Product Var Name: i_Aer_ir_ODFlg**

**Is element of: GLA11 Record**

**Short Description: Aerosol Optical Depth at 1064 nm Flag**

**Product Data Type: i1b ( 2)**

**Total Bytes: 2**

**Product Units: N/A**

**Invalid Value/Flag: No**

**Is Correction Flag?: NA**

**Is Unsigned?: No**

**Product Minimum: null**

**Product Maximum: null**

**Description:**

**Comments:**

**Product Var Name: i_Aer_ir_bot**

**Is element of: GLA08 Record, GLA11 Record**

**Short Description: Elevation of Bottom of Aerosol Layers Detected in 1064 nm**

**Product Data Type: i2b ( 2)**

**Total Bytes: 4**

**Product Units: deka-meters**

**Invalid Value/Flag: gi_invalid_i2b**

**Is Correction Flag?: NA**

**Is Unsigned?: No**

**Product Minimum: -100**

**Product Maximum: 2200**

**Description: Elevation of Bottom of Aerosol Layers Detected in 1064 nm.**

**Comments:**

**Product Var Name: i_Aer_ir_bot_pres**

**Is element of: GLA08 Record, GLA11 Record**

**Short Description: Pressure of Bottom of Aerosol Layers Detected in 1064 nm**

**Product Data Type: i2b ( 2)**

**Total Bytes: 4**

**Product Units: millibars * 10**

**Invalid Value/Flag: gi_invalid_i2b**

**Is Correction Flag?: NA**

**Is Unsigned?: No**

**Product Minimum: 0**

**Product Maximum: 20000**

**Description: Pressure of Bottom of Aerosol Layers Detected in 1064 nmComments:**

**Product Var Name: i_Aer_ir_bot_relh**

**Is element of: GLA08 Record, GLA11 Record**

**Short Description: Relative Humidity of Bottom of Aerosol Layers Detected in 1064 nm**

**Product Data Type: i2b ( 2)**

**Total Bytes: 4**

**Product Units: percentage * 100**

**Invalid Value/Flag: gi_invalid_i2b**

**Is Correction Flag?: NA**

**Is Unsigned?: No**

**Product Minimum: 0**

**Product Maximum: 10000**

**Description: Relative Humidity of Bottom of Aerosol Layers Detected in 1064 nm**

**Comments:**

**Product Var Name: i_Aer_ir_bot_temp**

**Is element of: GLA08 Record, GLA11 Record**

**Short Description: Temperature of Bottom of Aerosol Layers Detected in 1064 nm**

**Product Data Type: i2b ( 2)**

**Total Bytes: 4**

**Product Units: degrees Celsius * 100**

**Invalid Value/Flag: gi_invalid_i2b**

**Is Correction Flag?: NA**

**Is Unsigned?: No**

**Product Minimum: -10000**

**Product Maximum: 10000**

**Description: Temperature of Bottom of Aerosol Layers Detected in 1064 nm**

**Comments:**

**Product Var Name: i_Aer_ir_layflg**

**Is element of: GLA08 Record**

**Short Description: Layer Flag for 1064 Aerosol**

**Product Data Type: i1b ( 2)**

**Total Bytes: 2**

**Product Units: N/A**

**Invalid Value/Flag: No**

**Is Correction Flag?: NA**

**Is Unsigned?: No**

**Product Minimum: null**

**Product Maximum: null**

**Description: Please see the flag description for more details.Comments:**

**Product Var Name: i_Aer_ir_top**

**Is element of: GLA08 Record, GLA11 Record**

**Short Description: Elevation of Top of Aerosol Layers Detected in 1064 nm**

**Product Data Type: i2b ( 2)**

**Total Bytes: 4**

**Product Units: deka-meters**

**Invalid Value/Flag: gi_invalid_i2b**

**Is Correction Flag?: NA**

**Is Unsigned?: No**

**Product Minimum: -100**

**Product Maximum: 2200**

**Description: Elevation of Top of Aerosol Layers detected in 1064 nm**

**Comments:**

**Product Var Name: i_Aer_ir_top_pres**

**Is element of: GLA08 Record, GLA11 Record**

**Short Description: Pressure of Top of Aerosol Layers Detected in 1064 nm**

**Product Data Type: i2b ( 2)**

**Total Bytes: 4**

**Product Units: millibars * 10**

**Invalid Value/Flag: gi_invalid_i2b**

**Is Correction Flag?: NA**

**Is Unsigned?: No**

**Product Minimum: 0**

**Product Maximum: 20000**

**Description: Pressure of Top of Aerosol Layers Detected in 1064 nm**

**Comments:**

**Product Var Name: i_Aer_ir_top_relh**

**Is element of: GLA08 Record, GLA11 Record**

**Short Description: Relative Humidity of Top of Aerosol Layers Detected in 1064 nm**

**Product Data Type: i2b ( 2)**

**Total Bytes: 4**

**Product Units: percentage * 100**

**Invalid Value/Flag: gi_invalid_i2b**

**Is Correction Flag?: NA**

**Is Unsigned?: No**

**Product Minimum: 0**

**Product Maximum: 10000**

**Description: Relative Humidity of Top of Aerosol Layers Detected in 1064 nm**

**Comments:**

**Product Var Name: i_Aer_ir_top_temp**

**Is element of: GLA08 Record, GLA11 Record**

**Short Description: Temperature of Top of Aerosol Layers Detected in 1064 nm**

**Product Data Type: i2b ( 2)**

**Total Bytes: 4**

**Product Units: degrees Celsius * 100**

**Invalid Value/Flag: gi_invalid_i2b**

**Is Correction Flag?: NA**

**Is Unsigned?: No**

**Product Minimum: -10000**

**Product Maximum: 10000**

**Description: Temperature of Top of Aerosol Layers Detected in 1064 nm**

**Comments:**

**Product Var Name: i_Aer_top_a20_pres**

**Is element of: GLA08 Record**

**Short Description: Pressure of Top of Aerosol Layers Above 20km of Atmosphere at 532 nm**

**Product Data Type: i2b ( 3)**

**Total Bytes: 6**

**Product Units: millbars * 10**

**Invalid Value/Flag: gi_invalid_i2b**

**Is Correction Flag?: NA**

**Is Unsigned?: No**

**Product Minimum: 0**

**Product Maximum: 20000**

**Description: Pressure of Top of Aerosol Layers Above 20km of Atmosphere at 532 nm**

**Comments:**

**Product Var Name: i_Aer_top_a20_relh**

**Is element of: GLA08 Record**

**Short Description: Relative Humidity of Top of Aerosol Layers Above 20km of Atmosphere at 532 nm**

**Product Data Type: i2b ( 3)**

**Total Bytes: 6**

**Product Units: percentage * 100**

**Invalid Value/Flag: gi_invalid_i2b**

**Is Correction Flag?: NA**

**Is Unsigned?: No**

**Product Minimum: 0**

**Product Maximum: 10000**

**Description: Relative Humidity of Top of Aerosol Layers Above 20km of Atmosphere at 532 nm**

**Comments:**

**Product Var Name: i_Aer_top_a20_temp**

**Is element of: GLA08 Record**

**Short Description: Temperature of Top oof Aerosol Layers Above 20km of Atmosphere at 532 nm**

**Product Data Type: i2b ( 3)**

**Total Bytes: 6**

**Product Units: degrees Celsius * 100**

**Invalid Value/Flag: gi_invalid_i2b**

**Is Correction Flag?: No**

**Is Unsigned?: No**

**Product Minimum: -10000**

**Product Maximum: 10000**

**Description: Temperature of Top oof Aerosol Layers Above 20km of Atmosphere at 532 nm**

**Comments:**

**Product Var Name: i_Aer_top_b20_pres**

**Is element of: GLA08 Record**

**Short Description: Pressure of Top of Aerosol Layers in Bottom 20km of Atmosphere at 532 nm**

**Product Data Type: i2b ( 5)**

**Total Bytes: 10**

**Product Units: millibars * 10**

**Invalid Value/Flag: gi_invalid_i2b**

**Is Correction Flag?: NA**

**Is Unsigned?: No**

**Product Minimum: 0**

**Product Maximum: 20000**

**Description: Pressure of Top of Aerosol Layers in Bottom 20km of Atmosphere at 532 nm**

**Comments:**

**Product Var Name: i_Aer_top_b20_relh**

**Is element of: GLA08 Record**

**Short Description: Relative Humidity of Top of Aerosol Layers in Bottom 20km of Atm at 532 nm**

**Product Data Type: i2b ( 5)**

**Total Bytes: 10**

**Product Units: percentage * 100**

**Invalid Value/Flag: gi_invalid_i2b**

**Is Correction Flag?: NA**

**Is Unsigned?: No**

**Product Minimum: 0**

**Product Maximum: 10000**

**Description: Relative Humidity of Top of Aerosol Layers in Bottom 20km of Atmosphere at 532 nm**

**Comments:**

**Product Var Name: i_Aer_top_b20_temp**

**Is element of: GLA08 Record**

**Short Description: Temperature of Top of Aerosol Layers in Bottom 20km of Atmosphere at 532 nm**

**Product Data Type: i2b ( 5)**

**Total Bytes: 10**

**Product Units: degrees Celsius * 100**

**Invalid Value/Flag: gi_invalid_i2b**

**Is Correction Flag?: NA**

**Is Unsigned?: No**

**Product Minimum: -10000**

**Product Maximum: 10000**

**Description: Temperature of Top of Aerosol Layers in Bottom 20km of Atmosphere at 532 nm**

**Comments:**

**Product Var Name: i_Aer_top_pres**

**Is element of: GLA10 record, GLA11 Record**

**Short Description: Aerosol Layers Pressure at Top of Layer at 532 nm**

**Product Data Type: i2b ( 9)**

**Total Bytes: 18**

**Product Units: millibars * 10**

**Invalid Value/Flag: gi_invalid_i2b**

**Is Correction Flag?: NA**

**Is Unsigned?: No**

**Product Minimum: 0**

**Product Maximum: 20000**

**Description: Aerosol Layers Pressure at Top of Layer at 532 nm**

**Comments:**

**Product Var Name: i_Aer_top_relh**

**Is element of: GLA10 record, GLA11 Record**

**Short Description: Aerosol Layers Relative Humidity at Top of Layer at 532 nm**

**Product Data Type: i2b ( 9)**

**Total Bytes: 18**

**Product Units: percentage * 100**

**Invalid Value/Flag: gi_invalid_i2b**

**Is Correction Flag?: NA**

**Is Unsigned?: No**

**Product Minimum: 0**

**Product Maximum: 10000**

**Description: Aerosol Layers Relative Humidity at Top of Layer at 532 nm**

**Comments:**

**Product Var Name: i_Aer_top_temp**

**Is element of: GLA10 record, GLA11 Record**

**Short Description: Aerosol Layers Temperature at Top of Layer at 532 nm**

**Product Data Type: i2b ( 9)**

**Total Bytes: 18**

**Product Units: degrees Celsius * 100**

**Invalid Value/Flag: gi_invalid_i2b**

**Is Correction Flag?: NA**

**Is Unsigned?: No**

**Product Minimum: -10000**

**Product Maximum: 10000**

**Description: Aerosol Layers Temperature at Top of Layer at 532 nm**

**Comments:**

**Product Var Name: i_atm_char_conf**

**Is element of: GLA09 Record**

**Short Description: Atmosphere Characterization Flag Confidence**

**Product Data Type: i2b (4)**

**Total Bytes: 8**

**Product Units: N/A**

**Invalid Value/Flag: N/A**

**Is Correction Flag?: No**

**Is Unsigned?: No**

**Product Minimum: 0**

**Product Maximum: 10**

**Description: Confidence level ascribed to the atmosphere characterization flag**

**Comments: 0 Not applicable**

**1 low confidence**

**2 reasonable confidence**

**3 high confidence**

**9 not tested**

**10 data quality insufficient to assign flag**

**Product Var Name: i_atm_char_flag**

**Is element of: GLA09 Record**

**Short Description: Atmosphere Characterization Flag**

**Product Data Type: i2b (4)**

**Total Bytes: 8**

**Product Units: N/A**

**Invalid Value/Flag: N/A**

**Is Correction Flag?: No**

**Is Unsigned?: No**

**Product Minimum: 0**

**Product Maximum: 8**

**Description: Flag to characterize cloud and blowing snow state of the atmosphere**

**0 clear**

**1 high cloud (> 5 km) low optical depth**

**2 high cloud (> 5 km), high optical depth**

**3 mid cloud (>2, <=5 km) low optical depth**

**4 mid cloud (>2, <=5 km) high optical depth**

**5 low cloud (> 500 m, <=2 km), low optical depth**

**6 low cloud (> 500 m, <=2 km), high optical depth**

**7 blowing snow or fog (< 500 m), low optical depth**

**8 blowing snow or fog (< 500 m), high optical depth**

**Product Var Name: i_AttFlg1**

**Is element of: GLA07 Record**

**Short Description: Attitude Flag 1**

**Product Data Type: i2b**

**Total Bytes: 2**

**Product Units: N/A**

**Invalid Value/Flag: No**

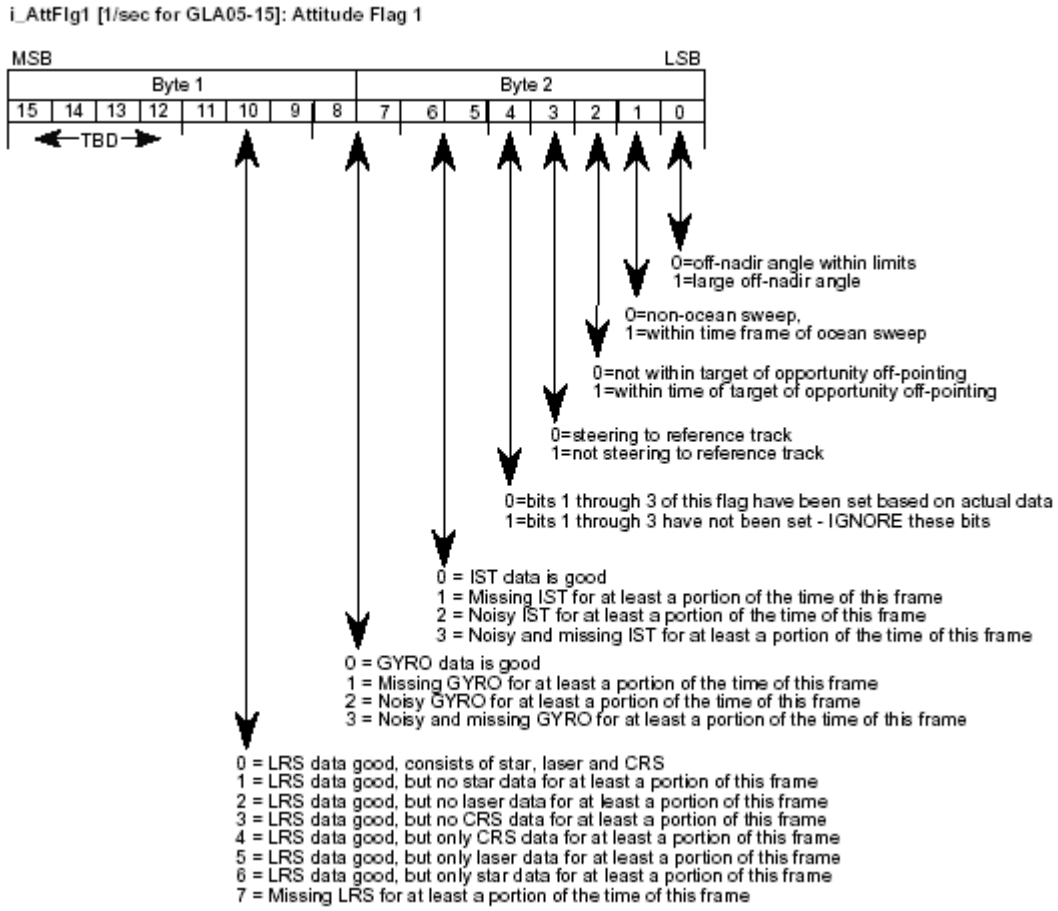
**Is Correction Flag?: NA**

**Is Unsigned?: No**

**Product Minimum: 0**

**Product Maximum: 32767**

**Description: At 1/sec denotes large off-nadir angle, ocn sweep, target of opportunity, steering to reference track.**



**Comments:**

**Product Var Name: i_AttFlg1**

**Is element of: GLA08 Record, GLA09 Record, GLA10 record, GLA11 Record**

**Short Description: Attitude flag**

**Product Data Type: i2b ( 4)**

**Total Bytes: 8**

**Product Units: NA**

**Invalid Value/Flag: No**

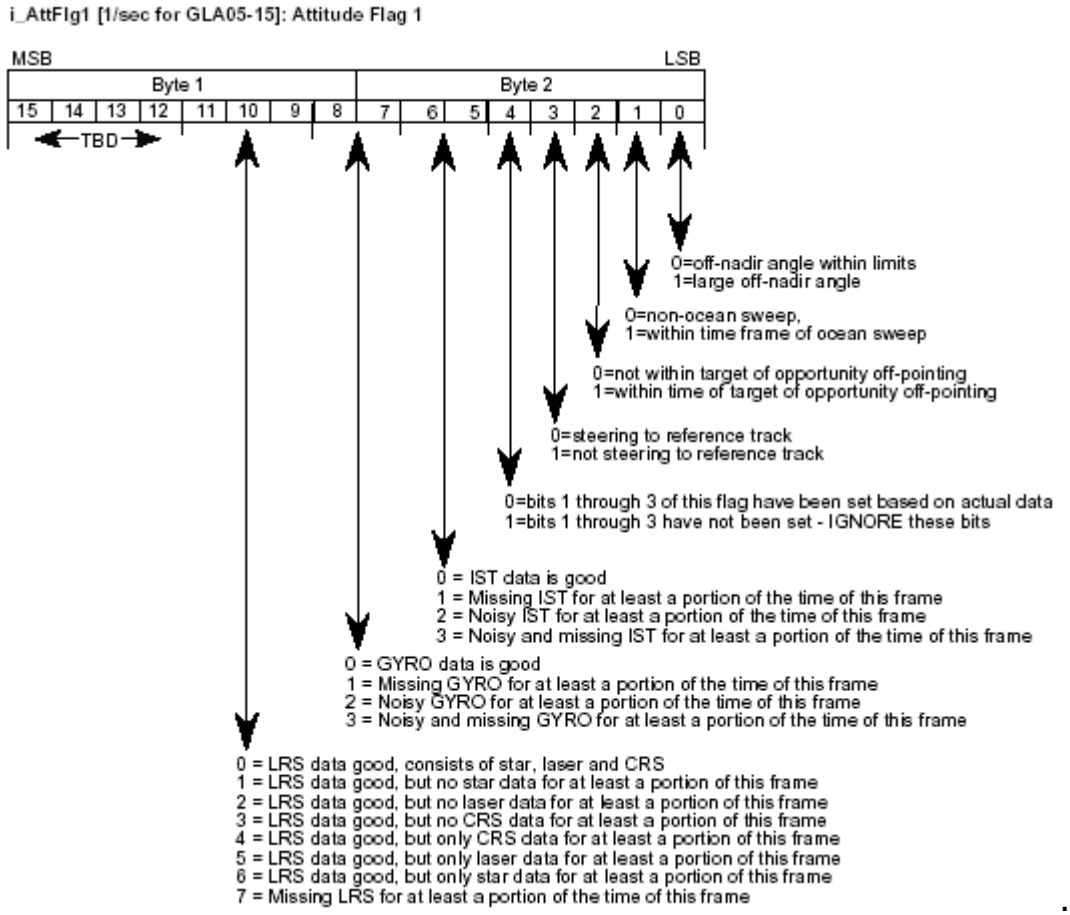
**Is Correction Flag?: NA**

**Is Unsigned?: No**

**Product Minimum: null**

**Product Maximum: null**

**Description: Composite Flag - see Common Flag Spreadsheet for details**



**Comments:**

**Product Var Name: i_AttFlg3**

**Is element of: GLA07 Record, GLA08 Record, GLA09 Record, GLA10 record, GLA11 Record**

**Short Description: Attitude Flag 3**

**Product Data Type: i1b**

**Total Bytes: 1**

**Product Units: NA**

**Invalid Value/Flag: No**

**Is Correction Flag?: NA**

**Is Unsigned?: No**

**Product Minimum: 0**

**Product Maximum: 1**

**Description:**

**Comments:**

**Product Var Name: i_CdBg2_Del**

**Is element of: GLA02 Record**

**Short Description: Cloud Digitizer Background 2 Delay**

**Product Data Type: i2b**

**Total Bytes: 2**

**Product Units: counts**

**Invalid Value/Flag: i_APID_AvFlg**

**Is Correction Flag?: NA**

**Is Unsigned?: Yes**

**Product Minimum: 0**

**Product Maximum: 65535**

**Description: The delays for background #2 and the range gate from the cloud digitizer board.Comments:**

**Product Var Name: i_CldPkSig**

**Is element of: GLA02 Record**

**Short Description: Cloud Return Peak Signal**

**Product Data Type: i1b ( 5)**

**Total Bytes: 5**

**Product Units: photons / bin**

**Invalid Value/Flag: i_APID_AvFlg**

**Is Correction Flag?: NA**

**Is Unsigned?: No**

**Product Minimum: 0**

**Product Maximum: 32**

**Description: Peak photon count in the 532 nm backscatter data within the range for cloud returns; at the 5 Hz rate.Comments:**

**Product Var Name: i_DEMmax**

**Is element of: GLA02 Record**

**Short Description: DEM maximum**

**Product Data Type: i2b**

**Total Bytes: 2**

**Product Units: meters**

**Invalid Value/Flag: i_APID_AvFlg**

**Is Correction Flag?: NA**

**Is Unsigned?: No**

**Product Minimum: -1000**

**Product Maximum: 12000**

**Description: Onboard spacecraft DEM maximum elevation used to calculate hmax. From APID19, Offset 1193.Comments:**

**Product Var Name: i_DEMmin**

**Is element of: GLA02 Record**

**Short Description: DEM minimum**

**Product Data Type: i2b**

**Total Bytes: 2**

**Product Units: meters**

**Invalid Value/Flag: i_APID_AvFlg**

**Is Correction Flag?: NA**

**Is Unsigned?: No**

**Product Minimum: -1000**

**Product Maximum: 12000**

**Description: Onbroard spacecraft DEM minimum elevation used to calculate hmin. From APID19, Offset 1192.Comments:**

**Product Var Name: i_DitheringEnabledFlag**

**Is element of: GLA02 Record, GLA07 Record**

**Short Description: Dithering Enabled Flag**

**Product Data Type: i1b**

**Total Bytes: 1**

**Product Units: N/A**

**Invalid Value/Flag: i_APID_AvFlg**

**Is Correction Flag?: Yes**

**Is Unsigned?: NA**

**Product Minimum: 0**

**Product Maximum: 1**

**Description: 0=FALSE, 1=TRUEComments: Not valid if APID15 is missing.**

**Product Var Name: i_DualPinA**

**Is element of: GLA02 Record**

**Short Description: Dual Pin A data**

**Product Data Type: i1b ( 40)**

**Total Bytes: 40**

**Product Units: counts**

**Invalid Value/Flag: i_APID_AvFlg**

**Is Correction Flag?: No**

**Is Unsigned?: Yes**

**Product Minimum: 0**

**Product Maximum: 255**

**Description: Dual Pin A data (from APID19, offset 1248)Comments:**

**Product Var Name: i_DualPinB**

**Is element of: GLA02 Record**

**Short Description: Dual Pin B Data**

**Product Data Type: i1b ( 40)**

**Total Bytes: 40**

**Product Units: counts**

**Invalid Value/Flag: i_APID_AvFlg**

**Is Correction Flag?: No**

**Is Unsigned?: Yes**

**Product Minimum: 0**

**Product Maximum: 255**

**Description: Dual Pin B data from APID19, Offset 1288**

**Comments:**

**Product Var Name: i_ET_state**

**Is element of: GLA02 Record**

**Short Description: Etalon State**

**Product Data Type: i1b**

**Total Bytes: 1**

**Product Units: N/A**

**Invalid Value/Flag: i_APID_AvFlg**

**Is Correction Flag?: NA**

**Is Unsigned?: No**

**Product Minimum: 0**

**Product Maximum: 3**

**Description: State of the etalon: 0 = Init, 1 = Set Temp, 2 = Wait, 3 = Average**

**Comments:**

**Product Var Name: i_ETsettleTime**

**Is element of: GLA02 Record**

**Short Description: Etalon Temperature Settle Time**

**Product Data Type: i2b**

**Total Bytes: 2**

**Product Units: seconds**

**Invalid Value/Flag: i_APID_AvFlg**

**Is Correction Flag?: NA**

**Is Unsigned?: Yes**

**Product Minimum: 0**

**Product Maximum: 65535**

**Description: The commanded time the software will wait after a temperature setpoint is sent to the etalon heater. Integer units in seconds. Applies only to tracking mode.**

**Comments:**

**Product Var Name: i_EtC37d_t**

**Is element of: GLA02 Record**

**Short Description: Etalon Temperature, Ch 37d**

**Product Data Type: i2b**

**Total Bytes: 2**

**Product Units: Celsius X 100**

**Invalid Value/Flag: i_APID_AvFlg**

**Is Correction Flag?: NA**

**Is Unsigned?: No**

**Product Minimum: -1000**

**Product Maximum: 3000**

**Description: Etalon Temperature, Ch 37dComments:**

**Product Var Name: i_EtHtrC37j_c**

**Is element of: GLA02 Record**

**Short Description: Etalon Heater Current, Ch 37j**

**Product Data Type: i2b**

**Total Bytes: 2**

**Product Units: Amps X 100**

**Invalid Value/Flag: i_APID_AvFlg**

**Is Correction Flag?: NA**

**Is Unsigned?: No**

**Product Minimum: 0**

**Product Maximum: 2500**

**Description: Etalon Heater Current, Ch 37j**

**Comments:**

**Product Var Name: i_FRCL_Flag**

**Is element of: GLA09 Record**

**Short Description: Full Resolution Cloud Layers Flag for 532 nm**

**Product Data Type: i1b ( 220)**

**Total Bytes: 220**

**Product Units: NA**

**Invalid Value/Flag: No**

**Is Correction Flag?: NA**

**Is Unsigned?: No**

**Product Minimum: 0**

**Product Maximum: 15**

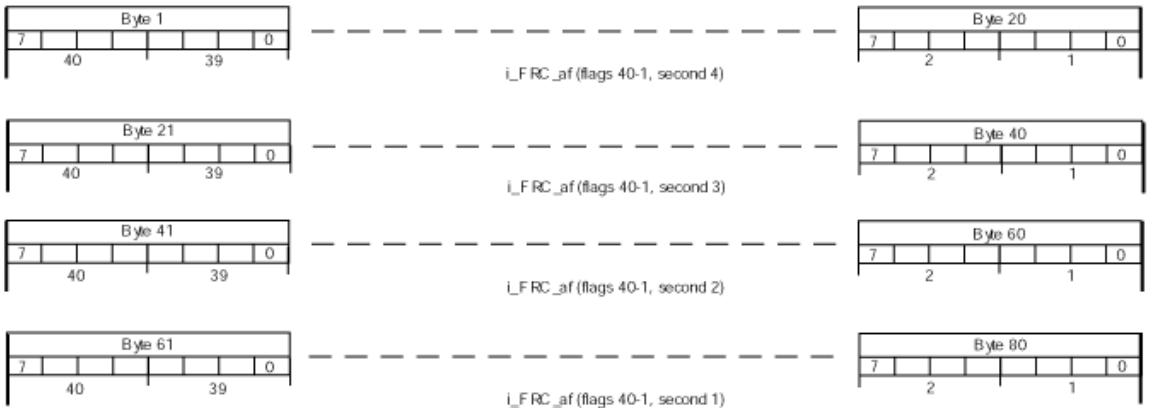
**Description: Composite Flag - see Breakout for details**

af = availability flag: Tells how many cloud layers were found (from the 532 channel) at this resolution.
value 15 = cloud layers were not searched for; value 0 = cloud layers were searched for, but not detected

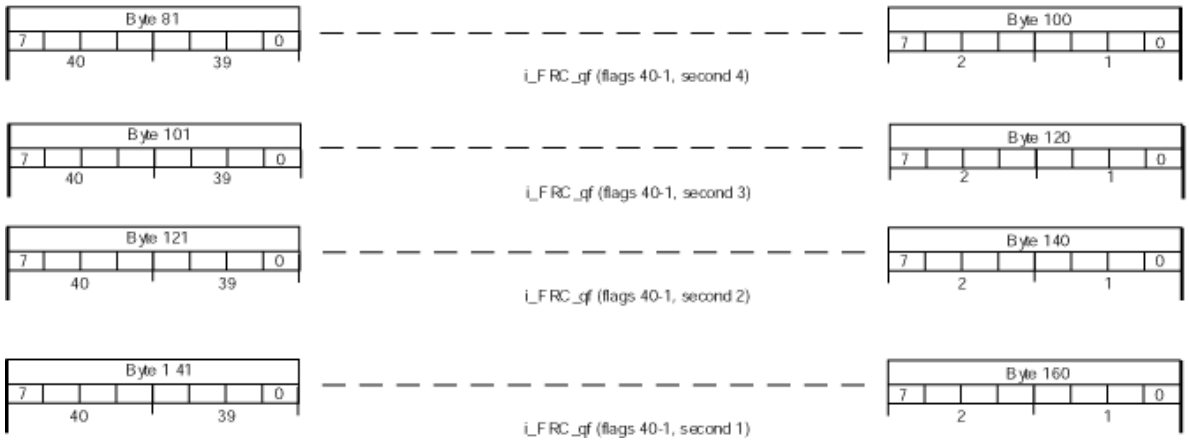
qf=quality flag: value 15 = cloud layers were not searched for - either bad data or cloud layers were not found at a coaser resolution;
value 1 = low chance of being a cloud; value 2 = moderate; value 3 = high; value 4 = no doubt -- based upon noise-to-signal and geometric thickness evaluation; Value 14 = height of bottom of lowest detected layer in profile very uncertain because ground signal was not detected.

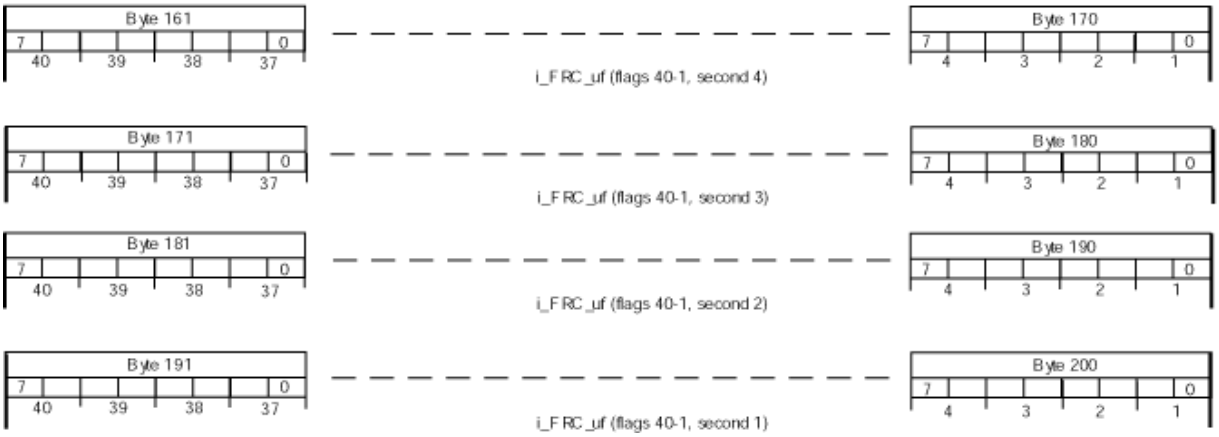
uf = use flag: not used at this time

df = diurnal flag: This tells whether a given layer would be detected during normal daylight conditions. value 0 = layer would not have been detected in typical daytime background; value 1 = layer would have been detected in daylight

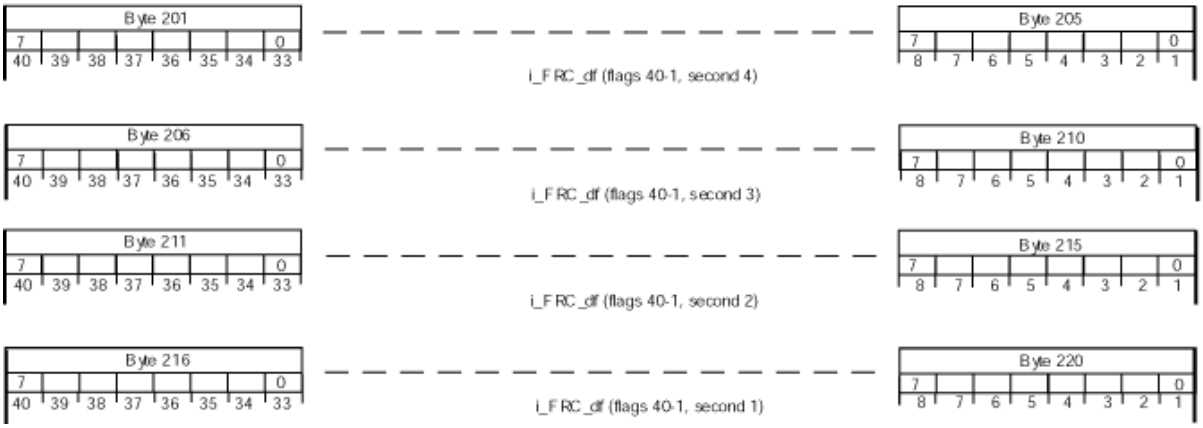









**Comments:**

**Product Var Name: i_FRcld_bot**

**Is element of: GLA09 Record**

**Short Description: Full Resolution Cloud Bottom at 532 nm**

**Product Data Type: i2b ( 160)**

**Total Bytes: 320**

**Product Units: deka-meters**

**Invalid Value/Flag: i_FRC_af**

**Is Correction Flag?: NA**

**Is Unsigned?: No**

**Product Minimum: -100**

**Product Maximum: 400**

**Description: The height above the reference ellipsoid to the bottom of the full resolution cloud layer (40 Hz). This resolution cloud search is independent of the lower resolution cloud search results and is done for each 40 Hz shot regardless of whether or not clouds were detected at the lower resolutions. Note that the 40 Hz data is available only below 10 km, and thus clouds existing above that level cannot be detected at the 40 Hz resolution.**

**Comments:**

**Product Var Name: i_FRcld_grd**

**Is element of: GLA09 Record**

**Short Description: Full Resolution Cloud Ground Detection at 532 nm**

**Product Data Type: i2b ( 160)**

**Total Bytes: 320**

**Product Units: deka-meters**

**Invalid Value/Flag: gi_invalid_i2b**

**Is Correction Flag?: NA**

**Is Unsigned?: No**

**Product Minimum: -127**

**Product Maximum: 1000**

**Description: The height above the reference ellipsoid of the ground as detected by the full resolution cloud processing algorithms. A value of -127 indicates that the ground was searched for, but not detected.**

**Comments:**

**Product Var Name: i_FRcld_top**

**Is element of: GLA09 Record**

**Short Description: Full Resolution Cloud Top at 532 nm**

**Product Data Type: i2b ( 160)**

**Total Bytes: 320**

**Product Units: deka-meters**

**Invalid Value/Flag: i_FRC_af**

**Is Correction Flag?: NA**

**Is Unsigned?: No**

**Product Minimum: -100**

**Product Maximum: 400**

**Description: The height above the reference ellipsoid to the top of the full resolution cloud layer (40 Hz). This resolution cloud search is independent of the lower resolution cloud search results and is done for each 40 Hz shot regardless of whether or not clouds were detected at the lower resolutions. Note that the 40 Hz data is available only below 10 km, and thus clouds existing above that level cannot be detected at the 40 Hz resolution.**

**Comments:**

**Product Var Name: i_FRg_grd_sig**

**Is element of: GLA09 Record**

**Short Description: Full Resolution Ground Return Signal at 532 nm**

**Product Data Type: i4b ( 160)**

**Total Bytes: 640**

**Product Units: e9/(m-sr)**

**Invalid Value/Flag: gi_invalid_i4b**

**Is Correction Flag?: NA**

**Is Unsigned?: No**

**Product Minimum: 10000**

**Product Maximum: 10000000**

**Description: Ground return signal from the 532 nm backscatter profile at the height that the ground return is detected.**

**Comments:**

**Product Var Name: i_FRir_ODflg**

**Is element of: GLA11 Record**

**Short Description: Full Resolution 1064 Optical Depth Flag**

**Product Data Type: i1b ( 160)**

**Total Bytes: 160**

**Product Units: NA**

**Invalid Value/Flag: No**

**Is Correction Flag?: NA**

**Is Unsigned?: No**

**Product Minimum: 0**

**Product Maximum: 0**

**Description: This parameter is for a 4 second record. This parameter is also in GLA06, 12-15.**

**Comments:**

**Product Var Name: i_FRir_cldtop**

**Is element of: GLA09 Record**

**Short Description: Full Resolution 1064 Cloud Top**

**Product Data Type: i2b ( 160)**

**Total Bytes: 320**

**Product Units: deka-meters**

**Invalid Value/Flag: gi_invalid_i2b**

**Is Correction Flag?: NA**

**Is Unsigned?: No**

**Product Minimum: 0**

**Product Maximum: 1030**

**Description: Full resolution (40 Hz) cloud top height obtained from the 1064 atmospheric channel. This parameter is for a 4 second record. Also parameter is in GLA06, 12-15.**

**Comments:**

**Product Var Name: i_FRir_grd_sig**

**Is element of: GLA09 Record**

**Short Description: Full Resolution Ground Return Signal at 1064 nm**

**Product Data Type: i4b ( 160)**

**Total Bytes: 640**

**Product Units: e9/(m-sr)**

**Invalid Value/Flag: gi_invalid_i4b**

**Is Correction Flag?: NA**

**Is Unsigned?: No**

**Product Minimum: 100000**

**Product Maximum: 10000000**

**Description: Ground return signal from the 1064 nm backscatter profile at the height that the ground return is detected.**

**Comments:**

**Product Var Name: i_FRir_intsig**

**Is element of: GLA09 Record**

**Short Description: Full Resolution 1064 Integrated Signal**

**Product Data Type: i2b ( 160)**

**Total Bytes: 320**

**Product Units: e7/(m-sr)**

**Invalid Value/Flag: gi_invalid_i2b**

**Is Correction Flag?: NA**

**Is Unsigned?: No**

**Product Minimum: 0**

**Product Maximum: 10000**

**Description: Though called 'integrated signal' this is actually an average of all bins in the above-ground portion of the 1064 40 Hz profile with values above the threshold of 1.0e-7 (1/(m-sr). This parameter is for a 4 second record. This parameter is also in GLA06, 12-15.**

**Comments:**

**Product Var Name: i_FRir_qaFlag**

**Is element of: GLA09 Record**

**Short Description: Full Resolution 1064 Quality Flag**

**Product Data Type: i1b ( 160)**

**Total Bytes: 160**

**Product Units: NA**

**Invalid Value/Flag: No**

**Is Correction Flag?: NA**

**Is Unsigned?: No**

**Product Minimum: 0**

**Product Maximum: 15**

**Description:**

**i_FRir_qaFlag [GLA09, 11]: Full Resolution 1064 Quality Flag** (i1b(160): 4 seconds per record, 40 per second rate)

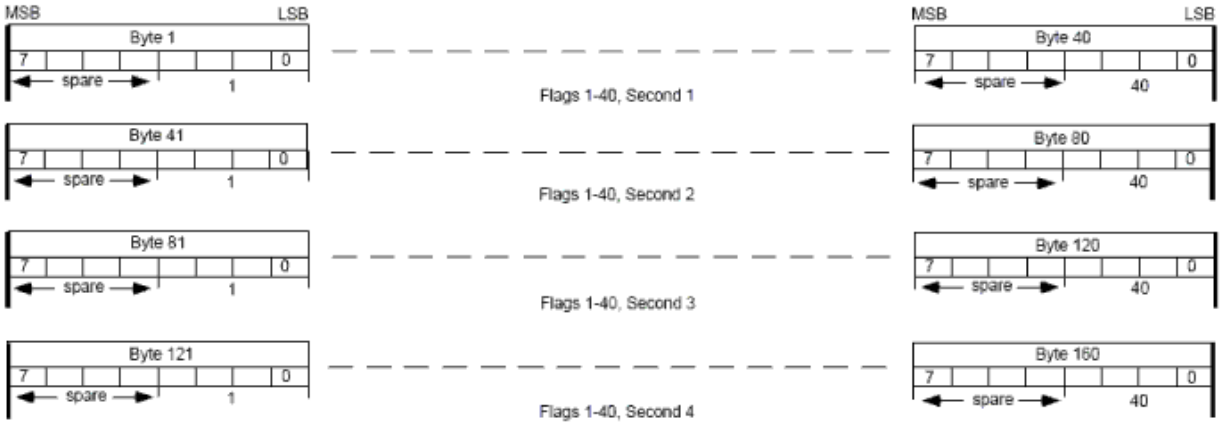
One byte per data quality flag

Value 15 = No clouds.

Value 14 = Indicates the likely presence of low clouds (< 150 m) based on elevated signal from the two bins above the ground return bin that were not detected directly by the cloud search algorithm. When this occurs, the 40 Hz cloud top height (i_Frir_cldtop) is set to a value of 0.10 km.

Value 13 = Indicates the possible presence of a cloud based on the value of the integrated signal parameter (i_FRir_intsig) that was not detected directly by the cloud search algorithm. When this occurs, the 40 Hz cloud top height (i_Frir_cldtop) is set to a value of 10.0 km.

Value 0 - 12 = Cloud detected by cloud search algorithm with higher numbers indicating a stronger average signal from the region starting at cloud top and extending 500 m below cloud top height.




**i_FRir_qaFlag [GLA06, 12-15]: Full Resolution 1064 Quality Flag** (i1b(40): 40 per second rate)


**Comments:**

**Product Var Name: i_HRCL_Flag**

**Is element of: GLA09 Record**

**Short Description: High Resolution Cloud Layers Flag for 532 nm**

**Product Data Type: i1b ( 185)**

**Total Bytes: 185**

**Product Units: NA**

**Invalid Value/Flag: No**

**Is Correction Flag?: NA**

**Is Unsigned?: No**

**Product Minimum: 0**

**Product Maximum: 15**

**Description: Composite Flag - see Breakout for details**

**i_HRCL_Flag [GLA09]: High Resolution Cloud Layer Flag** (4 seconds per record, 5 per second rate)

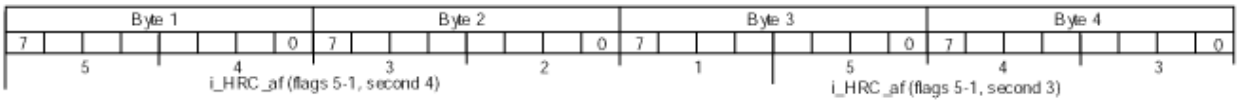


af = availability flag: Tells how many cloud layers were found (from the 532 channel) at this resolution.
value 15 = cloud layers were not searched for; value 0 = cloud layers were searched for, but not detected

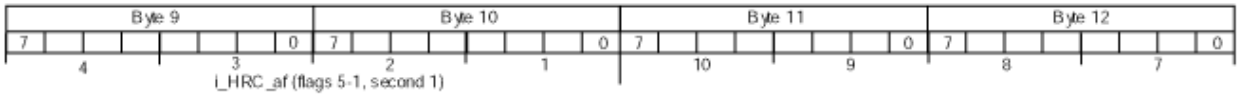
qf=quality flag: value 15 = cloud layers were not searched for - either bad data or cloud layers were not found at a coaser resolution; value 1 = low chance of being a cloud; value 2 = moderate; value 3 = high; value 4 = no doubt -- based upon noise-to-signal and geometric thickness evaluation; Value 14 = height of bottom of lowest detected layer in profile very uncertain because ground signal was not detected.

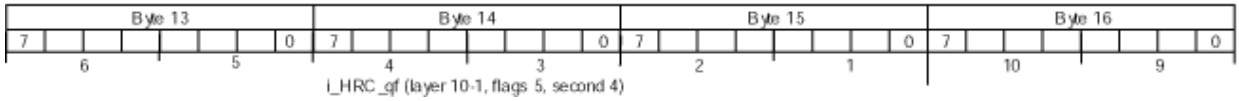
uf = use flag: not used at this time

df = diurnal flag: This tells whether a given layer would be detected during normal daylight conditions. value 0 = layer would not have been detected in typical daytime background; value 1 = layer would have been detected in daylight



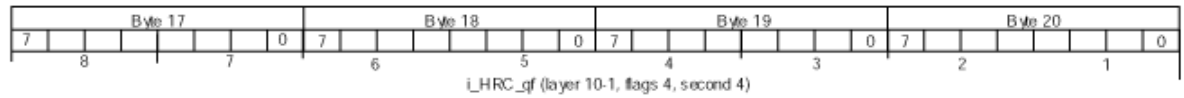


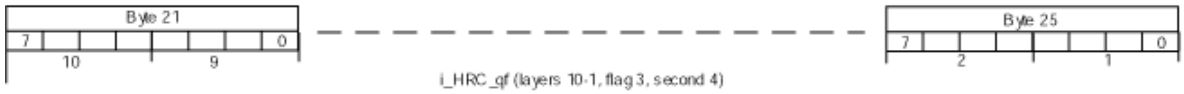


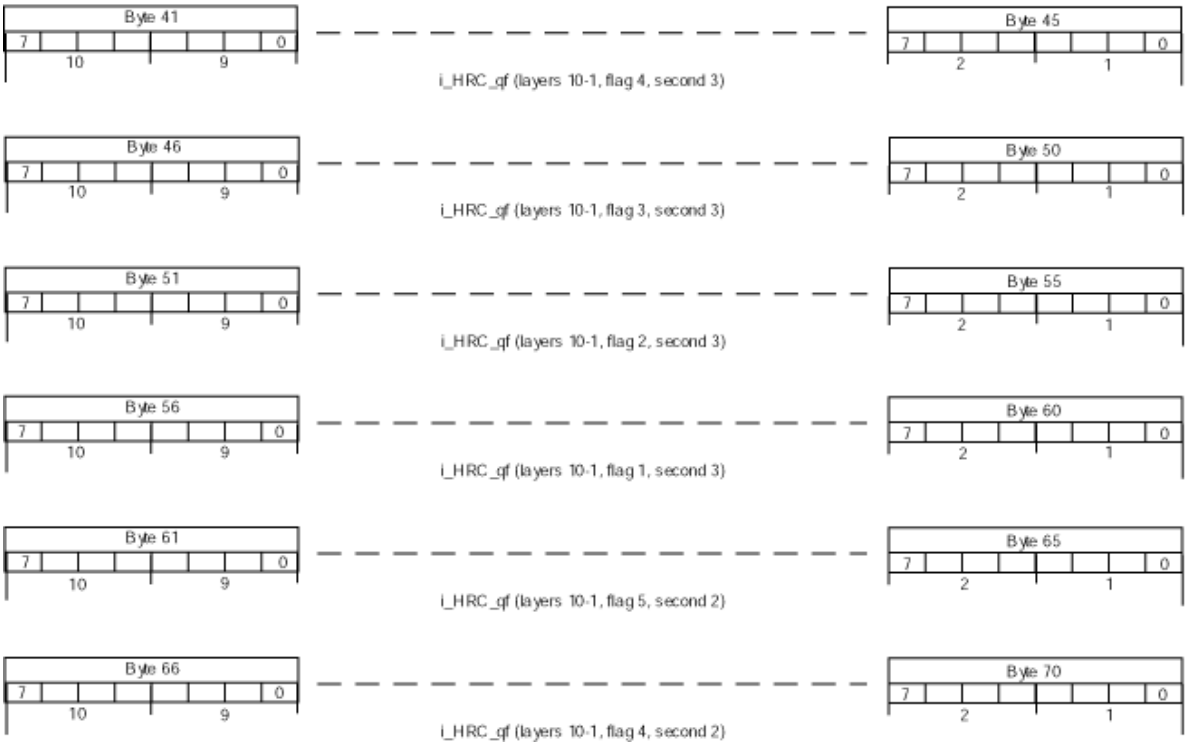

**i_HRCL_Flag [GLA09]: High Resolution Cloud Layer Flag** (4 seconds per record, 5 per second rate)



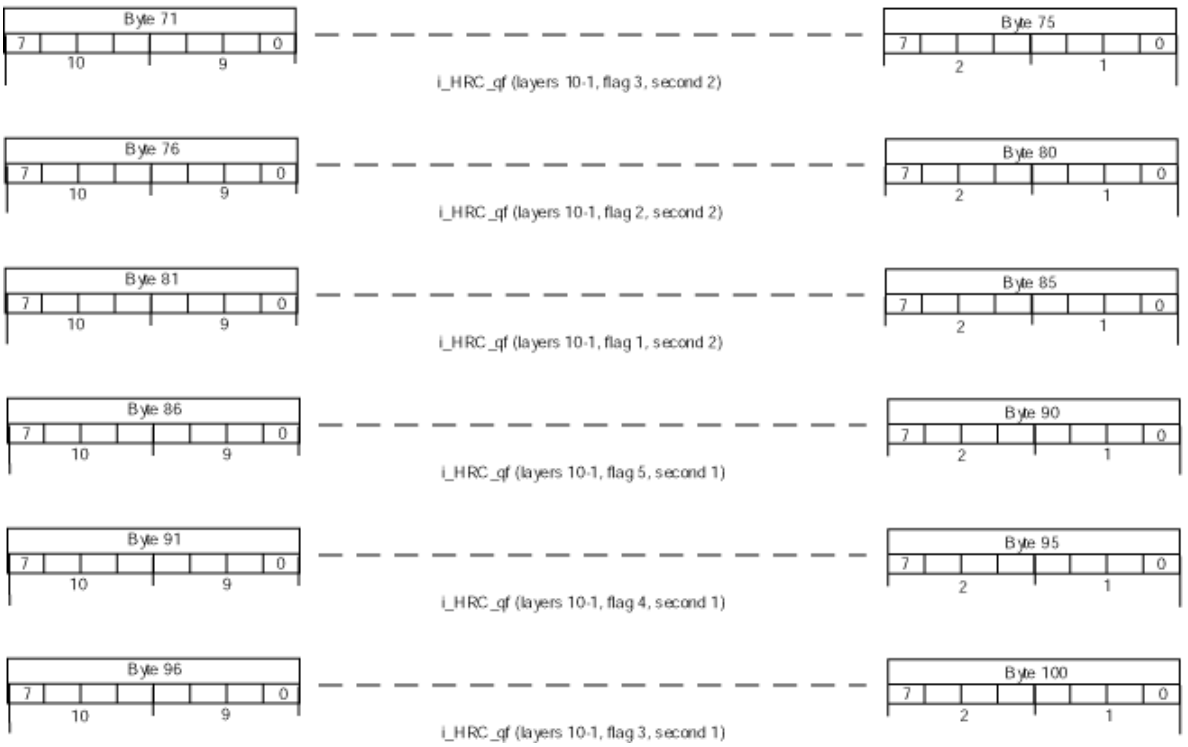


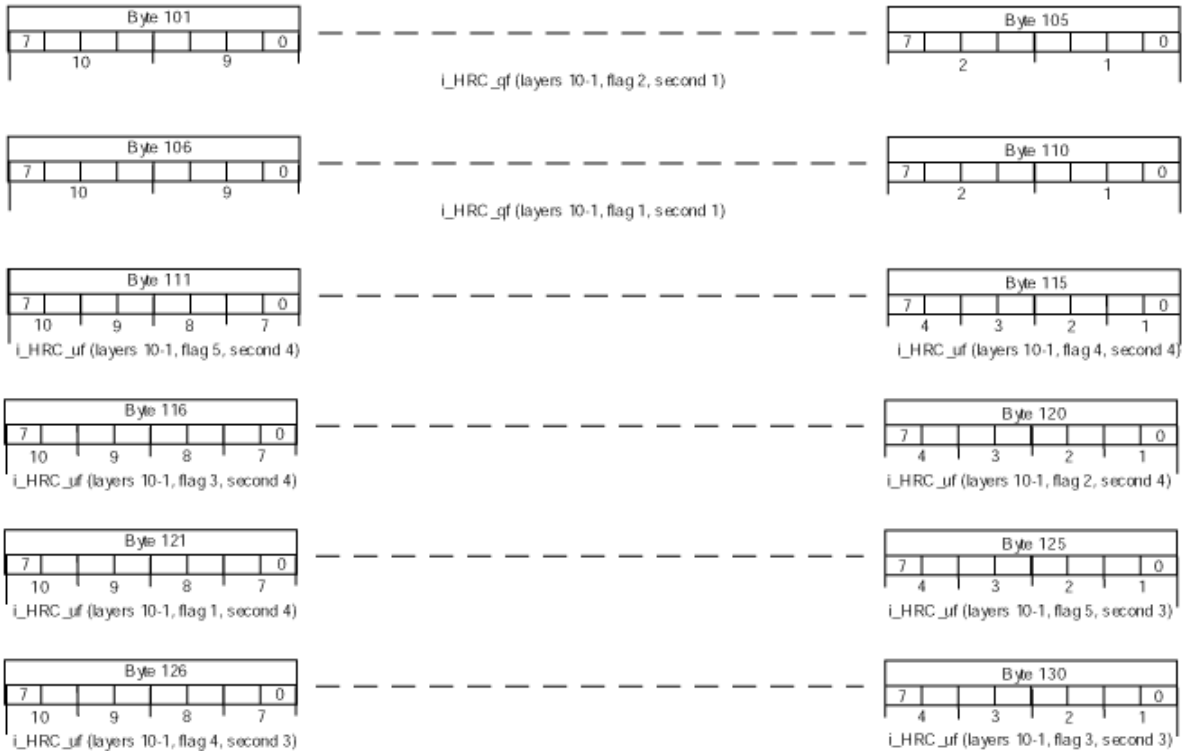





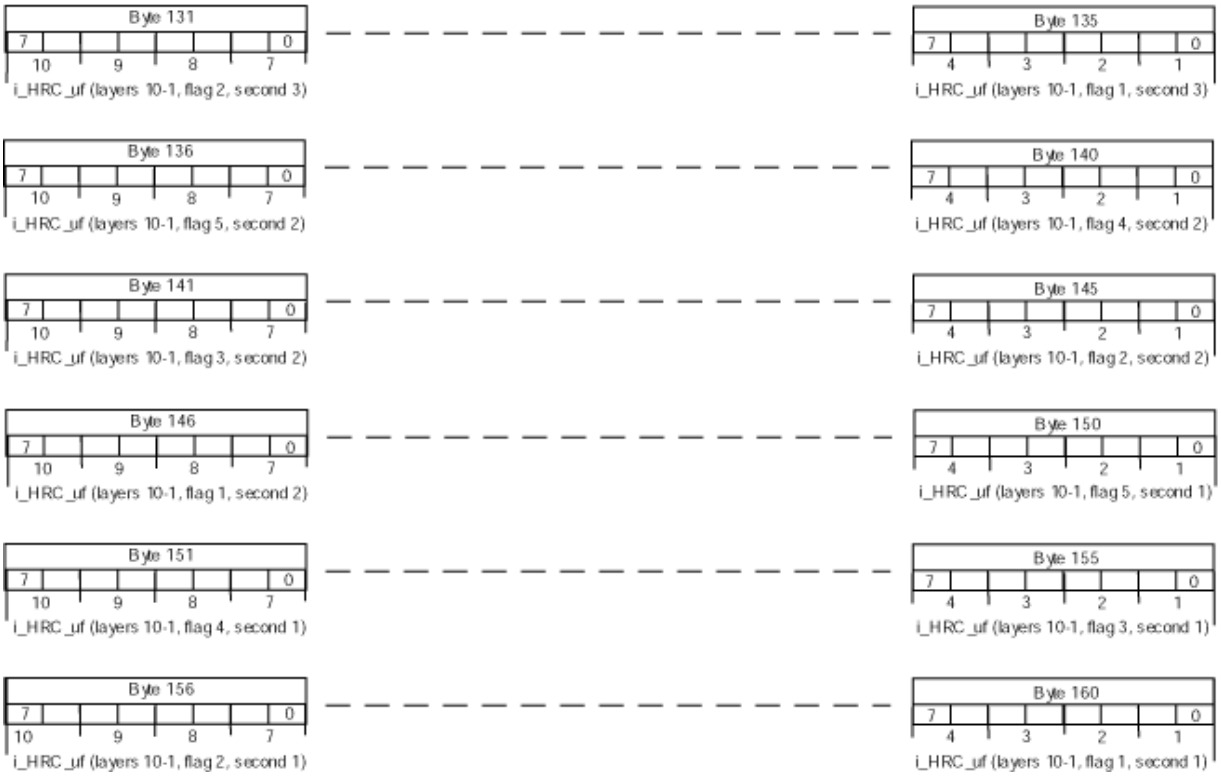


Byte 41
7 0
10 9
i_HRC_qf (layers 10-1, flag 4, second 3)
Byte 45
7 0
2 1
Byte 46
7 0
10 9
i_HRC_qf (layers 10-1, flag 3, second 3)
Byte 50
7 0
2 1
Byte 51
7 0
10 9
i_HRC_qf (layers 10-1, flag 2, second 3)
Byte 55
7 0
2 1
Byte 56
7 0
10 9
i_HRC_qf (layers 10-1, flag 1, second 3)
Byte 60
7 0
2 1
Byte 61
7 0
10 9
i_HRC_qf (layers 10-1, flag 5, second 2)
Byte 65
7 0
2 1
Byte 66
7 0
10 9
i_HRC_qf (layers 10-1, flag 4, second 2)
Byte 70
7 0
2 1

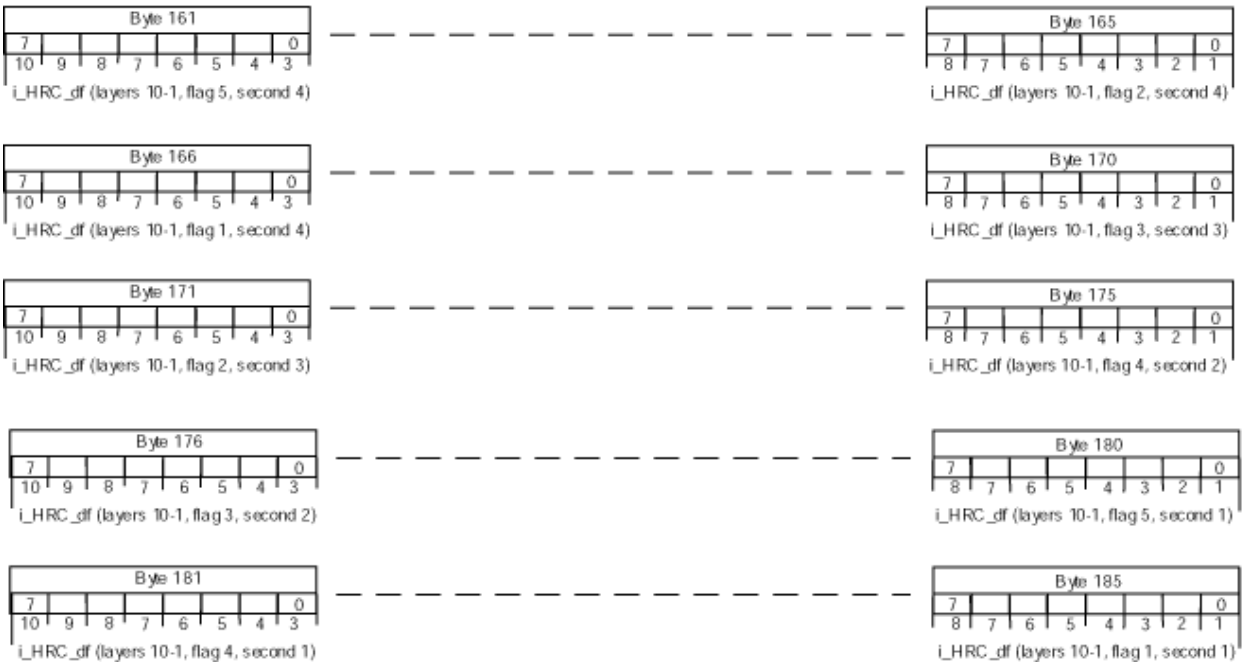



Byte 71
7 0
10 9
i_HRC_qf (layers 10-1, flag 3, second 2)
Byte 75
7 0
2 1
Byte 76
7 0
10 9
i_HRC_qf (layers 10-1, flag 2, second 2)
Byte 80
7 0
2 1
Byte 81
7 0
10 9
i_HRC_qf (layers 10-1, flag 1, second 2)
Byte 85
7 0
2 1
Byte 86
7 0
10 9
i_HRC_qf (layers 10-1, flag 5, second 1)
Byte 90
7 0
2 1
Byte 91
7 0
10 9
i_HRC_qf (layers 10-1, flag 4, second 1)
Byte 95
7 0
2 1
Byte 96
7 0
10 9
i_HRC_qf (layers 10-1, flag 3, second 1)
Byte 100
7 0
2 1


Byte 101
7 0
10 9
i_HRC_qf (layers 10-1, flag 2, second 1)
Byte 105
7 0
2 1
Byte 106
7 0
10 9
i_HRC_qf (layers 10-1, flag 1, second 1)
Byte 110
7 0
2 1
Byte 111
7 0
10 9 8 7
i_HRC_uf (layers 10-1, flag 5, second 4)
Byte 115
7 0
4 3 2 1
i_HRC_uf (layers 10-1, flag 4, second 4)
Byte 116
7 0
10 9 8 7
i_HRC_uf (layers 10-1, flag 3, second 4)
Byte 120
7 0
4 3 2 1
i_HRC_uf (layers 10-1, flag 2, second 4)
Byte 121
7 0
10 9 8 7
i_HRC_uf (layers 10-1, flag 1, second 4)
Byte 125
7 0
4 3 2 1
i_HRC_uf (layers 10-1, flag 5, second 3)
Byte 126
7 0
10 9 8 7
i_HRC_uf (layers 10-1, flag 4, second 3)
Byte 130
7 0
4 3 2 1
i_HRC_uf (layers 10-1, flag 3, second 3)




Byte 131
7 0
10 9 8 7
i_HRC_uf (layers 10-1, flag 2, second 3)
Byte 135
7 0
4 3 2 1
i_HRC_uf (layers 10-1, flag 1, second 3)
Byte 136
7 0
10 9 8 7
i_HRC_uf (layers 10-1, flag 5, second 2)
Byte 140
7 0
4 3 2 1
i_HRC_uf (layers 10-1, flag 4, second 2)
Byte 141
7 0
10 9 8 7
i_HRC_uf (layers 10-1, flag 3, second 2)
Byte 145
7 0
4 3 2 1
i_HRC_uf (layers 10-1, flag 2, second 2)
Byte 146
7 0
10 9 8 7
i_HRC_uf (layers 10-1, flag 1, second 2)
Byte 150
7 0
4 3 2 1
i_HRC_uf (layers 10-1, flag 5, second 1)
Byte 151
7 0
10 9 8 7
i_HRC_uf (layers 10-1, flag 4, second 1)
Byte 155
7 0
4 3 2 1
i_HRC_uf (layers 10-1, flag 3, second 1)
Byte 156
7 0
10 9 8 7
i_HRC_uf (layers 10-1, flag 2, second 1)
Byte 160
7 0
4 3 2 1
i_HRC_uf (layers 10-1, flag 1, second 1)




**Comments:**

**Product Var Name: i_HRcld_bot**

**Is element of: GLA09 Record**

**Short Description: High Resolution Cloud Bottom at 532 nm**

**Product Data Type: i2b (10, 20)**

**Total Bytes: 400**

**Product Units: deka-meters**

**Invalid Value/Flag: i_HRC_af**

**Is Correction Flag?: NA**

**Is Unsigned?: No**

**Product Minimum: -100**

**Product Maximum: 2000**

**Description: High resolution height above the reference ellipsoid of the bottom of a cirrus, thin, or dense cloud layer below 10KM in the atmosphere. There can be up to 10 cloud layers in an atmospheric profile. The high resolution data occurs at the rate of 5 per second.**

**Comments:**

**Product Var Name: i_HRcld_grd**

**Is element of: GLA09 Record**

**Short Description: High Resolution Ground Detection at 532 nm**

**Product Data Type: i2b ( 20)**

**Total Bytes: 40**

**Product Units: deka-meters**

**Invalid Value/Flag: gi_invalid_i2b**

**Is Correction Flag?: NA**

**Is Unsigned?: No**

**Product Minimum: -127**

**Product Maximum: 1000**

**Description: The height above the reference ellipsoid of the ground as detected by the high resolution cloud processing algorithms. A value of -127 indicates that the ground was searched for, but not detected.**

**Comments:**

**Product Var Name: i_HRcld_top**

**Is element of: GLA09 Record**

**Short Description: High Resolution Cloud Top at 532 nm**

**Product Data Type: i2b (10, 20)**

**Total Bytes: 400**

**Product Units: deka-meters**

**Invalid Value/Flag: i_HRC_af**

**Is Correction Flag?: NA**

**Is Unsigned?: No**

**Product Minimum: -100**

**Product Maximum: 2000**

**Description: High resolution height above the reference ellipsoid of the top of a cirrus, thin, or dense cloud layer below 10 KM in the atmosphere. There can be up to 10 cloud layers in an atmospheric profile. The high resolution data occurs at the rate of 5 per second.**

**Comments:**

**Product Var Name: i_HRg_SourceFt**

**Is element of: GLA09 Record**

**Short Description: High Resolution Data 532 nm Source Function**

**Product Data Type: i2b ( 20)**

**Total Bytes: 40**

**Product Units: Unknown**

**Invalid Value/Flag: gi_invalid_i2b**

**Is Correction Flag?: NA**

**Is Unsigned?: No**

**Product Minimum: 0**

**Product Maximum: 0**

**Description: High Resolution Data 532 nm Source Function**

**Comments:**

**Product Var Name: i_HRpbl_grd**

**Is element of: GLA08 Record**

**Short Description: Ground Detection for High Res PBL**

**Product Data Type: i2b ( 20)**

**Total Bytes: 40**

**Product Units: deka-meters**

**Invalid Value/Flag: gi_invalid_i2b**

**Is Correction Flag?: NA**

**Is Unsigned?: No**

**Product Minimum: -100**

**Product Maximum: 1000**

**Description: The height above the reference ellipsoid of the ground used by the high res PBL processing algorithms.**

**Comments:**

**Product Var Name: i_HRpbl_ht**

**Is element of: GLA08 Record**

**Short Description: High Resolution PBL Height at 532 nm**

**Product Data Type: i2b ( 20)**

**Total Bytes: 40**

**Product Units: deka-meters**

**Invalid Value/Flag: gi_invalid_i2b**

**Is Correction Flag?: NA**

**Is Unsigned?: No**

**Product Minimum: -100**

**Product Maximum: 700**

**Description: High resolution height of the planetary boundary layer, as derived from the aerosol structure; the high resolution data occurs at the rate of 5 per second.**

**Comments:**

**Product Var Name: i_HoffMin**

**Is element of: GLA02 Record**

**Short Description: Offset to minimum DEM height**

**Product Data Type: i2b**

**Total Bytes: 2**

**Product Units: meters**

**Invalid Value/Flag: i_APID_AvFlg**

**Is Correction Flag?: NA**

**Is Unsigned?: No**

**Product Minimum: 0**

**Product Maximum: 12000**

**Description: Offset to minimum DEM height used in flight algorithm**

**Comments:**

**Product Var Name: i_Hsat**

**Is element of: GLA02 Record**

**Short Description: Geodetic altitude of satellite above earth**

**Product Data Type: i4b**

**Total Bytes: 4**

**Product Units: centimeters**

**Invalid Value/Flag: i_APID_AvFlg**

**Is Correction Flag?: NA**

**Is Unsigned?: No**

**Product Minimum: 50000000**

**Product Maximum: 70000000**

**Description: Geodetic altitude of satellite above earth's surface computed in real time by the GLAS flight algorithm.**

**Comments:**

**Product Var Name: i_LRCL_Flag**

**Is element of: GLA09 Record**

**Short Description: Low Resolution Cloud Layers Flag for 532 nm**

**Product Data Type: i1b ( 11)**

**Total Bytes: 11**

**Product Units: NA**

**Invalid Value/Flag: No**

**Is Correction Flag?: NA**

**Is Unsigned?: No**

**Product Minimum: 0**

**Product Maximum: 15**

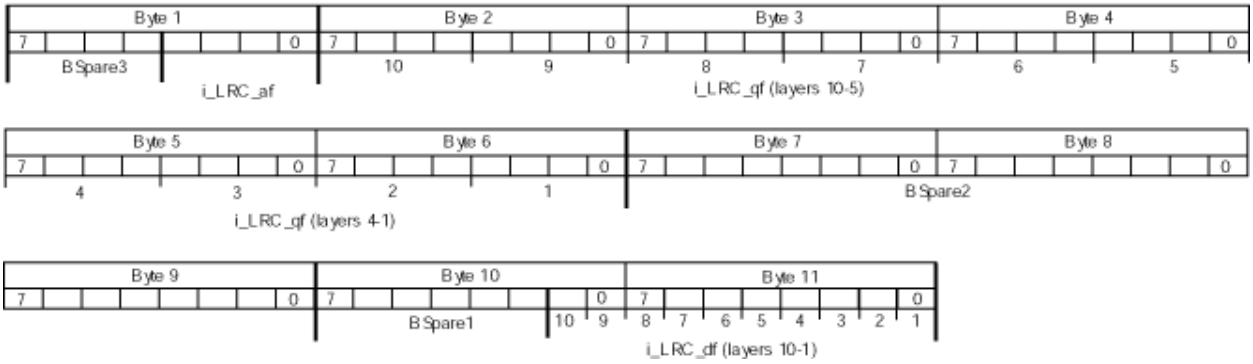
**Description: Composite Flag - see Breakout for details**

**i_LRCL_Flag [GLA09]: Low Resolution Cloud Layer Flag** (4 seconds per record, at once per 4 second rate)

af = availability flag: Tells how many cloud layers were found at this resolution from the 532 nm channel.
value 15 = cloud layers were not searched for; value 0 = cloud layers were searched for, but not detected

qf=quality flag: value 15 = cloud layers were not searched for - either bad data or cloud layers were not found at a coaser resolution; value 1 = low chance of being a cloud; value 2 = moderate; value 3 = high; value 4 = no doubt -- based upon noise-to-signal and geometric thickness evaluation; Value 14 = height of bottom of lowest detected layer in profile very uncertain because ground signal was not detected.

df = diurnal flag: This tells whether a given layer would be detected during normal daylight conditions. value 0 = layer would not have been detected in typical daytime background; value 1 = layer would have been detected in daylight




**Comments:**

**Product Var Name: i_LRcld_bot**

**Is element of: GLA09 Record**

**Short Description: Low Resolution Cloud Bottom at 532 nm**

**Product Data Type: i2b (10)**

**Total Bytes: 20**

**Product Units: deka-meters**

**Invalid Value/Flag: i_LRC_af**

**Is Correction Flag?: NA**

**Is Unsigned?: No**

**Product Minimum: -100**

**Product Maximum: 2000**

**Description: Low resolution height above the reference ellipsoid of the bottom of a cirrus, thin, or dense cloud layer in the atmosphere. There can be up to 10 cloud layers in an atmospheric profile. The low resolution data occurs at the rate of once per 4 seconds.**

**Comments:**

**Product Var Name: i_LRcld_grd**

**Is element of: GLA09 Record**

**Short Description: Low Resolution Ground Detection at 532 nm**

**Product Data Type: i2b**

**Total Bytes: 2**

**Product Units: deka-meters**

**Invalid Value/Flag: gi_invalid_i2b**

**Is Correction Flag?: NA**

**Is Unsigned?: No**

**Product Minimum: -127**

**Product Maximum: 1000**

**Description: The height from the reference ellipsoid of the ground as detected by the low resolution cloud processing algorithms. A value of -127 indicates that the ground was searched for, but not detected.**

**Comments:**

**Product Var Name: i_LRcld_top**

**Is element of: GLA09 Record**

**Short Description: Low Resolution Cloud Top at 532 nm**

**Product Data Type: i2b (10)**

**Total Bytes: 20**

**Product Units: deka-meters**

**Invalid Value/Flag: i_LRC_af**

**Is Correction Flag?: NA**

**Is Unsigned?: No**

**Product Minimum: -100**

**Product Maximum: 2000**

**Description: Low resolution height above the reference ellipsoid of the top of a cirrus, thin, or dense cloud layer in the atmosphere. There can be up to 10 cloud layers in an atmospheric profile. The low resolution data occurs at the rate of once per 4 seconds.**

**Comments:**

**Product Var Name: i_LRg_SourceFt**

**Is element of: GLA09 Record**

**Short Description: Low Resolution Data 532 nm Source Function**

**Product Data Type: i2b**

**Total Bytes: 2**

**Product Units: Unknown**

**Invalid Value/Flag: gi_invalid_i2b**

**Is Correction Flag?: NA**

**Is Unsigned?: No**

**Product Minimum: 0**

**Product Maximum: 0**

**Description: Low Resolution Data 532 nm Source Function**

**Comments:**

**Product Var Name: i_LRg_cldbot_pres**

**Is element of: GLA09 Record**

**Short Description: Low Resolution 532 nm Cloud Bottom Pressure**

**Product Data Type: i2b ( 10)**

**Total Bytes: 20**

**Product Units: millibars * 10**

**Invalid Value/Flag: gi_invalid_i2b**

**Is Correction Flag?: NA**

**Is Unsigned?: No**

**Product Minimum: 0**

**Product Maximum: 20000**

**Description: Low Resolution 532 nm Cloud Bottom Pressure**

**Comments:**

**Product Var Name: i_LRg_cldbot_relh**

**Is element of: GLA09 Record**

**Short Description: Low Resolution 532 nm Cloud Bottom Relative Humidity**

**Product Data Type: i2b ( 10)**

**Total Bytes: 20**

**Product Units: percentage * 100**

**Invalid Value/Flag: gi_invalid_i2b**

**Is Correction Flag?: NA**

**Is Unsigned?: No**

**Product Minimum: 0**

**Product Maximum: 10000**

**Description: Low Resolution 532 nm Cloud Bottom Relative Humidity**

**Comments:**

**Product Var Name: i_LRg_cldbot_temp**

**Is element of: GLA09 Record**

**Short Description: Low Resolution 532 nm Cloud Bottom Temperature**

**Product Data Type: i2b ( 10)**

**Total Bytes: 20**

**Product Units: degrees Celsius * 100**

**Invalid Value/Flag: gi_invalid_i2b**

**Is Correction Flag?: NA**

**Is Unsigned?: No**

**Product Minimum: -10000**

**Product Maximum: 10000**

**Description: Low Resolution 532 nm Cloud Bottom Temperature**

**Comments:**

**Product Var Name: i_LRg_cldtop_pres**

**Is element of: GLA09 Record**

**Short Description: Low Resolution 532 nm Cloud Top Pressure**

**Product Data Type: i2b ( 10)**

**Total Bytes: 20**

**Product Units: millibars * 10**

**Invalid Value/Flag: gi_invalid_i2b**

**Is Correction Flag?: NA**

**Is Unsigned?: No**

**Product Minimum: 0**

**Product Maximum: 20000**

**Description: Low Resolution 532 nm Cloud Top Pressure**

**Comments:**

**Product Var Name: i_LRg_cldtop_relh**

**Is element of: GLA09 Record**

**Short Description: Low Resolution 532 nm Cloud Top Relative Humidity**

**Product Data Type: i2b ( 10)**

**Total Bytes: 20**

**Product Units: percentage * 100**

**Invalid Value/Flag: gi_invalid_i2b**

**Is Correction Flag?: NA**

**Is Unsigned?: No**

**Product Minimum: 0**

**Product Maximum: 10000**

**Description: Low Resolution 532 nm Cloud Top Relative Humidity**

**Comments:**

**Product Var Name: i_LRg_cldtop_temp**

**Is element of: GLA09 Record**

**Short Description: Low Resolution 532 nm Cloud Top Temperature**

**Product Data Type: i2b ( 10)**

**Total Bytes: 20**

**Product Units: degrees Celsius * 100**

**Invalid Value/Flag: gi_invalid_i2b**

**Is Correction Flag?: NA**

**Is Unsigned?: No**

**Product Minimum: -10000**

**Product Maximum: 10000**

**Description: Low Resolution 532 nm Cloud Top Temperature**

**Comments:**

**Product Var Name: i_LRir_QAflag**

**Is element of: GLA09 Record**

**Short Description: Low Resolution 1064 nm Cloud Layer QA Flag**

**Product Data Type: i1b ( 10)**

**Total Bytes: 10**

**Product Units: NA**

**Invalid Value/Flag: No**

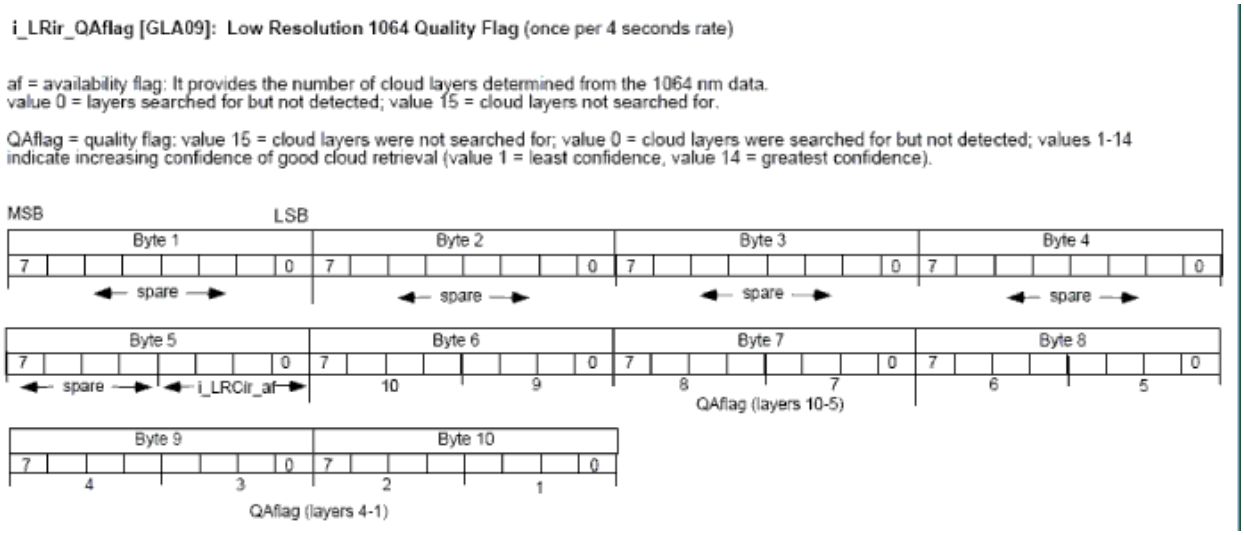
**Is Correction Flag?: NA**

**Is Unsigned?: No**

**Product Minimum: 0**

**Product Maximum: 256**

**Description: Low Resolution 1064 nm Cloud Layer QA Flag. Composite Flag - see Breakout for details**




**The data is arranged in 10 bytes. Within the 10 bytes:**

**bytes 1-4 are spares**

**byte 5 leaves bits 4-7 as spare, and stores the af availabilty flag in**

**bits 0-3; it provides the number of cloud layers determined**

**from 1064 nm data, with 0=layers searched for but not**

**detected and 15=cloud layers not searched for**

**bytes 6-10 are 10 flags, each 4 bits in length giving a quality flag;**

**15=cloud layers were not searched for, 0=cloud layers searched**

**for but not detected, 1= low chance of being a cloud,**

**2=moderate, 3=high, 4=no doubt**

**Comments:**

**Product Var Name: i_LRir_SourceFt**

**Is element of: GLA09 Record**

**Short Description: Low Resolution Data 1064 nm Source Function**

**Product Data Type: i2b**

**Total Bytes: 2**

**Product Units: Unknown**

**Invalid Value/Flag: gi_invalid_i2b**

**Is Correction Flag?: NA**

**Is Unsigned?: No**

**Product Minimum: 0**

**Product Maximum: 0**

**Description: Low Resolution Data 1064 nm Source Function**

**Comments:**

**Product Var Name: i_LRir_cld_bot**

**Is element of: GLA09 Record**

**Short Description: Elevation of Bottom of Cloud Layers Detected in 1064 nm at Low Resolution**

**Product Data Type: i2b ( 10)**

**Total Bytes: 20**

**Product Units: deka-meters**

**Invalid Value/Flag: gi_invalid_i2b**

**Is Correction Flag?: NA**

**Is Unsigned?: No**

**Product Minimum: -100**

**Product Maximum: 2200**

**Description: Elevation of Bottom of Cloud Layers Detected in 1064 nm at Low Resolution data rate (1 per 4 sec).**

**Comments:**

**Product Var Name: i_LRir_cld_top**

**Is element of: GLA09 Record**

**Short Description: Elevation of Top of Cloud Layers Detected in 1064 nm at Low Resolution**

**Product Data Type: i2b ( 10)**

**Total Bytes: 20**

**Product Units: deka-meters**

**Invalid Value/Flag: gi_invalid_i2b**

**Is Correction Flag?: NA**

**Is Unsigned?: No**

**Product Minimum: -100**

**Product Maximum: 2200**

**Description: Elevation of top of cloud layers detected in 1064 nm at low resolution data rate (1 per 4 sec).**

**Comments:**

**Product Var Name: i_LRir_cldbot_pres**

**Is element of: GLA09 Record**

**Short Description: Pressure of Bottom of Cloud Layers Detected in 1064 nm at Low Resolution**

**Product Data Type: i2b ( 10)**

**Total Bytes: 20**

**Product Units: millibars * 10**

**Invalid Value/Flag: gi_invalid_i2b**

**Is Correction Flag?: NA**

**Is Unsigned?: No**

**Product Minimum: 0**

**Product Maximum: 20000**

**Description: Pressure of Bottom of Cloud Layers Detected in 1064 nm at Low Resolution data rate (1 per 4 sec).**

**Comments:**

**Product Var Name: i_LRir_cldbot_relh**

**Is element of: GLA09 Record**

**Short Description: Relative Humidity of Bottom of Cloud Layers Detected in 1064 nm Low Resolution**

**Product Data Type: i2b ( 10)**

**Total Bytes: 20**

**Product Units: percentage * 100**

**Invalid Value/Flag: gi_invalid_i2b**

**Is Correction Flag?: NA**

**Is Unsigned?: No**

**Product Minimum: 0**

**Product Maximum: 10000**

**Description: Relative Humidity of Bottom of Cloud Layers Detected in 1064 nm Low Resolution data rate (1 per 4 sec).**

**Comments:**

**Product Var Name: i_LRir_cldbot_temp**

**Is element of: GLA09 Record**

**Short Description: Temperature of Bottom of Cloud Layers Detected in 1064 nm at Low Resolution**

**Product Data Type: i2b ( 10)**

**Total Bytes: 20**

**Product Units: degrees Celsius * 100**

**Invalid Value/Flag: gi_invalid_i2b**

**Is Correction Flag?: NA**

**Is Unsigned?: No**

**Product Minimum: -10000**

**Product Maximum: 10000**

**Description: Temperature of Bottom of Cloud Layers Detected in 1064 nm at Low Resolution data rate (1 per 4 sec).**

**Comments:**

**Product Var Name: i_LRir_cldtop_pres**

**Is element of: GLA09 Record**

**Short Description: Pressure of Top of Cloud Layers Detected in 1064 nm at Low Resolution**

**Product Data Type: i2b ( 10)**

**Total Bytes: 20**

**Product Units: millibars * 10**

**Invalid Value/Flag: gi_invalid_i2b**

**Is Correction Flag?: NA**

**Is Unsigned?: No**

**Product Minimum: 0**

**Product Maximum: 20000**

**Description: Pressure of Top of Cloud Layers Detected in 1064 nm at Low Resolution data rate (1 per 4 sec).**

**Comments:**

**Product Var Name: i_LRir_cldtop_relh**

**Is element of: GLA09 Record**

**Short Description: Relative Humidity of Top of Cloud Layers Detected in 1064 nm at Low Resolution**

**Product Data Type: i2b ( 10)**

**Total Bytes: 20**

**Product Units: percentage * 100**

**Invalid Value/Flag: gi_invalid_i2b**

**Is Correction Flag?: NA**

**Is Unsigned?: No**

**Product Minimum: 0**

**Product Maximum: 10000**

**Description: Relative Humidity of Top of Cloud Layers Detected in 1064 nm at Low Resolution data rate (1 per 4 sec).**

**Comments:**

**Product Var Name: i_LRir_cldtop_temp**

**Is element of: GLA09 Record**

**Short Description: Temperature of Top of Cloud Layers Detected in 1064 nm at Low Resolution**

**Product Data Type: i2b ( 10)**

**Total Bytes: 20**

**Product Units: degrees Celsius * 100**

**Invalid Value/Flag: gi_invalid_i2b**

**Is Correction Flag?: NA**

**Is Unsigned?: No**

**Product Minimum: -10000**

**Product Maximum: 10000**

**Description: Temperature of Top of Cloud Layers Detected in 1064 nm at Low Resolution data rate (1 per 4 sec).**

**Comments:**

**Product Var Name: i_LRpbl_grd**

**Is element of: GLA08 Record**

**Short Description: Ground Detection for Low Res PBL at 532 nm**

**Product Data Type: i2b**

**Total Bytes: 2**

**Product Units: deka-meters**

**Invalid Value/Flag: gi_invalid_i2b**

**Is Correction Flag?: NA**

**Is Unsigned?: No**

**Product Minimum: -100**

**Product Maximum: 1000**

**Description: The height above the reference ellipsoid of the ground used by the low res PBL processing algorithms.**

**Comments:**

**Product Var Name: i_LRpbl_ht**

**Is element of: GLA08 Record**

**Short Description: Low Resolution PBL Height at 532 nm**

**Product Data Type: i2b**

**Total Bytes: 2**

**Product Units: deka-meters**

**Invalid Value/Flag: gi_invalid_i2b**

**Is Correction Flag?: NA**

**Is Unsigned?: No**

**Product Minimum: -100**

**Product Maximum: 700**

**Description: Low resolution height of the planetary boundary layer, as derived from the aerosol structure; the low resolution data is averaged over 4 seconds.**

**Comments:**

**Product Var Name: i_LRpbl_pct**

**Is element of: GLA08 Record**

**Short Description: Percentage of Saturated Bins in Low Resolution PBL Layer at 532 nm**

**Product Data Type: i1b**

**Total Bytes: 1**

**Product Units: unitless**

**Invalid Value/Flag: gi_invalid_i1b**

**Is Correction Flag?: NA**

**Is Unsigned?: No**

**Product Minimum: 0**

**Product Maximum: 100**

**Description: Percentage of Saturated Bins in Low Resolution PBL Layer at 532 nm**

**Comments:**

**Product Var Name: i_LayHgt_Flag**

**Is element of: GLA08 Record**

**Short Description: Layer Height Flag**

**Product Data Type: i1b ( 32)**

**Total Bytes: 32**

**Product Units: NA**

**Invalid Value/Flag: No**

**Is Correction Flag?: NA**

**Is Unsigned?: No**

**Product Minimum: 0**

**Product Maximum: 15**

## Description: Composite Flag - see Breakout for details

**i_LayHgt_Flag [GLA08]: Layer Height Flag**



i_pscf: value 0 = not a Polar Stratospheric Cloud (PSC); value 1 = low likely; value 2 = medium likely; value 3 = high likely

i20_aer_qf = quality flag at 1 per 20 sec: value 0 = aerosol layers were searched for, but not detected; values 1 to 13 = increasing goodness; value 14 = bad; value 15 = upper (>20 km) aerosol layers were not searched for

i20_aer_af = availability flag at 1 per 20 sec: Contains the number of aerosol layers found above 20 km from a 20 second average of the data. Value 0 = aerosol layers were searched for, but not detected; value 15 = aerosol layers were not searched for.

i20_aer_uf = use flag at 1 per 20 sec: value 0 = no saturated bins present in layer; value 1 = saturated bins present in layer and replaced with 1064 data; value 2 = saturated bins present in layer and not replaced with 1064 data

i4_aer_qf = quality flag at 1 per 4 sec: value 0 = aerosol layers were searched for, but not detected; values 1 to 13 = increasing goodness; value 14 = bad; value 15 = lower (<20 km) aerosol layers were not searched for

i4_aer_af = availability flag at 1 per 4 sec: Contains the number of elevated (excluding PBL) aerosol layers found below 20 km from a 4 second average of the data. Value 0 = aerosol layers were searched for, but not detected; value 15 = aerosol layers were not searched for.

i4_aer_uf = use flag at 1 per 4 sec: value 0 = no saturated bins present in layer; value 1 = saturated bins present in layer and replaced with 1064 data; value 2 = saturated bins present in layer and not replaced with 1064 data

i_HRpbl_qf = quality flag at 5Hz for 4 sec: value 0 = PBL was searched for, but not detected; values 1 to 13 = increasing goodness; value 14 = bad; value 15 = PBL not searched for

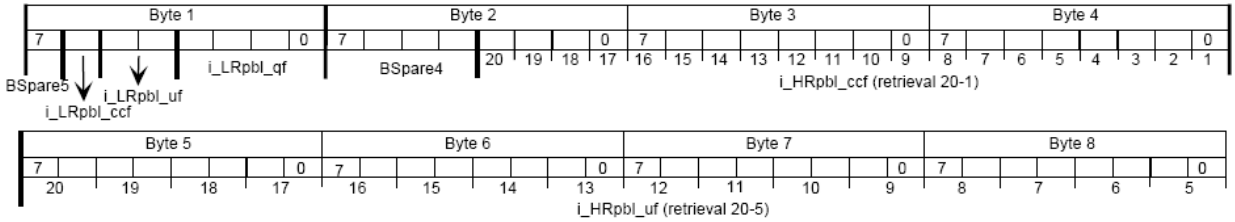
i_HRpbl_uf = use flag at 5Hz for 4 sec: value 0 = no saturated bins present in layer; value 1 = saturated bins present in layer and replaced with 1064 data; value 2 = saturated bins present in layer and not replaced with 1064 data

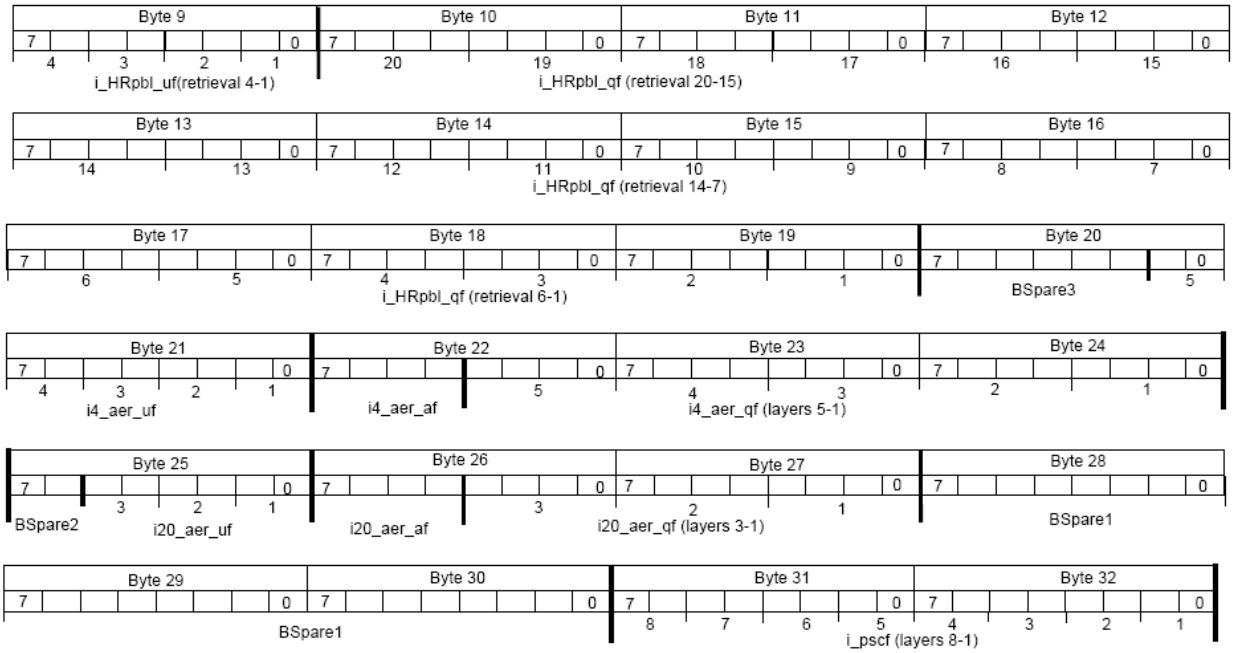
i_HRpbl_ccf = clear/cloudy flag at 5Hz for 4 sec: value 0 = clear; value 1 = cloudy

i_LRpbl_qf = quality flag at 1 per 4 sec: value 0 = PBL was searched for, but not detected; values 1 to 13 = increasing goodness; value 14 = bad; value 15 = PBL not searched for

i_LRpbl_uf = use flag at 1 per 4 sec: value 0 = no saturated bins present in layer; value 1 = saturated bins present in layer and replaced with 1064 data; value 2 = saturated bins present in layer and not replaced with 1064 data

i_LRpbl_ccf = clear/cloudy flag at 1 per 4 sec: value 0 = clear; value 1 = cloudy






**Comments:**

**Product Var Name: i_LidarQF**

**Is element of: GLA07 Record**

**Short Description: Lidar Frame quality flag**

**Product Data Type: i2b**

**Total Bytes: 2**

**Product Units: NA**

**Invalid Value/Flag: No**

**Is Correction Flag?: NA**

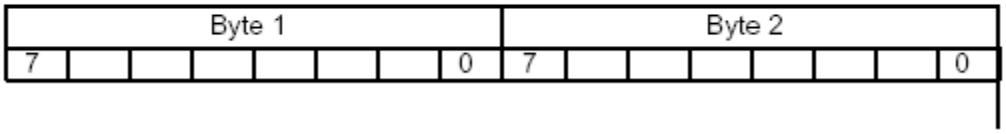
**Is Unsigned?: Yes**

**Product Minimum: 0**

**Product Maximum: 1**

**Description: Composite Flag - see Common Flag Spreadsheet for details**

**i_LidarQF** [1/sec for GLA07], [1/4 sec for GLA08-11]: Lidar Frame Quality Flag




**Comments:**

**Product Var Name: i_LidarQF**

**Is element of: GLA08 Record, GLA09 Record, GLA10 record, GLA11 Record**

**Short Description: Lidar Frame quality flag**

**Product Data Type: i2b ( 4)**

**Total Bytes: 8**

**Product Units: NA**

**Invalid Value/Flag: No**

**Is Correction Flag?: NA**

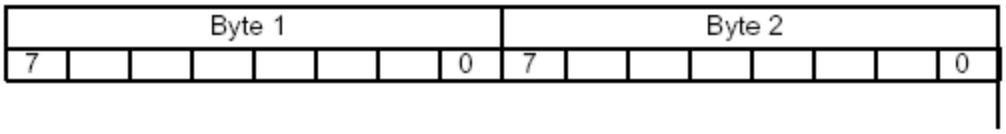
**Is Unsigned?: No**

**Product Minimum: null**

**Product Maximum: null**

**Description: Composite Flag - see Common Flag Spreadsheet for details**

**i_LidarQF** [1/sec for GLA07], [1/4 sec for GLA08-11]: Lidar Frame Quality Flag




**Comments:**

**Product Var Name: i_MRCL_Flag**

**Is element of: GLA09 Record**

**Short Description: Medium Resolution Cloud Layers Flag for 532 nm**

**Product Data Type: i1b ( 37)**

**Total Bytes: 37**

**Product Units: NA**

**Invalid Value/Flag: No**

**Is Correction Flag?: NA**

**Is Unsigned?: No**

**Product Minimum: 0**

**Product Maximum: 15**

**Description: Composite Flag - see Breakout for details**

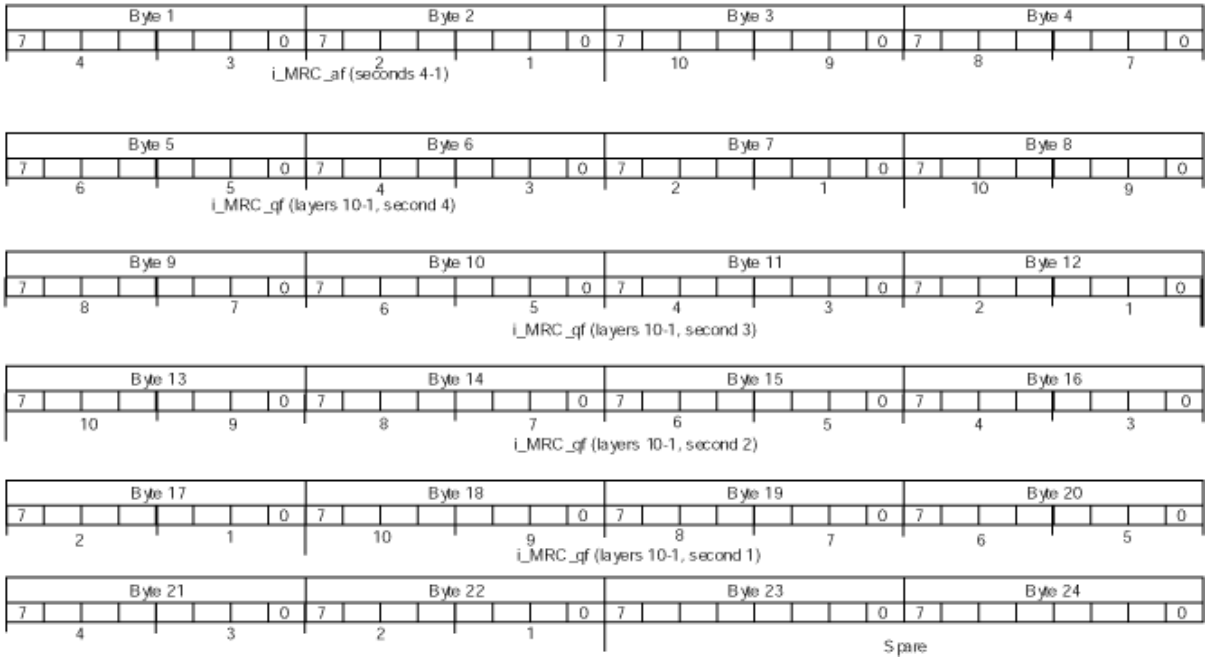
**i_MRCL_Flag [GLA09]: Medium Resolution Cloud Layer Flag** (4 seconds per record, at once per second rate)

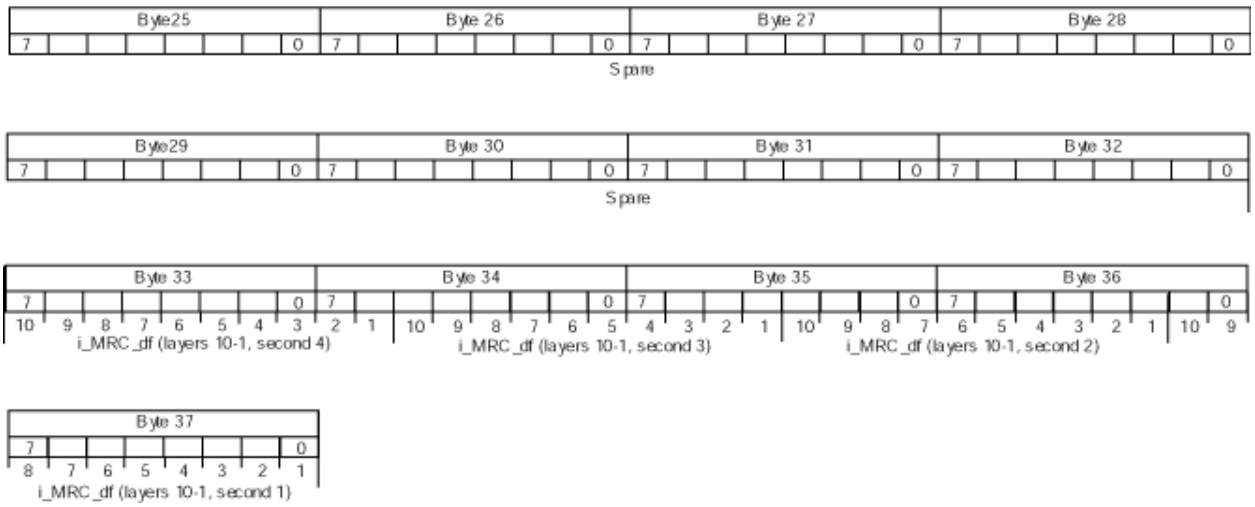


af = availability flag: Tells how many cloud layers were found at this resolution from the 532 nm channel.
value 15 = cloud layers were not searched for; value 0 = cloud layers were searched for, but not detected

qf=quality flag: value 15 = cloud layers were not searched for - either bad data or cloud layers were not found at a coaser resolution; value 1 = low chance of being a cloud; value 2 = moderate; value 3 = high; value 4 = no doubt -- based upon noise-to-signal and geometric thickness evaluation; Value 14 = height of bottom of lowest detected layer in profile very uncertain because ground signal was not detected.

df = diurnal flag: This tells whether a given layer would be detected during normal daylight conditions. value 0 = layer would not have been detected in typical daytime background; value 1 = layer would have been detected in daylight






**Comments:**

**Product Var Name: i_MRcld_bot**

**Is element of: GLA09 Record**

**Short Description: Medium Resolution Cloud Bottom at 532 nm**

**Product Data Type: i2b (10, 4)**

**Total Bytes: 80**

**Product Units: deka-meters**

**Invalid Value/Flag: i_MRC_af**

**Is Correction Flag?: NA**

**Is Unsigned?: No**

**Product Minimum: -100**

**Product Maximum: 2000**

**Description: Medium resolution height above the reference ellipsoid of the bottom of a cirrus, thin, or dense cloud layer in the atmosphere. There can be up to 10 cloud layers in an atmospheric profile. The medium resolution data occurs at the rate of once per second.**

**Comments:**

**Product Var Name: i_MRcld_grd**

**Is element of: GLA09 Record**

**Short Description: Medium Resolution Ground Detection at 532 nm**

**Product Data Type: i2b ( 4)**

**Total Bytes: 8**

**Product Units: deka-meters**

**Invalid Value/Flag: gi_invalid_i2b**

**Is Correction Flag?: NA**

**Is Unsigned?: No**

**Product Minimum: -127**

**Product Maximum: 1000**

**Description: The height above the reference ellipsoid of the ground as detected by the medium resolution cloud processing algorithms. A value of -127 indicates that the ground was searched for, but not detected.**

**Comments:**

**Product Var Name: i_MRcld_pct**

**Is element of: GLA09 Record**

**Short Description: Percentage of Saturated Bins in Medium Resolution Cloud Layers at 532 nm**

**Product Data Type: i1b (10, 4)**

**Total Bytes: 40**

**Product Units: unitless**

**Invalid Value/Flag: i_MRC_af**

**Is Correction Flag?: NA**

**Is Unsigned?: No**

**Product Minimum: 0**

**Product Maximum: 100**

**Description: Percentage of saturated bins in medium resolution cloud layers**

**Comments:**

**Product Var Name: i_MRcld_top**

**Is element of: GLA09 Record**

**Short Description: Medium Resolution Cloud Top at 532 nm**

**Product Data Type: i2b (10, 4)**

**Total Bytes: 80**

**Product Units: deka-meters**

**Invalid Value/Flag: i_MRC_af**

**Is Correction Flag?: NA**

**Is Unsigned?: No**

**Product Minimum: -100**

**Product Maximum: 2000**

**Description: Medium resolution height above the reference ellipsoid of the top of a cirrus, thin, or dense cloud layer in the atmosphere. There can be up to 10 cloud layers in an atmospheric profile. The medium resolution data occurs at the rate of once per second.**

**Comments:**

**Product Var Name: i_MRg_SourceFt**

**Is element of: GLA09 Record**

**Short Description: Medium Resolution Data 532 nm Source Function**

**Product Data Type: i2b ( 4)**

**Total Bytes: 8**

**Product Units: Unknown**

**Invalid Value/Flag: gi_invalid_i2b**

**Is Correction Flag?: NA**

**Is Unsigned?: No**

**Product Minimum: 0**

**Product Maximum: 0**

**Description: Medium Resolution Data 532 nm Source Function**

**Comments:**

**Product Var Name: i_MRg_cldbot_pres**

**Is element of: GLA09 Record, GLA10 record, GLA11 Record**

**Short Description: Medium Resolution 532 nm Cloud Bottom Pressure**

**Product Data Type: i2b (10, 4)**

**Total Bytes: 80**

**Product Units: millibars * 10**

**Invalid Value/Flag: gi_invalid_i2b**

**Is Correction Flag?: NA**

**Is Unsigned?: No**

**Product Minimum: 0**

**Product Maximum: 20000**

**Description: Medium Resolution 532 nm Cloud Bottom Pressure**

**Comments:**

**Product Var Name: i_MRg_cldbot_relh**

**Is element of: GLA09 Record, GLA10 record, GLA11 Record**

**Short Description: Medium Resolution 532 nm Cloud Bottom Relative Humidity**

**Product Data Type: i2b (10, 4)**

**Total Bytes: 80**

**Product Units: percentage * 100**

**Invalid Value/Flag: gi_invalid_i2b**

**Is Correction Flag?: NA**

**Is Unsigned?: No**

**Product Minimum: 0**

**Product Maximum: 10000**

**Description: Medium Resolution 532 nm Cloud Bottom Relative Humidity**

**Comments:**

**Product Var Name: i_MRg_cldbot_temp**

**Is element of: GLA09 Record, GLA10 record, GLA11 Record**

**Short Description: Medium Resolution 532 nm Cloud Bottom Temperature**

**Product Data Type: i2b (10, 4)**

**Total Bytes: 80**

**Product Units: degrees Celsius * 100**

**Invalid Value/Flag: gi_invalid_i2b**

**Is Correction Flag?: NA**

**Is Unsigned?: No**

**Product Minimum: -10000**

**Product Maximum: 10000**

**Description: Medium Resolution 532 nm Cloud Bottom Temperature**

**Comments:**

**Product Var Name: i_MRg_cldtop_pres**

**Is element of: GLA09 Record, GLA10 record, GLA11 Record**

**Short Description: Medium Resolution 532 nm Cloud Top Pressure**

**Product Data Type: i2b (10, 4)**

**Total Bytes: 80**

**Product Units: millibars * 10**

**Invalid Value/Flag: gi_invalid_i2b**

**Is Correction Flag?: NA**

**Is Unsigned?: No**

**Product Minimum: 0**

**Product Maximum: 20000**

**Description: Medium Resolution 532 nm Cloud Top Pressure**

**Comments:**

**Product Var Name: i_MRg_cldtop_relh**

**Is element of: GLA09 Record, GLA10 record, GLA11 Record**

**Short Description: Medium Resolution 532 nm Cloud Top Relative Humidity**

**Product Data Type: i2b (10, 4)**

**Total Bytes: 80**

**Product Units: percentage * 100**

**Invalid Value/Flag: gi_invalid_i2b**

**Is Correction Flag?: NA**

**Is Unsigned?: No**

**Product Minimum: 0**

**Product Maximum: 10000**

**Description: Medium Resolution 532 nm Cloud Top Relative Humidity**

**Comments:**

**Product Var Name: i_MRg_cldtop_temp**

**Is element of: GLA09 Record, GLA10 record, GLA11 Record**

**Short Description: Medium Resolution 532 nm Cloud Top Temperature**

**Product Data Type: i2b (10, 4)**

**Total Bytes: 80**

**Product Units: degrees Celsius * 100**

**Invalid Value/Flag: gi_invalid_i2b**

**Is Correction Flag?: NA**

**Is Unsigned?: No**

**Product Minimum: -10000**

**Product Maximum: 10000**

**Description: Medium Resolution 532 nm Cloud Top Temperature**

**Comments:**

**Product Var Name: i_MRir_QAflag**

**Is element of: GLA09 Record, GLA11 Record**

**Short Description: Medium Resolution 1064 nm Cloud Layer QA Flag**

**Product Data Type: i1b ( 40)**

**Total Bytes: 40**

**Product Units: NA**

**Invalid Value/Flag: No**

**Is Correction Flag?: NA**

**Is Unsigned?: No**

**Product Minimum: 0**

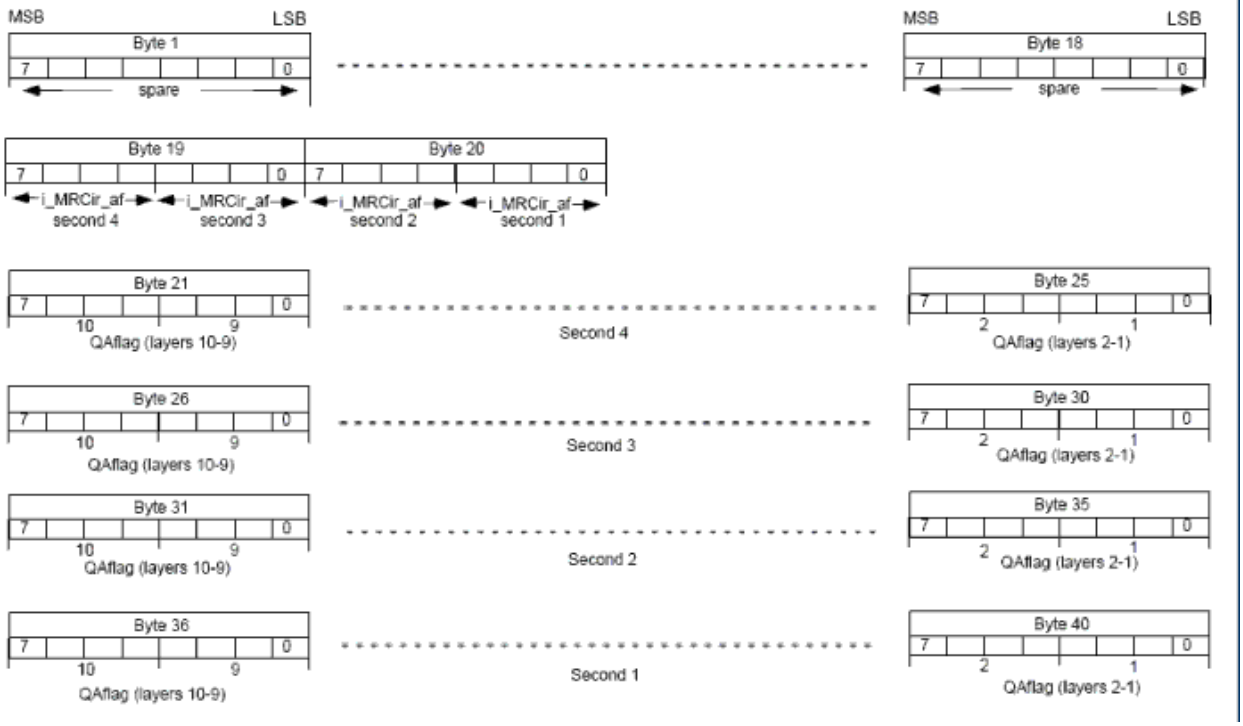
**Product Maximum: 20000**

**Description: Medium Resolution 1064 nm Cloud Layer QA Flag. Composite Flag - see Breakout for details**

**i_MRir_QAflag [GLA09, 11]: Medium Resolution 1064 Quality Flag** (4 seconds per record, at once per second rate)

af = availability flag: It provides the number of cloud layers determined from the 1064 nm data.
value 0 = layers searched for but not detected; value 15 = cloud layers not searched for.

QAflag = quality flag: value 15 = cloud layers were not searched for; value 0 = cloud layers were searched for but not detected; values 1-14 indicate increasing confidence of good cloud retrieval (value 1 = least confidence, value 14 = greatest confidence).




**The data is arranged in 40 bytes.**

**bytes 1-18 are spares:**

**bytes 19-20 are af flags: The 4 'af' flags (4 bits each) are concatenated with the QAflag storage and are contained in bytes 19-20 starting at bit 0 of byte 20.**

**bytes 21-40 are QAflags: The QAflag portion has been stored such that interval 1 is in bytes 40-36, interval 2 in bytes 35-31, interval 3 in bytes 30-26, and interval 4 in bytes 25-21. Each of the 10 layer flags per interval is 4 bits in length as before, such that interval 1 layer 1 is in bits 0-3 and interval 1 layer 2 is in bits 4-7 of byte 40, interval 1 layer 3 is in bits 0-3 and interval 1 layer 4 is in bits 4-7 of byte 39, etc.**

**Quality flag value 15=cloud layers were not searched for; 0=cloud layers were searched but not detected; 1-14 indicate increasing confidence of good cloud retrieval (value 1=least confidence, value 14=greatest confidence).**

**Availability flag value 15=cloud layers not searched for; 0=layers searched for but not detected.**

**Comments:**

**Product Var Name: i_MRir_SourceFt**

**Is element of: GLA09 Record**

**Short Description: Medium Resolution Data 1064 nm Source Function**

**Product Data Type: i2b ( 4)**

**Total Bytes: 8**

**Product Units: Unknown**

**Invalid Value/Flag: gi_invalid_i2b**

**Is Correction Flag?: NA**

**Is Unsigned?: No**

**Product Minimum: 0**

**Product Maximum: 0**

**Description: Medium Resolution Data 1064 nm Source FunctionComments:**

**Product Var Name: i_MRir_cld_bot**

**Is element of: GLA09 Record, GLA11 Record**

**Short Description: Elevation of Bottom of Cloud Layers Detected in 1064 nm at Medium Resolution**

**Product Data Type: i2b (10, 4)**

**Total Bytes: 80**

**Product Units: deka-meters**

**Invalid Value/Flag: gi_invalid_i2b**

**Is Correction Flag?: NA**

**Is Unsigned?: No**

**Product Minimum: -100**

**Product Maximum: 2200**

**Description: Elevation of Bottom of Cloud Layers Detected in 1064 nm at Medium Resolution data rate.**

**Comments:**

**Product Var Name: i_MRir_cld_top**

**Is element of: GLA09 Record, GLA11 Record**

**Short Description: Elevation of Top of Cloud Layers Detected in 1064 nm at Medium Resolution**

**Product Data Type: i2b (10, 4)**

**Total Bytes: 80**

**Product Units: deka-meters**

**Invalid Value/Flag: gi_invalid_i2b**

**Is Correction Flag?: NA**

**Is Unsigned?: No**

**Product Minimum: -100**

**Product Maximum: 2200**

**Description: Elevation of Top of Cloud Layers Detected in 1064 nm at Medium Resolution data rate.**

**Comments:**

**Product Var Name: i_MRir_cldbot_pres**

**Is element of: GLA09 Record, GLA11 Record**

**Short Description: Pressure of Bottom of Cloud Layers Detected in 1064 nm at Medium Resolution**

**Product Data Type: i2b (10, 4)**

**Total Bytes: 80**

**Product Units: millibars * 10**

**Invalid Value/Flag: gi_invalid_i2b**

**Is Correction Flag?: NA**

**Is Unsigned?: No**

**Product Minimum: 0**

**Product Maximum: 20000**

**Description: Pressure of Bottom of Cloud Layers Detected in 1064 nm at Medium Resolution data rate.**

**Comments:**

**Product Var Name: i_MRir_cldbot_relh**

**Is element of: GLA09 Record, GLA11 Record**

**Short Description: Relative Humidity of Bottom of Cloud Layers Detected in 1064 nm at MR**

**Product Data Type: i2b (10, 4)**

**Total Bytes: 80**

**Product Units: percentage * 100**

**Invalid Value/Flag: gi_invalid_i2b**

**Is Correction Flag?: NA**

**Is Unsigned?: No**

**Product Minimum: 0**

**Product Maximum: 10000**

**Description: Relative Humidity of Bottom of Cloud Layers Detected in 1064 nm at Medium Resolution data rate.**

**Comments:**

**Product Var Name: i_MRir_cldbot_temp**

**Is element of: GLA09 Record, GLA11 Record**

**Short Description: Temperature of Bottom of Cloud Layers Detected in 1064 nm at Medium Resolution**

**Product Data Type: i2b (10, 4)**

**Total Bytes: 80**

**Product Units: degrees Celsius * 100**

**Invalid Value/Flag: gi_invalid_i2b**

**Is Correction Flag?: NA**

**Is Unsigned?: No**

**Product Minimum: -10000**

**Product Maximum: 10000**

**Description: Temperature of Bottom of Cloud Layers Detected in 1064 nm at Medium Resolution data rate.**

**Comments:**

**Product Var Name: i_MRir_cldtop_pres**

**Is element of: GLA09 Record, GLA11 Record**

**Short Description: Pressure of Top of Cloud Layers Detected in 1064 nm at Medium Resolution**

**Product Data Type: i2b (10, 4)**

**Total Bytes: 80**

**Product Units: millibars * 10**

**Invalid Value/Flag: gi_invalid_i2b**

**Is Correction Flag?: NA**

**Is Unsigned?: No**

**Product Minimum: 0**

**Product Maximum: 20000**

**Description: Pressure of Top of Cloud Layers Detected in 1064 nm at Medium Resolution data rate.**

**Comments:**

**Product Var Name: i_MRir_cldtop_relh**

**Is element of: GLA09 Record, GLA11 Record**

**Short Description: Relative Humidity of Top of Cloud Layers in 1064 nm at Medium Resolution**

**Product Data Type: i2b (10, 4)**

**Total Bytes: 80**

**Product Units: percentage * 100**

**Invalid Value/Flag: gi_invalid_i2b**

**Is Correction Flag?: NA**

**Is Unsigned?: No**

**Product Minimum: 0**

**Product Maximum: 10000**

**Description: Relative Humidity of Top of Cloud Layers in 1064 nm at Medium Resolution data rate.**

**Comments:**

**Product Var Name: i_MRir_cldtop_temp**

**Is element of: GLA09 Record, GLA11 Record**

**Short Description: Temperature of Top of Cloud Layers Detected in 1064 nm at Medium Resolution**

**Product Data Type: i2b (10, 4)**

**Total Bytes: 80**

**Product Units: degrees Celsius * 100**

**Invalid Value/Flag: gi_invalid_i2b**

**Is Correction Flag?: NA**

**Is Unsigned?: No**

**Product Minimum: -10000**

**Product Maximum: 10000**

**Description: Temperature of Top of Cloud Layers Detected in 1064 nm at Medium Resolution data rate.**

**Comments:**

**Product Var Name: i_OrbFlg**

**Is element of: GLA08 Record, GLA09 Record, GLA10 record, GLA11 Record**

**Short Description: Orbit flag**

**Product Data Type: i1b (2, 4)**

**Total Bytes: 8**

**Product Units: NA**

**Invalid Value/Flag: No**

**Is Correction Flag?: NA**

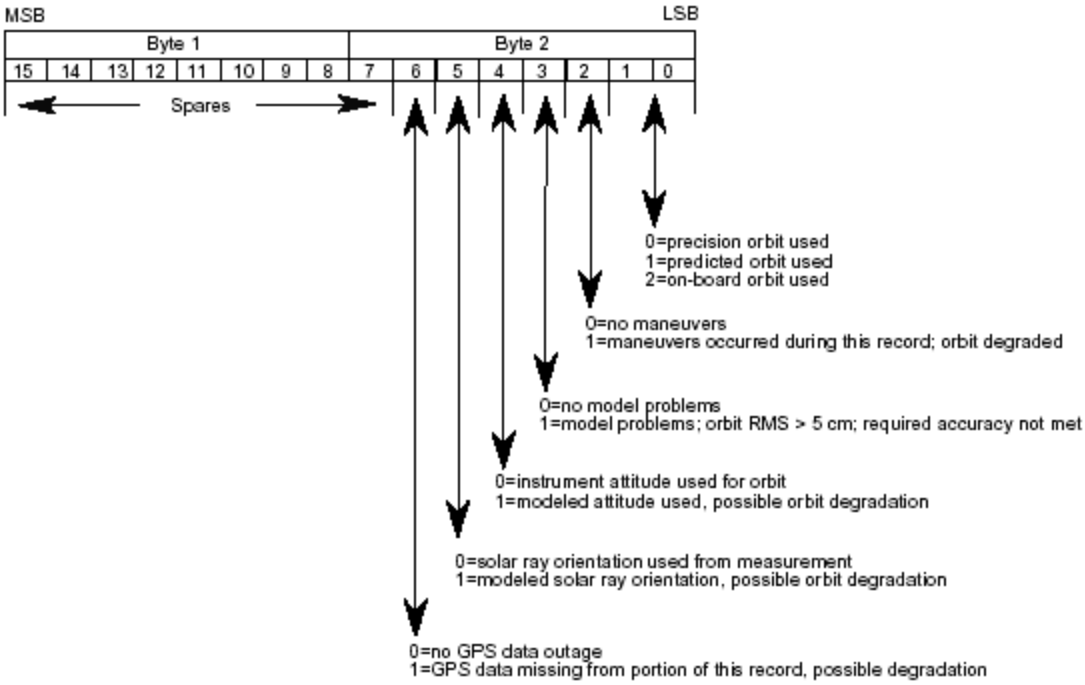
**Is Unsigned?: No**

**Product Minimum: 0**

**Product Maximum: 128**

**Description: Composite Flag - see Common Flag Spreadsheet for details**

i_OrbFlg [1/sec for GLA01, 02, 05-15]: Orbit Flag




**There are 4 sets of this flag value, 1/sec for each of the 4 sec covered in the record.**

**Comments:**

**Product Var Name: i_OrbFlg**

**Is element of: GLA02 Record, GLA07 Record**

**Short Description: POD flag (Orbit Flag)**

**Product Data Type: i1b (2)**

**Total Bytes: 2**

**Product Units: NA**

**Invalid Value/Flag: No**

**Is Correction Flag?: NA**

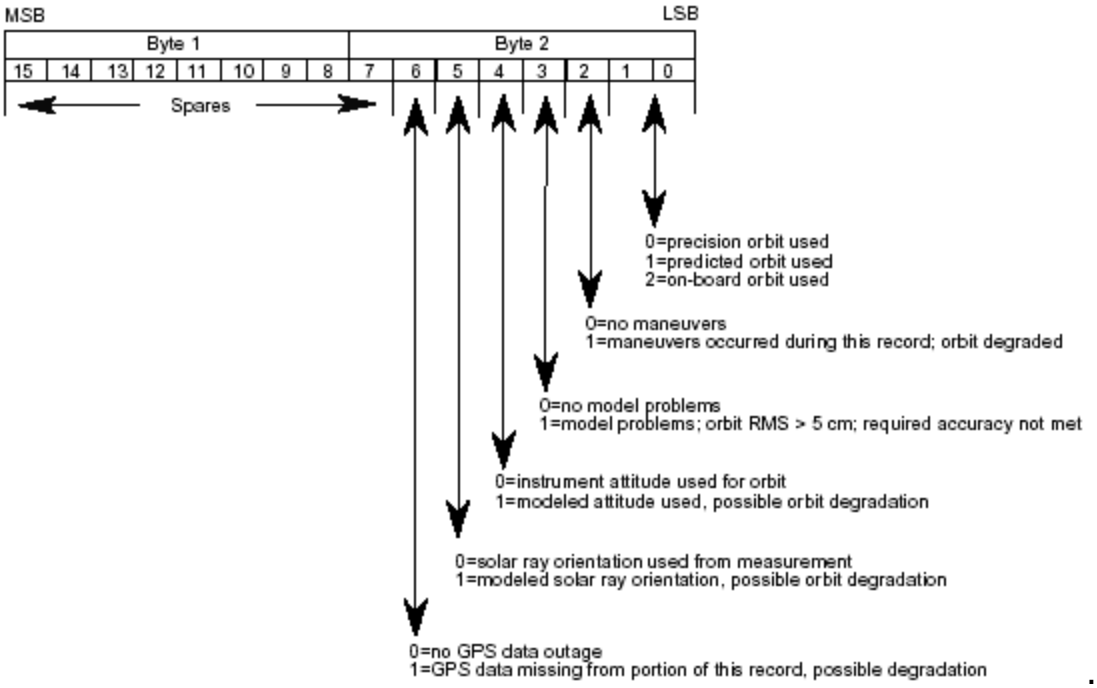
**Is Unsigned?: No**

**Product Minimum: 0**

**Product Maximum: 128**

**Description: Denotes quality of orbit, whether predicted or precision, loss of GPS data, maneuver-degraded, etc.**

i_OrbFlg [1/sec for GLA01, 02, 05-15]: Orbit Flag




**Comments:**

**Product Var Name: i_PBL_Layer_ht**

**Is element of: GLA08 Record, GLA09 Record**

**Short Description: PBL Layer Height from Met Data**

**Product Data Type: i2b ( 4)**

**Total Bytes: 8**

**Product Units: deka-meters**

**Invalid Value/Flag: gi_invalid_i2b**

**Is Correction Flag?: NA**

**Is Unsigned?: No**

**Product Minimum: -100**

**Product Maximum: 1000**

**Description:**

**Comments:**

**Product Var Name: i_Rng2CDProf_Cor**

**Is element of: GLA07 Record**

**Short Description: Start Range of 1064 nm Backscatter Profile**

**Product Data Type: i4b**

**Total Bytes: 4**

**Product Units: meters**

**Invalid Value/Flag: i_APID_AvFlg**

**Is Correction Flag?: NA**

**Is Unsigned?: No**

**Product Minimum: 50000000**

**Product Maximum: 70000000**

**Description: The range from the spacecraft to the start of the 1064 nm backscatter profile - the start of the 20 KM segment of Lidar Data. This variable has a slight correction applied to it.**

**Comments:**

**Product Var Name: i_Rng2PCProf**

**Is element of: GLA02 Record**

**Short Description: Start Range of 532 nm Backscatter Profile**

**Product Data Type: i4b**

**Total Bytes: 4**

**Product Units: centimeters**

**Invalid Value/Flag: i_APID_AvFlg**

**Is Correction Flag?: NA**

**Is Unsigned?: No**

**Product Minimum: 50000000**

**Product Maximum: 70000000**

**Description: The range from the spacecraft to the start of the 532 nm backscatter profile - the start of the 40 KM segment of Lidar Data.Comments: Not valid if APID19 is missing.**

**Product Var Name: i_Rng2PCProf_Cor**

**Is element of: GLA07 Record**

**Short Description: Start Range of 532 nm Backscatter Profile**

**Product Data Type: i4b**

**Total Bytes: 4**

**Product Units: centimeters**

**Invalid Value/Flag: i_APID_AvFlg**

**Is Correction Flag?: NA**

**Is Unsigned?: No**

**Product Minimum: 50000000**

**Product Maximum: 70000000**

**Description: The range from the spacecraft to the start of the 532 nm backscatter profile - the start of the 40 KM segment of Lidar Data. This variable has a slight correction applied to it.Comments: Not valid if APID19 is missing.**

**Product Var Name: i_RngGate_Del**

**Is element of: GLA02 Record**

**Short Description: Cloud Digitizer Range Gate Delay**

**Product Data Type: i2b**

**Total Bytes: 2**

**Product Units: counts**

**Invalid Value/Flag: i_APID_AvFlg**

**Is Correction Flag?: NA**

**Is Unsigned?: Yes**

**Product Minimum: 0**

**Product Maximum: 65535**

**Description: The delays for background #2 and the range gate from the cloud digitizer board.Comments:**

**Product Var Name: i_Rng_PkRt**

**Is element of: GLA02 Record**

**Short Description: Range from spacecraft to peak of return**

**Product Data Type: i4b**

**Total Bytes: 4**

**Product Units: centimeters**

**Invalid Value/Flag: gi_invalid_i4b**

**Is Correction Flag?: NA**

**Is Unsigned?: No**

**Product Minimum: 50000000**

**Product Maximum: 70000000**

**Description: Range calculated from the spacecraft to the location of the peak as returned in the telemetry (ground).**

**Comments:**

**Product Var Name: i_SolAng**

**Is element of: GLA07 Record**

**Short Description: Solar Angle**

**Product Data Type: i4b**

**Total Bytes: 4**

**Product Units: microdeg**

**Invalid Value/Flag: gi_invalid_i4b**

**Is Correction Flag?: NA**

**Is Unsigned?: No**

**Product Minimum: -90000000**

**Product Maximum: 90000000**

**Description: Solar Angle above or below the plane tangent to the ellipsoid surface at the laser spot. Positive values mean the sun is above the horizon, while negative values mean it is below the horizon. The effect of atmospheric refraction is not included. This is a low-precision value, with approximately one degree accuracy.**

**Comments:**

**Product Var Name: i_SolarAngle**

**Is element of: GLA08 Record, GLA09 Record, GLA10 record, GLA11 Record**

**Short Description: Solar Angle**

**Product Data Type: i4b ( 4)**

**Total Bytes: 16**

**Product Units: micro-degrees**

**Invalid Value/Flag: gi_invalid_i4b**

**Is Correction Flag?: NA**

**Is Unsigned?: No**

**Product Minimum: -90000000**

**Product Maximum: 90000000**

**Description: Solar Angle above or below the plane tangent to the ellipsoid surface at the laser spot. Positive values mean the sun is above the horizon, while negative values mean it is below the horizon. The effect of atmospheric refraction is not included. This is a low-precision value, with approximately one degree accuracy.**

**Comments:**

**Product Var Name: i_Spare1**

**Is element of: GLA07 Record**

**Short Description: Spares**

**Product Data Type: i1b**

**Total Bytes: 1**

**Product Units: NA**

**Invalid Value/Flag: N/A**

**Is Correction Flag?: No**

**Is Unsigned?: No**

**Product Minimum: 0**

**Product Maximum: 0**

**Description: not used**

**Comments:**

**Product Var Name: i_Spare2**

**Is element of: GLA07 Record**

**Short Description: Spares**

**Product Data Type: i1b (6)**

**Total Bytes: 6**

**Product Units: NA**

**Invalid Value/Flag: N/A**

**Is Correction Flag?: NA**

**Is Unsigned?: No**

**Product Minimum: null**

**Product Maximum: null**

**Description: not used**

**Comments:**

**Product Var Name: i_SpcmBg1Del**

**Is element of: GLA02 Record**

**Short Description: SPCM Background 1 Delay**

**Product Data Type: i2b**

**Total Bytes: 2**

**Product Units: nanoseconds**

**Invalid Value/Flag: i_APID_AvFlg**

**Is Correction Flag?: NA**

**Is Unsigned?: Yes**

**Product Minimum: 0**

**Product Maximum: 65535**

**Description: The Background #1 Delay from the photon counter board.Comments:**

**Product Var Name: i_SpcmBg2Del**

**Is element of: GLA02 Record**

**Short Description: SPCM Background 2 Delay**

**Product Data Type: i2b**

**Total Bytes: 2**

**Product Units: nanoseconds**

**Invalid Value/Flag: i_APID_AvFlg**

**Is Correction Flag?: NA**

**Is Unsigned?: Yes**

**Product Minimum: 0**

**Product Maximum: 65535**

**Description: The delay for the background #2 as read from the photon counter board. From APID19, Offset 586.**

**Comments:**

**Product Var Name: i_SpcmGateDel**

**Is element of: GLA02 Record**

**Short Description: SPCM Gate Delay**

**Product Data Type: i2b**

**Total Bytes: 2**

**Product Units: nanoseconds**

**Invalid Value/Flag: i_APID_AvFlg**

**Is Correction Flag?: NA**

**Is Unsigned?: Yes**

**Product Minimum: 0**

**Product Maximum: 65535**

**Description: The SPCM Gate Delay from the photon counter board. This is the delay from the fire acknowledge prior to to enabling the SPCMs.Comments:**

**Product Var Name: i_SpcmRngDel**

**Is element of: GLA02 Record**

**Short Description: SPCM Range Delay**

**Product Data Type: i2b**

**Total Bytes: 2**

**Product Units: nanoseconds**

**Invalid Value/Flag: i_APID_AvFlg**

**Is Correction Flag?: NA**

**Is Unsigned?: Yes**

**Product Minimum: 0**

**Product Maximum: 65535**

**Description: The delay for the range gate as read from the photon counter board. This is the delay from the fire acknowledge to the start of data collection for the 40 KM profile.Comments:**

**Product Var Name: i_Spec_Humid**

**Is element of: GLA08 Record, GLA09 Record**

**Short Description: Specific Humidity**

**Product Data Type: i2b ( 4)**

**Total Bytes: 8**

**Product Units: gram/kilogram*100**

**Invalid Value/Flag: gi_invalid_i2b**

**Is Correction Flag?: NA**

**Is Unsigned?: No**

**Product Minimum: 0**

**Product Maximum: 1000**

**Description: Specific humidity 2m above ground.Comments:**

**Product Var Name: i_Surface_pres**

**Is element of: GLA08 Record, GLA09 Record, GLA10 record, GLA11 Record**

**Short Description: Surface Pressure**

**Product Data Type: i2b ( 4)**

**Total Bytes: 8**

**Product Units: millibars * 10**

**Invalid Value/Flag: gi_invalid_i2b**

**Is Correction Flag?: NA**

**Is Unsigned?: No**

**Product Minimum: 0**

**Product Maximum: 20000**

**Description: Surface Pressure, 4 of 1-second intervals.**

**Comments:**

**Product Var Name: i_Surface_pres**

**Is element of: GLA07 Record**

**Short Description: Surface Pressure**

**Product Data Type: i2b**

**Total Bytes: 2**

**Product Units: millibars * 10**

**Invalid Value/Flag: gi_invalid_i2b**

**Is Correction Flag?: NA**

**Is Unsigned?: No**

**Product Minimum: 0**

**Product Maximum: 20000**

**Description:**

**Comments:**

**Product Var Name: i_Surface_relh**

**Is element of: GLA07 Record**

**Short Description: Relative Humidity**

**Product Data Type: i2b**

**Total Bytes: 2**

**Product Units: percentage * 100**

**Invalid Value/Flag: gi_invalid_i2b**

**Is Correction Flag?: NA**

**Is Unsigned?: No**

**Product Minimum: 0**

**Product Maximum: 10000**

**Description:**

**Comments:**

**Product Var Name: i_Surface_relh**

**Is element of: GLA08 Record, GLA09 Record, GLA10 record, GLA11 Record**

**Short Description: Surface Relative Humidity**

**Product Data Type: i2b ( 4)**

**Total Bytes: 8**

**Product Units: percentage * 100**

**Invalid Value/Flag: gi_invalid_i2b**

**Is Correction Flag?: NA**

**Is Unsigned?: No**

**Product Minimum: 0**

**Product Maximum: 10000**

**Description: Surface Relative Humidity, 4 of 1-second intervals.**

**Comments:**

**Product Var Name: i_Surface_temp**

**Is element of: GLA08 Record, GLA09 Record, GLA10 record, GLA11 Record**

**Short Description: Surface Temperature**

**Product Data Type: i2b ( 4)**

**Total Bytes: 8**

**Product Units: degrees Celsius * 100**

**Invalid Value/Flag: gi_invalid_i2b**

**Is Correction Flag?: NA**

**Is Unsigned?: No**

**Product Minimum: -10000**

**Product Maximum: 10000**

**Description: Surface Temperature, 4 of 1-second intervals.**

**Comments:**

**Product Var Name: i_Surface_temp**

**Is element of: GLA07 Record**

**Short Description: Surface Temperature**

**Product Data Type: i2b**

**Total Bytes: 2**

**Product Units: degrees Celsius * 100**

**Invalid Value/Flag: gi_invalid_i2b**

**Is Correction Flag?: NA**

**Is Unsigned?: No**

**Product Minimum: -10000**

**Product Maximum: 10000**

**Description:**

**Comments:**

**Product Var Name: i_Surface_wdir**

**Is element of: GLA08 Record, GLA09 Record, GLA10 record, GLA11 Record**

**Short Description: Surface Wind Direction Azimuth from North**

**Product Data Type: i2b ( 4)**

**Total Bytes: 8**

**Product Units: degrees * 10**

**Invalid Value/Flag: gi_invalid_i2b**

**Is Correction Flag?: NA**

**Is Unsigned?: No**

**Product Minimum: 0**

**Product Maximum: 3600**

**Description: Surface wind direction azimuth from North, 4 of 1-second intervals. Wind direction at Earth's surface level measured in degrees of azimuth from North and derived from the meteorological data files.**

**Comments:**

**Product Var Name: i_Surface_wdir**

**Is element of: GLA07 Record**

**Short Description: Surface Wind Direction Azimuth from North**

**Product Data Type: i2b**

**Total Bytes: 2**

**Product Units: degrees * 10**

**Invalid Value/Flag: gi_invalid_i2b**

**Is Correction Flag?: NA**

**Is Unsigned?: No**

**Product Minimum: 0**

**Product Maximum: 3600**

**Description: Wind direction at Earth's surface level measured in degrees of azimuth from North and derived from the meteorological data files.**

**Comments:**

**Product Var Name: i_Surface_wind**

**Is element of: GLA08 Record, GLA09 Record, GLA10 record, GLA11 Record**

**Short Description: Surface Wind Speed**

**Product Data Type: i2b ( 4)**

**Total Bytes: 8**

**Product Units: meters/second * 100**

**Invalid Value/Flag: gi_invalid_i2b**

**Is Correction Flag?: NA**

**Is Unsigned?: No**

**Product Minimum: 0**

**Product Maximum: 20000**

**Description: Surface Wind Speed, 4 of 1-second intervals. Wind speed at Earth's surface level measured in km/hour and derived from the meteorological data files.**

**Comments:**

**Product Var Name: i_Surface_wind**

**Is element of: GLA07 Record**

**Short Description: Surface Wind Speed**

**Product Data Type: i2b**

**Total Bytes: 2**

**Product Units: meters/second * 100**

**Invalid Value/Flag: gi_invalid_i2b**

**Is Correction Flag?: NA**

**Is Unsigned?: No**

**Product Minimum: 0**

**Product Maximum: 20000**

**Description: Wind speed at Earth's surface level measured in km/hour and derived from the meteorological data files.**

**Comments:**

**Product Var Name: i_Temp2mAbvGrnd**

**Is element of: GLA08 Record, GLA09 Record**

**Short Description: Temperature 2m Above Ground Level**

**Product Data Type: i2b ( 4)**

**Total Bytes: 8**

**Product Units: degrees Celsius * 100**

**Invalid Value/Flag: gi_invalid_i2b**

**Is Correction Flag?: NA**

**Is Unsigned?: No**

**Product Minimum: -10000**

**Product Maximum: 10000**

**Description:**

**Comments:**

**Product Var Name: i_Total_CloudCov**

**Is element of: GLA08 Record, GLA09 Record**

**Short Description: Total Cloud Cover**

**Product Data Type: i2b ( 4)**

**Total Bytes: 8**

**Product Units: percentage**

**Invalid Value/Flag: gi_invalid_i2b**

**Is Correction Flag?: NA**

**Is Unsigned?: No**

**Product Minimum: 0**

**Product Maximum: 100**

**Description:**

**Comments:**

**Product Var Name: i_UTCTime**

**Is element of: GLA02 Record, GLA07 Record, GLA08 Record, GLA09 Record, GLA10 record, GLA11 Record**

**Short Description: Transmit Time of First Shot in frame in J2000**

**Product Data Type: i4b (2)**

**Total Bytes: 8**

**Product Units: seconds, microseconds**

**Invalid Value/Flag: No**

**Is Correction Flag?: NA**

**Is Unsigned?: No**

**Product Minimum: 0**

**Product Maximum: 2147483647**

**Description: The transmit time in UTC of the 1st shot in the 1 second frame referenced to noon on Jan 1, 2000. The first item is the whole number of seconds ; the second item is the fractional part in microseconds.**

**Comments: This is not the ground bounce time, but the transmit time.**

**Product Var Name: i_aer4_bot**

**Is element of: GLA10 record**

**Short Description: Low Resolution Aerosol Layer Bottom at 532 nm**

**Product Data Type: i2b (9)**

**Total Bytes: 18**

**Product Units: deka-meters**

**Invalid Value/Flag: gi_invalid_i2b**

**Is Correction Flag?: NA**

**Is Unsigned?: No**

**Product Minimum: -100**

**Product Maximum: 4000**

**Description: Low resolution aerosol layer bottom heights for layers which were selected for optical processing at 0.25hz, 1 per layer, 9 layers including the planetary boundary layer and PSC**

**Comments:**

**Product Var Name: i_aer4_bot**

**Is element of: GLA11 Record**

**Short Description: Low Resolution Aerosol Layer Bottom at 532 nm**

**Product Data Type: i2b (8)**

**Total Bytes: 16**

**Product Units: deka-meters**

**Invalid Value/Flag: gi_invalid_i2b**

**Is Correction Flag?: NA**

**Is Unsigned?: No**

**Product Minimum: -100**

**Product Maximum: 4000**

**Description: Low resolution elevated aerosol layer (including PSC) bottom height for layers which were selected for optical processing at 0.25hz, 1 per layer, 8 layers**

**Comments:**

**Product Var Name: i_aer4_bs_flag**

**Is element of: GLA10 record**

**Short Description: Aerosol backscatter flag for 532 nm**

**Product Data Type: i1b ( 10)**

**Total Bytes: 10**

**Product Units: NA**

**Invalid Value/Flag: No**

**Is Correction Flag?: NA**

**Is Unsigned?: No**

**Product Minimum: 0**

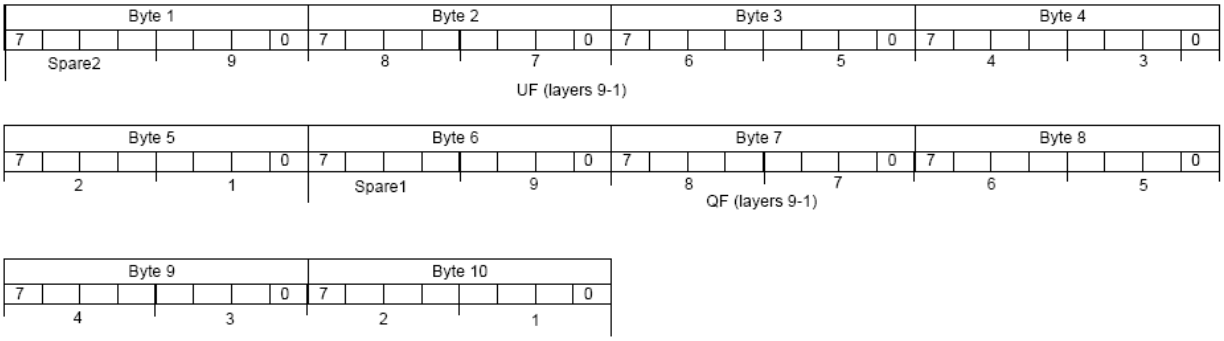
**Product Maximum: 15**

**Description: Composite Flag - see Breakout for details**



**i_aer4_bs_flag [GLA10]: Aerosol Backscatter Flag** (once per 4 sec., up to 9 layers/record)

(QF = Quality Flag; UF = Use Flag)



**Layer Use Flag Values**

a) For backscatter cross section, the use flag gives saturation status as follows:

Use FLAG SATURATION STATUS
0 = no saturation detected
1 = one or two bins were saturated with 1064 nm conversion performed
2 = at least three bins were saturated with 1064 nm conversion performed
3 = at least one but less than four bins were saturated with no conversion performed
4 = four or more bins were saturated with no conversion performed
15 = invalid

b) for extinction cross section and layer optical depth, the use flag designates layer type category as follows:

Aerosol: {based on S ratio default index, PSC flag, and tropopause height}
Use Flag Meaning
00 = PBL generic (all PBL indices not mentioned below)
01 = PBL maritime (index 4)
02 = PBL continental ice (index 7)
03 = PBL continental haze (index 11)
04 = PBL Saharan dust (index 12)
05 = PBL desert (index 13)
06 = PBL smoke (indices 15,3)
07 = TROP generic (all TROP indices not mentioned below)
08 = TROP volcanic (index 3)
09 = TROP continental haze (index 11)
10 = TROP Saharan dust (index 12)
11 = TROP smoke (index 15)
12 = STRATO aerosol (any non-PSC layer whose top is > tropopause
13 = PSC type I (PSC with rh less than or equal to 95%)
14 = PSC type II (PSC with rh greater than 95%)
15 = invalid

Cloud: {based on average cloud temperature, water cloud is warmer than –13 C}

Use Flag Meaning
00 = less than or equal to –75.0 C
01 = -75.0 through –68.5
02 = -68.5 through –62.0
03 = -62.0 through –55.5
04 = -55.5 through –49.0
05 = -49.0 through –32.5
06 = -32.5 through –26.0
07 = -26.0 through –19.5
08 = -19.5 through –13.0
09 = -13.0 through –6.5
10 = -6.5 through 0.0
11 = 0.0 through 6.5
12 = 6.5 through 13.0
13 = 13.0 through 19.5
14 = greater than 19.5 C
15 = invalid

**Quality Flag Values**

0 = 0-5 % Error
1 = 5-10 % Error
2 = 10-15 % Error
3 = 15-20 % Error
4 = 20-25 % Error
5 = 25-30 % Error
6 = 30-35 % Error
7 = 35-40 % Error
8 = 40-45 % Error
9 = 45-50 % Error
10 = 50-55 % Error
11 = 55-60 % Error
12 = 60-65 % Error
13 = 65-70 % Error
14 = 70 and greater % Error
15 = Unable to process

**Comments:**

**Product Var Name: i_aer4_bs_prof**

**Is element of: GLA10 record**

**Short Description: Aerosol Backscatter Cross Section Profile at 532nm**

**Product Data Type: i4b (548)**

**Total Bytes: 2192**

**Product Units: e10/(m-sr)**

**Invalid Value/Flag: gi_invalid_i4b**

**Is Correction Flag?: NA**

**Is Unsigned?: No**

**Product Minimum: -1000000**

**Product Maximum: 100000000**

**Description: 532 nm aerosol backscatter cross section from 40 to -1km at 0.25hz. The 4*548 bytes refer to the profile at the four second interval.**

**Comments:**

**Product Var Name: i_aer4_ext_flag**

**Is element of: GLA10 record**

**Short Description: Aerosol extinction flag for 532 nm**

**Product Data Type: i1b ( 10)**

**Total Bytes: 10**

**Product Units: NA**

**Invalid Value/Flag: No**

**Is Correction Flag?: NA**

**Is Unsigned?: No**

**Product Minimum: 0**

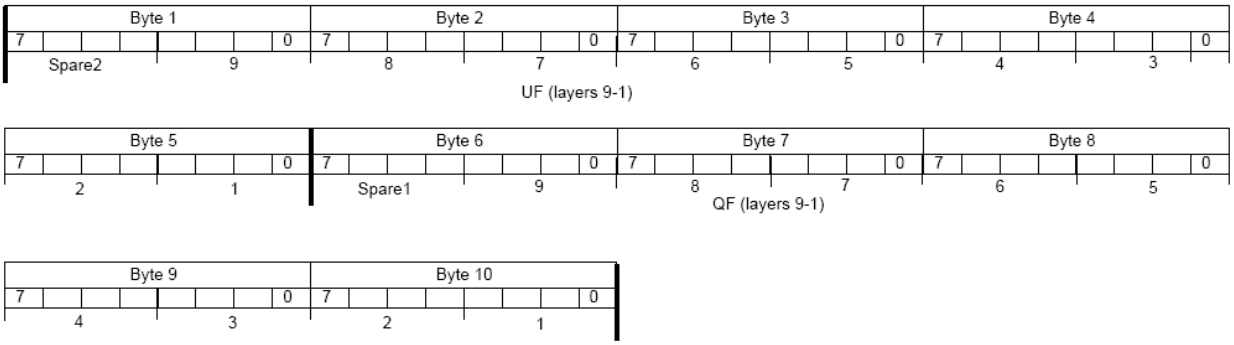
**Product Maximum: 15**

**Description: Composite Flag - see Breakout for details**

**i_aer4_ext_flag [GLA10]: Aerosol Extinction Flag** (once per 4 sec., up to 9 layers/record)



(QF = Quality Flag; UF = Use Flag)



**Layer Use Flag Values**

a) For backscatter cross section, the use flag gives saturation status as follows:

Use FLAG SATURATION STATUS
0 = no saturation detected
1 = one or two bins were saturated with 1064 nm conversion performed
2 = at least three bins were saturated with 1064 nm conversion performed
3 = at least one but less than four bins were saturated with no conversion performed
4 = four or more bins were saturated with no conversion performed
15 = invalid

b) for extinction cross section and layer optical depth, the use flag designates layer type category as follows:

Aerosol: {based on S ratio default index, PSC flag, and tropopause height}
Use Flag Meaning
00 = PBL generic (all PBL indices not mentioned below)
01 = PBL maritime (index 4)
02 = PBL continental ice (index 7)
03 = PBL continental haze (index 11)
04 = PBL Saharan dust (index 12)
05 = PBL desert (index 13)
06 = PBL smoke (indices 15,3)
07 = TROP generic (all TROP indices not mentioned below)
08 = TROP volcanic (index 3)
09 = TROP continental haze (index 11)
10 = TROP Saharan dust (index 12)
11 = TROP smoke (index 15)
12 = STRATO aerosol (any non-PSC layer whose top is > tropopause
13 = PSC type I (PSC with rh less than or equal to 95%)
14 = PSC type II (PSC with rh greater than 95%)
15 = invalid

Cloud: {based on average cloud temperature, water cloud is warmer than –13 C}

Use Flag Meaning
00 = less than or equal to –75.0 C
01 = -75.0 through –68.5
02 = -68.5 through –62.0
03 = -62.0 through –55.5
04 = -55.5 through –49.0
05 = -49.0 through –32.5
06 = -32.5 through –26.0
07 = -26.0 through –19.5
08 = -19.5 through –13.0
09 = -13.0 through –6.5
10 = -6.5 through 0.0
11 = 0.0 through 6.5
12 = 6.5 through 13.0
13 = 13.0 through 19.5
14 = greater than 19.5 C
15 = invalid

**Quality Flag Values**

0 = 0-5 % Error
1 = 5-10 % Error
2 = 10-15 % Error
3 = 15-20 % Error
4 = 20-25 % Error
5 = 25-30 % Error
6 = 30-35 % Error
7 = 35-40 % Error
8 = 40-45 % Error
9 = 45-50 % Error
10 = 50-55 % Error
11 = 55-60 % Error
12 = 60-65 % Error
13 = 65-70 % Error
14 = 70 and greater % Error
15 = Unable to process

**Comments:**

**Product Var Name: i_aer4_ext_prof**

**Is element of: GLA10 record**

**Short Description: Aerosol Extinction Cross Section Profile at 532 nm**

**Product Data Type: i4b (548)**

**Total Bytes: 2192**

**Product Units: e9/m**

**Invalid Value/Flag: gi_invalid_i4b**

**Is Correction Flag?: NA**

**Is Unsigned?: No**

**Product Minimum: -10000000**

**Product Maximum: 1000000000**

**Description: Aerosol extinction cross section profile for 40 to -1km calculated from the 532 nm data at 0.25hz. The 4*548 bytes refer to the profile at the four second interval.**

**Comments:**

**Product Var Name: i_aer4_flag**

**Is element of: GLA11 Record**

**Short Description: Aerosol optical depth flag for 532 nm**

**Product Data Type: i1b ( 8)**

**Total Bytes: 8**

**Product Units: NA**

**Invalid Value/Flag: No**

**Is Correction Flag?: NA**

**Is Unsigned?: No**

**Product Minimum: 0**

**Product Maximum: 15**

**Description: Composite Flag - see Breakout for details**

i_aer4_flag [GLA11]: Aerosol Optical Depth (4 sec. per record, at once per 4 second rate)

(QF = Quality Flag; UF = Use Flag)

| Byte 1 | | | | | | | | Byte 2 | | | | | | | | Byte 3 | | | | | | | | Byte 4 | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 7 | | | | | | | 0 | 7 | | | | | | | 0 | 7 | | | | | | | 0 | 7 | | | | | | | 0 |
| UF (layer 8) | | | | UF (layer 7) | | | | UF (layer 6) | | | | UF (layer 5) | | | | UF (layer 4) | | | | UF (layer 3) | | | | UF (layer 2) | | | | UF (layer 1) | | | |

| Byte 5 | | | | | | | | Byte 6 | | | | | | | | Byte 7 | | | | | | | | Byte 8 | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 7 | | | | | | | 0 | 7 | | | | | | | 0 | 7 | | | | | | | 0 | 7 | | | | | | | 0 |
| QF (layer 8) | | | | QF (layer 7) | | | | QF (layer 6) | | | | QF (layer 5) | | | | QF (layer 4) | | | | QF (layer 3) | | | | QF (layer 2) | | | | QF (layer 1) | | | |

**Comments:**

**Product Var Name: i_aer4_grd_det**

**Is element of: GLA11 Record**

**Short Description: Low Resolution Ground Detection at 532 nm**

**Product Data Type: i2b**

**Total Bytes: 2**

**Product Units: deka-meters**

**Invalid Value/Flag: gi_invalid_i2b**

**Is Correction Flag?: NA**

**Is Unsigned?: No**

**Product Minimum: -100**

**Product Maximum: 1000**

**Description: Low resolution processed ground detection height at 0.25hz, 1 per profile**

**Comments:**

**Product Var Name: i_aer4_ht**

**Is element of: GLA11 Record**

**Short Description: Low Resolution PBL Height at 532 nm**

**Product Data Type: i2b**

**Total Bytes: 2**

**Product Units: deka-meters**

**Invalid Value/Flag: gi_invalid_i2b**

**Is Correction Flag?: NA**

**Is Unsigned?: No**

**Product Minimum: -100**

**Product Maximum: 700**

**Description: Low resolution Planetary Boundary Layer height at 0.25hz, 1 per profile**

**Comments:**

**Product Var Name: i_aer4_msf**

**Is element of: GLA11 Record**

**Short Description: Aerosol Multiple Scattering Factor**

**Product Data Type: i2b (9)**

**Total Bytes: 18**

**Product Units: unitless**

**Invalid Value/Flag: gi_invalid_i2b**

**Is Correction Flag?: NA**

**Is Unsigned?: No**

**Product Minimum: 0**

**Product Maximum: 1000**

**Description: Aerosol multiple scattering coefficient used at 0.25hz, 1 per layer, 9 layers (including PSC and PBL)**

**Comments:**

**Product Var Name: i_aer4_od**

**Is element of: GLA11 Record**

**Short Description: Aerosol Optical Depth at 532 nm**

**Product Data Type: i2b (8)**

**Total Bytes: 16**

**Product Units: unitless*1000**

**Invalid Value/Flag: gi_invalid_i2b**

**Is Correction Flag?: NA**

**Is Unsigned?: No**

**Product Minimum: 0**

**Product Maximum: 5000**

**Description: 532 nm elevated aerosol optical depth, corrected for multiple scattering, at 0.25hz, 1 per layer, 8 layers**

**Comments:**

**Product Var Name: i_aer4_aod_ratio**

**Is element of: GLA11 Record**

**Short Description: 532/1064 aerosol optical depth ratio**

**Product Data Type: i2b (9)**

**Total Bytes: 18**

**Product Units: N/A**

**Invalid Value/Flag: gi_invalid_i2b**

**Is Correction Flag?: NA**

**Is Unsigned?: No**

**Product Minimum: 120**

**Product Maximum: 380**

**Description: The ratio of 532 nm aerosol optical depth to 1064 nm aerosol optical depth for each detected aerosol layer.**

**Comments:**

**Product Var Name: i_aer4_sval_ratio**

**Is element of: GLA11 Record**

**Short Description: 532/1064 aerosol S ratio**

**Product Data Type: i2b (9)**

**Total Bytes: 18**

**Product Units: N/A**

**Invalid Value/Flag: gi_invalid_i2b**

**Is Correction Flag?: NA**

**Is Unsigned?: No**

**Product Minimum: 105**

**Product Maximum: 210**

**Description: The ratio of 532 nm extinction to backscatter ratio (S532) to the 1064 nm extinction to backscatter ratio (S1064) for each detected aerosol layer.**

**Comments:**

**Product Var Name: i_aer4_sval1**

**Is element of: GLA10 record, GLA11 Record**

**Short Description: Aerosol true S Values from table**

**Product Data Type: i2b (9)**

**Total Bytes: 18**

**Product Units: 100*sr**

**Invalid Value/Flag: gi_invalid_i2b**

**Is Correction Flag?: NA**

**Is Unsigned?: No**

**Product Minimum: 100**

**Product Maximum: 20000**

**Description: Aerosol true extinction to backscatter ratios calculated from meteorological and geographic data**

**Comments:**

**Product Var Name: i_aer4_sval2**

**Is element of: GLA10 record**

**Short Description: Aerosol true S Values from equation calc.**

**Product Data Type: i2b (9)**

**Total Bytes: 18**

**Product Units: 100*sr**

**Invalid Value/Flag: gi_invalid_i2b**

**Is Correction Flag?: NA**

**Is Unsigned?: No**

**Product Minimum: 100**

**Product Maximum: 20000**

**Description: Aerosol true extinction to backscatter ratios calculated from optically thin layer considerations**

**Comments:**

**Product Var Name: i_aer4_sval_uf**

**Is element of: GLA10 record, GLA11 record**

**Short Description: Aerosol true S Values use flag**

**Product Data Type: i1b ( 5)**

**Total Bytes: 5**

**Product Units: NA**

**Invalid Value/Flag: No**

**Is Correction Flag?: NA**

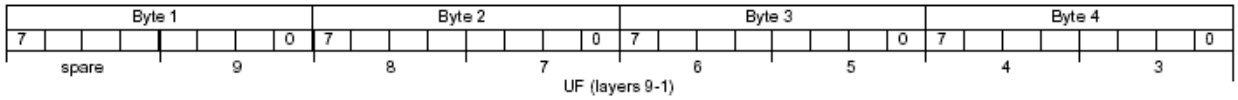
**Is Unsigned?: No**

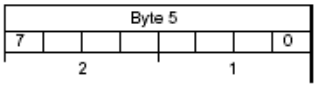
**Product Minimum: 0**

**Product Maximum: 15**

**Description: Aerosol true S values use flag for 9 layers at 1 per 4 sec. Bits 0-3 (least significant bits) of byte 5 are for first layer, bits 0-3 of byte 1 are for 9th layer. 15 denotes no layer detected (invalid). Bits 36-39 are spares needed to make 5 bytes. Stipulates which extinction to backscatter ratio was used in processing (1=default, 2=calculated).**

i_aer4_sval_uf [GLA10]: Aerosol True S Values Use Flag (once per 4 sec., up to 9 layers/record)




**Comments:**

**Product Var Name: i_aer4_top**

**Is element of: GLA10 record**

**Short Description: Low Resolution Aerosol Layer Top at 532 nm**

**Product Data Type: i2b (9)**

**Total Bytes: 18**

**Product Units: deka-meters**

**Invalid Value/Flag: gi_invalid_i2b**

**Is Correction Flag?: NA**

**Is Unsigned?: No**

**Product Minimum: -100**

**Product Maximum: 4000**

**Description: Low resolution aerosol layer top heights for layers which were selected for optical processing at 0.25hz, 1 per layer, 9 layers including the planetary boundary layer and PSC**

**Comments:**

**Product Var Name: i_aer4_top**

**Is element of: GLA11 Record**

**Short Description: Low Resolution Aerosol Layer Top at 532 nm**

**Product Data Type: i2b (8)**

**Total Bytes: 16**

**Product Units: deka-meters**

**Invalid Value/Flag: gi_invalid_i2b**

**Is Correction Flag?: NA**

**Is Unsigned?: No**

**Product Minimum: -100**

**Product Maximum: 4000**

**Description: Low resolution elevated aerosol layer (including PSC) top height for layers which were selected for optical processing at 0.25hz, 1 per layer, 8 layers**

**Comments:**

**Product Var Name: i_aod_4s**

**Is element of: GLA11 Record**

**Short Description: Total Column Aerosol OD (AOD)**

**Product Data Type: i2b**

**Total Bytes: 2**

**Product Units: unitless*1000**

**Invalid Value/Flag: N/A**

**Is Correction Flag?: NA**

**Is Unsigned?: NA**

**Product Minimum: -100**

**Product Maximum: 10000**

**Description: Total column aerosol optical depth (AOD).**

**Comments:**

**Product Var Name: i_aod_botht_4s**

**Is element of: GLA10 record**

**Short Description: Cloud-free Trop. Height**

**Product Data Type: i2b**

**Total Bytes: 2**

**Product Units: deka-meters**

**Invalid Value/Flag: No**

**Is Correction Flag?: NA**

**Is Unsigned?: NA**

**Product Minimum: -1000**

**Product Maximum: 40000**

**Description: Height of cloud-free troposphere (bottom of full column extinction profile).**

**Comments:**

**Product Var Name: i_aod_flg_4s**

**Is element of: GLA11 Record**

**Short Description: AOD use flag**

**Product Data Type: i1b**

**Total Bytes: 1**

**Product Units: NA**

**Invalid Value/Flag: N/A**

**Is Correction Flag?: NA**

**Is Unsigned?: NA**

**Product Minimum: 0**

**Product Maximum: 15**

**Description: AOD use flag.**

**The total column AOD use flag ranges from 0 - 7 and has the following meanings:**

**0 - night, full column good, no bad layers, ground detected - highest quality**

**1 - day, no full column, sum of all detected layers, no bad layers, ground detected - highest daytime quality**

**2 - night, full column good, with detected lower layers with a bad layer**

**3 - night, full column good, with bad lower layers**

**4 - night, full column bad, includes only detected lower layers.**

**5 - day, no full column, sum of all good layers, but bad layer present**

**6 - night, full column good, but no ground detected**

**7 - day, no full column, good or no layers, but no ground detected**

**15 - invalid**

**Notes: In the descriptions above 'full column' means the extinction retrieval from 20 km to i_aod_botht_4s. 'Bad layer' means a layer for which extinction could not be computed.**

**Comments:**

**Product Var Name: i_atm_dem**

**Is element of: GLA07 Record**

**Short Description: DEM value at current location from 1 km x 1 km grid**

**Product Data Type: i4b**

**Total Bytes: 4**

**Product Units: meters**

**Invalid Value/Flag: gi_invalid_i4b**

**Is Correction Flag?: NA**

**Is Unsigned?: No**

**Product Minimum: -32768**

**Product Maximum: 32768**

**Description: Surface height value for current location from 1 km x 1 km grid**

**Comments:**

**Product Var Name: i_atm_dem**

**Is element of: GLA09 Record**

**Short Description: DEM value at current location from 1 km x 1 km grid**

**Product Data Type: i4b ( 4)**

**Total Bytes: 16**

**Product Units: meters**

**Invalid Value/Flag: gi_invalid_i4b**

**Is Correction Flag?: NA**

**Is Unsigned?: No**

**Product Minimum: -32768**

**Product Maximum: 32768**

**Description: Surface height value for current location from 1 km x 1 km grid**

**Comments:**

**Product Var Name: i_atm_dem**

**Is element of: GLA08 Record**

**Short Description: DEM value at current location from 1 km x 1 km grid**

**Product Data Type: i4b ( 4)**

**Total Bytes: 16**

**Product Units: meters**

**Invalid Value/Flag: gi_invalid_i4b**

**Is Correction Flag?: NA**

**Is Unsigned?: No**

**Product Minimum: -32768**

**Product Maximum: 32768**

**Description: Surface height value for current location from 1 km x 1 km grid**

**Comments:**

**Product Var Name: i_beam_azimuth**

**Is element of: GLA08 Record, GLA09 Record, GLA10 record, GLA11 Record**

**Short Description: Azimuth**

**Product Data Type: i4b (4)**

**Total Bytes: 16**

**Product Units: degrees*100**

**Invalid Value/Flag: gi_invalid_i4b**

**Is Correction Flag?: NA**

**Is Unsigned?: No**

**Product Minimum: 0**

**Product Maximum: 36000**

**Description: Azimuth (Az) is the direction clockwise from north of the laser beam as seen by an observer at the laser ground spot.Comments:**

**Product Var Name: i_beam_azimuth**

**Is element of: GLA07 Record**

**Short Description: Azimuth**

**Product Data Type: i4b**

**Total Bytes: 4**

**Product Units: degrees*100**

**Invalid Value/Flag: gi_invalid_i4b**

**Is Correction Flag?: NA**

**Is Unsigned?: No**

**Product Minimum: 0**

**Product Maximum: 36000**

**Description: The direction, eastwards from north, of the laser beam vector as seen by an observer at the laser ground spot viewing toward the spacecraft (i.e., the vector from the ground to the spacecraft). When the spacecraft is precisely at the geodetic zenith, the value will be 99999 degrees.Comments:**

**Product Var Name: i_beam_coelev**

**Is element of: GLA07 Record**

**Short Description: Co-elevation**

**Product Data Type: i4b**

**Total Bytes: 4**

**Product Units: degrees*100**

**Invalid Value/Flag: gi_invalid_i4b**

**Is Correction Flag?: NA**

**Is Unsigned?: No**

**Product Minimum: 0**

**Product Maximum: 36000**

**Description: Co-elevation (CE) is direction from vertical of the laser beam as seen by an observer located at the laser ground spot.Comments:**

**Product Var Name: i_beam_coelev**

**Is element of: GLA08 Record, GLA09 Record, GLA10 record, GLA11 Record**

**Short Description: Co-elevation**

**Product Data Type: i4b (4)**

**Total Bytes: 16**

**Product Units: degrees*100**

**Invalid Value/Flag: gi_invalid_i4b**

**Is Correction Flag?: NA**

**Is Unsigned?: No**

**Product Minimum: 0**

**Product Maximum: 36000**

**Description: Co-elevation (CE) is direction from vertical of the laser beam as seen by an observer located at the laser ground spot.**

**Comments:**

**Product Var Name: i_blow_snow_conf**

**Is element of: GLA09 Record**

**Short Description: Blowing Snow Confidence**

**Product Data Type: i1b ( 20)**

**Total Bytes: 20**

**Product Units: NA**

**Invalid Value/Flag: N/A**

**Is Correction Flag?: NA**

**Is Unsigned?: NA**

**Product Minimum: 0**

**Product Maximum: 15**

**Description: A number that indicates the degree of confidence that this is indeed blowing snow. Blowing snow confidence ranges from 0 - 15 and has the following meanings:**

**0: profile tested, but no blowing snow detected**

**1 - 5: Good blowing snow detection using the 1064 channel. 1 is lowest confidence that layer is blowing snow, 5 is highest confidence.**

**6: Layer suspected of being low cloud (such as fog), or seemingly too thick to be blowing snow (> 1.0 km thick) as determined from 1064 channel.**

**7 - 12: Good blowing snow detection using the 532 channel. 7 is lowest confidence that layer is blowing snow, 12 is highest confidence.**

**13: Layer suspected of being low cloud (such as fog), or seemingly too thick to be blowing snow (> 1.0 km thick) as determined from 532 channel.**

**14: Wind speed < 5 m/s or ground stroke not detected (the latter case indicating overlying thick cloud)**

**15: Signal not examined for blowing snow (could be because it is closer to the equator than plus or minus 60 degrees latitude, or not over sea ice or land)**

**Comments:**

**Product Var Name: i_blow_snow_erd**

**Is element of: GLA09 Record**

**Short Description: Blowing Snow Range Delay**

**Product Data Type: i2b ( 20)**

**Total Bytes: 40**

**Product Units: millimeters * 10**

**Invalid Value/Flag: gi_invalid_i2b**

**Is Correction Flag?: NA**

**Is Unsigned?: NA**

**Product Minimum: 0**

**Product Maximum: 255**

**Description: An estimate of the range delay caused by blowing snow.**

**Comments:**

**Product Var Name: i_blow_snow_ht**

**Is element of: GLA09 Record**

**Short Description: Blowing Snow Height**

**Product Data Type: i2b ( 20)**

**Total Bytes: 40**

**Product Units: meters * 10**

**Invalid Value/Flag: gi_invalid_i2b**

**Is Correction Flag?: NA**

**Is Unsigned?: No**

**Product Minimum: 0**

**Product Maximum: 255**

**Description: Represents the maximum height above the surface of the blowing snow layer.**

**Comments:**

**Product Var Name: i_blow_snow_od**

**Is element of: GLA09 Record**

**Short Description: Blowing Snow Optical Depth**

**Product Data Type: i2b ( 20)**

**Total Bytes: 40**

**Product Units: unitless * 1000**

**Invalid Value/Flag: gi_invalid_i2b**

**Is Correction Flag?: NA**

**Is Unsigned?: NA**

**Product Minimum: 0**

**Product Maximum: 255**

**Description: An estimate of the optical depth of the blowing snow layer.**

**Comments:**

**Product Var Name: i_bs_conf**

**Is element of: GLA11 Record**

**Short Description: Blowing Snow Confidence**

**Product Data Type: i1b ( 4)**

**Total Bytes: 4**

**Product Units: N/A**

**Invalid Value/Flag: N/A**

**Is Correction Flag?: NA**

**Is Unsigned?: NA**

**Product Minimum: 0**

**Product Maximum: 15**

**Description: A number that indicates the degree of confidence that this is indeed blowing snow. Blowing snow confidence ranges from 0 - 15 and has the following meanings:**

**15: profile never tested for blowing snow (outside of latitude limits, or over ocean).**

**14: wind speed too low or clouds above 1.5 km**

**7-13: BS detected, 532 used, low to high confidence in blowing snow**

**1-6: BS detected, 1064 used, low to high confidence in blowing snow**

**0: profile tested, but no blowing snow detected**

**Comments:**

**Product Var Name: i_bs_erd**

**Is element of: GLA11 Record**

**Short Description: Blowing Snow Range Delay**

**Product Data Type: i2b (4)**

**Total Bytes: 8**

**Product Units: millimeters * 10**

**Invalid Value/Flag: None**

**Is Correction Flag?: NA**

**Is Unsigned?: No**

**Product Minimum: 0**

**Product Maximum: 255**

**Description: Estimated range delay due to blowing snow.**

**Comments:**

**Product Var Name: i_cd_ad_out**

**Is element of: GLA02 Record**

**Short Description: A/D Output**

**Product Data Type: i1b**

**Total Bytes: 1**

**Product Units: n/a**

**Invalid Value/Flag: i_APID_AvFlg**

**Is Correction Flag?: NA**

**Is Unsigned?: Yes**

**Product Minimum: 0**

**Product Maximum: 255**

**Description: The output from the A/D converter; from the cloud digitizer board. Used for to diagnose problems with the analog path.Comments:**

**Product Var Name: i_cd_att_set**

**Is element of: GLA02 Record**

**Short Description: Attentuation Setting**

**Product Data Type: i1b**

**Total Bytes: 1**

**Product Units: n/a**

**Invalid Value/Flag: i_APID_AvFlg**

**Is Correction Flag?: NA**

**Is Unsigned?: Yes**

**Product Minimum: 0**

**Product Maximum: 255**

**Description: The attentuation setting from the cloud digitizer board. Comments:**

**Product Var Name: i_cd_bg1_del**

**Is element of: GLA02 Record**

**Short Description: Cloud Digitizer Background 1 Delay**

**Product Data Type: i2b**

**Total Bytes: 2**

**Product Units: counts**

**Invalid Value/Flag: i_APID_AvFlg**

**Is Correction Flag?: NA**

**Is Unsigned?: Yes**

**Product Minimum: 0**

**Product Maximum: 65535**

**Description: The delay for background #1 from the cloud digitizer board.Comments:**

**Product Var Name: i_cd_det_stat**

**Is element of: GLA02 Record**

**Short Description: Cloud Digitizer Detector Status**

**Product Data Type: i2b**

**Total Bytes: 2**

**Product Units: n/a**

**Invalid Value/Flag: i_APID_AvFlg**

**Is Correction Flag?: NA**

**Is Unsigned?: Yes**

**Product Minimum: 0**

**Product Maximum: 65535**

**Description: Status of the detector from the cloud digitizer board.Comments:**

**Product Var Name: i_cd_rbias**

**Is element of: GLA02 Record**

**Short Description: Cloud Digitizer Range Bias**

**Product Data Type: i4b**

**Total Bytes: 4**

**Product Units: n/a**

**Invalid Value/Flag: i_APID_AvFlg**

**Is Correction Flag?: NA**

**Is Unsigned?: No**

**Product Minimum: -1000000**

**Product Maximum: 1000000**

**Description: The range bias from the cloud digitizer; always positive.**

**Comments:**

**Product Var Name: i_cld1_bot**

**Is element of: GLA10 record, GLA11 Record**

**Short Description: Medium Resolution Cloud Bottom at 532 nm**

**Product Data Type: i2b (10, 4)**

**Total Bytes: 80**

**Product Units: deka-meters**

**Invalid Value/Flag: gi_invalid_i2b**

**Is Correction Flag?: NA**

**Is Unsigned?: No**

**Product Minimum: -100**

**Product Maximum: 2000**

**Description: Medium resolution cloud bottom heights for layers which were selected for optical processing at 1hz, 1 per layer, 10 layers**

**Comments:**

**Product Var Name: i_cld1_bs_flag**

**Is element of: GLA10 record**

**Short Description: Cloud backscatter flag for 532 nm**

**Product Data Type: i1b ( 40)**

**Total Bytes: 40**

**Product Units: NA**

**Invalid Value/Flag: No**

**Is Correction Flag?: NA**

**Is Unsigned?: No**

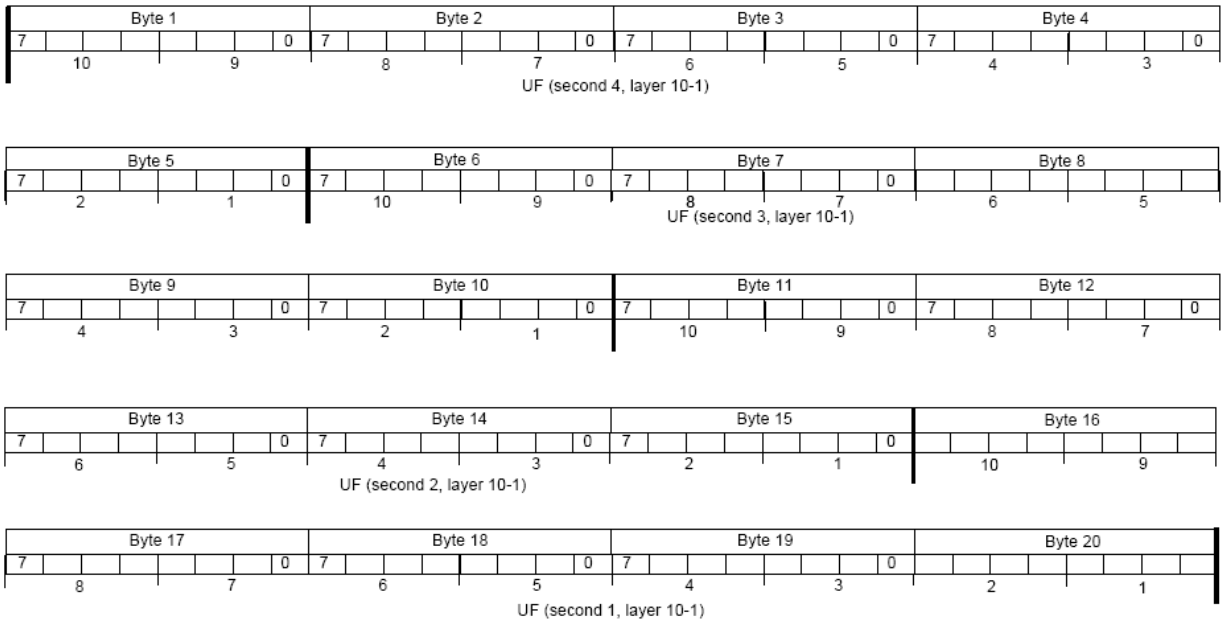
**Product Minimum: 0**

**Product Maximum: 15**

**Description: Composite Flag - see Breakout for details**

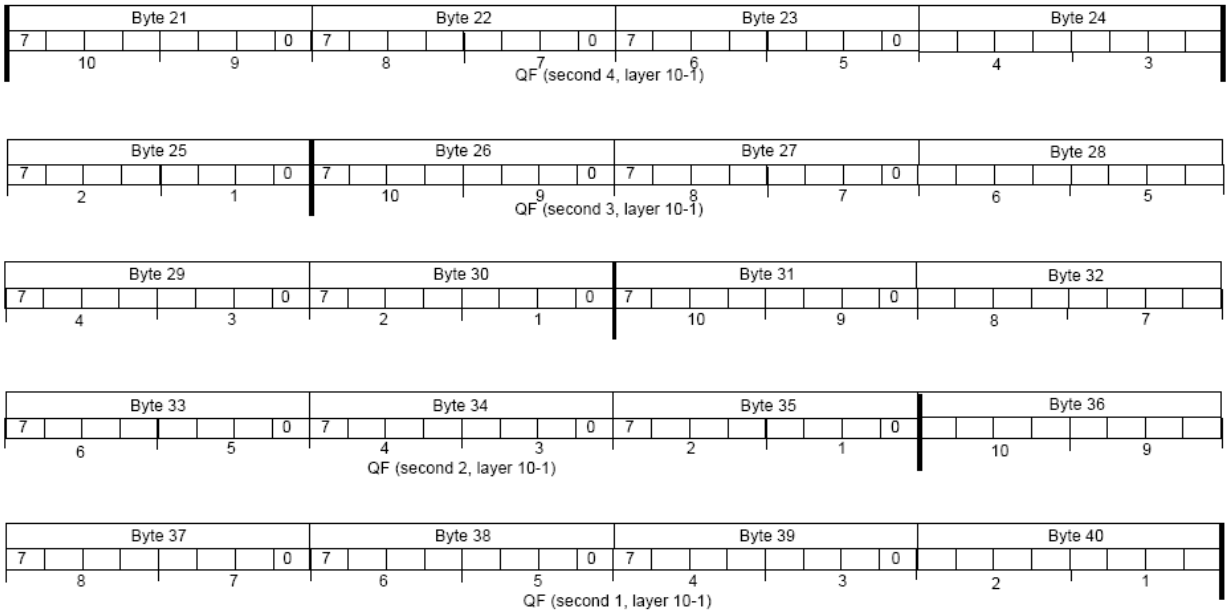
**i_cld1_bs_flag [GLA10]: Cloud Backscatter Flag** (4 sec/records, up to 10 layers/sec.) 

(QF = Quality Flag; UF = Use Flag)



**i_cld1_bs_flag [GLA10]: Cloud Backscatter Flag** (4 sec/records, up to 10 layers/sec.)

(QF = Quality Flag; UF = Use Flag)






**Layer Use Flag Values**

a) For backscatter cross section, the use flag gives saturation status as follows:

Use FLAG SATURATION STATUS
- 0 = no saturation detected
- 1 = one or two bins were saturated with 1064 nm conversion performed
- 2 = at least three bins were saturated with 1064 nm conversion performed
- 3 = at least one but less than four bins were saturated with no conversion performed
- 4 = four or more bins were saturated with no conversion performed
- 15 = invalid

b) for extinction cross section and layer optical depth, the use flag designates layer type category as follows:

Aerosol: {based on S ratio default index, PSC flag, and tropopause height}

Use Flag Meaning
- 00 = PBL generic (all PBL indices not mentioned below)
- 01 = PBL maritime (index 4)
- 02 = PBL continental ice (index 7)
- 03 = PBL continental haze (index 11)
- 04 = PBL Saharan dust (index 12)
- 05 = PBL desert (index 13)
- 06 = PBL smoke (indices 15,3)
- 07 = TROP generic (all TROP indices not mentioned below)
- 08 = TROP volcanic (index 3)
- 09 = TROP continental haze (index 11)
- 10 = TROP Saharan dust (index 12)
- 11 = TROP smoke (index 15)
- 12 = STRATO aerosol (any non-PSC layer whose top is > tropopause
- 13 = PSC type I (PSC with rh less than or equal to 95%)
- 14 = PSC type II (PSC with rh greater than 95%)
- 15 = invalid

Cloud: {based on average cloud temperature, water cloud is warmer than –13 C}

Use Flag Meaning
- 00 = less than or equal to –75.0 C
- 01 = -75.0 through –68.5
- 02 = -68.5 through –62.0
- 03 = -62.0 through –55.5
- 04 = -55.5 through –49.0
- 05 = -49.0 through –32.5
- 06 = -32.5 through –26.0
- 07 = -26.0 through –19.5
- 08 = -19.5 through –13.0
- 09 = -13.0 through –6.5
- 10 = -6.5 through 0.0
- 11 = 0.0 through 6.5
- 12 = 6.5 through 13.0
- 13 = 13.0 through 19.5
- 14 = greater than 19.5 C
- 15 = invalid

**Quality Flag Values**

- 0 = 0-5 % Error
- 1 = 5-10 % Error
- 2 = 10-15 % Error
- 3 = 15-20 % Error
- 4 = 20-25 % Error
- 5 = 25-30 % Error
- 6 = 30-35 % Error
- 7 = 35-40 % Error
- 8 = 40-45 % Error
- 9 = 45-50 % Error
- 10 = 50-55 % Error
- 11 = 55-60 % Error
- 12 = 60-65 % Error
- 13 = 65-70 % Error
- 14 = 70 and greater % Error
- 15 = Unable to process

**Comments:**

**Product Var Name: i_cld1_bs_prof**

**Is element of: GLA10 record**

**Short Description: Cloud Backscatter Cross Section Profile at 532 nm**

**Product Data Type: i4b (280, 4)**

**Total Bytes: 4480**

**Product Units: e10/(m-sr)**

**Invalid Value/Flag: gi_invalid_i4b**

**Is Correction Flag?: NA**

**Is Unsigned?: No**

**Product Minimum: -1000000**

**Product Maximum: 100000000**

**Description: 532 nm cloud backscatter cross section corrected for attenuation, from 20 to -1km at 1hz. The first 4*280 bytes refer to the profile at the first second.**

**Comments:**

**Product Var Name: i_cld1_ext_flag**

**Is element of: GLA10 record**

**Short Description: Cloud extinction flag at 532 nm**

**Product Data Type: i1b ( 40)**

**Total Bytes: 40**

**Product Units: NA**

**Invalid Value/Flag: No**

**Is Correction Flag?: NA**

**Is Unsigned?: No**

**Product Minimum: 0**

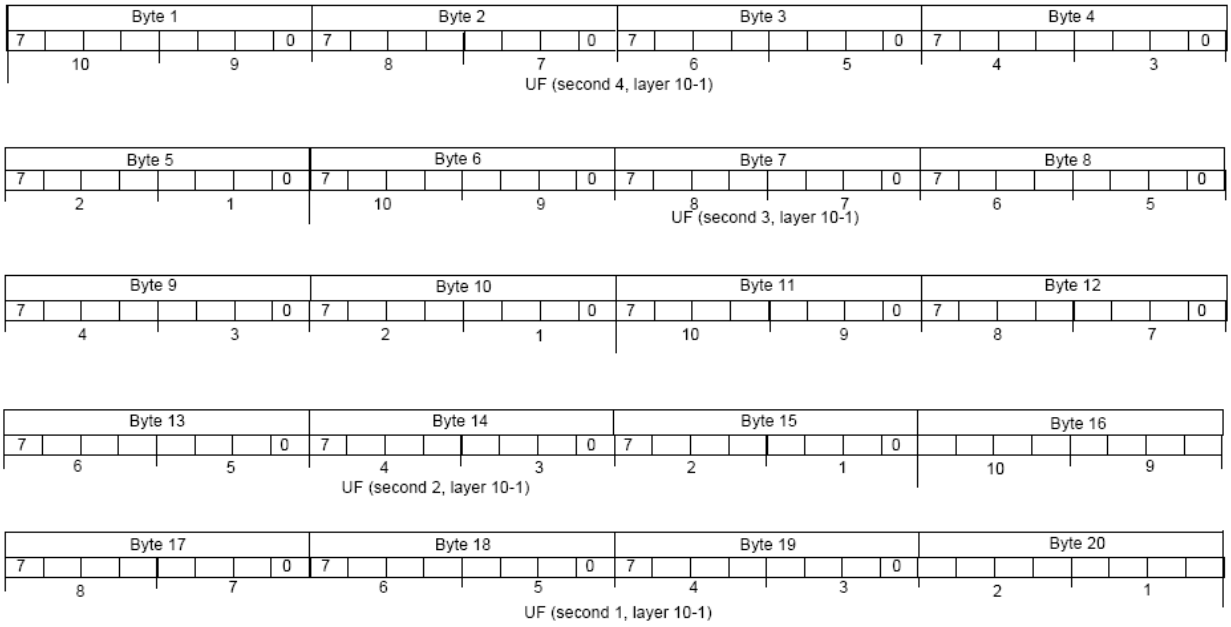
**Product Maximum: 15**

**Description: Composite Flag - see Breakout for details**

**i_cld1_ext_flag [GLA10]: Cloud Extinction Flag** (4 sec/records, up to 10 layers/sec.)



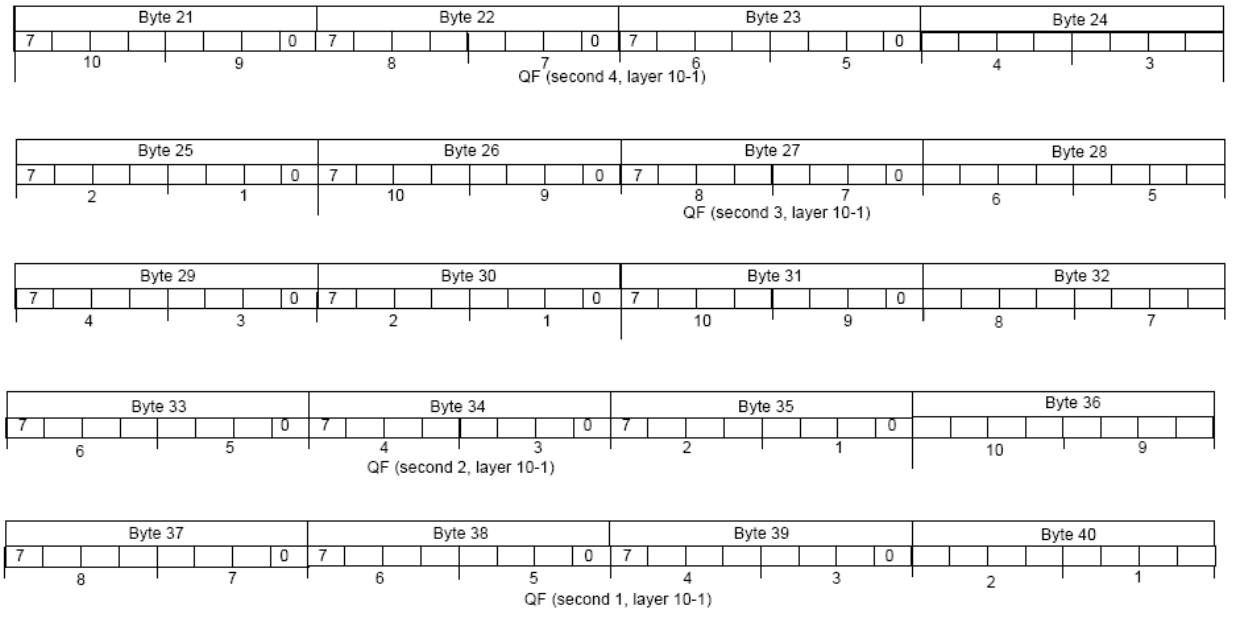
(QF = Quality Flag; UF = Use Flag)




**i_cld1_ext_flag [GLA10]: Cloud Extinction Flag** (4 sec/records, up to 10 layers/sec.)



(QF = Quality Flag; UF = Use Flag)



**Layer Use Flag Values**

a) For backscatter cross section, the use flag gives saturation status as follows:

Use FLAG SATURATION STATUS
0 = no saturation detected
1 = one or two bins were saturated with 1064 nm conversion performed
2 = at least three bins were saturated with 1064 nm conversion performed
3 = at least one but less than four bins were saturated with no conversion performed
4 = four or more bins were saturated with no conversion performed
15 = invalid

b) for extinction cross section and layer optical depth, the use flag designates layer type category as follows:

Aerosol: {based on S ratio default index, PSC flag, and tropopause height}
Use Flag Meaning
00 = PBL generic (all PBL indices not mentioned below)
01 = PBL maritime (index 4)
02 = PBL continental ice (index 7)
03 = PBL continental haze (index 11)
04 = PBL Saharan dust (index 12)
05 = PBL desert (index 13)
06 = PBL smoke (indices 15,3)
07 = TROP generic (all TROP indices not mentioned below)
08 = TROP volcanic (index 3)
09 = TROP continental haze (index 11)
10 = TROP Saharan dust (index 12)
11 = TROP smoke (index 15)
12 = STRATO aerosol (any non-PSC layer whose top is > tropopause
13 = PSC type I (PSC with rh less than or equal to 95%)
14 = PSC type II (PSC with rh greater than 95%)
15 = invalid

Cloud: {based on average cloud temperature, water cloud is warmer than –13 C}

Use Flag Meaning
00 = less than or equal to –75.0 C
01 = -75.0 through –68.5
02 = -68.5 through –62.0
03 = -62.0 through –55.5
04 = -55.5 through –49.0
05 = -49.0 through –32.5
06 = -32.5 through –26.0
07 = -26.0 through –19.5
08 = -19.5 through –13.0
09 = -13.0 through –6.5
10 = -6.5 through 0.0
11 = 0.0 through 6.5
12 = 6.5 through 13.0
13 = 13.0 through 19.5
14 = greater than 19.5 C
15 = invalid

**Quality Flag Values**

0 = 0-5 % Error
1 = 5-10 % Error
2 = 10-15 % Error
3 = 15-20 % Error
4 = 20-25 % Error
5 = 25-30 % Error
6 = 30-35 % Error
7 = 35-40 % Error
8 = 40-45 % Error
9 = 45-50 % Error
10 = 50-55 % Error
11 = 55-60 % Error
12 = 60-65 % Error
13 = 65-70 % Error
14 = 70 and greater % Error
15 = Unable to process

**Comments:**

**Product Var Name: i_cld1_ext_prof**

**Is element of: GLA10 record**

**Short Description: Cloud Extinction Cross Section Profile at 532 nm**

**Product Data Type: i4b (280, 4)**

**Total Bytes: 4480**

**Product Units: e9/m**

**Invalid Value/Flag: gi_invalid_i4b**

**Is Correction Flag?: NA**

**Is Unsigned?: No**

**Product Minimum: -10000000**

**Product Maximum: 1000000000**

**Description: Cloud extinction cross section profile from 20 to -1km at 1hz calculated from the 532 nm data. The first 4*280 bytes refer to the profile at the first second.**

**Comments:**

**Product Var Name: i_cld1_flag**

**Is element of: GLA11 Record**

**Short Description: Cloud optical depth flag for 532 nm**

**Product Data Type: i1b ( 40)**

**Total Bytes: 40**

**Product Units: NA**

**Invalid Value/Flag: No**

**Is Correction Flag?: NA**

**Is Unsigned?: No**

**Product Minimum: 0**

**Product Maximum: 15**

**Description: Composite Flag - see Breakout for details**

i_cld1_flag [GLA11]: Cloud Optical Depth (4 sec. per record, at once per second rate)



(QF = Quality Flag; UF = Use Flag)

| Byte 1 | | | | | | | | Byte 2 | | | | | | | | Byte 3 | | | | | | | | Byte 4 | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 7 | | | | | | | 0 | 7 | | | | | | | 0 | 7 | | | | | | | 0 | 7 | | | | | | | 0 |
| 10 | | | | 9 | | | | 8 | | | | 7 | | | | 6 | | | | 5 | | | | 4 | | | | 3 | | | |

UF (second 4, layer 10-1)

| Byte 5 | | | | | | | | Byte 6 | | | | | | | | Byte 7 | | | | | | | | Byte 8 | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 7 | | | | | | | 0 | 7 | | | | | | | 0 | 7 | | | | | | | 0 | 7 | | | | | | | 0 |
| 2 | | | | 1 | | | | 10 | | | | 9 | | | | 8 | | | | 7 | | | | 6 | | | | 5 | | | |

UF (second 3, layer 10-1)

| Byte 9 | | | | | | | | Byte 10 | | | | | | | | Byte 11 | | | | | | | | Byte 12 | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 7 | | | | | | | 0 | 7 | | | | | | | 0 | 7 | | | | | | | 0 | 7 | | | | | | | 0 |
| 4 | | | | 3 | | | | 2 | | | | 1 | | | | 10 | | | | 9 | | | | 8 | | | | 7 | | | |

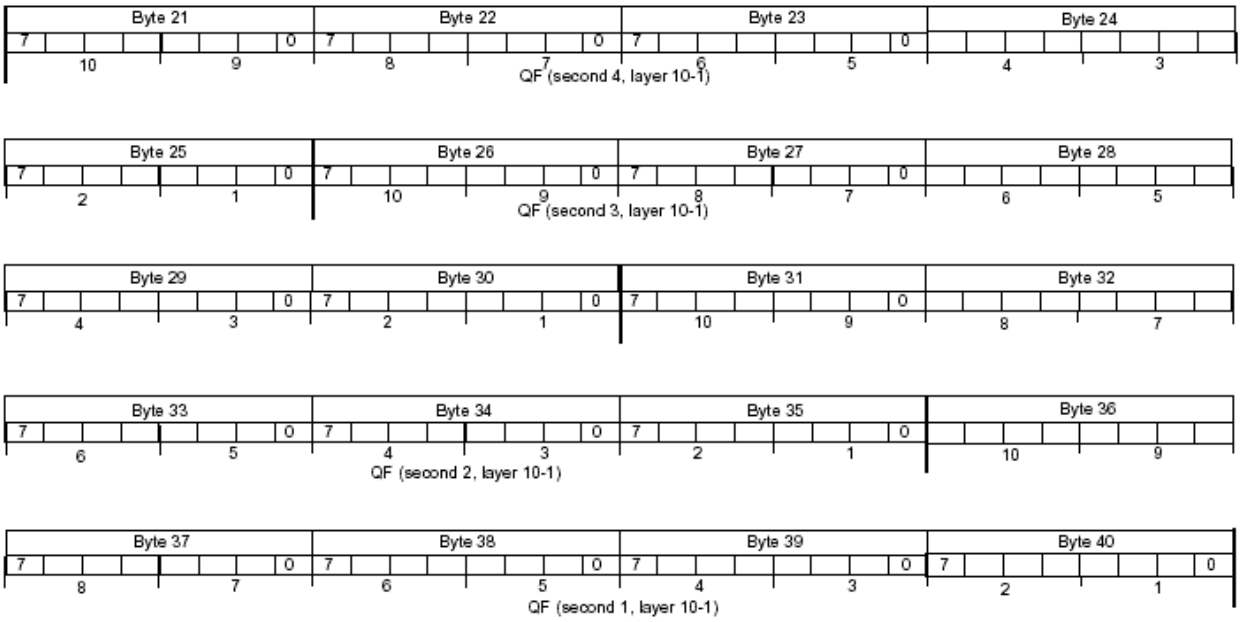
| Byte 13 | | | | | | | | Byte 14 | | | | | | | | Byte 15 | | | | | | | | Byte 16 | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 7 | | | | | | | 0 | 7 | | | | | | | 0 | 7 | | | | | | | 0 | 7 | | | | | | | 0 |
| 6 | | | | 5 | | | | 4 | | | | 3 | | | | 2 | | | | 1 | | | | 10 | | | | 9 | | | |

UF (second 2, layer 10-1)

| Byte 17 | | | | | | | | Byte 18 | | | | | | | | Byte 19 | | | | | | | | Byte 20 | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 7 | | | | | | | 0 | 7 | | | | | | | 0 | 7 | | | | | | | 0 | 7 | | | | | | | 0 |
| 8 | | | | 7 | | | | 6 | | | | 5 | | | | 4 | | | | 3 | | | | 2 | | | | 1 | | | |

UF (second 1, layer 10-1)

(QF = Quality Flag; UF = Use Flag)




**Comments:**

**Product Var Name: i_cld1_grd_det**

**Is element of: GLA10 record, GLA11 Record**

**Short Description: Medium Resolution Ground Detection at 532 nm**

**Product Data Type: i2b ( 4)**

**Total Bytes: 8**

**Product Units: deka-meters**

**Invalid Value/Flag: gi_invalid_i2b**

**Is Correction Flag?: NA**

**Is Unsigned?: No**

**Product Minimum: -100**

**Product Maximum: 2000**

**Description: Medium resolution processed ground height at 1hz, 1 per profile**

**Comments:**

**Product Var Name: i_cld1_msf**

**Is element of: GLA11 Record**

**Short Description: Cloud Multiple Scattering Factor**

**Product Data Type: i2b (10, 4)**

**Total Bytes: 80**

**Product Units: unitless**

**Invalid Value/Flag: gi_invalid_i2b**

**Is Correction Flag?: NA**

**Is Unsigned?: No**

**Product Minimum: 0**

**Product Maximum: 1000**

**Description: Cloud multiple scattering coefficient at 1 hz, 1 per layer, 10 layers**

**Comments:**

**Product Var Name: i_cld1_mswf**

**Is element of: GLA11 Record**

**Short Description: Cloud Multiple Scattering Warning Flag**

**Product Data Type: i1b ( 2)**

**Total Bytes: 2**

**Product Units: NA**

**Invalid Value/Flag: No**

**Is Correction Flag?: NA**

**Is Unsigned?: No**

**Product Minimum: 0**

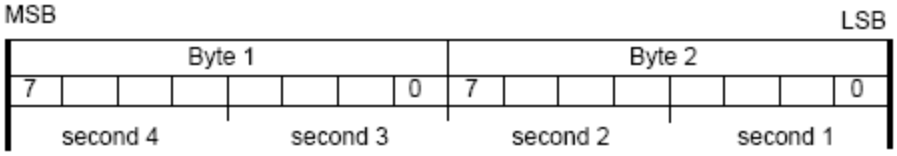
**Product Maximum: 15**

**Description: Cloud Multiple Scattering Warning Flag at 1 Hz for 4 sec. First 4 bits are for first second, last 4 bits are for 4th second.**

**i_cld1_mswf [GLA11]: Multiple Scattering Warning Flag** (4 sec. per record, at once per second rate)

4 bit set of values;

0 = < 0.010
1 = 0.010 - 0.030
2 = 0.030 - 0.060
3 = 0.060 - 0.100
4 = 0.100 - 0.150
5 = 0.150 - 0.225
6 = 0.225 - 0.300
7 = 0.300 - 0.400
8 = 0.400 - 0.500
9 = 0.500 - 0.670
10 = 0.670 - 0.900
11 = 0.900 - 1.200
12 = 1.200 - 1.600
13 = 1.600 - 2.000
14 = > 2.000
15 = Invalid




Note: A warning flag value of 15 will be the default whenever no 532nm signal is available (as when the 532 laser energy is < 4 mJ c
To distinguish this case from that of optically thick clouds, one must check the number of layers. If there were zero layers reported, b
then the cause is the lack of useable 532 data. If the number of layers is > 0 and the MSWF is 15, then the cause is total extinction c
(this happens for clouds of optical depth > about 3).

A warning flag of '0' is a very good indicator of no layers or a layer so thin it won't cause any altimetry range delays.

**The multiple scattering warning flag (MSWF) is based on the total column optical depth (aerosol plus cloud) calculated in GLA11 using 532nm. It is intended as a way to quickly obtain information about the potential severity of multiple scattering with regards to the range-to-surface calculated by the altimetry processing software. It will be output on the GLA11 product for use by the altimetry group. The multiple scattering warning flag will have values ranging from 0-14, based on the total column optical depth as detailed in the PDF.**

**A warning flag value of 15 will signify ?invalid?. An invalid will be encoded if an optical depth in any of the layers in the 1-second column could not be calculated. This usually occurs in a very optically ?thick? cloud which extinguishes the signal. It could also occur if the extinction-to-backscatter ratio assignment is set too high, causing the transmission calculations in the lidar inversion to go out-of-range.**

**Comments:**

**Product Var Name: i_cld1_od**

**Is element of: GLA11 Record**

**Short Description: Cloud Optical Depth at 532 nm**

**Product Data Type: i2b (10, 4)**

**Total Bytes: 80**

**Product Units: unitless*1000**

**Invalid Value/Flag: gi_invalid_i2b**

**Is Correction Flag?: NA**

**Is Unsigned?: No**

**Product Minimum: 0**

**Product Maximum: 5000**

**Description: 532 nm cloud optical depth, corrected for multiple scattering, at 1hz, 1 per layer, 10 layers**

**Comments:**

**Product Var Name: i_cld1_sval1**

**Is element of: GLA10 record**

**Short Description: Cloud true S values from table**

**Product Data Type: i2b (10, 4)**

**Total Bytes: 80**

**Product Units: 100*sr**

**Invalid Value/Flag: gi_invalid_i2b**

**Is Correction Flag?: NA**

**Is Unsigned?: No**

**Product Minimum: 100**

**Product Maximum: 20000**

**Description: Cloud true extinction to backscatter ratios calculated from meteorological and geographic data. The first set of 2*10 bytes refers to the 10 possible layers at the first second.**

**Comments:**

**Product Var Name: i_cld1_sval2**

**Is element of: GLA10 record**

**Short Description: Cloud true S values from equation calc.**

**Product Data Type: i2b (10, 4)**

**Total Bytes: 80**

**Product Units: 100*sr**

**Invalid Value/Flag: gi_invalid_i2b**

**Is Correction Flag?: NA**

**Is Unsigned?: No**

**Product Minimum: 100**

**Product Maximum: 20000**

**Description: Cloud true extinction to backscatter ratios calculated from optically thin layer considerations. The first set of 2*10 bytes refers to the 10 possible layers at the first second.**

**Comments:**

**Product Var Name: i_cld1_sval_uf**

**Is element of: GLA10 record**

**Short Description: Cloud true S values use flag**

**Product Data Type: i1b ( 20)**

**Total Bytes: 20**

**Product Units: NA**

**Invalid Value/Flag: No**

**Is Correction Flag?: NA**

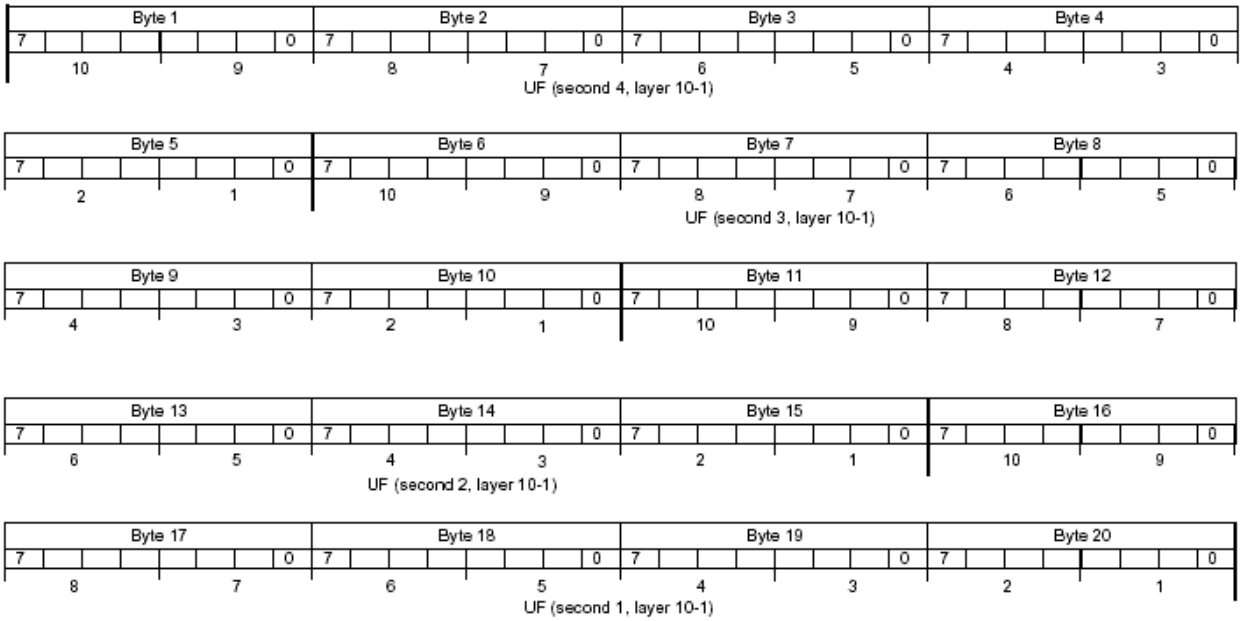
**Is Unsigned?: No**

**Product Minimum: 0**

**Product Maximum: 15**

**Description: Cloud true S values use flag for 10 layers at 1 Hz for 4 sec. First 40 bits (bytes 16-20) are for 10 layers of the first second, last 40 bits (bytes 1 - 5) are for 10 layers of the fourth second. Stipulates which extinction to backscatter ratio was used in processing (1=default, 2=calculated). 15 denotes no layer detected (invalid).**

i_cld1_sval_uf [GLA10]: Cloud True S Values Use Flag (4 sec/records, up to 10 layers/sec.)




**Comments:**

**Product Var Name: i_cld1_top**

**Is element of: GLA10 record, GLA11 Record**

**Short Description: Medium Resolution Cloud Top at 532 nm**

**Product Data Type: i2b (10, 4)**

**Total Bytes: 80**

**Product Units: deka-meters**

**Invalid Value/Flag: gi_invalid_i2b**

**Is Correction Flag?: NA**

**Is Unsigned?: No**

**Product Minimum: -100**

**Product Maximum: 2000**

**Description: Medium resolution cloud top heights for layers which were selected for optical processing at 1hz, 1 per layer, 10 layers**

**Comments:**

**Product Var Name: i_cld_ir_OD**

**Is element of: GLA11 Record**

**Short Description: Cloud Optical Depth at 1064 nm**

**Product Data Type: i2b (10, 4)**

**Total Bytes: 80**

**Product Units: Unknown**

**Invalid Value/Flag: gi_invalid_i2b**

**Is Correction Flag?: NA**

**Is Unsigned?: No**

**Product Minimum: 0**

**Product Maximum: 0**

**Description: Cloud Optical Depth at 1064 nm**

**Comments:**

**Product Var Name: i_cld_ir_ODFlg**

**Is element of: GLA11 Record**

**Short Description: Cloud Optical Depth at 1064 nm Flag**

**Product Data Type: i1b (10, 4)**

**Total Bytes: 40**

**Product Units: N/A**

**Invalid Value/Flag: No**

**Is Correction Flag?: NA**

**Is Unsigned?: No**

**Product Minimum: null**

**Product Maximum: null**

**Description:**

**Comments:**

**Product Var Name: i_erd**

**Is element of: GLA11 Record**

**Short Description: Estimated Range Delay**

**Product Data Type: i2b ( 4)**

**Total Bytes: 8**

**Product Units: millimeters**

**Invalid Value/Flag: gi_invalid_i2b**

**Is Correction Flag?: NA**

**Is Unsigned?: No**

**Product Minimum: 0**

**Product Maximum: 1000**

**Description: The estimated range delay is an estimate of the effect of atmospheric multiple scattering on the measured range as deduced from the surface pulse. Tables were created using the Monte Carlo method which contain the range delay as a function of height of scatting layer, geometrical thickness, optical thickness and particale size. The i_erd is provided to the elevation process as a range correction and isreported as a negative number that can be added to the range to correct it. The computation of i_erd is restricted to those timeswhen the 532 channel was working sufficiently well (L2A and first half of L2B (also possibly for night L3A and L3B)).**

**Comments:**

**Product Var Name: i_et_Flags**

**Is element of: GLA02 Record**

**Short Description: Etalon Flags**

**Product Data Type: i1b**

**Total Bytes: 1**

**Product Units: n/a**

**Invalid Value/Flag: No**

**Is Correction Flag?: NA**

**Is Unsigned?: Yes**

**Product Minimum: 0**

**Product Maximum: 255**

**Description: Etalon Flags.**

**Comments:**

**Product Var Name: i_et_StartTemp**

**Is element of: GLA02 Record**

**Short Description: Start Temperature**

**Product Data Type: i1b**

**Total Bytes: 1**

**Product Units: Celsius**

**Invalid Value/Flag: i_APID_AvFlg**

**Is Correction Flag?: NA**

**Is Unsigned?: No**

**Product Minimum: 0**

**Product Maximum: 255**

**Description: Start TemperatureComments:**

**Product Var Name: i_et_StopTemp**

**Is element of: GLA02 Record**

**Short Description: Stop Temperature**

**Product Data Type: i1b**

**Total Bytes: 1**

**Product Units: Celsius**

**Invalid Value/Flag: i_APID_AvFlg**

**Is Correction Flag?: NA**

**Is Unsigned?: No**

**Product Minimum: 0**

**Product Maximum: 255**

**Description: Stop Temperature.Comments:**

**Product Var Name: i_et_TempStep**

**Is element of: GLA02 Record**

**Short Description: Temperature Step**

**Product Data Type: i1b**

**Total Bytes: 1**

**Product Units: Celsius**

**Invalid Value/Flag: i_APID_AvFlg**

**Is Correction Flag?: NA**

**Is Unsigned?: No**

**Product Minimum: 0**

**Product Maximum: 255**

**Description: Temperature StepComments:**

**Product Var Name: i_et_acqavg_tm**

**Is element of: GLA02 Record**

**Short Description: Etalon Averaging time for acquire command**

**Product Data Type: i1b**

**Total Bytes: 1**

**Product Units: seconds**

**Invalid Value/Flag: No**

**Is Correction Flag?: NA**

**Is Unsigned?: No**

**Product Minimum: 0**

**Product Maximum: 255**

**Description: Etalon Averaging Time for Acquire Command.Comments:**

**Product Var Name: i_et_acqset_tm**

**Is element of: GLA02 Record**

**Short Description: Etalon Temperature Settle time for acquire cmd**

**Product Data Type: i2b**

**Total Bytes: 2**

**Product Units: seconds**

**Invalid Value/Flag: i_APID_AvFlg**

**Is Correction Flag?: NA**

**Is Unsigned?: Yes**

**Product Minimum: 0**

**Product Maximum: 32767**

**Description: Etalon Temperature Settle Time for acquire cmd.**

**Comments:**

**Product Var Name: i_et_cal_mode**

**Is element of: GLA02 Record**

**Short Description: Etalon Calibration - Current mode**

**Product Data Type: i1b**

**Total Bytes: 1**

**Product Units: n/a**

**Invalid Value/Flag: i_APID_AvFlg**

**Is Correction Flag?: NA**

**Is Unsigned?: No**

**Product Minimum: 0**

**Product Maximum: 3**

**Description: Current mode of Etalon calibration: 0 = Off, 1 = Acquire, 2 = Tracking, 3 = Invalid.**

**Comments:**

**Product Var Name: i_et_offax_xmit**

**Is element of: GLA02 Record**

**Short Description: Etalon Averaged off-axis Transmission**

**Product Data Type: i4b**

**Total Bytes: 4**

**Product Units: n/a**

**Invalid Value/Flag: i_APID_AvFlg**

**Is Correction Flag?: NA**

**Is Unsigned?: No**

**Product Minimum: 0**

**Product Maximum: 2147483647**

**Description: Etalon Averaged off-axis Transmission.**

**Comments:**

**Product Var Name: i_et_onax_xmit**

**Is element of: GLA02 Record**

**Short Description: Etalon Averaged on-axis Transmission**

**Product Data Type: i4b**

**Total Bytes: 4**

**Product Units: n/a**

**Invalid Value/Flag: i_APID_AvFlg**

**Is Correction Flag?: NA**

**Is Unsigned?: No**

**Product Minimum: 0**

**Product Maximum: 2147483647**

**Description: Etalon Averaged on-axis Transmission.**

**Comments:**

**Product Var Name: i_et_spare**

**Is element of: GLA02 Record**

**Short Description: Spares**

**Product Data Type: i1b ( 3)**

**Total Bytes: 3**

**Product Units: NA**

**Invalid Value/Flag: N/A**

**Is Correction Flag?: No**

**Is Unsigned?: No**

**Product Minimum: 0**

**Product Maximum: 0**

**Description:**

**Comments:**

**Product Var Name: i_et_temperr**

**Is element of: GLA02 Record**

**Short Description: Etalon Temperature Error**

**Product Data Type: i4b**

**Total Bytes: 4**

**Product Units: n/a**

**Invalid Value/Flag: i_APID_AvFlg**

**Is Correction Flag?: NA**

**Is Unsigned?: No**

**Product Minimum: 0**

**Product Maximum: 2147483647**

**Description: Etalon Temperature Error.**

**Comments:**

**Product Var Name: i_et_trkfltavg**

**Is element of: GLA02 Record**

**Short Description: Etalon Tracking Failure Average**

**Product Data Type: i4b**

**Total Bytes: 4**

**Product Units: n/a**

**Invalid Value/Flag: i_APID_AvFlg**

**Is Correction Flag?: NA**

**Is Unsigned?: No**

**Product Minimum: 0**

**Product Maximum: 2147483647**

**Description: Etalon Tracking Failure Average**

**Comments:**

**Product Var Name: i_et_trkfltout**

**Is element of: GLA02 Record**

**Short Description: Etalon Tracking Loop Filter output**

**Product Data Type: i4b**

**Total Bytes: 4**

**Product Units: n/a**

**Invalid Value/Flag: i_APID_AvFlg**

**Is Correction Flag?: NA**

**Is Unsigned?: No**

**Product Minimum: 0**

**Product Maximum: 2147483647**

**Description: Etalon Tracking Loop Filter output.Comments:**

**Product Var Name: i_et_update_ctr**

**Is element of: GLA02 Record**

**Short Description: Etalon Averaging Update Counter**

**Product Data Type: i1b**

**Total Bytes: 1**

**Product Units: n/a**

**Invalid Value/Flag: i_APID_AvFlg**

**Is Correction Flag?: NA**

**Is Unsigned?: No**

**Product Minimum: 0**

**Product Maximum: 255**

**Description: Etalon averaging update counter.Comments:**

**Product Var Name: i_gPredCldTop**

**Is element of: GLA02 Record**

**Short Description: 532 nm Predicted Cloud Top Height at 5Hz**

**Product Data Type: i2b ( 5)**

**Total Bytes: 10**

**Product Units: meters**

**Invalid Value/Flag: i_APID_AvFlg**

**Is Correction Flag?: NA**

**Is Unsigned?: No**

**Product Minimum: 0**

**Product Maximum: 30000**

**Description: The predicted height of the first cloud above local ground, predicted from the 532 nm lidar signal.Comments:**

**Product Var Name: i_g_IntRet**

**Is element of: GLA02 Record**

**Short Description: 532 nm Integrated Return, 40 to 20 KM**

**Product Data Type: i4b**

**Total Bytes: 4**

**Product Units: photons*100**

**Invalid Value/Flag: i_APID_AvFlg**

**Is Correction Flag?: NA**

**Is Unsigned?: No**

**Product Minimum: 0**

**Product Maximum: 500000**

**Description: Sum of raw photon counts (after background is subtracted) over the 20 to 40 km bins.Comments:**

**Product Var Name: i_g_IntRet_qf**

**Is element of: GLA02 Record**

**Short Description: Integrated Return Quality Flag**

**Product Data Type: i1b**

**Total Bytes: 1**

**Product Units: n/a**

**Invalid Value/Flag: No**

**Is Correction Flag?: NA**

**Is Unsigned?: Yes**

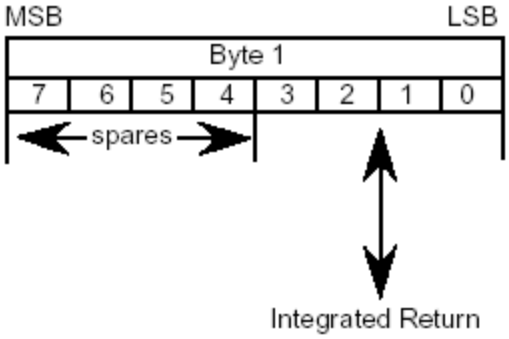
**Product Minimum: 0**

**Product Maximum: 5**

**Description: Assessment of the integrated return value; indicator of boresight accuracy and signal strength. 0 = unused, 1 = excellent, 2 = good, 3 = marginal, 4 = poor, 5 = bad data.**

**i_g_IntRet_qf** [GLA02]: Integrated Return Quality Flag

4-bit set of values: 0 = unused, 1 = excellent, 2 = good, 3 = marginal, 5 = bad data




**Comments:**

**Product Var Name: i_g_TxNrg_Cts**

**Is element of: GLA02 Record**

**Short Description: 532 nm Laser Transmit Energy, counts**

**Product Data Type: i1b ( 40)**

**Total Bytes: 40**

**Product Units: counts**

**Invalid Value/Flag: i_APID_AvFlg**

**Is Correction Flag?: NA**

**Is Unsigned?: Yes**

**Product Minimum: 0**

**Product Maximum: 255**

**Description: The 532 nm transmitted pulse energy, in raw counts from the transmitted pulse energy monitor.Comments:**

**Product Var Name: i_g_TxNrg_qf**

**Is element of: GLA02 Record, GLA07 Record**

**Short Description: 532 nm Laser Transmit Energy Quality Flag**

**Product Data Type: i1b (10)**

**Total Bytes: 10**

**Product Units: n/a**

**Invalid Value/Flag: No**

**Is Correction Flag?: NA**

**Is Unsigned?: Yes**

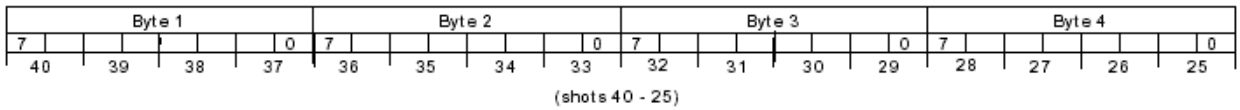
**Product Minimum: 0**

**Product Maximum: 3**

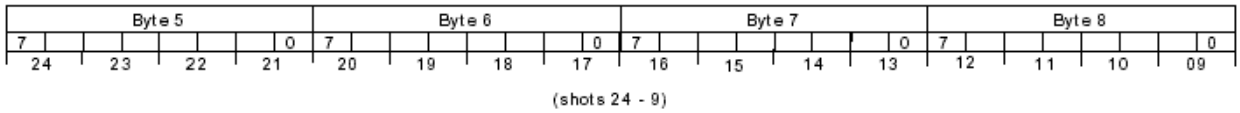
**Description: Evaluation of the 532 nm laser transmit energy which is an indication of the laser health; 2 bits per shot for 40 shots; 1 = full laser energy, 2 = marginal laser energy, 3 = deficient laser energy, 0 = not used.**

i_g_TxNrg_qf [GLA02,07]: 532 nm Laser Transmitted Energy Quality Flag

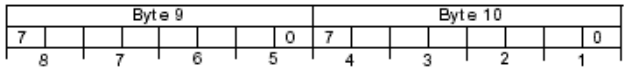
2 bit per shot values: 0=not used, 1=full laser energy, 2=marginal laser energy, 3=deficient laser energy




(shots 40 - 25)




(shots 24 - 9)




(shots 8 - 1)

**Comments:**

**Product Var Name: i_g_cal_cof**

**Is element of: GLA07 Record**

**Short Description: 532 nm Backscatter Calibration Coefficient**

**Product Data Type: i4b (3)**

**Total Bytes: 12**

**Product Units: 1d-6*(Photons/bin)(km^3/J)sr**

**Invalid Value/Flag: No**

**Is Correction Flag?: NA**

**Is Unsigned?: No**

**Product Minimum: 1.0d4**

**Product Maximum: 1.0d9**

**Description: The calibration value applied to the 532 nm lidar data to get the backscatter (1=high cal ht, 2=low cal ht, 3=used).**

**Comments:**

**Product Var Name: i_g_lid_qf**

**Is element of: GLA02 Record**

**Short Description: 532 nm LIDAR Data Quality Flag**

**Product Data Type: i1b (12)**

**Total Bytes: 12**

**Product Units: n/a**

**Invalid Value/Flag: No**

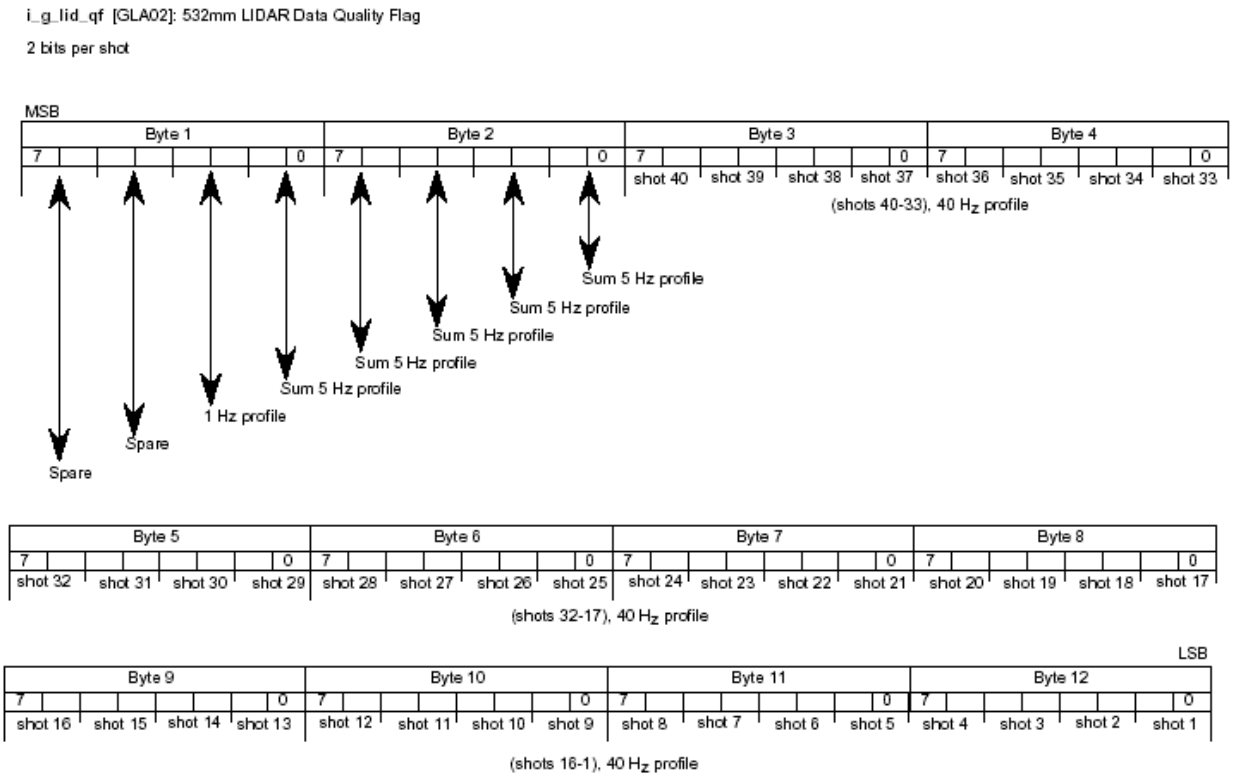
**Is Correction Flag?: NA**

**Is Unsigned?: Yes**

**Product Minimum: 0**

**Product Maximum: 3**

**Description: 532 nm lidar data quality flag. 2 bits per shot for the 40 HZ profile; 2 bits per sum for the 5 Hz profile, 2 bits for the 1 Hz profile for a total of 92 bits. There are 4 spare bits. A value of 3 indicates the background data is out of bounds (0-100).**




**Comments:**

**Product Var Name: i_g_mbscs**

**Is element of: GLA07 Record**

**Short Description: 532 nm molecular backscatter cross section profile 40 to -1 km**

**Product Data Type: i4b (548)**

**Total Bytes: 2192**

**Product Units: e11/(m-sr)**

**Invalid Value/Flag: No**

**Is Correction Flag?: NA**

**Is Unsigned?: No**

**Product Minimum: 1000**

**Product Maximum: 1000000**

**Description: 532 nm molecular backscatter profile computed from MET data interpolated in space and time to profile location.**

**Comments:**

**Product Var Name: i_g_shot_ctr**

**Is element of: GLA02 Record**

**Short Description: 532 nm LIDAR Data Shot Counter**

**Product Data Type: i2b**

**Total Bytes: 2**

**Product Units: n/a**

**Invalid Value/Flag: i_APID_AvFlg**

**Is Correction Flag?: NA**

**Is Unsigned?: No**

**Product Minimum: 0**

**Product Maximum: 200**

**Description: Corresponds to first value of the 40 -1 km to 10 km aerosol science data. From APID15, Offset 14.**

**Comments:**

**Product Var Name: i_gnd_ret_loc**

**Is element of: GLA02 Record**

**Short Description: Ground Return Location**

**Product Data Type: i1b ( 5)**

**Total Bytes: 5**

**Product Units: bin number**

**Invalid Value/Flag: i_APID_AvFlg**

**Is Correction Flag?: NA**

**Is Unsigned?: No**

**Product Minimum: 0**

**Product Maximum: 32**

**Description: Bin number (from the end of the profile) of the estimated ground return peak signal; at the 5 Hz rate.Comments:**

**Product Var Name: i_gndret_pksig**

**Is element of: GLA02 Record**

**Short Description: Ground Return Peak Signal**

**Product Data Type: i1b ( 5)**

**Total Bytes: 5**

**Product Units: photons / bin**

**Invalid Value/Flag: i_APID_AvFlg**

**Is Correction Flag?: NA**

**Is Unsigned?: No**

**Product Minimum: 0**

**Product Maximum: 32**

**Description: Peak photon count in the 532 nm backscatter data. It is assumed that a ground return causes the maximum signal; at the 5 Hz rate.Comments:**

**Product Var Name: i_ir_TxNrg_qf**

**Is element of: GLA02 Record, GLA07 Record**

**Short Description: 1064 nm Laser Transmit Energy Quality Flag**

**Product Data Type: i1b (10)**

**Total Bytes: 10**

**Product Units: n/a**

**Invalid Value/Flag: No**

**Is Correction Flag?: NA**

**Is Unsigned?: Yes**

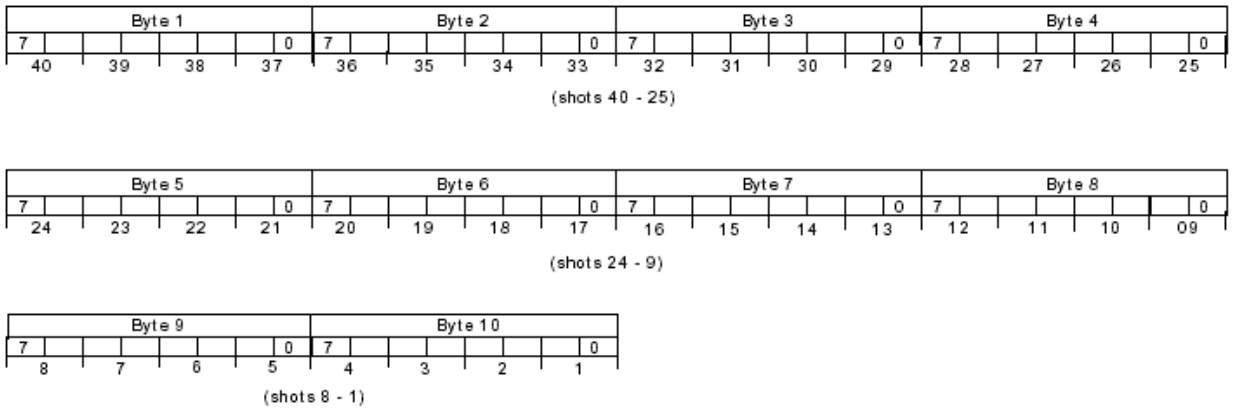
**Product Minimum: 0**

**Product Maximum: 3**

**Description: Evaluation of the 1064 nm laser transmit energy which is an indication of the laser health; 2 bits per shot for 40 shots; 1 = full laser energy, 2 = marginal laser energy, 3 = deficient laser energy, 0 = not used.**

i_ir_TxNrg_qf [GLA02, 07]: 1064 nm Laser Transmitted Energy Quality Flag

2 bits per shot values: 0=not used, 1=full laser energy, 2=marginal laser energy, 3=deficient laser energy




**Comments:**

**Product Var Name: i_ir_bin_shift**

**Is element of: GLA07 Record**

**Short Description: 1064 vertical alignment offset**

**Product Data Type: i1b**

**Total Bytes: 1**

**Product Units: bins**

**Invalid Value/Flag: No**

**Is Correction Flag?: NA**

**Is Unsigned?: No**

**Product Minimum: -10**

**Product Maximum: 10**

**Description: Number of bins that 1064 nm surface return bin is shifted to align with 532 nm surface return bin.Comments:**

**Product Var Name: i_ir_cal_cof**

**Is element of: GLA07 Record**

**Short Description: 1064 nm Backscatter Calibration Coefficient**

**Product Data Type: i4b (2)**

**Total Bytes: 8**

**Product Units: 1d4*(Watts)(km^3/J)sr**

**Invalid Value/Flag: No**

**Is Correction Flag?: NA**

**Is Unsigned?: No**

**Product Minimum: 1.0d5**

**Product Maximum: 1.0d8**

**Description: The calibration value applied to the 1064 nm lidar data to get the backscatter (1=low cal ht, 2=used).**

**Comments:**

**Product Var Name: i_ir_lid_qf**

**Is element of: GLA02 Record**

**Short Description: 1064 nm LIDAR Data Quality Flag**

**Product Data Type: i1b (12)**

**Total Bytes: 12**

**Product Units: n/a**

**Invalid Value/Flag: No**

**Is Correction Flag?: NA**

**Is Unsigned?: Yes**

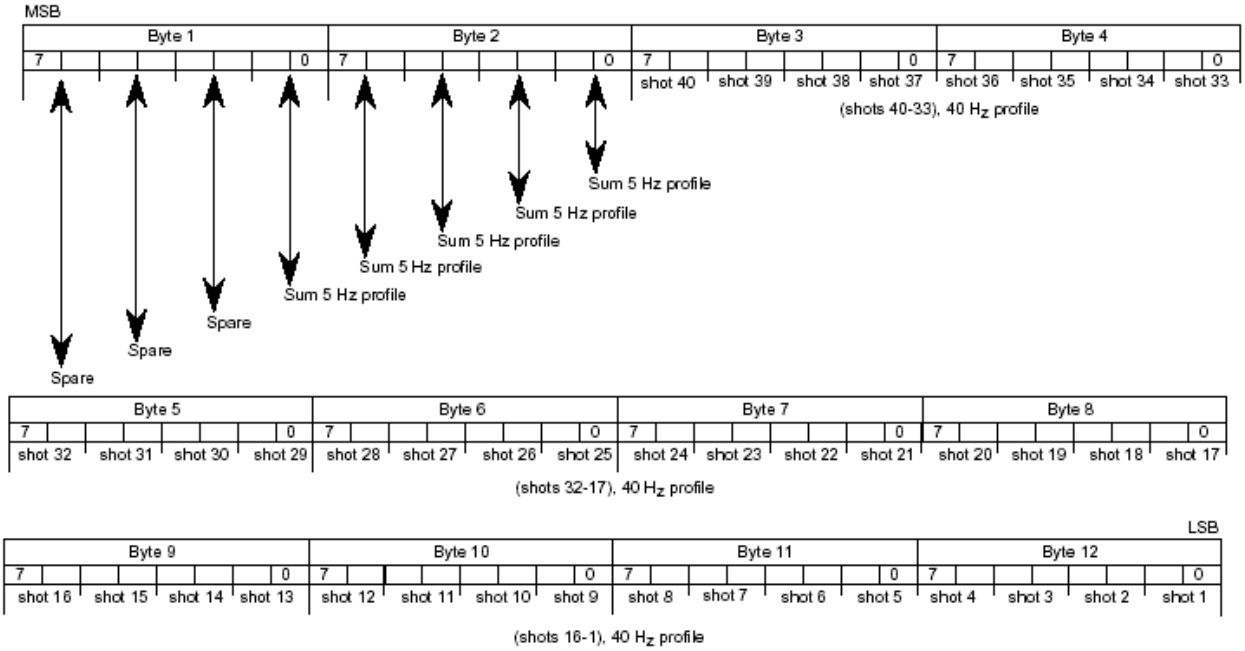
**Product Minimum: 0**

**Product Maximum: 3**

**Description: 1064 nm lidar data quality flag. 2 bits per shot for the 40 HZ profile; 2 bits per sum for the 5 Hz profile for a total of 90 bits. The upper 6 bits are spares. A value of 3 indicates the background data is out of bounds (0-255).**

i_ir_lid_qf [GLA02]: 1064mm LIDAR Data Quality Flag

2 bits per shot




**Comments:**

**Product Var Name: i_ir_mbscs**

**Is element of: GLA07 Record**

**Short Description: 1064 nm molecular backscatter cross section profile 20 to -1 km**

**Product Data Type: i4b (280)**

**Total Bytes: 1120**

**Product Units: e11/(m-sr)**

**Invalid Value/Flag: No**

**Is Correction Flag?: NA**

**Is Unsigned?: No**

**Product Minimum: 1000**

**Product Maximum: 1000000**

**Description: 1064 nm molecular backscatter profile computed from MET data interpolated in space and time to profile location.**

**Comments:**

**Product Var Name: i_ir_shot_ctr**

**Is element of: GLA02 Record**

**Short Description: 1064 nm Cloud Digitizer Shot Counter**

**Product Data Type: i2b**

**Total Bytes: 2**

**Product Units: n/a**

**Invalid Value/Flag: i_APID_AvFlg**

**Is Correction Flag?: NA**

**Is Unsigned?: No**

**Product Minimum: 0**

**Product Maximum: 200**

**Description: Shot number corresponding to first value of the 40 -1 km to 10 km cloud digitizer data.**

**Comments:**

**Product Var Name: i_lat**

**Is element of: GLA07 Record**

**Short Description: Profile Coordinate, Latitude**

**Product Data Type: i4b**

**Total Bytes: 4**

**Product Units: microdegrees**

**Invalid Value/Flag: gi_invalid_i4b**

**Is Correction Flag?: NA**

**Is Unsigned?: No**

**Product Minimum: -90000000**

**Product Maximum: 90000000**

**Description: Profile coordinate in the IERS Terrestrial Reference Frame: east longitude and latitude, at the 1 herz rate.Comments:**

**Product Var Name: i_lat**

**Is element of: GLA08 Record, GLA09 Record, GLA10 record, GLA11 Record**

**Short Description: Profile Location, Latitude**

**Product Data Type: i4b ( 4)**

**Total Bytes: 16**

**Product Units: microdegrees**

**Invalid Value/Flag: gi_invalid_i4b**

**Is Correction Flag?: NA**

**Is Unsigned?: No**

**Product Minimum: -90000000**

**Product Maximum: 90000000**

**Description: Profile coordinate in the IERS Terrestrial Reference Frame: east longitude and latitude, at the 1 herz rate.**

**Comments:**

**Product Var Name: i_lon**

**Is element of: GLA07 Record**

**Short Description: Profile Coordinate, Longitude**

**Product Data Type: i4b**

**Total Bytes: 4**

**Product Units: microdegrees**

**Invalid Value/Flag: gi_invalid_i4b**

**Is Correction Flag?: NA**

**Is Unsigned?: No**

**Product Minimum: 0**

**Product Maximum: 360000000**

**Description: Profile coordinate in the IERS Terrestrial Reference Frame: east longitude and latitude, at the 1 herz rate.Comments:**

**Product Var Name: i_lon**

**Is element of: GLA08 Record, GLA09 Record, GLA10 record, GLA11 Record**

**Short Description: Profile Location, Longitude**

**Product Data Type: i4b ( 4)**

**Total Bytes: 16**

**Product Units: microdegrees**

**Invalid Value/Flag: gi_invalid_i4b**

**Is Correction Flag?: NA**

**Is Unsigned?: No**

**Product Minimum: 0**

**Product Maximum: 360000000**

**Description: Profile coordinate in the IERS Terrestrial Reference Frame: east longitude and latitude, at the 1 herz rate.**

**Comments:**

**Product Var Name: i_metFlg**

**Is element of: GLA07 Record**

**Short Description: Met/std atm source/quality flag**

**Product Data Type: i1b**

**Total Bytes: 1**

**Product Units: NA**

**Invalid Value/Flag: No**

**Is Correction Flag?: NA**

**Is Unsigned?: No**

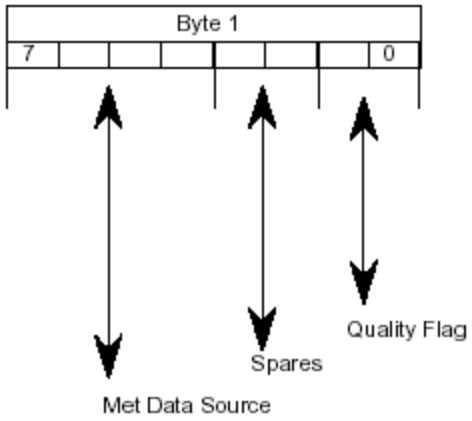
**Product Minimum: 0**

**Product Maximum: 15**

**Description: Flag indicating if met data or standard atmosphere data are used to fill met profiles. Flag is set to 1 if time of first file > 24 hrs, 2 if time of second file > 24 hrs, 2+index of standard atmosphere file if time of both files > 24 hrs.**

**i_metFlg** [GLA07]: Meteorological/Standard Atmospheric Data Source/Quality Flag

Flag indicating if met data or standard atmosphere data are used to fill met profiles.
Flag is set to 0 if times of both met files are <=24 hrs apart, 1 if time of only first
file > 24 hrs, 2 if time of only second file > 24 hrs, 2+index of standard atmosphere file if time of both files >24 hours




**Comments:**

**Product Var Name: i_pad_angle**

**Is element of: GLA08 Record, GLA09 Record, GLA10 record, GLA11 Record**

**Short Description: PAD Angle**

**Product Data Type: i4b ( 4)**

**Total Bytes: 16**

**Product Units: microdegrees**

**Invalid Value/Flag: gi_invalid_i4b**

**Is Correction Flag?: NA**

**Is Unsigned?: No**

**Product Minimum: 0**

**Product Maximum: 3600000000**

**Description: Attitude angle calculated from PAD and POD.Comments:**

**Product Var Name: i_pad_angle**

**Is element of: GLA07 Record**

**Short Description: PAD Angle**

**Product Data Type: i4b**

**Total Bytes: 4**

**Product Units: microdegrees**

**Invalid Value/Flag: gi_invalid_i4b**

**Is Correction Flag?: NA**

**Is Unsigned?: No**

**Product Minimum: 0**

**Product Maximum: 360000000**

**Description: Attitude angle calculated from PAD and POD.**

**Comments:**

**Product Var Name: i_pbl4_flag**

**Is element of: GLA11 Record**

**Short Description: PBL optical depth flag for 532 nm**

**Product Data Type: i1b**

**Total Bytes: 1**

**Product Units: NA**

**Invalid Value/Flag: No**

**Is Correction Flag?: NA**

**Is Unsigned?: No**

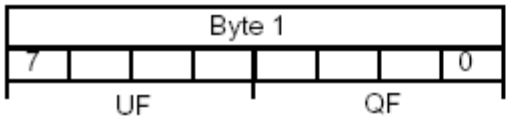
**Product Minimum: 0**

**Product Maximum: 15**

**Description: Composite Flag - see Breakout for details**

**i_pbl4_flag [GLA11]: PBL Optical Depth** (4 sec. per record, at once per 4 second rate)

(QF = Quality Flag; UF = Use Flag)




**Comments:**

**Product Var Name: i_pbl4_grd_det**

**Is element of: GLA10 record**

**Short Description: Low Resolution Aerosol Layer Ground Detection**

**Product Data Type: i2b**

**Total Bytes: 2**

**Product Units: deka-meters**

**Invalid Value/Flag: gi_invalid_i2b**

**Is Correction Flag?: NA**

**Is Unsigned?: No**

**Product Minimum: -100**

**Product Maximum: 1000**

**Description: Low resolution processed ground detection height at 0.25hz, 1 per profile**

**Comments:**

**Product Var Name: i_pbl4_od**

**Is element of: GLA11 Record**

**Short Description: PBL Optical Depth at 532 nm**

**Product Data Type: i2b**

**Total Bytes: 2**

**Product Units: unitless*1000**

**Invalid Value/Flag: gi_invalid_i2b**

**Is Correction Flag?: NA**

**Is Unsigned?: No**

**Product Minimum: 0**

**Product Maximum: 5000**

**Description: 532 nm Planetary Boundary Layer aerosol optical depth, corrected for multiple scattering at 0.25hz, 1 per layer, 1 layer**

**Comments:**

**Product Var Name: i_pc_rbias**

**Is element of: GLA02 Record**

**Short Description: Photon Counter Range Bias**

**Product Data Type: i4b**

**Total Bytes: 4**

**Product Units: n/a**

**Invalid Value/Flag: i_APID_AvFlg**

**Is Correction Flag?: NA**

**Is Unsigned?: No**

**Product Minimum: -1000000**

**Product Maximum: 1000000**

**Description: The range bias of the photon counter; always positive.**

**Comments:**

**Product Var Name: i_pse**

**Is element of: GLA11 Record**

**Short Description: Particle Size Estimate**

**Product Data Type: i2b ( 4)**

**Total Bytes: 8**

**Product Units: microns**

**Invalid Value/Flag: gi_invalid_i2b**

**Is Correction Flag?: NA**

**Is Unsigned?: No**

**Product Minimum: 0**

**Product Maximum: 1000**

**Description: Particle size estimate used to calculate warning flag and range delay, 1 per second**

**Comments:**

**Product Var Name: i_rdu**

**Is element of: GLA11 Record**

**Short Description: Range Delay Uncertainty**

**Product Data Type: i2b ( 4)**

**Total Bytes: 8**

**Product Units: millimeters**

**Invalid Value/Flag: gi_invalid_i2b**

**Is Correction Flag?: NA**

**Is Unsigned?: No**

**Product Minimum: 0**

**Product Maximum: 10000**

**Description: Estimated uncertainty value in the range delay distance.Comments:**

**Product Var Name: i_rec_ndx**

**Is element of: GLA02 Record, GLA07 Record, GLA08 Record, GLA09 Record, GLA10 record, GLA11 Record**

**Short Description: GLAS Record Index**

**Product Data Type: i4b**

**Total Bytes: 4**

**Product Units: N/A**

**Invalid Value/Flag: No**

**Is Correction Flag?: NA**

**Is Unsigned?: No**

**Product Minimum: 0**

**Product Maximum: 2147483647**

**Description: Unique index that relates this record to the corresponding record(s) in each GLAS data product.**

**Comments:**

**Product Var Name: i_reflCor_atm**

**Is element of: GLA11 Record**

**Short Description: Reflectivity Correction Factor For Atmospheric Effects**

**Product Data Type: i2b (4)**

**Total Bytes: 8**

**Product Units: Unitless**

**Invalid Value/Flag: N/A**

**Is Correction Flag?: No**

**Is Unsigned?: No**

**Product Minimum: 1 Product Maximum: 1000000**

**Description: This reflectance correction factor is calculated as 1 / e^(-2(tc+ta+tp+tm)), where tc is the cloud (column) integrated optical depth, ta is the aerosol (column) integrated optical depth, tp is the planetary boundary layer optical depth, and tm is the molecular optical depth. tm is a constant equal to -log(gd_T_RTatm)/2, where gd_T_RTatm = 0.98 is defined in const_elev_mod.f90 or read from ANC07-03. The reflectance has been corrected for waveform saturation. The reflectance correction factor is computed from the 532 nm channel and has been corrected for multiple scattering.**

**Comments:**

**Product Var Name: i_reflct_1064msf_1hz**

**Is element of: GLA11 Record**

**Short Description: 1 Hz 1064nm multiple scattering corr. factor**

**Product Data Type: i1b (4)**

**Total Bytes: 4**

**Product Units: unitless**

**Invalid Value/Flag: N/A**

**Is Correction Flag?: NA**

**Is Unsigned?: NA**

**Product Minimum: 0**

**Product Maximum: 255**

**Description: Total column od 1064nm multiple scattering correction factor.Comments:**

**Product Var Name: i_reflct_1064msf_40hz**

**Is element of: GLA11 Record**

**Short Description: 40 Hz 1064nm multiple scattering corr. factor**

**Product Data Type: i1b (40, 4)**

**Total Bytes: 160**

**Product Units: unitless**

**Invalid Value/Flag: N/A**

**Is Correction Flag?: NA**

**Is Unsigned?: NA**

**Product Minimum: 0**

**Product Maximum: 255**

**Description: Total column od 1064nm multiple scattering correction factor.Comments:**

**Product Var Name: i_reflct_1064od_1hz_cor**

**Is element of: GLA11 Record**

**Short Description: 1 Hz 1064nm total column od**

**Product Data Type: i2b (4)**

**Total Bytes: 8**

**Product Units: unitless**

**Invalid Value/Flag: N/A**

**Is Correction Flag?: NA**

**Is Unsigned?: NA**

**Product Minimum: -100**

**Product Maximum: 10000**

**Description: Total column 1064nm optical depth from surface reflectance corrected for multiple scattering.**

**Comments:**

**Product Var Name: i_reflct_1064od_40hz_cor**

**Is element of: GLA11 Record**

**Short Description: 40 Hz 1064nm total column od**

**Product Data Type: i2b (40, 4)**

**Total Bytes: 320**

**Product Units: unitless**

**Invalid Value/Flag: N/A**

**Is Correction Flag?: NA**

**Is Unsigned?: NA**

**Product Minimum: -100**

**Product Maximum: 10000**

**Description: Total column 1064nm optical depth from surface reflectance corrected for multiple scattering.**

**Comments:**

**Product Var Name: i_reflct_pristine_1hz**

**Is element of: GLA11 Record**

**Short Description: 1064nm modeled surface reflectance**

**Product Data Type: i2b (4)**

**Total Bytes: 8**

**Product Units: unitless**

**Invalid Value/Flag: N/A**

**Is Correction Flag?: NA**

**Is Unsigned?: NA**

**Product Minimum: 0**

**Product Maximum: 5000**

**Description: Modeled (calculated) 1064nm surface reflectance from wind speed.Comments:**

**Product Var Name: i_rng2CDProf**

**Is element of: GLA02 Record**

**Short Description: Start Range of the 1064 nm Backscatter Profile**

**Product Data Type: i4b**

**Total Bytes: 4**

**Product Units: centimeters**

**Invalid Value/Flag: i_APID_AvFlg**

**Is Correction Flag?: NA**

**Is Unsigned?: No**

**Product Minimum: 50000000**

**Product Maximum: 70000000**

**Description: The range from the spacecraft to the start of the 1064 nm backscatter profile - the start of the 20 KM segment of Lidar Data.Comments:**

**Product Var Name: i_rng_geoid**

**Is element of: GLA07 Record**

**Short Description: Range of satellite above geoid**

**Product Data Type: i4b**

**Total Bytes: 4**

**Product Units: meters**

**Invalid Value/Flag: No**

**Is Correction Flag?: NA**

**Is Unsigned?: No**

**Product Minimum: -1000**

**Product Maximum: 60000000**

**Description: Range of satellite above geoid based upon POD, PAD, and geoid**

**Comments:**

**Product Var Name: i_spare0**

**Is element of: GLA07 Record**

**Short Description: Spares**

**Product Data Type: i1b (16)**

**Total Bytes: 16**

**Product Units: null**

**Invalid Value/Flag: No**

**Is Correction Flag?: NA**

**Is Unsigned?: No**

**Product Minimum: 0**

**Product Maximum: 0**

**Description:**

**Comments:**

**Product Var Name: i_spare0**

**Is element of: GLA08 Record, GLA09 Record, GLA10 record, GLA11 Record**

**Short Description: Spares**

**Product Data Type: i1b (40)**

**Total Bytes: 40**

**Product Units: null**

**Invalid Value/Flag: No**

**Is Correction Flag?: NA**

**Is Unsigned?: NA**

**Product Minimum: 0**

**Product Maximum: 0**

**Description:**

**Comments:**

**Product Var Name: i_spare2**

**Is element of: GLA02 Record**

**Short Description: Spares**

**Product Data Type: i1b**

**Total Bytes: 1**

**Product Units: NA**

**Invalid Value/Flag: No**

**Is Correction Flag?: NA**

**Is Unsigned?: Yes**

**Product Minimum: 0**

**Product Maximum: 0**

**Description: Not used**

**Comments:**

**Product Var Name: i_spare2**

**Is element of: GLA10 record**

**Short Description: Spares**

**Product Data Type: i1b ( 2)**

**Total Bytes: 2**

**Product Units: NA**

**Invalid Value/Flag: N/A**

**Is Correction Flag?: NA**

**Is Unsigned?: No**

**Product Minimum: null**

**Product Maximum: null**

**Description: not used**

**Comments:**

**Product Var Name: i_spare2**

**Is element of: GLA09 Record**

**Short Description: Spares**

**Product Data Type: i1b (8)**

**Total Bytes: 8**

**Product Units: NA**

**Invalid Value/Flag: N/A**

**Is Correction Flag?: NA**

**Is Unsigned?: No**

**Product Minimum: null**

**Product Maximum: null**

**Description: not used**

**Comments:**

**Product Var Name: i_spare2**

**Is element of: GLA11 Record**

**Short Description: Spares**

**Product Data Type: i1b ( 2)**

**Total Bytes: 2**

**Product Units: NA**

**Invalid Value/Flag: N/A**

**Is Correction Flag?: NA**

**Is Unsigned?: No**

**Product Minimum: null**

**Product Maximum: null**

**Description: not used**

**Comments:**

**Product Var Name: i_spare2**

**Is element of: GLA08 Record**

**Short Description: Spares**

**Product Data Type: i1b (232)**

**Total Bytes: 232**

**Product Units: NA**

**Invalid Value/Flag: N/A**

**Is Correction Flag?: NA**

**Is Unsigned?: No**

**Product Minimum: null**

**Product Maximum: null**

**Description: not used**

**Comments:**

**Product Var Name: i_spare3**

**Is element of: GLA02 Record**

**Short Description: Spares**

**Product Data Type: i1b**

**Total Bytes: 1**

**Product Units: NA**

**Invalid Value/Flag: No**

**Is Correction Flag?: NA**

**Is Unsigned?: Yes**

**Product Minimum: 0**

**Product Maximum: 0**

**Description: Not used**

**Comments:**

**Product Var Name: i_spare3**

**Is element of: GLA07 Record**

**Short Description: Spares**

**Product Data Type: i1b (5)**

**Total Bytes: 5**

**Product Units: NA**

**Invalid Value/Flag: N/A**

**Is Correction Flag?: NA**

**Is Unsigned?: No**

**Product Minimum: null**

**Product Maximum: null**

**Description: not used**

**Comments:**

**Product Var Name: i_spare3**

**Is element of: GLA09 Record**

**Short Description: Spares**

**Product Data Type: i1b (2)**

**Total Bytes: 2**

**Product Units: NA**

**Invalid Value/Flag: N/A**

**Is Correction Flag?: NA**

**Is Unsigned?: No**

**Product Minimum: null**

**Product Maximum: null**

**Description: not used**

**Comments:**

**Product Var Name: i_spare3**

**Is element of: GLA10 record**

**Short Description: Spares**

**Product Data Type: i1b (3)**

**Total Bytes: 3**

**Product Units: NA**

**Invalid Value/Flag: N/A**

**Is Correction Flag?: NA**

**Is Unsigned?: No**

**Product Minimum: null**

**Product Maximum: null**

**Description: not used**

**Comments:**

**Product Var Name: i_spare3**

**Is element of: GLA11 Record**

**Short Description: Spares**

**Product Data Type: i1b**

**Total Bytes: 1**

**Product Units: N/A**

**Invalid Value/Flag: No**

**Is Correction Flag?: NA**

**Is Unsigned?: No**

**Product Minimum: null**

**Product Maximum: null**

**Description:**

**Comments:**

**Product Var Name: i_spare4**

**Is element of: GLA02 Record**

**Short Description: Spares**

**Product Data Type: i1b**

**Total Bytes: 1**

**Product Units: NA**

**Invalid Value/Flag: No**

**Is Correction Flag?: NA**

**Is Unsigned?: Yes**

**Product Minimum: 0**

**Product Maximum: 0**

**Description: Not used**

**Comments:**

**Product Var Name: i_spare4**

**Is element of: GLA07 Record**

**Short Description: Spares**

**Product Data Type: i1b (130)**

**Total Bytes: 130**

**Product Units: NA**

**Invalid Value/Flag: N/A**

**Is Correction Flag?: NA**

**Is Unsigned?: No**

**Product Minimum: null**

**Product Maximum: null**

**Description: not used**

**Comments:**

**Product Var Name: i_spare4**

**Is element of: GLA09 Record**

**Short Description: Spares**

**Product Data Type: i1b (402)**

**Total Bytes: 402**

**Product Units: NA**

**Invalid Value/Flag: N/A**

**Is Correction Flag?: NA**

**Is Unsigned?: No**

**Product Minimum: null**

**Product Maximum: null**

**Description: not used**

**Comments:**

**Product Var Name: i_spare4**

**Is element of: GLA10 record**

**Short Description: Spares**

**Product Data Type: i1b**

**Total Bytes: 1**

**Product Units: null**

**Invalid Value/Flag: No**

**Is Correction Flag?: NA**

**Is Unsigned?: NA**

**Product Minimum: 0**

**Product Maximum: 0**

**Description:**

**Comments:**

**Product Var Name: i_spare4**

**Is element of: GLA11 Record**

**Short Description: Spares**

**Product Data Type: i1b (160)**

**Total Bytes: 160**

**Product Units: NA**

**Invalid Value/Flag: None**

**Is Correction Flag?: NA**

**Is Unsigned?: No**

**Product Minimum: 0**

**Product Maximum: 255**

**Description:**

**Comments:**

**Product Var Name: i_spare5**

**Is element of: GLA10 record**

**Short Description: Spares**

**Product Data Type: i1b (290)**

**Total Bytes: 290**

**Product Units: NA**

**Invalid Value/Flag: N/A**

**Is Correction Flag?: NA**

**Is Unsigned?: No**

**Product Minimum: 0**

**Product Maximum: 0**

**Description: not used**

**Comments:**

**Product Var Name: i_spare5**

**Is element of: GLA11 Record**

**Short Description: Spare 5**

**Product Data Type: i1b**

**Total Bytes: 1**

**Product Units: N/A**

**Invalid Value/Flag: N/A**

**Is Correction Flag?: NA**

**Is Unsigned?: No**

**Product Minimum: 0**

**Product Maximum: 255**

**Description: This variable consists of spare bytes reserved for architectural consistency of the data file. It contains no meaningful information.**

**Comments: GLA11 Spare 5**

**Product Var Name: i_spare6**

**Is element of: GLA02 Record**

**Short Description: Spare**

**Product Data Type: i1b**

**Total Bytes: 1**

**Product Units: NA**

**Invalid Value/Flag: No**

**Is Correction Flag?: NA**

**Is Unsigned?: Yes**

**Product Minimum: 0**

**Product Maximum: 0**

**Description:**

**Comments:**

**Product Var Name: i_spare6**

**Is element of: GLA11 Record**

**Short Description: Spare 6**

**Product Data Type: i1b (202)**

**Total Bytes: 202**

**Product Units: n/a**

**Invalid Value/Flag: n/a**

**Is Correction Flag?: NA**

**Is Unsigned?: No**

**Product Minimum: n/a**

**Product Maximum: n/a**

**Description: This variable consists of spare bytes reserved for architectural consistency of the data file. It contains no meaningful information.**

**Comments:**

**Product Var Name: i_spcm_cts**

**Is element of: GLA02 Record**

**Short Description: SPCM Raw Counts**

**Product Data Type: i1b (8)**

**Total Bytes: 8**

**Product Units: n/a**

**Invalid Value/Flag: i_APID_AvFlg**

**Is Correction Flag?: NA**

**Is Unsigned?: Yes**

**Product Minimum: 0**

**Product Maximum: 255**

**Description: The raw counts for each photon counter (1-8) from the S? Photon Counter Module.Comments:**

**Product Var Name: i_spcm_stat**

**Is element of: GLA02 Record**

**Short Description: SPCM Status**

**Product Data Type: i2b**

**Total Bytes: 2**

**Product Units: n/a**

**Invalid Value/Flag: i_APID_AvFlg**

**Is Correction Flag?: NA**

**Is Unsigned?: Yes**

**Product Minimum: 0**

**Product Maximum: 65280**

**Description: The status of the SPCM as read from the photon counter board. The Photon Counter Bd address 0xXX800004.**

**Comments:**

**Product Var Name: i_surfType**

**Is element of: GLA08 Record, GLA09 Record, GLA10 record, GLA11 Record**

**Short Description: Region Type**

**Product Data Type: i1b ( 4)**

**Total Bytes: 4**

**Product Units: NA**

**Invalid Value/Flag: No**

**Is Correction Flag?: NA**

**Is Unsigned?: No**

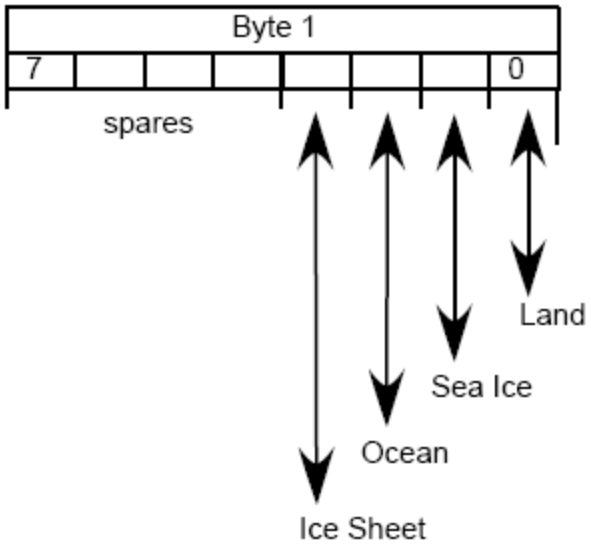
**Product Minimum: 1**

**Product Maximum: 15**

**Description: Describes the region type or types associated with each shot Ice Sheet, ocean, sea ice, or Land.**

**i_surfType** [GLA06, 12-15]: Region Type

1 byte of 1 bit values




**Comments:**

**Product Var Name: i_surfType**

**Is element of: GLA07 Record**

**Short Description: Region Type**

**Product Data Type: i1b**

**Total Bytes: 1**

**Product Units: N/A**

**Invalid Value/Flag: No**

**Is Correction Flag?: NA**

**Is Unsigned?: No**

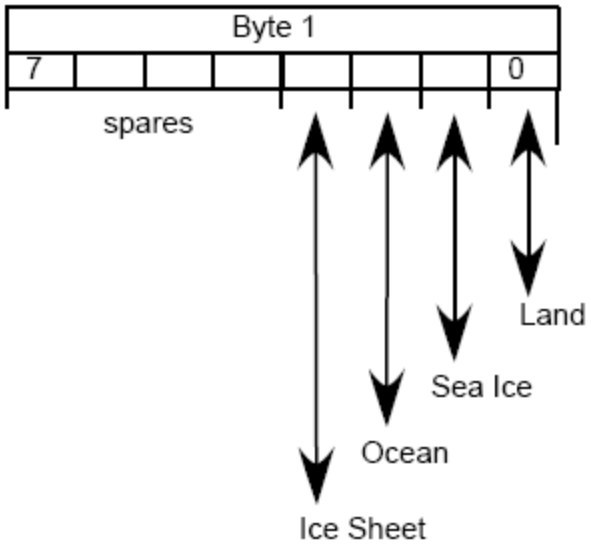
**Product Minimum: 1**

**Product Maximum: 15**

**Description: Describes the region type or types associated with each shot Ice Sheet, ocean, sea ice, or Land.**

**i_surfType** [GLA06, 12-15]: Region Type

1 byte of 1 bit values




**Comments:**

**Product Var Name: i_timecorflg**

**Is element of: GLA02 Record, GLA07 Record, GLA08 Record, GLA09 Record, GLA10 record, GLA11 Record**

**Short Description: time correction flag**

**Product Data Type: i2b**

**Total Bytes: 2**

**Product Units: N/A**

**Invalid Value/Flag: No**

**Is Correction Flag?: No**

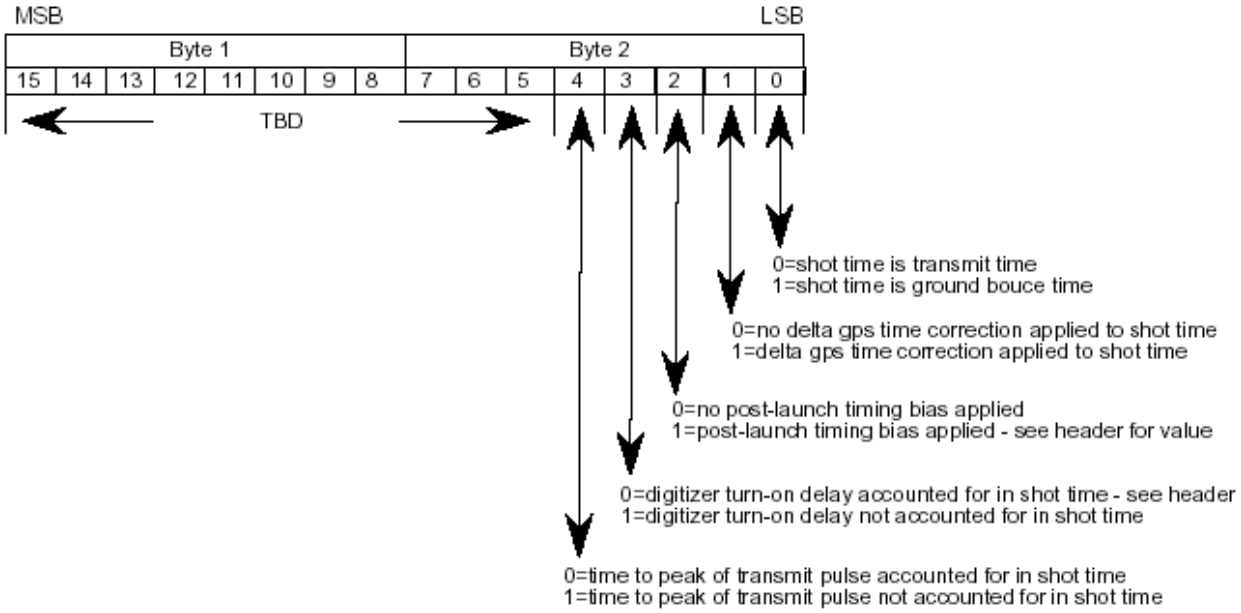
**Is Unsigned?: No**

**Product Minimum: 0**

**Product Maximum: 32767**

**Description: Indicates what instrument or bias corrections were applied to the times on this record.**

i_timecorflg [1/sec for GLA05-15]: Correction Status Flag




**Comments:**

**Product Var Name: i_topo_elev**

**Is element of: GLA07 Record**

**Short Description: Topographic elevation of surface above geoid**

**Product Data Type: i4b**

**Total Bytes: 4**

**Product Units: meters**

**Invalid Value/Flag: gi_invalid_i4b**

**Is Correction Flag?: NA**

**Is Unsigned?: No**

**Product Minimum: -2500**

**Product Maximum: 32000**

**Description: Topographic elevation of surface above geoid based upon POD, PAD, and geoid**

**Comments:**

**Product Var Name: i_topo_elev**

**Is element of: GLA09 Record**

**Short Description: Topographic elevation of surface above geoid**

**Product Data Type: i4b ( 4)**

**Total Bytes: 16**

**Product Units: meters**

**Invalid Value/Flag: gi_invalid_i4b**

**Is Correction Flag?: NA**

**Is Unsigned?: No**

**Product Minimum: -2500**

**Product Maximum: 32000**

**Description: Topographic elevation of surface above geoid based upon POD, PAD, and geoid**

**Comments:**

**Product Var Name: spare5**

**Is element of: GLA02 Record**

**Short Description: Spare 5**

**Product Data Type: i1b (12)**

**Total Bytes: 12**

**Product Units: n/a**

**Invalid Value/Flag: N/A**

**Is Correction Flag?: NA**

**Is Unsigned?: NA**

**Product Minimum: n/a**

**Product Maximum: n/a**

**Description:**

**Comments:**