GLAS Atmosphere Data Dictionary

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<th>Updated</th>
<th>Reason</th>
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<td>Release-33</td>
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<td>March 2006</td>
<td>Release-26</td>
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<td>Release-24</td>
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<td>January 2005</td>
<td>Release-19</td>
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</table>

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.

NIB

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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 quality

Comments:

Product Var Name: i1_pred_lat
Is element of: GLA02 Record
Short Description: Predicted geodetic Latitude of the laser footprint
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

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 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.
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.
Co

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
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

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

Description: The 532 nm Merged Attenuated Backscatter Profile 40 to -1 km
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: 1000000000
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.

**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.

1 bit per each shot(40) per bin (548): 0 = not saturated, 1 = saturated.

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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: \((W\cdot KM^2)/J\)\(\times 10^8\)

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
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
Comments:

Product Var Name: i_APIID_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.

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<td>LPA packet #2</td>
<td>LPA packet #1</td>
<td>3/C position, rate, and altitude telemetry packet</td>
<td>GPS telemetry packet</td>
<td>Large software telemetry packet #2 (APID 55)</td>
<td>Large software telemetry packet #1 (APID 25)</td>
<td>Small software telemetry packet #1 (APID 24)</td>
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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_ODF1g
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: Aerosol Optical Depth at 1064 nm Flag
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 nm
Comments:

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
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Total Bytes: 4
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Is Correction Flag?: NA
Is Unsigned?: No
Product Minimum: 0
Product Maximum: 20000
Description: Pressure of Top of Aerosol Layers Detected in 1064 nm
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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)
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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 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?: No
Is Unsigned?: No
Product Minimum: -10000
Product Maximum: 10000
Description: Temperature of Top of 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 Atmosphere 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.

i_AttFlg1 [1/sec for GLA05-15]: Attitude Flag 1

<table>
<thead>
<tr>
<th>MSB</th>
<th>Byte 1</th>
<th>Byte 2</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>15</td>
<td>14</td>
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<tr>
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</table>

- 0 = off-nadir angle within limits
- 1 = large off-nadir angle
- 0 = non-ocean sweep
- 1 = within time frame of ocean sweep
- 0 = not within target of opportunity off-pointing
- 1 = within time of target of opportunity off-pointing
- 0 = steering to reference track
- 1 = not steering to reference track

0 = IST data is good
1 = Missing IST for at least a portion of the time of this frame
2 = Noisy IST for at least a portion of the time of this frame
3 = Noisy and missing IST for at least a portion of the time of this frame

0 = GYRO data is good
1 = Missing GYRO for at least a portion of the time of this frame
2 = Noisy GYRO for at least a portion of the time of this frame
3 = Noisy and missing GYRO for at least a portion of the time of this frame

0 = LRS data good, consists of star, laser and CRS
1 = LRS data good, but no laser data for at least a portion of this frame
2 = LRS data good, but no laser data for at least a portion of this frame
3 = LRS data good, but no CRS data for at least a portion of this frame
4 = LRS data good, but only CRS data for at least a portion of this frame
5 = LRS data good, but only laser data for at least a portion of this frame
6 = LRS data good, but only star data for at least a portion of this frame
7 = Missing LRS for at least a portion of the time of this frame
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
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: Onboard 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=TRUE Comments: 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 37d
Comments:

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
**i_FRCL_Flag [GLA08]: Full Resolution Cloud Layer Flag** (4 seconds per record, 40 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.

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</table>

**of = quality flag:** Value 15 = cloud layers were not searched for - either bad data or cloud layers were not found at a coarser 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.

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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_oqFlag [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_intsec) 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.

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_HRC_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 channels) at this resolution.
  - Value 15 = cloud layers were not searched for: value 0 = cloud layers were searched for, but not detected
- **gf** = quality flag: Value 15 = cloud layers were not searched for - either bad data or cloud layers were not found at a coarser resolution; value 3 = low chance of being a cloud; value 2 = moderate; value 1 = high; value 0 = no doubt - based upon meteorological 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** = daylight 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

---

<table>
<thead>
<tr>
<th>Byte 1</th>
<th>Byte 2</th>
<th>Byte 3</th>
<th>Byte 4</th>
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<td>i_HRC.af (flags 5-1, second 4)</td>
<td>i_HRC.af (flags 5-1, second 3)</td>
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<td>i_HRC.af (flags 10-1, flags 4, second 4)</td>
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**i_HRC_FLAG [GLA09]: High Resolution Cloud Layer Flag (4 seconds per record, 5 per second rate)**

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<thead>
<tr>
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<th>Byte 19</th>
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<td>i_HRC.af (flags 10-1, flags 5, second 4)</td>
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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_LRcld_bot [GLA09]: Low Resolution Cloud Layer Flag

Byte 1

<table>
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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:
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
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

\[ \text{i\_LROt\_QAflag [GLA09]: Low Resolution 1064 Quality Flag (once per 4 seconds rate)} \]

af = availability flag. It provides the number of cloud layers determined from the 1064 nm data.
value 3 = 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).

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<tr>
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<th>7</th>
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</table>
|     | byte   | 5 leaves bits 4-7 as spare, and stores the af availability flag in  
|     | 1-4 are spares |  
|     | 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_LRpb1_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_LRpb1_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**

- **Layer Height Flag**

  - `i_LayHgt_Flag [GL008]`

- **Flag Details**

  - `i_press`: 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

  - `i_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

  - `i_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

  - `i_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_HRplbl_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_HRplbl.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_HRplbl_ccf`: clear/cloudy flag at 5Hz for 4 sec. Value 0 = clear; value 1 = cloudy

  - `i_LRplbl_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_LRplbl.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_LRplbl_ccf`: clear/cloudy flag at 1 per 4 sec. Value 0 = clear; value 1 = cloudy

---

### Table: Flags Details

<table>
<thead>
<tr>
<th>Byte 1</th>
<th>Byte 2</th>
<th>Byte 3</th>
<th>Byte 4</th>
</tr>
</thead>
<tbody>
<tr>
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### Table: Flags Details continued

<table>
<thead>
<tr>
<th>Byte 5</th>
<th>Byte 6</th>
<th>Byte 7</th>
<th>Byte 8</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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- `i_HRplbl uf (retrieval 20-1)`

- `i_LRplbl uf (retrieval 20-5)`
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

<table>
<thead>
<tr>
<th>Byte 1</th>
<th>Byte 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>7</td>
<td>0</td>
</tr>
</tbody>
</table>

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

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

Left side:

af = availability flag. Tells how many cloud layers were found at this resolution from the 5.32 mm channel.
value 15 = cloud layers were not searched for; value 0 = cloud layers were searched for, but not detected

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

df = diurnal flag. 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.

Right side:

\* \* \*
### i_MRclad_bot

**Product Var Name:** i_MRclad_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:**

### i_MRclad_grd

**Product Var Name:** i_MRclad_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_MRclld_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_MRclld_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
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 Function
Comments:

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

Comments:

Product Var Name: i_MRir_clldtop_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_clldtop_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
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.
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
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 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
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)
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

\( i\_aer4\_flag \text{ [GLA11]: Aerosol Optical Depth (4 sec per record, at once per 4 second rate)} \)

(QF = Quality Flag; UF = Use Flag)

<table>
<thead>
<tr>
<th>Byte 1</th>
<th>Byte 2</th>
<th>Byte 3</th>
<th>Byte 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>UF (layer 8)</td>
<td>UF (layer 7)</td>
<td>UF (layer 6)</td>
<td>UF (layer 5)</td>
</tr>
<tr>
<td>UF (layer 4)</td>
<td>UF (layer 3)</td>
<td>UF (layer 2)</td>
<td>UF (layer 1)</td>
</tr>
</tbody>
</table>

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).
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
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 attenuation 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.

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_cl1 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:

<table>
<thead>
<tr>
<th>Quality Flag Values</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 = 0-5 % Error</td>
</tr>
<tr>
<td>1 = 5-10 % Error</td>
</tr>
<tr>
<td>2 = 10-15 % Error</td>
</tr>
<tr>
<td>3 = 15-20 % Error</td>
</tr>
<tr>
<td>4 = 20-25 % Error</td>
</tr>
<tr>
<td>5 = 25-30 % Error</td>
</tr>
<tr>
<td>6 = 30-35 % Error</td>
</tr>
<tr>
<td>7 = 35-40 % Error</td>
</tr>
<tr>
<td>8 = 40-45 % Error</td>
</tr>
<tr>
<td>9 = 45-50 % Error</td>
</tr>
<tr>
<td>10 = 50-55 % Error</td>
</tr>
<tr>
<td>11 = 55-60 % Error</td>
</tr>
<tr>
<td>12 = 60-65 % Error</td>
</tr>
<tr>
<td>13 = 65-70 % Error</td>
</tr>
<tr>
<td>14 = 70 and大于 % Error</td>
</tr>
<tr>
<td>15 = Invalid</td>
</tr>
</tbody>
</table>

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, 16)
07 = TROP generic (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 16)
12 = STRATO aerosol (any non-PSC layer whose top is > tropopause)
13 = PSC type I (PSC with RH less than or equal to 05%)
14 = PSC type II (PSC with RH greater than 05%)
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 -68.0
02 = -68.5 through -45.0
03 = -45.0 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 -10.0
10 = -10.5 through 0.0
11 = 0.0 through 8.5
12 = 8.5 through 13.0
13 = 13.0 through 19.5
14 = greater than 19.5 C
15 = invalid
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
### l_cldl_ext_flag [GLA10]: Cloud Extinction Flag

(4 sec/records, up to 10 layers/sec.)

(QF = Quality Flag; UF = Use Flag)

<table>
<thead>
<tr>
<th>Byte 1</th>
<th>Byte 2</th>
<th>Byte 3</th>
<th>Byte 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>7</td>
<td>10</td>
<td>9</td>
<td>7</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>UF (second 4, layer 10-1)</td>
<td></td>
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</tr>
</tbody>
</table>

<table>
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<tr>
<th>Byte 5</th>
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<td>7</td>
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<td></td>
</tr>
<tr>
<td>UF (second 3, layer 10-1)</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Byte 9</th>
<th>Byte 10</th>
<th>Byte 11</th>
<th>Byte 12</th>
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<tr>
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<td>2</td>
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<tr>
<td></td>
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<td></td>
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<tr>
<td>UF (second 1, layer 10-1)</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Byte 13</th>
<th>Byte 14</th>
<th>Byte 15</th>
<th>Byte 16</th>
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</thead>
<tbody>
<tr>
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<td>0</td>
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<tr>
<td></td>
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<td></td>
<td></td>
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<tr>
<td>UF (second 2, layer 10-1)</td>
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</table>

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<thead>
<tr>
<th>Byte 17</th>
<th>Byte 18</th>
<th>Byte 19</th>
<th>Byte 20</th>
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<td>8</td>
<td>7</td>
<td>5</td>
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<tr>
<td>UF (second 1, layer 10-1)</td>
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</tbody>
</table>

### l_cldl_ext_flag [GLA10]: Cloud Extinction Flag

(4 sec/records, up to 10 layers/sec.)

(QF = Quality Flag; UF = Use Flag)

<table>
<thead>
<tr>
<th>Byte 21</th>
<th>Byte 22</th>
<th>Byte 23</th>
<th>Byte 24</th>
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<td></td>
<td></td>
<td></td>
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<tr>
<td>QF (second 4, layer 10-1)</td>
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<table>
<thead>
<tr>
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<th>Byte 26</th>
<th>Byte 27</th>
<th>Byte 28</th>
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<tr>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>QF (second 3, layer 10-1)</td>
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</table>

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</table>

<table>
<thead>
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<th>Byte 34</th>
<th>Byte 35</th>
<th>Byte 36</th>
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<tr>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>QF (second 2, layer 10-1)</td>
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</table>

<table>
<thead>
<tr>
<th>Byte 37</th>
<th>Byte 38</th>
<th>Byte 39</th>
<th>Byte 40</th>
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<td>6</td>
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<tr>
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<td></td>
<td></td>
</tr>
<tr>
<td>QF (second 1, layer 10-1)</td>
<td></td>
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<td></td>
</tr>
</tbody>
</table>
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 5 ratio default index, PSC flag, and tropopause height)
Use Flag Meaning
05 = PBL generic (all PBL indices not mentioned below)
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 18, 31)
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 16)
12 = STRATO aerosol only (non-PSC layer whose top is > tropopause
13 = PSC type I (PSC with RH less than or equal to 55%)
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 -69.5
02 = -69.0 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 0.5
12 = 0.5 through 3.0
13 = 3.0 through 15.5
14 = greater than 15.5 C
15 = invalid

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: 100000000
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

<table>
<thead>
<tr>
<th>Byte 1</th>
<th>Byte 2</th>
<th>Byte 3</th>
<th>Byte 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>7</td>
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<table>
<thead>
<tr>
<th>Byte 5</th>
<th>Byte 6</th>
<th>Byte 7</th>
<th>Byte 8</th>
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<tbody>
<tr>
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<tr>
<td>7</td>
<td>6</td>
<td>5</td>
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<table>
<thead>
<tr>
<th>Byte 9</th>
<th>Byte 10</th>
<th>Byte 11</th>
<th>Byte 12</th>
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<tbody>
<tr>
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<tr>
<td>15</td>
<td>14</td>
<td>13</td>
<td>12</td>
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</table>

<table>
<thead>
<tr>
<th>Byte 13</th>
<th>Byte 14</th>
<th>Byte 15</th>
<th>Byte 16</th>
<th>Byte 17</th>
</tr>
</thead>
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<tr>
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<td>4</td>
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<tr>
<td>10</td>
<td>9</td>
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<td>7</td>
<td>6</td>
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</table>

<table>
<thead>
<tr>
<th>Byte 18</th>
<th>Byte 19</th>
<th>Byte 20</th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
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<tr>
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<td>6</td>
<td>5</td>
</tr>
<tr>
<td>4</td>
<td>3</td>
<td>2</td>
</tr>
</tbody>
</table>
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.
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 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).
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_cld1_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
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 scattering layer, geometrical thickness, optical thickness and particale size. The i_erd is provided to the elevation process as a range correction and is reported as a negative number that can be added to the range to correct it. The computation of i_erd is restricted to those times when 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 Temperature Comments:

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 Step Comments:
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_trkftavg
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_InRet
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.

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

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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.
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
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.
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).
**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

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Spares  Quality Flag

Met Data Source

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:
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

\[i\_pbl4\_flag\ [\text{GLA11}]: \text{PBL Optical Depth}\ (4\ \text{sec. per record, at once per 4 second rate})\]
\([\text{QF} = \text{Quality Flag}; \text{UF} = \text{Use Flag}]\)

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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.

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 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 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
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)
This variable consists of spare bytes reserved for architectural consistency of the data file. It contains no meaningful information.

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
IsUnsigned?: Yes
Product Minimum: 0
Product Maximum: 255
Description: The raw counts for each photon counter (1-8) from the S? Photon Counter Module.

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

<table>
<thead>
<tr>
<th>Bit</th>
<th>Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>7</td>
<td>0</td>
<td>spares</td>
</tr>
<tr>
<td>6</td>
<td>1</td>
<td>Ice Sheet</td>
</tr>
<tr>
<td>5</td>
<td>1</td>
<td>Ocean</td>
</tr>
<tr>
<td>4</td>
<td>1</td>
<td>Sea Ice</td>
</tr>
<tr>
<td>3</td>
<td>1</td>
<td>Land</td>
</tr>
<tr>
<td>0</td>
<td>0</td>
<td></td>
</tr>
</tbody>
</table>

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.
**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_timeconfig [1/sec for GLA05-15]: Correction Status Flag

<table>
<thead>
<tr>
<th>MSB</th>
<th>Byte 1</th>
<th>LSB</th>
<th>Byte 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>15</td>
<td>14</td>
<td>13</td>
<td>12</td>
</tr>
<tr>
<td>11</td>
<td>10</td>
<td>9</td>
<td>8</td>
</tr>
<tr>
<td>7</td>
<td>6</td>
<td>5</td>
<td>4</td>
</tr>
<tr>
<td>3</td>
<td>2</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>TBD</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

0=shot time is transmit time
1=shot time is ground bounce time
0=no delta gps time correction applied to shot time
1=delta gps time correction applied to shot time
0=no post-launch timing bias applied
1=post-launch timing bias applied - see header for value
0=digitizer turn-on delay accounted for in shot time - see header
1=digitizer turn-on delay not accounted for in shot time
0=time to peak of transmit pulse accounted for in shot time
1=time to peak of transmit pulse not accounted for in shot time

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: