GLAS Altimetry Data Dictionary

Table 1. GLAS Altimetry Data Update Description

Updated	Reason
June 2014	Release-34
August 2011	Release-33
October 2009	Release-31
September 2008	Release-29
October 2006	Release-28
March 2006	Release-26
December 2005	Release-24
July 2005	Release-22

Product Var Name: i1_pred_lat
Is element of: GLA01 Main Record
Short Description: Predicted geodetic Latitude of the laser footprint
Product Data Type: i4b
Total Bytes: 4
Product Units: microdegrees
Invalid Value/Flag: gi_invalid_i4b
Is Correction Flag?: NA
Is Unsigned?: No
Product Minimum: -90000000
Product Maximum: 90000000
Description: The geodetic Latitude of the laser footprint; obtained from the predicted orbit; assuming the laser is nadir pointing.
Comments:

Product Var Name: i1_pred_lon
Is element of: GLA01 Main Record
Short Description: Predicted geodetic Longitude of the laser footprint
Product Data Type: i4b
Total Bytes: 4
Product Units: microdegrees
Invalid Value/Flag: gi_invalid_i4b
Is Correction Flag?: NA
Is Unsigned?: No
Product Minimum: 0
Product Maximum: 360000000
Description: The geodetic Longitude of the laser footprint; obtained from the predicted orbit; assuming the laser is nadir pointing.
Comments:

Product Var Name: i_4nsBgMean
Is element of: GLA01 Long Waveform Record
Short Description: Background Mean Value
Product Data Type: i2b (8)
Total Bytes: 16
Product Units: .01 counts
Invalid Value/Flag: i_APID_AvFlg
Is Correction Flag?: NA
Is Unsigned?: Yes
Product Minimum: 0
Product Maximum: 51200
Description: Background Noise Mean Value for the 4 ns filter. From APID12/13, Offset 112.
Comments:

Product Var Name: i_4nsBgMean
Is element of: GLA01_Short_Record
Short Description: Background Mean Value
Product Data Type: i2b (20)
Total Bytes: 40
Product Units: .01 counts
Invalid Value/Flag: i_APID_AvFlg
Is Correction Flag?: NA
Is Unsigned?: Yes
Product Minimum: 0
Product Maximum: 51200
Description: Background Noise Mean Value for the 4 ns filter. From APID12/13, Offset 112.
Comments:

Product Var Name: i_4nsBgSDEV

Is element of: GLA01_Short_Record
Short Description: Background Standard Deviation
Product Data Type: i2b (20)
Total Bytes: 40
Product Units: .01 counts
Invalid Value/Flag: i_APID_AvFlg
Is Correction Flag?: NA
Is Unsigned?: Yes
Product Minimum: 0
Product Maximum: 51200
Description: The standard deviation of the background noise for the 4 ns filter. From APID12/13, Offset 116
Comments:

Product Var Name: i_4nsBgSDEV
Is element of: GLA01 Long Waveform Record
Short Description: Background Standard Deviation
Product Data Type: i2b (8)
Total Bytes: 16
Product Units: .01 counts
Invalid Value/Flag: i_APID_AvFlg
Is Correction Flag?: NA
Is Unsigned?: Yes
Product Minimum: 0
Product Maximum: 51200
Description: The standard deviation of the background noise for the 4 ns filter. From APID12/13, Offset 116.
Comments:

Product Var Name: i_4nsPeakVal
Is element of: GLA01_Short_Record
Short Description: 4ns Filter Peak Value
Product Data Type: i2b (20)
Total Bytes: 40
Product Units: counts
Invalid Value/Flag: i_APID_AvFlg
Is Correction Flag?: No
Is Unsigned?: No
Product Minimum: 0
Product Maximum: 255
Description: Received pulse Peak value for the 4ns filter; returned by the FIR engine. From APID12/13, Offset 92.
Comments:

Product Var Name: i_4nsPeakVal
Is element of: GLA01 Long Waveform Record
Short Description: 4ns Filter Peak value
Product Data Type: i2b (8)
Total Bytes: 16
Product Units: counts
Invalid Value/Flag: i_APID_AvFlg
Is Correction Flag?: No
Is Unsigned?: No
Product Minimum: 0
Product Maximum: 255
Description: Received pulse Peak value for the 4ns filter; returned by the FIR engine. From APID12/13, Offset 92.
Comments:

Product Var Name: i_8nsPeakVal
Is element of: GLA01_Short_Record
Short Description: 8ns Filter Peak Value
Product Data Type: i2b (20)
Total Bytes: 40
Product Units: counts
Invalid Value/Flag: i_APID_AvFlg
Is Correction Flag?: No
Is Unsigned?: No
Product Minimum: 0
Product Maximum: 255
Description: Received pulse Peak value for the 8ns filter; returned by the FIR engine. From APID12/13, Offset 94.
Comments:

Product Var Name: i_8nsPeakVal
Is element of: GLA01 Long Waveform Record
Short Description: 8ns Filter Peak value
Product Data Type: i2b (8)
Total Bytes: 16
Product Units: counts
Invalid Value/Flag: i_APID_AvFlg
Is Correction Flag?: NA
Is Unsigned?: No
Product Minimum: 0
Product Maximum: 255
Description: Received pulse Peak value for the 8ns filter; returned by the FIR engine. From APID12/13, Offset 94.
Comments:

Product Var Name: i_ADBias
Is element of: GLA01 Main Record
Short Description: Altimeter Digitizer Bias
Product Data Type: i4b (2)
Total Bytes: 8
Product Units: Meters
Invalid Value/Flag: i_APID_AvFlg
Is Correction Flag?: NA
Is Unsigned?: No
Product Minimum: -1000000
Product Maximum: 1000000
Description: Altimeter Digitizer bias values added to minimum and maximum range: 1st item is bias for minimum range (Rbmin) - default = 0; 2nd item is bias for maximum range (Rbmax) - default = 0. Used when necessary to correct for off-nadir pointing angles greater than 1 degree. From APID19, Offset 1124.
Comments:

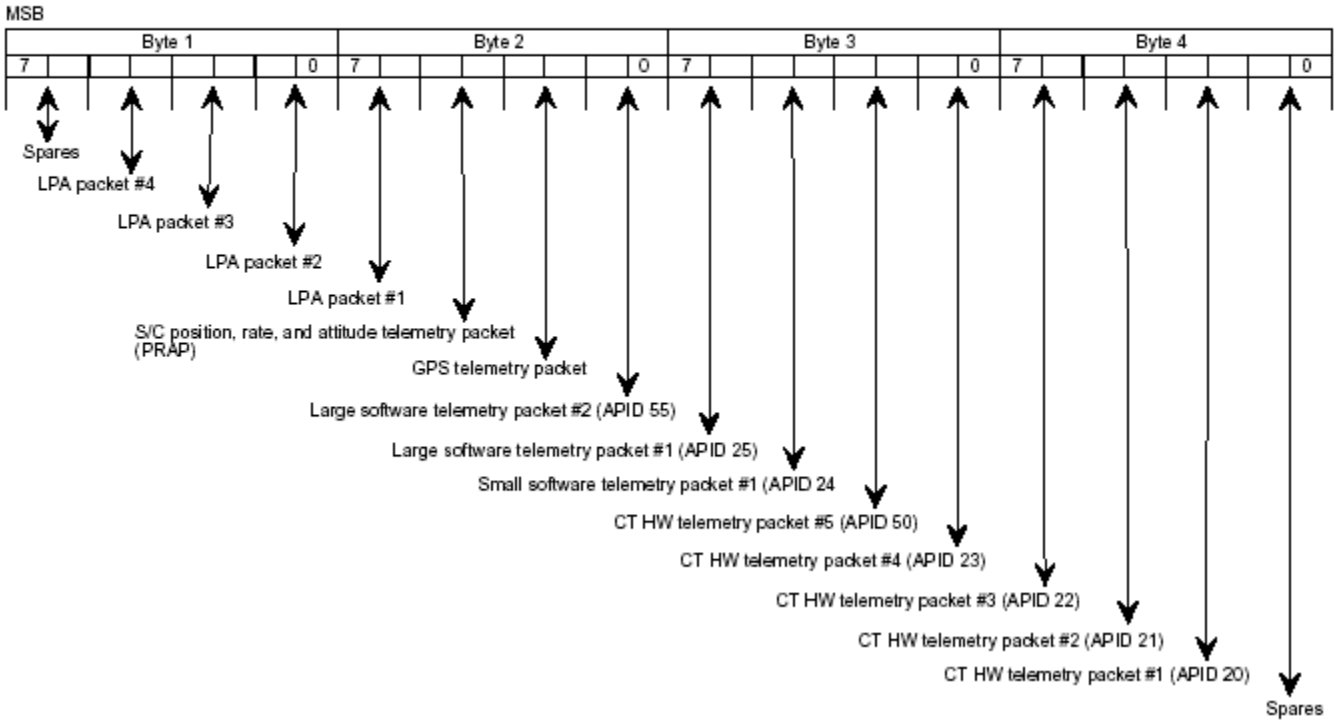
Product Var Name: i_ADdetOutGn
Is element of: GLA01 Main Record
Short Description: Transmitted Gain
Product Data Type: i2b
Total Bytes: 2
Product Units: counts
Invalid Value/Flag: N/A
Is Correction Flag?: NA
Is Unsigned?: No
Product Minimum: 0
Product Maximum: 255
Description:
Comments: This is only updated every 4 seconds.

Product Var Name: i_APID_AvFlg
Is element of: GLA01 Main Record , GLA05 record, GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record
Short Description: APID Data Availability Flag
Product Data Type: i1b (8)
Total Bytes: 8
Product Units: n/a
Invalid Value/Flag: No
Is Correction Flag?: NA
Is Unsigned?: No
Product Minimum: -127
Product Maximum: 127

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

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

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



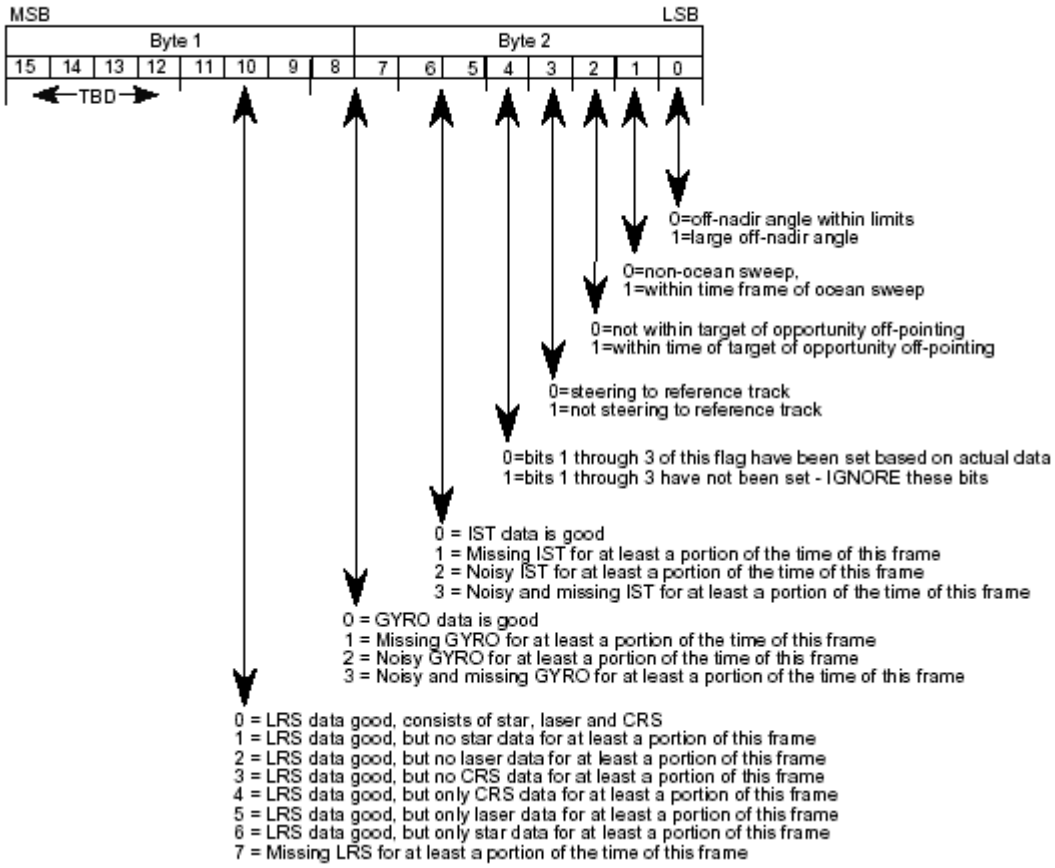
Comments:

Product Var Name: i_atm_char_conf
Is element of: GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record
Short Description: Atmosphere Characterization Flag Confidence
Product Data Type: i2b
Total Bytes: 2
Product Units: n/a
Invalid Value/Flag: n/a
Is Correction Flag?: No
Is Unsigned?: No
Product Minimum: 0
Product Maximum: 3
Description: Confidence level ascribed to the atmosphere characterization flag
0 Not applicable (for contamination flag values of 9 or 10)
1 low confidence
2 reasonable confidence
3 high confidence
Comments:

Product Var Name: i_atm_char_flag
Is element of: GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record
Short Description: Atmosphere Characterization Flag
Product Data Type: i2b
Total Bytes: 2
Product Units: n/a
Invalid Value/Flag: n/a
Is Correction Flag?: No
Is Unsigned?: No
Product Minimum: 0
Product Maximum: 10
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
9 not tested
10 data quality insufficient to assign flag
Comments:

Product Var Name: i_AttFlg1
Is element of: GLA05 record, GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 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

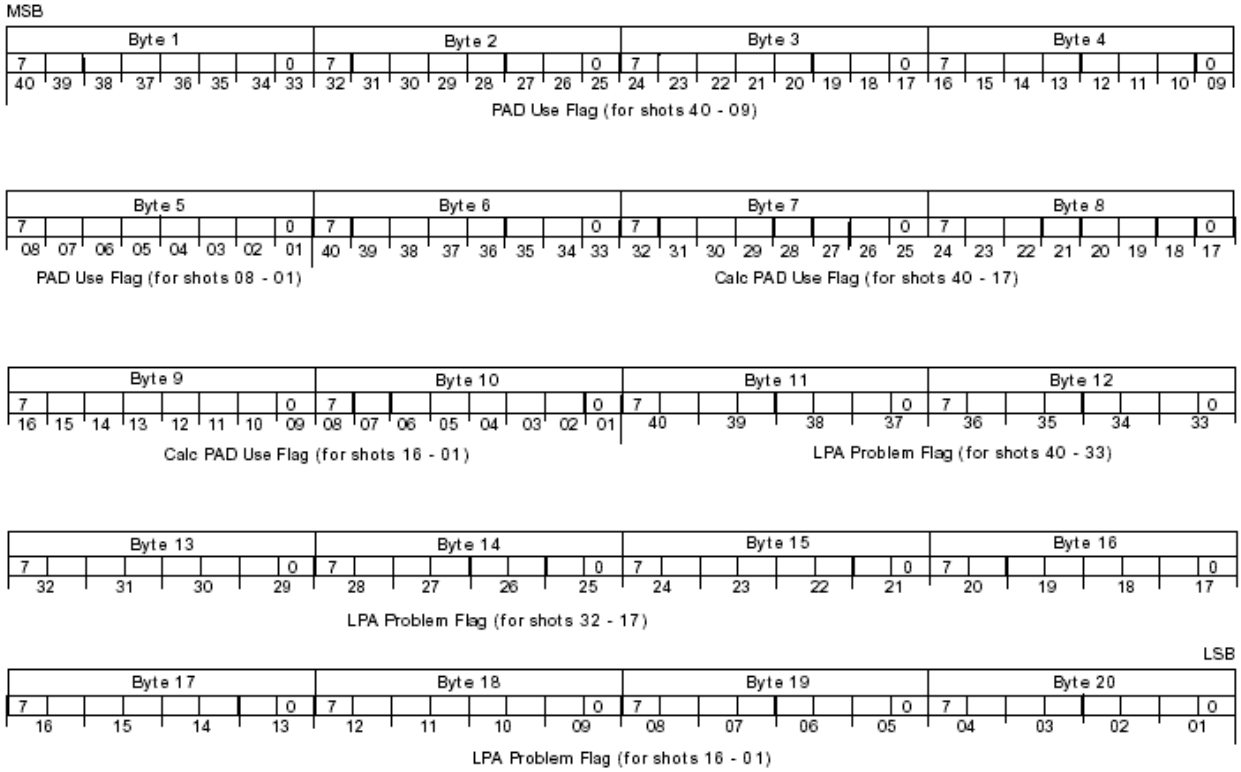


Comments:

Product Var Name: i_AttFlg2
Is element of: GLA05 record, GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record
Short Description: Attitude Flag 2
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: Denotes at 40/sec rate whether precision attitude was used to determine spot location, and if problems with LPA, etc.

i_AttFlg2 [1/sec for GLA05,06,12-15]: Attitude Flag 2

Bytes 1-5, PAD Use Flag: 1 bit/shot values; 0 = PAD used to determine spot location, 1 = PAD not used to determine spot location
Bytes 6-10, Calc PAD Use Flag: 1 bit/shot values; 0 = new PAD used to determine orbit, 1 = pass-thru PAD not used to determine orbit
Bytes 11-20, LPA Problem Flag: 2 bit/shot values; 0 = no problems with LPA, 1 = missing LPA, 2 = noisy LPA



Comments:

Product Var Name: i_Azimuth
Is element of: GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record
Short Description: Local Azimuth
Product Data Type: i4b
Total Bytes: 4
Product Units: millideg
Invalid Value/Flag: gi_invalid_i4b
Is Correction Flag?: NA
Is Unsigned?: No
Product Minimum: 0
Product Maximum: 360000
Description: Mean azimuth measured clockwise from north based on latitude, longitude, and elevation of a 1 second interval of the trace of the ground footprint-center.
Comments:

Product Var Name: i_bathyElv
Is element of: GLA15 Record
Short Description: Bathymetry Elevation

Product Data Type: i4b
Total Bytes: 4
Product Units: cm
Invalid Value/Flag: n/a
Is Correction Flag?: NA
Is Unsigned?: No
Product Minimum: -500000
Product Maximum: 1000000
Description: Bathymetry Elevation
Comments:

Product Var Name: i_beamAzimuth
Is element of: GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record
Short Description: Azimuth
Product Data Type: i4b (40)
Total Bytes: 160
Product Units: degrees*1000
Invalid Value/Flag: gi_invalid_i4b
Is Correction Flag?: NA
Is Unsigned?: No
Product Minimum: 0
Product Maximum: 36000
Description: The direction, eastwards from north, of the laser beam vector as seen by an observer at the laser ground spot viewing toward the spacecraft (i.e., the vector from the ground to the spacecraft). When the spacecraft is precisely at the geodetic zenith, the value will be 99999 degrees. 40 Hz.
Comments:

Product Var Name: i_beamCoelv
Is element of: GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record
Short Description: Co-elevation
Product Data Type: i4b (40)
Total Bytes: 160
Product Units: degrees*1000
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. 40Hz.
Comments:

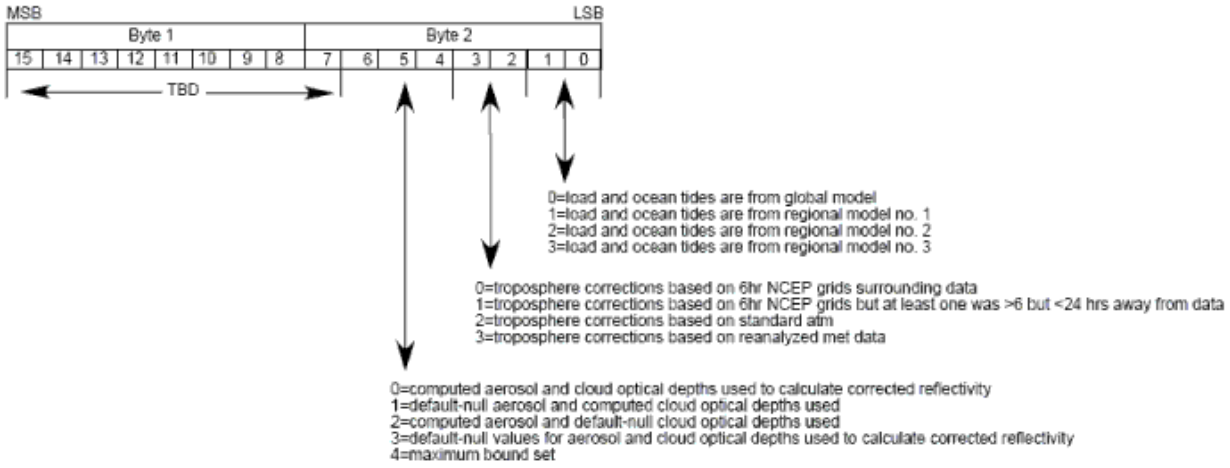
Product Var Name: i_BergElev

Is element of: GLA13 Record
Short Description: Iceberg Elevation
Product Data Type: i4b (40)
Total Bytes: 160
Product Units: mm
Invalid Value/Flag: gi_invalid_i4b
Is Correction Flag?: NA
Is Unsigned?: No
Product Minimum: 0
Product Maximum: 200000
Description: For waveforms with more than 1 peak, 'iceberg' elevation is calculated using the difference between the range offset of the maximum amplitude peak and the range offset of the first peak. Computations are made after atmospheric and tide corrections have been applied. The elevation computed is relative to the ellipsoid.
Comments: Users should be wary that this parameter is computed for all multiple-peak GLA13 records, even if the elevation is too high to be sea-ice.

Product Var Name: i_campaign
Is element of: GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record
Short Description: Campaign
Product Data Type: i1b (2)
Total Bytes: 2
Product Units: n/a
Invalid Value/Flag: n/a
Is Correction Flag?: No
Is Unsigned?: No
Product Minimum: INT(ICHAR(1A))
Product Maximum: INT(ICHAR(3K))
Description: The campaign. ie: for campaign L1A, it will be '1A'.
Comments:

Product Var Name: i_CorrStatFlg
Is element of: GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record
Short Description: Correction Status 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: 32767
Description: For each geophysical correction that has multiple values denotes which algorithm or model was used.

i_CorrStatFlg [1/sec for GLA06, 12-15]: Correction Status Flag



Comments:

Product Var Name: i_cycTrk
Is element of: GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record
Short Description: Cycle and Track
Product Data Type: i4b
Total Bytes: 4
Product Units: n/a
Invalid Value/Flag: n/a
Is Correction Flag?: No
Is Unsigned?: No
Product Minimum: 10001
Product Maximum: 9991354
Description: The track and cycle. On the product, they will be stored as one number: ccctttt.
Comments:

Product Var Name: i_d2refTrk
Is element of: GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record
Short Description: Distance to the reference ground track
Product Data Type: i4b (40)
Total Bytes: 160
Product Units: m*1000
Invalid Value/Flag: gi_invalid_i4b
Is Correction Flag?: NA
Is Unsigned?: No
Product Minimum: 0
Product Maximum: 1000000000
Description: Distance to the reference ground track.
Comments:

Product Var Name: i_deltaEllip
Is element of: GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record
Short Description: Delta Ellipsoid
Product Data Type: i2b (40)
Total Bytes: 80
Product Units: mm
Invalid Value/Flag: n/a
Is Correction Flag?: NA
Is Unsigned?: No
Product Minimum: -9000
Product Maximum: 9000
Description: Surface Elevation(T/P ellipsoid) minus Surface Elevation(WGS84 ellipsoid).
Comments:

Product Var Name: i_DEM_elv
Is element of: GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record
Short Description: DEM Elevation
Product Data Type: i4b (40)
Total Bytes: 160
Product Units: centimeters
Invalid Value/Flag: gi_invalid_i4b
Is Correction Flag?: NA
Is Unsigned?: No
Product Minimum: -50000
Product Maximum: 1000000
Description: Elevation at the footprint location from the SRTM30 (GTOPO30 + SRTM) Digital Elevation Model (DEM). The reference frame for the DEM elevation was changed to the TOPEX/ Poseidon ellipsoid to make it consistent with the GLAS elevations.
Comments:

Product Var Name: i_DEM_hires_elv
Is element of: GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record
Short Description: High Resolution Elevation
Product Data Type: i2b (40)
Total Bytes: 80
Product Units: meters
Invalid Value/Flag: gi_invalid_i2b
Is Correction Flag?: NA
Is Unsigned?: No
Product Minimum: -500
Product Maximum: 13000
Description: High resolution regional DEM elevation. See the 'pdf' file for the flag i_DEM_hires_src for a full description of the DEM.

High Resolution DEM values from the SRTM source may sometimes be missing from GSAS Products due to the nature of the algorithm used to retreive the data. If the ICESat pointing deviates for any of several possible reasons by more than +- 1.1 km for the 'unfinished' tracks or +- 2.1 km for the 'finished' tracks from the nadir-pointing reference track, the cataloged SRTM data will not be available.

Comments:

Product Var Name: i_DEM_hires_src
Is element of: GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record
Short Description: High Resolution Source 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: 128
Description: Flag to specify who the source provider was for the high resolution DEM.
0 = no high res source available
1 = unfinished research Shuttle Radar Topography Mission (SRTM)
C-band 90 m DEM produced by JPL (+-1.1km E-W swath)
2 = finishedSRTM C-band 90 m DEM produced by NGA (+-2.1km E-W swath)
3 = ICESat Greenland V1 1km DEM
4 = ICESat Antarctica V1 500m DEM
5 = 90m Canadian Digital Elevation Data (CDED)
6 = Data in overlap area of SRTM and CDED. Value reported is from _finished_ SRTM C-band 90 m DEM.
Comments: DEM elevations are referenced to the TOPEX/Poseidon ellipsoid and are directly comparable to the elevation on the GLAS products.

Product Var Name: i_DEMhiresArElv
Is element of: GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record
Short Description: DEMhiresArElv
Product Data Type: i2b (9, 40)
Total Bytes: 720
Product Units: meters
Invalid Value/Flag: gi_invalid_i2b
Is Correction Flag?: NA
Is Unsigned?: No
Product Minimum: -500
Product Maximum: 1300
Description: d_DEMhiresArElv is a 3 X 3 X 40 array of high resolution DEM values. The 1-40 index

corresponds to 1/40 second samples. The 1-9 index corresponds to the position of the DEM value relative to the spot. Given the first 1/40 second of data, positional correspondence of the DEM element to the spot is as follows:
The 9 points on the product correspond to the 3x3 points in the alg variable as follows:
gla06%d_DEMhiresArElv(1,1,k) = gla06_prod%i_DEMhiresArElv(1,k) NW
gla06%d_DEMhiresArElv(2,1,k) = gla06_prod%i_DEMhiresArElv(2,k) N
gla06%d_DEMhiresArElv(3,1,k) = gla06_prod%i_DEMhiresArElv(3,k) NE
gla06%d_DEMhiresArElv(1,2,k) = gla06_prod%i_DEMhiresArElv(4,k) W
gla06%d_DEMhiresArElv(2,2,k) = gla06_prod%i_DEMhiresArElv(5,k) center
gla06%d_DEMhiresArElv(3,2,k) = gla06_prod%i_DEMhiresArElv(6,k) E
gla06%d_DEMhiresArElv(1,3,k) = gla06_prod%i_DEMhiresArElv(7,k) SW
gla06%d_DEMhiresArElv(2,3,k) = gla06_prod%i_DEMhiresArElv(8,k) S
gla06%d_DEMhiresArElv(3,3,k) = gla06_prod%i_DEMhiresArElv(9,k) SE
Comments:

Product Var Name: i_DEMmax
Is element of: GLA01 Main 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: GLA01 Main 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_EchoLandType
Is element of: GLA01 Main Record
Short Description: Echo Land Type
Product Data Type: i1b
Total Bytes: 1
Product Units: unitless
Invalid Value/Flag: i_APID_AvFlg
Is Correction Flag?: NA
Is Unsigned?: No
Product Minimum: 0
Product Maximum: 3
Description: Surface Echo Land Type for Compression. 0=sea, 1=land, 2=sea/ice, 3=land/ice. From APID19, Offset 231.
Comments: The long and short values and values of 'p', 'q', and 'N' are surface echo land type dependent, but can only change once per frame (1sec).

Product Var Name: i_EchoPeakLoc
Is element of: GLA01 Main Record
Short Description: Echo Peak Location
Product Data Type: i4b (40)
Total Bytes: 160
Product Units: nanoseconds
Invalid Value/Flag: i_APID_AvFlg
Is Correction Flag?: NA
Is Unsigned?: No
Product Minimum: 0
Product Maximum: 5100000
Description: Address (in digitizer counts) of the detected peak value (as measured from the start of Acquisition Memory, i.e. Start of digitization). Set to 0 if a threshold crossing was NOT detected. From APID12/13 offset 100.
Comments:

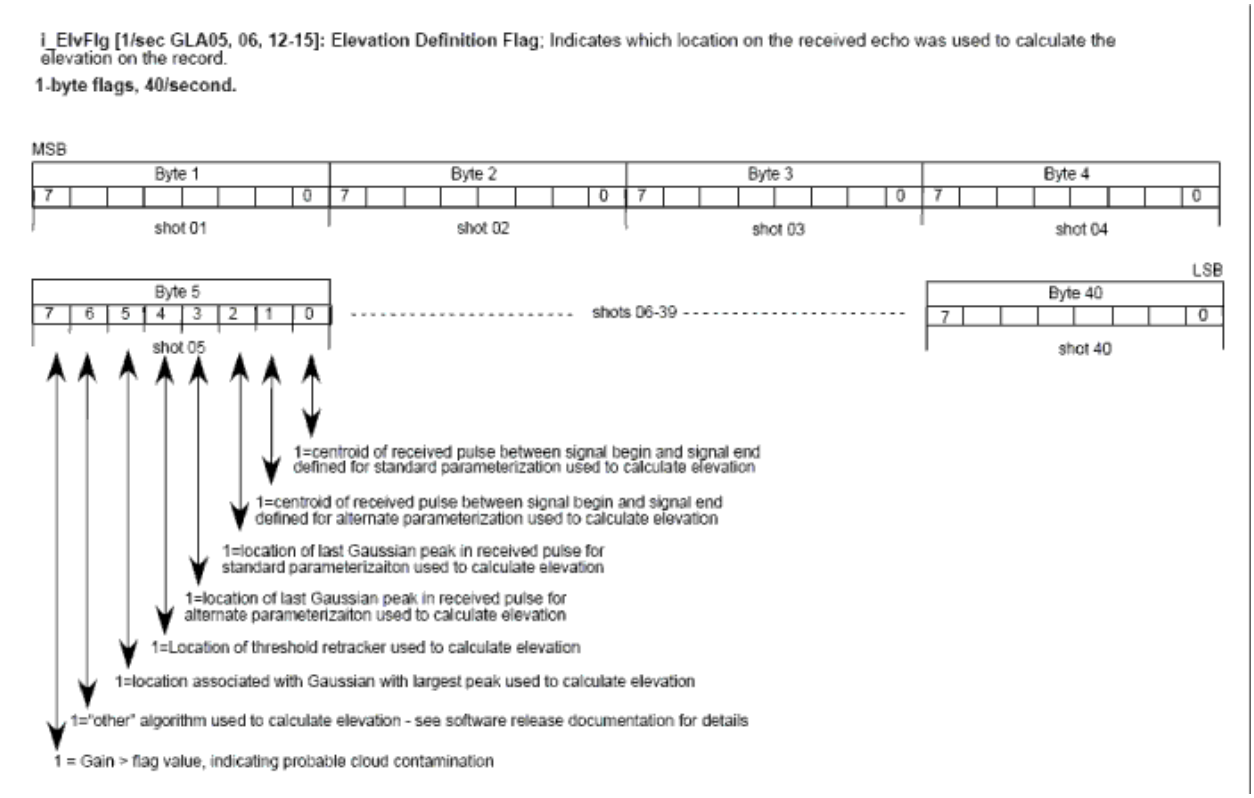
Product Var Name: i_EchoPeakVal
Is element of: GLA01 Main Record
Short Description: Echo Peak Value
Product Data Type: i2b (40)
Total Bytes: 80
Product Units: counts
Invalid Value/Flag: i_APID_AvFlg
Is Correction Flag?: NA
Is Unsigned?: No
Product Minimum: 0
Product Maximum: 255

Description: Peak value for the selected filter returned by the FIR filter engine. Set to 0 if a threshold crossing was not detected. From APID12/13 offset 96.
Comments:

Product Var Name: i_ElevBiasCorr
Is element of: GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record
Short Description: Elevation Bias Correction
Product Data Type: i2b (40)
Total Bytes: 80
Product Units: mm
Invalid Value/Flag: gi_invalid_i2b
Is Correction Flag?: NA
Is Unsigned?: NA
Product Minimum: 0
Product Maximum: 3000
Description: Correction to elevation based on post flight analysis for biases determined for each campaign. This bias correction has not been applied to the data so to apply it SUBTRACT the correction from the range estimate. To apply the correction to the elevations it must be ADDED to the elevation estimates.Comments: See the altimeter user guide for full description.
Comments:

Product Var Name: i_ElvFlg
Is element of: GLA05 record, GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record
Short Description: Elevation Definition Flag
Product Data Type: i1b (40)
Total Bytes: 40
Product Units: N/A
Invalid Value/Flag: No
Is Correction Flag?: NA
Is Unsigned?: No
Product Minimum: 0
Product Maximum: 127
Description: Indicates how location on the received echo was determined to calculate the

elevation on the record.

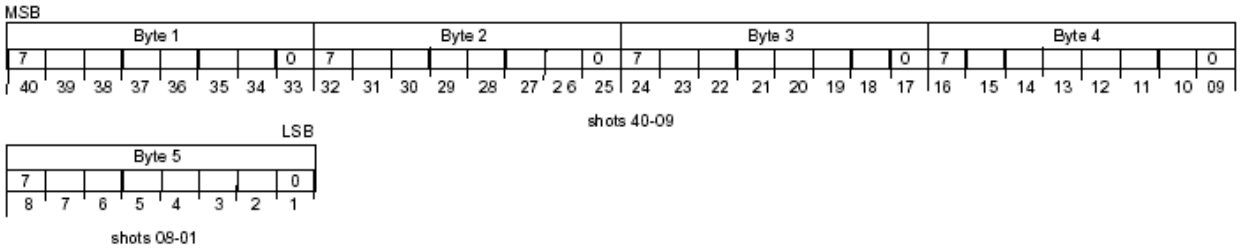


'For GLA05, 06 and 12,13,14 and 15, bits are set to reflect the range offset used for that products elevation. Although defined as a pass-thru, the values are different on GLA06/12,13,15 and GLA14.'
Comments:

Product Var Name: i_ElvuseFlg
Is element of: GLA05 record, GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record
Short Description: Elevation use flag
Product Data Type: i1b (5)
Total Bytes: 5
Product Units: N/A
Invalid Value/Flag: No
Is Correction Flag?: NA
Is Unsigned?: Yes
Product Minimum: -127
Product Maximum: 127
Description: Flag indicating whether the elevations on this record should be used or not (1 bit set/shot).

i_ElvuseFlg [1/sec for GLA05, 06, 12-15]: Elevation Use Flag; One flag per shot; indicates quality to use based on valid or invalid criteria
1-bit flags, 40/ second.

0=elevation is valid
1=elevation is invalid



Comments:

Product Var Name: i_FRir_ODflg
Is element of: GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record
Short Description: Full Resolution 1064 Optical Depth 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: 0
Description: This parameter is for a 1 second record. This parameter is also in GLA11.
Comments:

Product Var Name: i_FRir_cldtop
Is element of: GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record
Short Description: Full Resolution 1064 Cloud Top
Product Data Type: i2b (40)
Total Bytes: 80
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 1 second record. This parameter is in GLA09.
Comments:

Product Var Name: i_FRir_intsig
Is element of: GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: Full Resolution 1064 Integrated Signal
Product Data Type: i2b (40)
Total Bytes: 80
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) units). This parameter is for a 1 second record. This parameter is extracted from the equivalent parameter on GLA09.
Comments:

Product Var Name: i_FRir_qaFlag
Is element of: GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record
Short Description: Full Resolution 1064 Quality 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: 15
Description: One byte per data quality flag.
Value 15 = No clouds.
Value 14 = Indicates the likely presence of low clouds (< 150 m) based on elevated signal from the two bins above the ground return bin that were not detected directly by the cloud search algorithm. When this occurs, the 40 Hz cloud top height (i_Frir_cldtop) is set to a value of 0.10 km.
Value 13 = Indicates the possible presence of a cloud based on the value of the integrated signal parameter (i_FRir_intsig) that was not detected directly by the cloud search algorithm. When this occurs, the 40 Hz cloud top height (i_Frir_cldtop) is set to a value of 10.0 km.
Value 0 - 12 = Cloud detected by cloud search algorithm with higher numbers indicating a stronger average signal from the region starting at cloud top and extending 500 m below cloud top height.

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

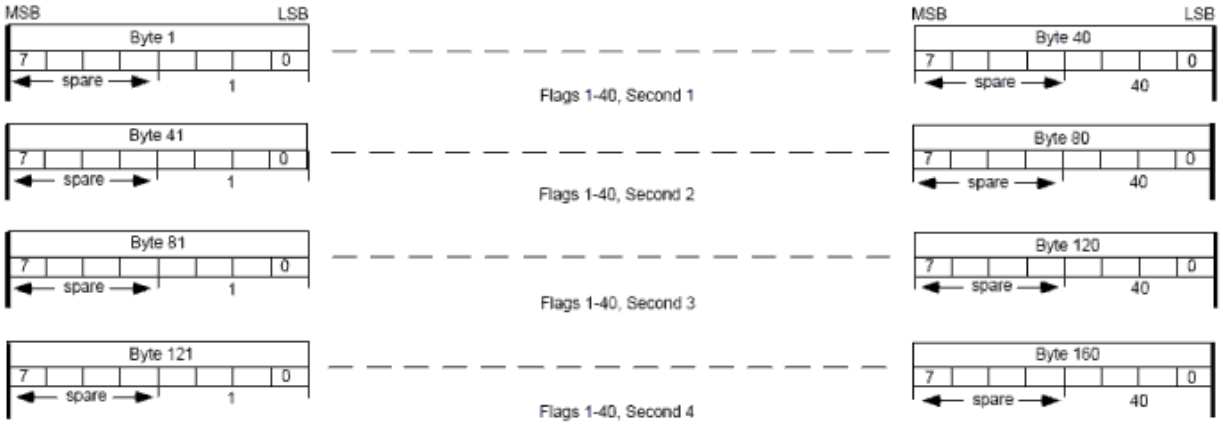
One byte per data quality flag

Value 15 = No clouds.

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

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

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



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

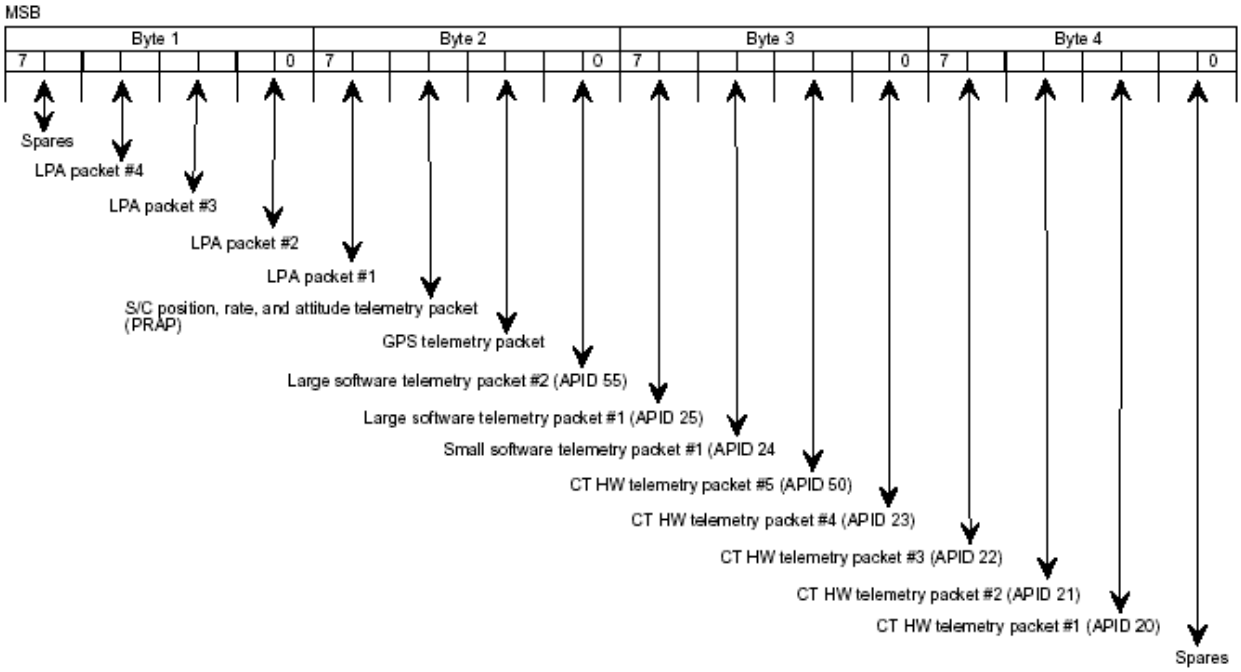
This parameter is extracted from the equivalent parameter on GLA09.
Comments:

Product Var Name: i_FiltNumMask
Is element of: GLA01 Main Record
Short Description: Filter Selection Mask
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: 64
Description: The low order 6 bits, bits 0 through 5, indicate which filters were selectable for a shot. The definition of complete failure of the filters has been changed to mean the complete failure of all SELECTABLE filters. Bit 0: 4 nsec filter, bit 1: 8 nsec filter, bit 2: 16 nsec filter, bit 3: 32 nsec filter, bit 4: 64 nsec filter, bit 5: 128 nsec filter. In case of the complete failure of all the filters, the result of the last 'good' shot shall be used, even if this mask proscribes the filter

choice. A bit value = 1 =selectable; bit value = 0 = not selectable. From APID19, Offset 30.

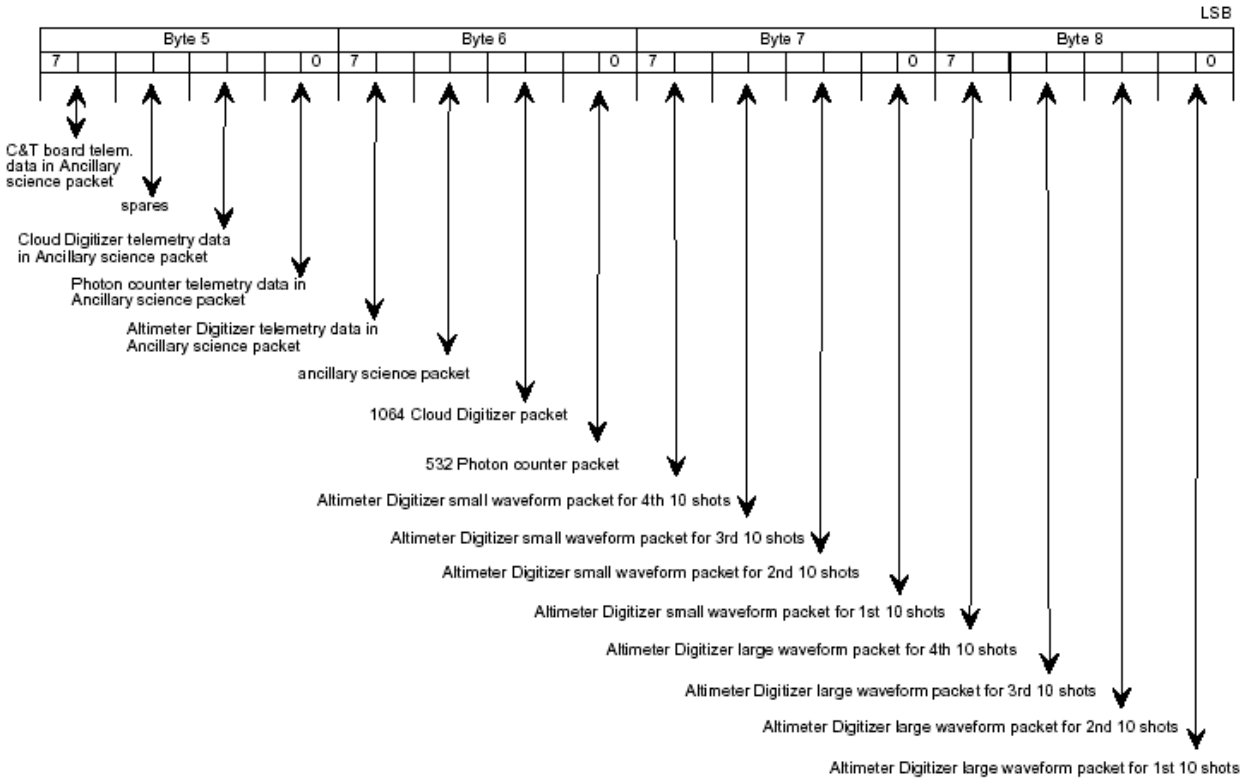
i_APID_AvFlg [1/sec for GLA01, 02, 04-07, 12-15], [1/16 sec for GLA03]: APID Data Availability Flag

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



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

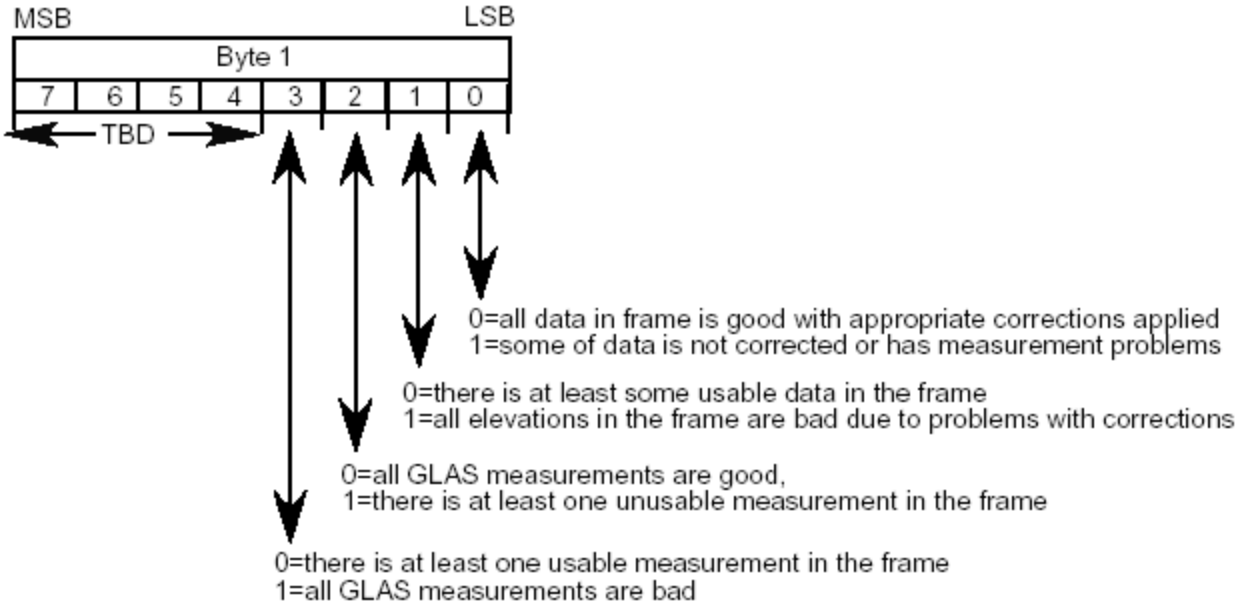
2 bit sets of values; 0= present, 1=filled at EDOS, 2=never received - ISIPS filled



Comments:

Product Var Name: i_FrameQF
Is element of: GLA05 record, GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record
Short Description: Altimeter Frame Quality Flag
Product Data Type: i1b
Total Bytes: 1
Product Units: N/A
Invalid Value/Flag: No
Is Correction Flag?: NA
Is Unsigned?: No
Product Minimum: 0
Product Maximum: 1
Description: Denotes all bad data (no signal in whole frame), or all data good and all science team recommended corrections applied

i_FrameQF [1/sec for GLA05,06,12-15]: Altimeter Quality Flag



Comments:

Product Var Name: i_GainShiftFlg
Is element of: GLA01 Main Record
Short Description: Gain Shift Flag
Product Data Type: i1b (5)
Total Bytes: 5
Product Units: N/A
Invalid Value/Flag: No
Is Correction Flag?: NA
Is Unsigned?: No
Product Minimum: -127
Product Maximum: 127
Description: Flag indicates if the gain has been shifted for the corresponding measurement. 0=Gain has been shifted (valid) or 1=Gain has not been shifted (potentially invalid) in this record (1 bit set/shot).
Comments:

Product Var Name: i_Gamp
Is element of: GLA14 Record
Short Description: Amplitudes of Gaussians
Product Data Type: i4b (6, 40)
Total Bytes: 960
Product Units: 0.01 volts
Invalid Value/Flag: gi_invalid_i4b

Is Correction Flag?: NA
Is Unsigned?: No
Product Minimum: 0
Product Maximum: 300
Description: Amplitude of each Gaussian solved for (up to six), using the alternate parameters.
Comments:

Product Var Name: i_Garea
Is element of: GLA14 Record
Short Description: Area under Gaussian
Product Data Type: i4b (6, 40)
Total Bytes: 960
Product Units: 0.01 volts * ns
Invalid Value/Flag: gi_invalid_i4b
Is Correction Flag?: NA
Is Unsigned?: No
Product Minimum: 0
Product Maximum: 348457
Description: Area under each of the Gaussians solved for (up to six), using alternate parameters.
Comments:

Product Var Name: i_gASP
Is element of: GLA15 Record
Short Description: Global Mean Atmospheric Pressure
Product Data Type: i4b
Total Bytes: 4
Product Units: .001 Pa
Invalid Value/Flag: gi_invalid_i4b
Is Correction Flag?: NA
Is Unsigned?: No
Product Minimum: 10000000
Product Maximum: 120000000
Description:
Comments:

Product Var Name: i_Gsigma
Is element of: GLA14 Record
Short Description: Sigma of Gaussians
Product Data Type: i4b (6, 40)
Total Bytes: 960
Product Units: 0.001 ns
Invalid Value/Flag: gi_invalid_i4b
Is Correction Flag?: NA
Is Unsigned?: No

Product Minimum: 0
Product Maximum: 327660
Description: Width (sigma) of each Gaussian solved for (up to six), using alternate parameters.
Comments:

Product Var Name: i_HOff
Is element of: GLA01 Main Record
Short Description: DEM Offset
Product Data Type: i4b (2)
Total Bytes: 8
Product Units: Millimeters
Invalid Value/Flag: i_APID_AvFlg
Is Correction Flag?: NA
Is Unsigned?: No
Product Minimum: -1.0D9
Product Maximum: 1.0D9
Description: Offsets associated with the minimum and maximum height uploaded in the DEM used to define the range window. 1st item: minimum height offset = DEM uncertainty + bias; default is 1.125 km. 2nd item: maximum height offset = DEM uncertainty - bias; default is -0.875 km. From APID19, Offset 1116.
Comments:

Product Var Name: i_IceSVar
Is element of: GLA12 Record
Short Description: Standard Deviation of the ice sheet Gaussian Fit
Product Data Type: i2b (40)
Total Bytes: 80
Product Units: microvolts*10
Invalid Value/Flag: gi_invalid_i2b
Is Correction Flag?: NA
Is Unsigned?: No
Product Minimum: 0
Product Maximum: 30000
Description: The Standard deviation of the difference between the functional fit and the received echo using standard parameters. It is directly taken from GLA05 parameter i_wfFitSDev_2 (standard).
Comments:

Product Var Name: i_InstState
Is element of: GLA01 Main Record
Short Description: Instrument State
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: 524288
Description: Flag defining current configuration of the GLAS instrument. This is a common flag.
Comments:

Product Var Name: i_IsRngFst
Is element of: GLA12 Record
Short Description: Ice Sheet Range Offset using first peak
Product Data Type: i4b (40)
Total Bytes: 160
Product Units: mm
Invalid Value/Flag: gi_invalid_i4b
Is Correction Flag?: NA
Is Unsigned?: No
Product Minimum: -150000
Product Maximum: 0
Description: Range offset to be added to i_refRngNs to calculate ice sheet specific range from centroid of first peak in standard Gaussian fit
Comments:

Product Var Name: i_IsRngLast
Is element of: GLA12 Record
Short Description: Ice Sheet Range offset using last peak
Product Data Type: i4b (40)
Total Bytes: 160
Product Units: mm
Invalid Value/Flag: gi_invalid_i4b
Is Correction Flag?: NA
Is Unsigned?: No
Product Minimum: -150000
Product Maximum: 0
Description: Range offset to be added to i_refRngNs to calculate ice sheet specific range from centroid of last peak in standard Gaussian fit.
Comments:

Product Var Name: i_LandVar
Is element of: GLA14 Record
Short Description: Standard Deviation of the land Gaussian Fit
Product Data Type: i2b (40)
Total Bytes: 80
Product Units: unitless

Invalid Value/Flag: gi_invalid_i2b
Is Correction Flag?: NA
Is Unsigned?: No
Product Minimum: 0
Product Maximum: 30000
Description: The Standard deviation of the difference between the functional fit and the received echo using alternative parameters. It is directly taken from GLA05 parameter i_wfFitSDev_1 (alternative).
Comments:

Product Var Name: i_LastThrXingT
Is element of: GLA01 Main Record
Short Description: Last Threshold Crossing Location for Selected Filter
Product Data Type: i4b (40)
Total Bytes: 160
Product Units: ns
Invalid Value/Flag: i_APID_AvFlg
Is Correction Flag?: No
Is Unsigned?: No
Product Minimum: 0
Product Maximum: 5100000
Description: Address, in digitizer counts, of the detected last (i.e. last in time) threshold crossing (as measured from the start of Acquisition Memory, i.e. Start of digitization). Also called the trailing edge. Set to 0 if threshold crossing was NOT detected. From APID12/13, Offset 84.
Comments: null

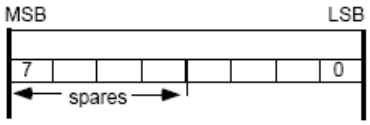
Product Var Name: i_localSolarTime
Is element of: GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record
Short Description: Local apparent solar time
Product Data Type: i4b
Total Bytes: 4
Product Units: seconds*1000
Invalid Value/Flag: gi_invalid_i4b
Is Correction Flag?: NA
Is Unsigned?: No
Product Minimum: 0
Product Maximum: 86400000
Description: Local apparent solar time.
Comments:

Product Var Name: i_MRC_af
Is element of: GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record
Short Description: Medium Resolution Cloud Availability 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: Tells how many cloud layers were found at this resolution from the 532 nm channel.

i_MRC_af [GLA06, 12-15]: Medium Resolution Cloud Availability Flag

Tells how many cloud layers were found at this resolution. The total number of layers found is the sum of those found using the 532 channel and the 1064 channel (thus, this number will generally be larger than the actual number of layers present). value 15 = cloud layers were not searched for; value 0 = cloud layers were searched for, but not detected



This parameter is extracted from the i_MRCL_flag on GLA09.
Comments:

Product Var Name: i_MSS_elv
Is element of: GLA15 Record
Short Description: Mean Sea Surface Elevation
Product Data Type: i4b(40)
Total Bytes: 160
Product Units: cm
Invalid Value/Flag: gi_invalid_i4b
Is Correction Flag?: NA
Is Unsigned?: No
Product Minimum: -50000
Product Maximum: 1000000
Description:
Comments:

Product Var Name: i_N_val
Is element of: GLA01 Main Record , GLA05 record
Short Description: Value of N
Product Data Type: i2b
Total Bytes: 2
Product Units: counts

Invalid Value/Flag: i_APID_AvFlg
Is Correction Flag?: NA
Is Unsigned?: No
Product Minimum: 0
Product Maximum: 544
Description: Value of N used for waveform compression for the frame. From APID19, Offset 236.
Comments: Not valid if APID19 is missing.

Product Var Name: i_NextThrXing
Is element of: GLA01 Main Record
Short Description: Next to Last Threshold Crossing Location for Selected Filter
Product Data Type: i4b (40)
Total Bytes: 160
Product Units: ns
Invalid Value/Flag: i_APID_AvFlg
Is Correction Flag?: No
Is Unsigned?: No
Product Minimum: 0
Product Maximum: 5100000
Description: Address (in dititizer counts) of the detected next to last threshold crossing (as measured from the start of Acquisition Memory, i.e. Start of digitization. Also called the leading edge. Set to 0 if a threshold crossing was NOT detected. From APID12/13 offset 88.
Comments:

Product Var Name: i_NumCoinc
Is element of: GLA01 Long Waveform Record
Short Description: Number of Coincidences for Selected Filter
Product Data Type: i1b (8)
Total Bytes: 8
Product Units: n/a
Invalid Value/Flag: i_APID_AvFlg
Is Correction Flag?: NA
Is Unsigned?: Yes
Product Minimum: 0
Product Maximum: 255
Description: The number of coincidences between the selected filter and all other filters (including itself). This is one of the terms used to calculate the weight of the selected filter. If no filter is selected, this value is 0.
Comments:

Product Var Name: i_NumCoinc
Is element of: GLA01_Short_Record
Short Description: Number of Coincidences for Selected Filter
Product Data Type: i1b (20)

Total Bytes: 20
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 number of coincidences between the selected filter and all other filters (including itself). This is one of the terms used to calculate the weight of the selected filter. If no filter is selected, this value is 0.
Comments:

Product Var Name: i_ObSCHt
Is element of: GLA01 Main Record
Short Description: On-board Height of S/C
Product Data Type: i4b
Total Bytes: 4
Product Units: Millimeters
Invalid Value/Flag: i_APID_AvFlg
Is Correction Flag?: NA
Is Unsigned?: No
Product Minimum: -1.0D9
Product Maximum: 1.0D9
Description: Geodetic altitude of S/C above earth surface (Hsat). From APID19, Offset 1092.
Comments:

Product Var Name: i_OcMeanElev
Is element of: GLA15 Record
Short Description: Mean elevation over 1 sec
Product Data Type: i4b
Total Bytes: 4
Product Units: mm
Invalid Value/Flag: gi_invalid_i4b
Is Correction Flag?: NA
Is Unsigned?: No
Product Minimum: -500000
Product Maximum: 10000000
Description: 1 -sec mean elevation of the up to 40 GLA15 ocean elevations.
Comments:

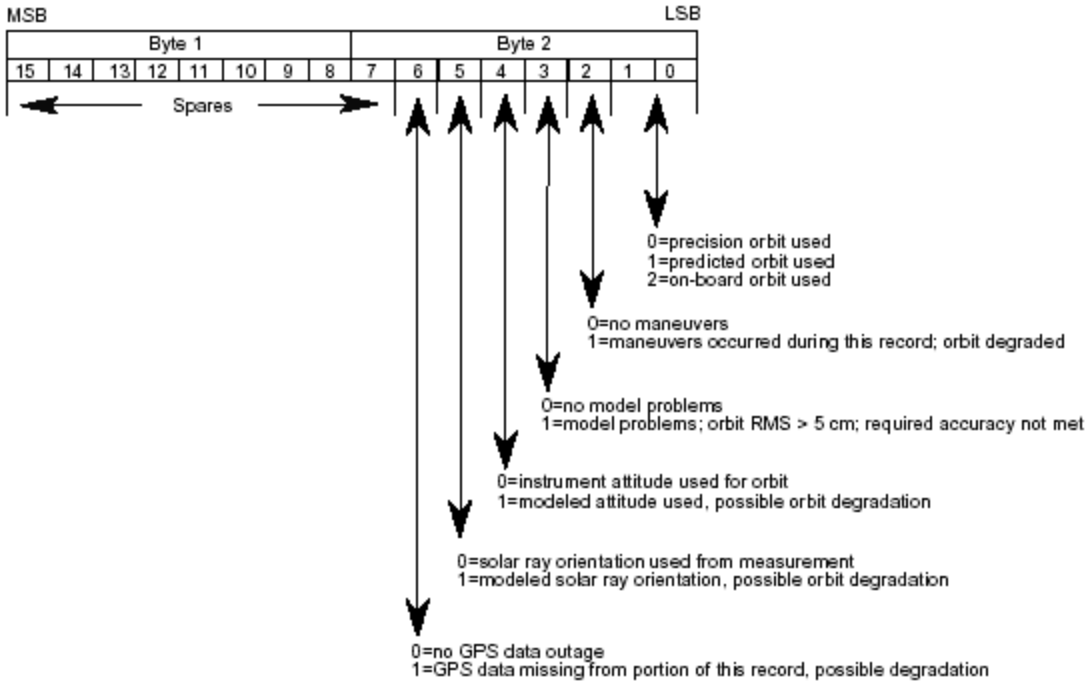
Product Var Name: i_OcRufRMS
Is element of: GLA15 Record
Short Description: RMS of elevations used for 1-sec mean elevation
Product Data Type: i4b

Total Bytes: 4
Product Units: mm
Invalid Value/Flag: gi_invalid_i4b
Is Correction Flag?: NA
Is Unsigned?: No
Product Minimum: 0
Product Maximum: 120000
Description: The standard deviation of the up to 40 GLA15 ocean elevations measurements.
Comments:

Product Var Name: i_OceanVar
Is element of: GLA15 Record
Short Description: Standard Deviation of the ocean Gaussian Fit
Product Data Type: i2b (40)
Total Bytes: 80
Product Units: microvolts*10
Invalid Value/Flag: gi_invalid_i2b
Is Correction Flag?: NA
Is Unsigned?: No
Product Minimum: 0
Product Maximum: 30000
Description: The Standard deviation of the difference between the functional fit and the received echo using standard parameters. It is directly taken from GLA05 parameter i_wfFitSDev_2 (standard).
Comments:

Product Var Name: i_OrbFlg
Is element of: GLA01 Main Record , GLA05 record, GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record
Short Description: POD flag (Orbit Flag)
Product Data Type: i1b (2)
Total Bytes: 2
Product Units: NA
Invalid Value/Flag: No
Is Correction Flag?: NA
Is Unsigned?: No
Product Minimum: 0
Product Maximum: 128
Description: Denotes quality of orbit, whether predicted or precision, loss of GPS data, maneuver-degraded, etc.

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



Comments:

Product Var Name: i_RMSpulseWd
Is element of: GLA05 record
Short Description: RMS Pulse Width
Product Data Type: i2b (40)
Total Bytes: 80
Product Units: 100 ns
Invalid Value/Flag: gi_invalid_i2b
Is Correction Flag?: NA
Is Unsigned?: No
Product Minimum: 0
Product Maximum: 1000
Description: The RMS width of the entire received waveform. See Eq 5 of ATBD for Derivation of Range.
Comments:

Product Var Name: i_RecNrgAll
Is element of: GLA05 record, GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record
Short Description: Received Energy signal begin to signal end
Product Data Type: i2b (40)
Total Bytes: 80

Product Units: 0.01 fJoules
Invalid Value/Flag: i_APID_AvFlg
Is Correction Flag?: NA
Is Unsigned?: No
Product Minimum: 0
Product Maximum: 32000
Description: This is a pass throught of gla01 i_recNrgAll_EU, but stored in different units on the product. This is calculated by taking the area under the received waveform (referenced to the observed noise) from all responses between the noise crossing before the first threshold crossing and the noise crossing after the last threshold crossing. It is a rescaled value of GLA01 parameter i_recNrgAll_EU and is not recomputed.
Comments:

Product Var Name: i_RecNrgAll_EU
Is element of: GLA01 Main Record
Short Description: 1064 Laser received Energy from all signal above threshold
Product Data Type: i4b (40)
Total Bytes: 160
Product Units: attojoules
Invalid Value/Flag: i_APID_AvFlg
Is Correction Flag?: No
Is Unsigned?: No
Product Minimum: 0
Product Maximum: 200000
Description: This is calculated by taking the area under the received waveform (referenced to the observed noise) from all responses between the noise crossing before the first threshold crossing and the noise crossing after the last threshold crossing.
Comments:

Product Var Name: i_RecNrgLast_EU
Is element of: GLA01 Main Record
Short Description: 1064 nm Laser Received Energy (max pk)
Product Data Type: i4b (40)
Total Bytes: 160
Product Units: attojoules
Invalid Value/Flag: i_APID_AvFlg
Is Correction Flag?: NA
Is Unsigned?: No
Product Minimum: 0
Product Maximum: 200000
Description: This is the energy in the 1064 nm laser pulse between the threshold crossings before and after the maximum amplitude in energy units.
Comments:

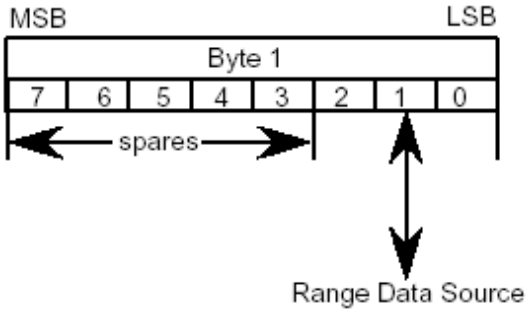
Product Var Name: i_RespEndTime
Is element of: GLA01 Main Record
Short Description: Ending Address of Range Reponse
Product Data Type: i4b (40)
Total Bytes: 160
Product Units: nanoseconds
Invalid Value/Flag: i_APID_AvFlg
Is Correction Flag?: NA
Is Unsigned?: No
Product Minimum: 0
Product Maximum: 5100000
Description: Address (in digitizer counts) of the 2000-byte surface echo data dump (as measured from the start of Acquisition Memory, i.e. Start of digitization). Last in time. From APID12/13 offset 80.
Comments:

Product Var Name: i_RminRmax
Is element of: GLA01 Main Record
Short Description: Range Window Start and Stop
Product Data Type: i4b (2)
Total Bytes: 8
Product Units: Meters
Invalid Value/Flag: i_APID_AvFlg
Is Correction Flag?: NA
Is Unsigned?: No
Product Minimum: 0
Product Maximum: 1000000
Description: Range window start and stop in kilometers. From APID19, Offset 1100.
Comments:

Product Var Name: i_RngSrc_Flag
Is element of: GLA01 Main Record
Short Description: Range Data Source
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: 2
Description: Source of Range data: 0 = s/c time and position packet; 1 = uplinked DEM bytes; 2 = uplinked Rmin/Rmax.

i_RngSrc_Flag [GLA01_Main]:Range Data Source Flag

1 byte set of values: 0 = s/c time and position packet, 1 = uplinked DEM bytes, 2 = uplinked Rmin/Rmax



From APID19, Offset 1194.
Comments:

Product Var Name: i_SeaIceVar
Is element of: GLA13 Record
Short Description: Standard Deviation of the sea ice Gaussian fit
Product Data Type: i2b (40)
Total Bytes: 80
Product Units: millivolts
Invalid Value/Flag: gi_invalid_i2b
Is Correction Flag?: NA
Is Unsigned?: No
Product Minimum: 0
Product Maximum: 25500
Description: The Standard deviation of the difference between the functional fit and the received echo using standard parameters. It is directly taken from GLA05 parameter i_wfFitSDev_2 (standard).
Comments:

Product Var Name: i_SiRngFst
Is element of: GLA13 Record
Short Description: Sea ice range increment to first peak
Product Data Type: i4b (40)
Total Bytes: 160
Product Units: mm
Invalid Value/Flag: gi_invalid_i4b
Is Correction Flag?: NA
Is Unsigned?: No
Product Minimum: -150000
Product Maximum: 0

Description: Range increment to be added to reference range to compute the sea ice specific range. This was determined from centroid of first peak in sea ice Gaussian fit
Comments:

Product Var Name: i_SigBegOff
Is element of: GLA06 record, GLA12 Record, GLA13 Record, GLA15 Record
Short Description: Signal Begin Range Increment
Product Data Type: i4b (40)
Total Bytes: 160
Product Units: mm
Invalid Value/Flag: gi_invalid_i4b
Is Correction Flag?: NA
Is Unsigned?: No
Product Minimum: -150000
Product Maximum: 0
Description: Offset to be added to i_refRng to give the range in distance to the location on the received echo calculated as the beginning of signal (closest to the spacecraft) using standard parameters.
Comments:

Product Var Name: i_SigBegOff
Is element of: GLA06 record
Short Description: Signal Begin Range Offset
Product Data Type: i4b (40)
Total Bytes: 160
Product Units: mm
Invalid Value/Flag: gi_invalid_i4b
Is Correction Flag?: NA
Is Unsigned?: No
Product Minimum: -150000
Product Maximum: 0
Description: Offset to be added to i_refRngNs to give the range in distance to the location on the received echo calculated as the beginning of signal (closest to the spacecraft) using standard parameters.
Comments:

Product Var Name: i_SigBegOff
Is element of: GLA14 Record
Short Description: Signal Begin Range Increment
Product Data Type: i4b (40)
Total Bytes: 160
Product Units: mm
Invalid Value/Flag: gi_invalid_i4b
Is Correction Flag?: NA

Is Unsigned?: No
Product Minimum: -150000
Product Maximum: 0
Description: Range increment to be added to reference range to signal begin as computed in ground process using the alternate parameterization.
Comments:

Product Var Name: i_SigEndOff
Is element of: GLA14 Record
Short Description: Signal End Range Increment
Product Data Type: i4b (40)
Total Bytes: 160
Product Units: mm
Invalid Value/Flag: gi_invalid_i4b
Is Correction Flag?: NA
Is Unsigned?: No
Product Minimum: -150000
Product Maximum: 0
Description: Range increment to be added to reference range to signal end as computed in ground process using the alternate parameterization.
Comments:

Product Var Name: i_SigEndOff
Is element of: GLA06 record, GLA12 Record, GLA13 Record, GLA15 Record
Short Description: Signal End Range Offset
Product Data Type: i4b (40)
Total Bytes: 160
Product Units: mm
Invalid Value/Flag: gi_invalid_i4b
Is Correction Flag?: NA
Is Unsigned?: No
Product Minimum: -150000
Product Maximum: 0
Description: Offset to be added to i_refRngNs to give the range in distance to the location on the received echo calculated as the end of signal (farthest from the spacecraft) using standard parameters.
Comments:

Product Var Name: i_SolAng
Is element of: GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 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_Spare1
Is element of: GLA06 record
Short Description: 2 byte spare
Product Data Type: i1b (2)
Total Bytes: 2
Product Units: N/A
Invalid Value/Flag: N/A
Is Correction Flag?: No
Is Unsigned?: No
Product Minimum: null
Product Maximum: null
Description:
Comments:

Product Var Name: i_Spare1
Is element of: GLA14 Record
Short Description: Spare
Product Data Type: i1b (2)
Total Bytes: 2
Product Units: N/A
Invalid Value/Flag: No
Is Correction Flag?: NA
Is Unsigned?: No
Product Minimum: null
Product Maximum: null
Description:
Comments:

Product Var Name: i_Spare1
Is element of: GLA15 Record
Short Description: Spare
Product Data Type: i1b (2)
Total Bytes: 2

Product Units: N/A
Invalid Value/Flag: No
Is Correction Flag?: NA
Is Unsigned?: No
Product Minimum: null
Product Maximum: null
Description:
Comments:

Product Var Name: i_Spare1
Is element of: GLA12 Record
Short Description: Spare
Product Data Type: i1b (2)
Total Bytes: 2
Product Units: N/A
Invalid Value/Flag: No
Is Correction Flag?: NA
Is Unsigned?: No
Product Minimum: null
Product Maximum: null
Description:
Comments:

Product Var Name: i_Spare1
Is element of: GLA13 Record
Short Description: Spare
Product Data Type: i1b (2)
Total Bytes: 2
Product Units: N/A
Invalid Value/Flag: No
Is Correction Flag?: NA
Is Unsigned?: No
Product Minimum: null
Product Maximum: null
Description:
Comments:

Product Var Name: i_poleTide
Is element of: GLA12 Record
Short Description: Pole Tide
Product Data Type: i1b (2)
Total Bytes: 2
Product Units: null
Invalid Value/Flag: No

Is Correction Flag?: NA
Is Unsigned?: No
Product Minimum: null
Product Maximum: null
Description:
Comments:

Product Var Name:i_poleTide
Is element of: GLA15 Record
Short Description: Pole Tide
Product Data Type: i1b (2)
Total Bytes: 2
Product Units: N/A
Invalid Value/Flag: No
Is Correction Flag?: NA
Is Unsigned?: No
Product Minimum: null
Product Maximum: null
Description:
Comments:

Product Var Name: i_poleTide
Is element of: GLA13 Record
Short Description: Pole Tide
Product Data Type: i1b (2)
Total Bytes: 2
Product Units: N/A
Invalid Value/Flag: No
Is Correction Flag?: NA
Is Unsigned?: No
Product Minimum: null
Product Maximum: null
Description:
Comments:

Product Var Name: i_poleTide
Is element of: GLA14 Record
Short Description: Pole Tide
Product Data Type: i1b (2)
Total Bytes: 2
Product Units: N/A
Invalid Value/Flag: No
Is Correction Flag?: NA
Is Unsigned?: No

Product Minimum: null
Product Maximum: null
Description:
Comments:

Product Var Name: i_poleTide
Is element of: GLA06 record
Short Description: Pole Tide
Product Data Type: i1b (2)
Total Bytes: 2
Product Units: null
Invalid Value/Flag: No
Is Correction Flag?: NA
Is Unsigned?: No
Product Minimum: null
Product Maximum: null
Description:
Comments:

Product Var Name: i_Spare3
Is element of: GLA15 Record
Short Description: Spares
Product Data Type: i1b (3)
Total Bytes: 3
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_Spare6
Is element of: GLA12 Record
Short Description: Spare
Product Data Type: i1b (2)
Total Bytes: 2
Product Units: N/A
Invalid Value/Flag: No
Is Correction Flag?: NA
Is Unsigned?: No
Product Minimum: null
Product Maximum: null

Description:
Comments:

Product Var Name: i_Spare6
Is element of: GLA14 Record
Short Description: Spares
Product Data Type: i1b (2)
Total Bytes: 2
Product Units: N/A
Invalid Value/Flag: No
Is Correction Flag?: NA
Is Unsigned?: No
Product Minimum: null
Product Maximum: null
Description:
Comments:

Product Var Name: i_Spare6
Is element of: GLA13 Record
Short Description: Spares
Product Data Type: i1b (2)
Total Bytes: 2
Product Units: N/A
Invalid Value/Flag: No
Is Correction Flag?: NA
Is Unsigned?: NA
Product Minimum: null
Product Maximum: null
Description:
Comments:

Product Var Name: i_Spare6
Is element of: GLA15 Record
Short Description: spares
Product Data Type: i1b (2)
Total Bytes: 2
Product Units: N/A
Invalid Value/Flag: No
Is Correction Flag?: NA
Is Unsigned?: No
Product Minimum: null
Product Maximum: null
Description:
Comments:

Product Var Name: i_Spare6
Is element of: GLA06 record
Short Description: spares
Product Data Type: i1b (2)
Total Bytes: 2
Product Units: N/A
Invalid Value/Flag: No
Is Correction Flag?: NA
Is Unsigned?: No
Product Minimum: null
Product Maximum: null
Description:
Comments:

Product Var Name: i_Spare7
Is element of: GLA15 Record
Short Description: spares
Product Data Type: i1b (150)
Total Bytes: 150
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_Spare7
Is element of: GLA14 Record
Short Description: spares
Product Data Type: i1b (120)
Total Bytes: 120
Product Units: NA
Invalid Value/Flag: No
Is Correction Flag?: NA
Is Unsigned?: No
Product Minimum: null
Product Maximum: null
Description:
Comments:

Product Var Name: i_Spare7

Is element of: GLA06 record, GLA12 Record, GLA13 Record
Short Description: spares
Product Data Type: i1b (282)
Total Bytes: 282
Product Units: NA
Invalid Value/Flag: No
Is Correction Flag?: NA
Is Unsigned?: No
Product Minimum: null
Product Maximum: null
Description:
Comments:

Product Var Name: i_Surface_pres
Is element of: GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 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: Atmospheric pressure at Earth's surface level measured in millibars and derived from the meteorological data files.
Comments: This surface pressure is computed in the atmospheric processing and is not the pressure used for the troposphere delay correction.

Product Var Name: i_Surface_relh
Is element of: GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 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: Atmospheric relative humidity at Earth's surface level measured as a percentage and derived from the meteorological data files.
Comments:

Product Var Name: i_Surface_temp
Is element of: GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 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: Atmospheric temperature at Earth's surface level measured in degrees Celcius and derived from the meteorological data files.
Comments:

Product Var Name: i_Surface_wdir
Is element of: GLA15 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: GLA15 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_TrshRngOff
Is element of: GLA06 record, GLA12 Record, GLA13 Record, GLA15 Record
Short Description: Threshold Retracker Range Offset
Product Data Type: i4b (40)
Total Bytes: 160
Product Units: mm
Invalid Value/Flag: gi_invalid_i4b
Is Correction Flag?: NA
Is Unsigned?: No
Product Minimum: -150000
Product Maximum: 0
Description: Offset to be added to i_refRngNs to give the range in distance to the threshold retracker location on the received echo using standard parameters.
Comments:

Product Var Name: i_TxFlg
Is element of: GLA01 Main Record
Short Description: Transmit Pulse Flag
Product Data Type: i1b (5)
Total Bytes: 5
Product Units: N/A
Invalid Value/Flag: No
Is Correction Flag?: NA
Is Unsigned?: No
Product Minimum: -127
Product Maximum: 127
Description: Flag indicating whether the transmit pulse is telemetered (valid) or not telemetered (invalid) in this record (1 bit set/shot).
Comments:

Product Var Name: i_TxNrg
Is element of: GLA05 record, GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record
Short Description: 1064 nm Laser Transmit Energy
Product Data Type: i2b (40)
Total Bytes: 80
Product Units: 0.01 millijoules
Invalid Value/Flag: gi_invalid_i2b
Is Correction Flag?: NA
Is Unsigned?: No
Product Minimum: 0
Product Maximum: 32766
Description: The 1064 nm laser pulse transmitted energy in energy units, computed from the

digitized outgoing pulse, and the transmit gain.
Comments:

Product Var Name: i_TxNrg_EU
Is element of: GLA01 Main Record
Short Description: 1064 nm Laser Transmit Energy
Product Data Type: i4b
Total Bytes: 4
Product Units: microjoules
Invalid Value/Flag: i_APID_AvFlg
Is Correction Flag?: NA
Is Unsigned?: No
Product Minimum: 0
Product Maximum: 90000
Description: The 1064 nm laser pulse transmitted energy in energy units, computed from the digitized outgoing pulse, and the transmit gain.
Comments:

Product Var Name: i_TxWfStart
Is element of: GLA01 Main Record
Short Description: Starting Address of Transmit Pulse Sample
Product Data Type: i4b (40)
Total Bytes: 160
Product Units: ns
Invalid Value/Flag: i_APID_AvFlg
Is Correction Flag?: NA
Is Unsigned?: No
Product Minimum: 0
Product Maximum: 500000
Description: Starting Address in digitizer counts of the Transmit Pulse sample relative to the start of digitization. From APID12/13, Offset 76.
Comments:

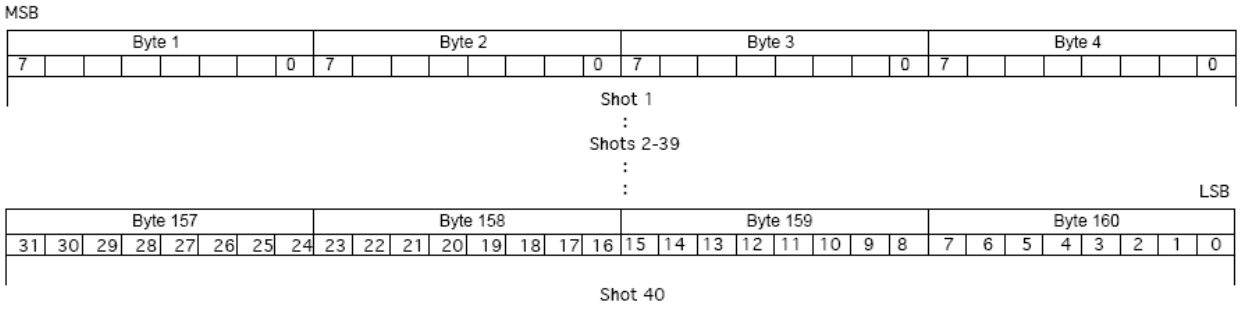
Product Var Name: i_UTCTime
Is element of: GLA01 Long Waveform Record, GLA01 Main Record , GLA01_Short_Record, GLA05 record, GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record
Short Description: Transmit Time of First Shot in frame in J2000
Product Data Type: i4b (2)
Total Bytes: 8
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_WFqual
Is element of: GLA05 record
Short Description: Received Echo Quality Flag
Product Data Type: i4b (40)
Total Bytes: 160
Product Units: NA
Invalid Value/Flag: No
Is Correction Flag?: NA
Is Unsigned?: No
Product Minimum: 0
Product Maximum: 2147483647
Description: Indicator of the quality of the received echo (waveform); determined during the received echo assessment process, and the functional fit. Each 4 byte integer represents 32 bits of flag information. For definitions of each bit,

i_WFqual [GLA05]:Waveform Quality Flags

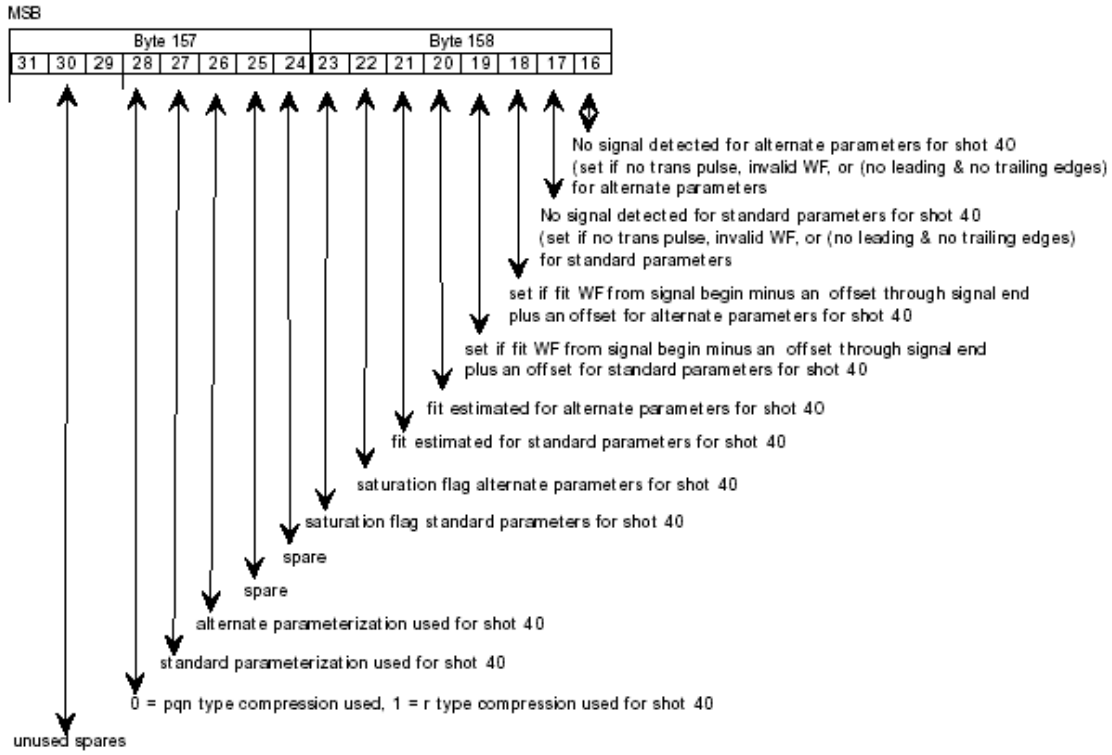
4 byte set of 32 bit flags, 40/second



Breakdown of shot 40, Bytes 157 - 158, Bits 31-16

i_WFqual [GLA05]:Waveform Quality Flags (continued)

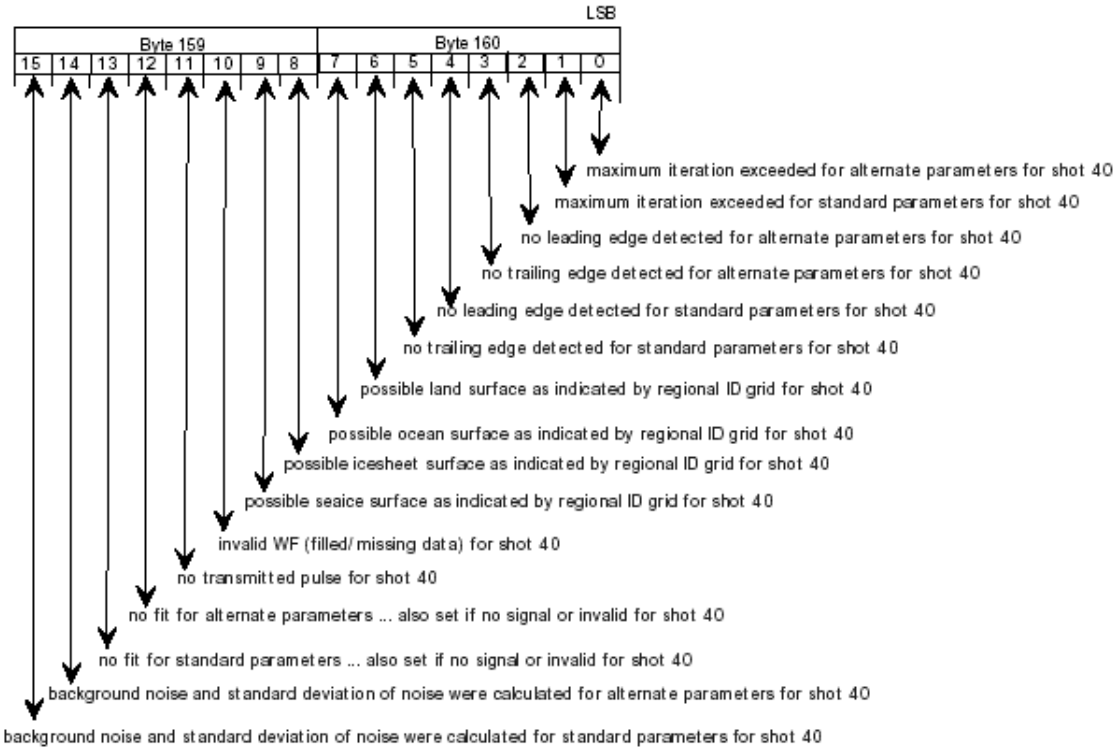
4 byte set of 32 bit flags, 40/second



Breakdown of shot 40, Bytes 159 - 160, Bits 15-0

i_WFqual [GLA05]:Waveform Quality Flags (continued)

4 byte set of 32 bit flags, 40/second



Comments:

Product Var Name: i_WMinMax
Is element of: GLA01 Main Record
Short Description: Window Size
Product Data Type: i4b (2)
Total Bytes: 8
Product Units: Meters
Invalid Value/Flag: i_APID_AvFlg
Is Correction Flag?: NA
Is Unsigned?: No
Product Minimum: 0
Product Maximum: 1000000
Description: Range window minimum and maximum size. 1st item is minimum - default is 2 km; 2nd item is maximum - default is 11 km. From APID19, Offset 1108.
Comments:

Product Var Name: i_areaRecWF1
Is element of: GLA05 record
Short Description: Area under received echo (alternative)
Product Data Type: i2b (40)

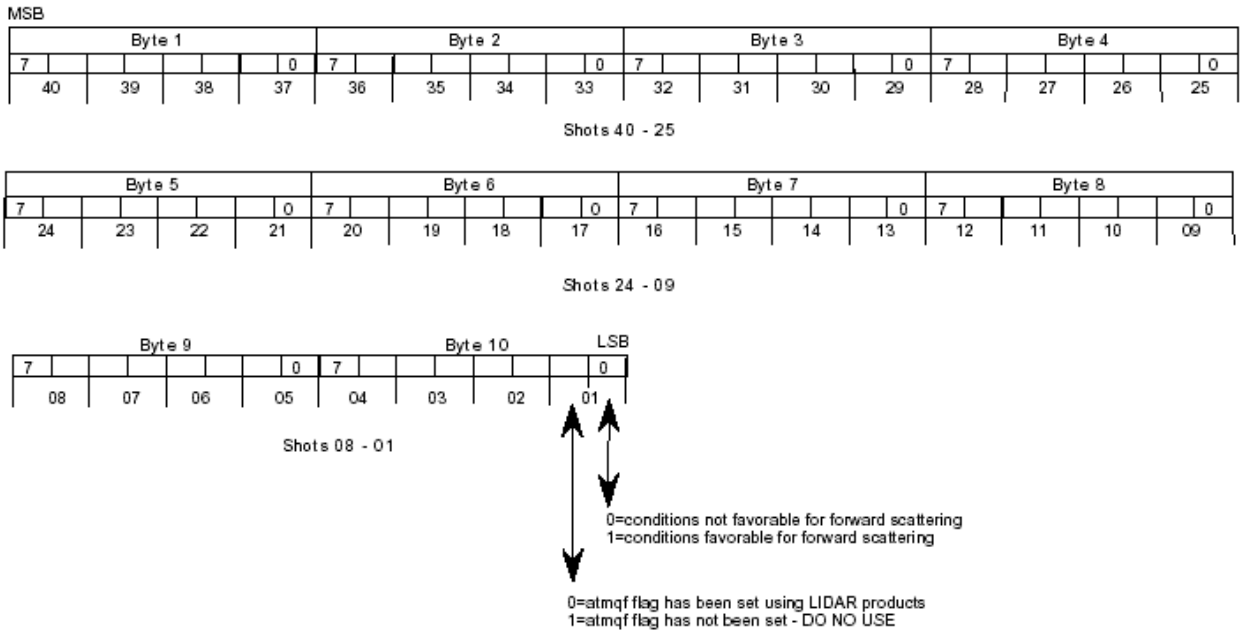
Total Bytes: 80
Product Units: 0.01 volts * ns
Invalid Value/Flag: gi_invalid_i2b
Is Correction Flag?: NA
Is Unsigned?: No
Product Minimum: 0
Product Maximum: 32766
Description: Area under the received echo from signal begin to signal end using alternative parameters.
Comments: This is calculated after converting the return to voltage.

Product Var Name: i_areaRecWF2
Is element of: GLA05 record
Short Description: Area under received echo (standard)
Product Data Type: i2b (40)
Total Bytes: 80
Product Units: 0.01 volts * ns
Invalid Value/Flag: gi_invalid_i2b
Is Correction Flag?: NA
Is Unsigned?: No
Product Minimum: 0
Product Maximum: 32766
Description: Area under the received echo from signal begin to signal end using standard parameters.
Comments: This is calculated after converting the return to voltage.

Product Var Name: i_atmQF
Is element of: GLA05 record, GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record
Short Description: Atmosphere Flag
Product Data Type: i1b (10)
Total Bytes: 10
Product Units: N/A
Invalid Value/Flag: No
Is Correction Flag?: NA
Is Unsigned?: No
Product Minimum: 0
Product Maximum: 1
Description: Indicates from LIDAR channel if conditions for forward scattering were favorable.

i_atmQF [1/sec for GLA05, 06, 12-15]: Atmosphere Flag

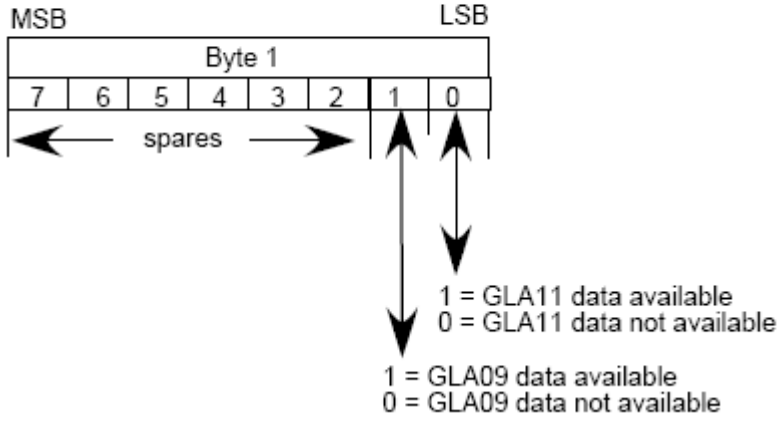
2 bit flags, 40/second



Comments: If forward scattering occurs, it may map to an error in the elevation measurement. Users may want to delete data with forward scattering.

Product Var Name: i_atm_avail
Is element of: GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record
Short Description: Atmosphere Availability 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:

i_atm_avail [1/sec for GLA06, 12-15]: Atmosphere Availability Flag



Comments:

Product Var Name: i_beam_azimuth
Is element of: GLA05 record, GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record
Short Description: Azimuth
Product Data Type: i4b
Total Bytes: 4
Product Units: degrees*100
Invalid Value/Flag: gi_invalid_i4b
Is Correction Flag?: NA
Is Unsigned?: No
Product Minimum: 0
Product Maximum: 36000
Description: The direction, eastwards from north, of the laser beam vector as seen by an observer at the laser ground spot viewing toward the spacecraft (i.e., the vector from the ground to the spacecraft). When the spacecraft is precisely at the geodetic zenith, the value will be 99999 degrees.
Comments:

Product Var Name: i_beam_coelev
Is element of: GLA05 record, GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 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_centroid1
Is element of: GLA05 record
Short Description: Centroid retracker offset (alternative)
Product Data Type: i4b (40)
Total Bytes: 160
Product Units: 0.01 ns
Invalid Value/Flag: gi_invalid_i4b
Is Correction Flag?: NA
Is Unsigned?: No
Product Minimum: -100000
Product Maximum: 0
Description: Offset to be added to i_refRngNs to give the two-way range in time to the location of the centroid of the received echo from signal begin through signal end defined by the alternative parameters.
Comments: This is calculated after the received echo and noise values are calibrated and converted from counts to voltage (see ATBD).

Product Var Name: i_centroid2
Is element of: GLA05 record
Short Description: Centroid retracker offset (standard)
Product Data Type: i4b (40)
Total Bytes: 160
Product Units: 0.01 ns
Invalid Value/Flag: gi_invalid_i4b
Is Correction Flag?: NA
Is Unsigned?: No
Product Minimum: -100000
Product Maximum: 0
Description: Offset to be added to i_refRngNs to give the two-way range in time to the location of the centroid of the received echo from signal begin through signal end defined by the standard parameters.
Comments: This is calculated after the received echo and noise values are calibrated and converted from counts to voltage (see ATBD).

Product Var Name: i_centroidInstr
Is element of: GLA05 record
Short Description: Centroid retracker offset using max peak

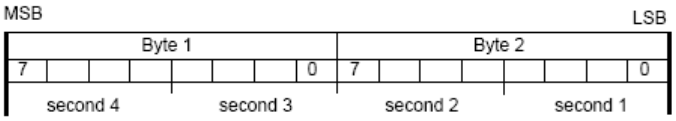
Product Data Type: i4b (40)
Total Bytes: 160
Product Units: 0.01 ns
Invalid Value/Flag: gi_invalid_i4b
Is Correction Flag?: NA
Is Unsigned?: No
Product Minimum: -100000
Product Maximum: 0
Description: Offset to be added to i_refRngNs to give the two-way range in time to the location on the received echo of the centroid of the signal surrounding the maximum amplitude peak.
Comments: This is the definition used by the instrument team to check out the on-board algorithms. See ATBD

Product Var Name: i_cld1_mswf
Is element of: GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record
Short Description: Cloud Multiple Scattering Warning 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: 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 detailedin 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.

i_cld1_mswf [GLA11]: Multiple Scattering Warning Flag (4 sec. per record, at once per second rate)

4 bit set of values;

0 = < 0.010
1 = 0.010 - 0.030
2 = 0.030 - 0.060
3 = 0.060 - 0.100
4 = 0.100 - 0.150
5 = 0.150 - 0.225
6 = 0.225 - 0.300
7 = 0.300 - 0.400
8 = 0.400 - 0.500
9 = 0.500 - 0.670
10 = 0.670 - 0.900
11 = 0.900 - 1.200
12 = 1.200 - 1.600
13 = 1.600 - 2.000
14 = > 2.000
15 = Invalid



Note: A warning flag value of 15 will be the default whenever no 532nm signal is available (as when the 532 laser energy is < 4 mJ during daytime). To distinguish this case from that of optically thick clouds, one must check the number of layers. If there were zero layers reported, but the MSWF is 15, then the cause is the lack of useable 532 data. If the number of layers is > 0 and the MSWF is 15, then the cause is total extinction of the lidar beam (this happens for clouds of optical depth > about 3).

A warning flag of '0' is a very good indicator of no layers or a layer so thin it won't cause any altimetry range delays.

Comments:

Product Var Name: i_cntRngOff
Is element of: GLA06 record, GLA12 Record, GLA13 Record, GLA15 Record
Short Description: Centroid Range Offset
Product Data Type: i4b (40)
Total Bytes: 160
Product Units: mm
Invalid Value/Flag: gi_invalid_i4b
Is Correction Flag?: NA
Is Unsigned?: No
Product Minimum: -150000
Product Maximum: 0
Description: The range offsets to be added to i_refRngNs to calculate range for each of the up to 6 Gaussian peak centroids as determined from the alternate Gaussian fit process. These are the 'location' values in GLA05 parameter parm1 converted to millimeters.
Comments:

Product Var Name: i_compRatio
Is element of: GLA01 Main Record , GLA05 record
Short Description: Compression Ratios
Product Data Type: i2b (2)
Total Bytes: 4
Product Units: counts
Invalid Value/Flag: i_APID_AvFlg
Is Correction Flag?: NA
Is Unsigned?: No

Product Minimum: 1
Product Maximum: 5
Description: Averaging values p and q for frame. First item is p; second is q. From APID19, Offset 232. First N downlink samples are generated by averaging p raw digitized elements and the rest of the allocated samples in the waveform by averaging q elements.
Comments: Not valid if APID19 is missing.

Product Var Name: i_comp_type
Is element of: GLA01 Long Waveform Record
Short Description: Echo Compression Type
Product Data Type: i1b (8)
Total Bytes: 8
Product Units: n/a
Invalid Value/Flag: i_APID_AvFlg
Is Correction Flag?: NA
Is Unsigned?: No
Product Minimum: 0
Product Maximum: 1
Description: Surface echo compression type. Indicates the type of compression performed. 0 = N, p, and q; 1 = r. From APID12/13, Offset 154.
Comments:

Product Var Name: i_comp_type
Is element of: GLA01_Short_Record
Short Description: Echo Compression Type
Product Data Type: i1b (20)
Total Bytes: 20
Product Units: n/a
Invalid Value/Flag: i_APID_AvFlg
Is Correction Flag?: NA
Is Unsigned?: No
Product Minimum: 0
Product Maximum: 1
Description: Surface echo compression type. Indicates the type of compression performed. 0 = N, p, and q; 1 = r. From APID12/13, Offset 154.
Comments:

Product Var Name: i_dShotTime
Is element of: GLA01 Main Record , GLA05 record, GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record
Short Description: Laser Shot Time Deltas (shots 2-40)
Product Data Type: i4b (39)
Total Bytes: 156
Product Units: microseconds

Invalid Value/Flag: No
Is Correction Flag?: NA
Is Unsigned?: No
Product Minimum: 0
Product Maximum: 1200000
Description: The time deltas of pulses 2 through 40 to i_UTCTime, the UTC time tag of the first pulse in the 1-second data frame. Adding the deltas to i_UTCTime will give the user the time of each individual shot in the frame.
Comments: To calculate the time for shots 2-40, add these deltas to the time of the first shot.

Product Var Name: i_dTrop
Is element of: GLA06 record, GLA12 Record, GLA13 Record, GLA15 Record
Short Description: Range Correction, Dry Troposphere
Product Data Type: i2b (40)
Total Bytes: 80
Product Units: mm
Invalid Value/Flag: gi_invalid_i2b
Is Correction Flag?: NA
Is Unsigned?: No
Product Minimum: -2500
Product Maximum: 0
Description: The range correction due to the dry troposphere; one correction for each shot.
Comments:

Product Var Name: i_dTrop
Is element of: GLA14 Record
Short Description: Range Correction, Dry Troposphere
Product Data Type: i2b (40)
Total Bytes: 80
Product Units: mm
Invalid Value/Flag: gi_invalid_i2b
Is Correction Flag?: NA
Is Unsigned?: No
Product Minimum: -2500
Product Maximum: 0
Description: Atmospheric dry tropospheric delay correction added to the elevation
Comments:

Product Var Name: i_deltagpstmcor
Is element of: GLA05 record, GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record
Short Description: Delta GPS time correction
Product Data Type: i4b
Total Bytes: 4

Product Units: nanoseconds
Invalid Value/Flag: gi_invalid_i4b
Is Correction Flag?: NA
Is Unsigned?: No
Product Minimum: -1000000
Product Maximum: 1000000
Description: The high frequency delta GPS time correction calculated during the precision orbit processing step.
Comments:

Product Var Name: i_elev
Is element of: GLA12 Record
Short Description: Ice Sheet Surface elevation
Product Data Type: i4b (40)
Total Bytes: 160
Product Units: mm
Invalid Value/Flag: gi_invalid_i4b
Is Correction Flag?: NA
Is Unsigned?: No
Product Minimum: -500000
Product Maximum: 10000000
Description: Surface elevation with respect to the ellipsoid at the spot location determined by range using the ice sheet specific algorithm after instrument corrections, atmospheric delays and tides have been applied.
Comments:

Product Var Name: i_elev
Is element of: GLA14 Record
Short Description: Land surface Elevation
Product Data Type: i4b (40)
Total Bytes: 160
Product Units: mm
Invalid Value/Flag: gi_invalid_i4b
Is Correction Flag?: NA
Is Unsigned?: No
Product Minimum: -500000
Product Maximum: 10000000
Description: Surface elevation with respect to the ellipsoid at the spot location determined by range using the land-specific fitting procedure after all instrument corrections, atmospheric delays and tides have been applied.
Comments:

Product Var Name: i_elev
Is element of: GLA15 Record

Short Description: Ocean Surface Elevation
Product Data Type: i4b (40)
Total Bytes: 160
Product Units: mm
Invalid Value/Flag: gi_invalid_i4b
Is Correction Flag?: NA
Is Unsigned?: No
Product Minimum: -500000
Product Maximum: 10000000
Description: Surface elevation with respect to the ellipsoid at the spot location determined by range using the fitting algorithm after instrument corrections, atmospheric delays and tides have been applied.
Comments:

Product Var Name: i_elev
Is element of: GLA13 Record
Short Description: Sea Ice Surface Elevation
Product Data Type: i4b (40)
Total Bytes: 160
Product Units: mm
Invalid Value/Flag: gi_invalid_i4b
Is Correction Flag?: NA
Is Unsigned?: No
Product Minimum: -500000
Product Maximum: 10000000
Description: Surface elevation wrt ellipsoid at the spot location determined by range using the sea ice specific fitting procedure after atmospheric delays and tides have been applied.
Comments:

Product Var Name: i_elev
Is element of: GLA05 record
Short Description: Spot Surface Elevation with respect to ITRF ellipsoid (Uncorrected)
Product Data Type: i4b (40)
Total Bytes: 160
Product Units: mm
Invalid Value/Flag: gi_invalid_i4b
Is Correction Flag?: NA
Is Unsigned?: No
Product Minimum: -3300000
Product Maximum: 9000000
Description: The surface elevation with respect to ellipsoid of the forty laser spots in this record. The elevation is calculated using the preliminary range, the precision orbit, and precision attitude with no geodetic corrections applied.
Comments: This will differ from the elevation on the elevation products where it is calculated

from the range corrected for geodetic affects and measured to a region-type dependent specific location on the received waveform.

Product Var Name: i_elev
Is element of: GLA06 record
Short Description: Surface Elevation
Product Data Type: i4b (40)
Total Bytes: 160
Product Units: mm
Invalid Value/Flag: gi_invalid_i4b
Is Correction Flag?: NA
Is Unsigned?: No
Product Minimum: -500000
Product Maximum: 10000000
Description: Surface elevation with respect to the ellipsoid at the spot location determined by the ice-sheet specific range after instrument corrections, atmospheric delays and tides have been applied. The saturation elevation correction (i_satElevCorr) has not been applied and needs to be added to this elevation. This can be over a one meter correction. If it is invalid then the elevation should not be used. The saturation correction flag (i_satCorrFlg) is an important flag to understand the possible quality of the elevation data. The saturation index (i_satNdx) can be used for more understanding of concerns on data quality from saturation effects. Also no correction for pulse spreading from forward scatter has been applied.
Comments:

Product Var Name: i_engineering
Is element of: GLA01 Main Record
Short Description: Engineering Data
Product Data Type: i2b (12)
Total Bytes: 24
Product Units: various
Invalid Value/Flag: i_APID_AvFlg
Is Correction Flag?: NA
Is Unsigned?: No
Product Minimum: -3000
Product Maximum: 5000
Description: The following is from /glas/vob/src/l1a_lib/L_EngCorr_mod.f90 which is called by L1AMgr:
i_engineering(1) = active detector temperature [T_detID
if detector=1, T_detID = GLA00_prod%CTHW3_hk(1)%i_PRTad1C24_t
if detector=2, T_detID = GLA00_prod%CTHW3_hk(1)%i_PRTad2C25_t]
i_engineering(2) = active digitizer temperature [T_digID
if digitizer=1, T_digID = GLA00_prod%CTHW3_hk(1)%i_AD1ADCC19_t
if digitizer=2, T_digID = GLA00_prod%CTHW3_hk(1)%i_AD2ADCC20_t]
i_engineering(3) = oscillator board temperature

[T_relay = GLA00_prod%CTHW3_hk(1)%i_OscBdC11_t]
i_engineering(4) = Fiber Box temperature
[T_fb = GLA00_prod%CTHW3_hk(1)%i_PRTfboxC29_t]
i_engineering(5) thru i_engineering(12) TBD. All temperatures are in Celsius X 100.

Comments: Engineering data (temperatures, voltages, currents) affecting the altimetry data. Array of 12 values.

Product Var Name: i_eqElv
Is element of: GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record
Short Description: Equilibrium Tide Elevation (at first & last shot)
Product Data Type: i2b (2)
Total Bytes: 4
Product Units: mm
Invalid Value/Flag: gi_invalid_i2b
Is Correction Flag?: NA
Is Unsigned?: NA
Product Minimum: -10000
Product Maximum: 10000
Description: The equilibrium (long period) tide at first and last valid shot over the ocean.
Comments:

Product Var Name: i_erElv
Is element of: GLA06 record, GLA12 Record, GLA13 Record, GLA15 Record
Short Description: Solid Earth Tide Elevation (at first & last shot)
Product Data Type: i2b (2)
Total Bytes: 4
Product Units: mm
Invalid Value/Flag: gi_invalid_i2b
Is Correction Flag?: NA
Is Unsigned?: No
Product Minimum: -10000
Product Maximum: 10000
Description: The solid earth tide elevation for the first & last shot in the record.
Comments:

Product Var Name: i_erElv
Is element of: GLA14 Record
Short Description: Earth Tide Elevation
Product Data Type: i2b (2)
Total Bytes: 4
Product Units: mm
Invalid Value/Flag: gi_invalid_i2b
Is Correction Flag?: NA

Is Unsigned?: No
Product Minimum: -10000
Product Maximum: 10000
Description: Solid earth tide elevation (first and last shot)
Comments:

Product Var Name: i_erd
Is element of: GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record
Short Description: Estimated Range Delay
Product Data Type: i2b
Total Bytes: 2
Product Units: Millimeters
Invalid Value/Flag: gi_invalid_i2b
Is Correction Flag?: NA
Is Unsigned?: No
Product Minimum: 0
Product Maximum: 1000
Description: The estimated range delay is an estimate of the effect of atmospheric multiple scattering on the measured range as deduced from the surface pulse. Tables were created using the Monte Carlo method which contain the range delay as a function of height of scatting layer, geometrical thickness, optical thickness and particale size. The i_erd is taken from GLA11 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)). It has not been applied in the computation of elevation and would be subtracted from elevations to make the correction (a small location error would exist).

Comments - If all 4 things are known, the range delay can be computed exactly from Monte Carlo simulations (see Duda et al., 2001). When the GLAS atmospheric data is good enough, it measures 1 -3. Then an estimated particle size based on geographic location, temperature and height is used to allow index into the pre-computed range delay table to obtain a range delay (i_erd).

Comments:

Product Var Name: i_filtnum
Is element of: GLA01 Long Waveform Record
Short Description: Filter Number
Product Data Type: i1b (8)
Total Bytes: 8
Product Units: n/a
Invalid Value/Flag: i_APID_AvFlg
Is Correction Flag?: NA

Is Unsigned?: No
Product Minimum: 0
Product Maximum: 5
Description: Filter with the highest weight (0 for 4 nsec filter; 1 for 8 nsec filter; 2 for 16 nsec filter; 3 for 32 nsec filter; 4 for 64 nsec filter; 5 for 128 nsec filter). May or may not be selectable! If no selectable filter can be chosen, then the last successful filter, selectable or NOT is chosen. From APID12/13, Offset 104.
Comments:

Product Var Name: i_filtnum
Is element of: GLA01_Short_Record
Short Description: Filter Number
Product Data Type: i1b (20)
Total Bytes: 20
Product Units: n/a
Invalid Value/Flag: i_APID_AvFlg
Is Correction Flag?: NA
Is Unsigned?: No
Product Minimum: 0
Product Maximum: 5
Description: Filter with the highest weight (0 for 4 nsec filter; 1 for 8 nsec filter; 2 for 16 nsec filter; 3 for 32 nsec filter; 4 for 64 nsec filter; 5 for 128 nsec filter). May or may not be selectable! If no selectable filter can be chosen, then the last successful filter, selectable or NOT is chosen. From APID12/13, Offset 104.
Comments:

Product Var Name: i_filtr_thresh
Is element of: GLA01 Main Record
Short Description: Selected Filter Threshold Value
Product Data Type: i2b (40)
Total Bytes: 80
Product Units: counts
Invalid Value/Flag: i_APID_AvFlg
Is Correction Flag?: NA
Is Unsigned?: No
Product Minimum: 0
Product Maximum: 255
Description: Threshold values used to find the last and next to last threshold crossings for the selected filter. From APID12/13, Offset 108.
Comments:

Product Var Name: i_gainSet1064
Is element of: GLA01_Short_Record
Short Description: AD Gain Setting

Product Data Type: i2b (20)
Total Bytes: 40
Product Units: unitless
Invalid Value/Flag: i_APID_AvFlg
Is Correction Flag?: No
Is Unsigned?: NA
Product Minimum: 0
Product Maximum: 255
Description: The receiver gain; results of the gain algorithm. From APID12/13, Offset 148.
Comments: This number has calibrations applied so will differ from the value on the APID12/13.

Product Var Name: i_gainSet1064
Is element of: GLA01 Long Waveform Record
Short Description: AD Gain Setting
Product Data Type: i2b (8)
Total Bytes: 16
Product Units: counts
Invalid Value/Flag: i_APID_AvFlg
Is Correction Flag?: NA
Is Unsigned?: No
Product Minimum: 0
Product Maximum: 255
Description: The receiver gain; results of the gain algorithm. From APID12/13, Offset 148.
Comments:

Product Var Name: i_gainStatus
Is element of: GLA01 Long Waveform Record
Short Description: Gain Status Bits
Product Data Type: i1b (8)
Total Bytes: 8
Product Units: n/a
Invalid Value/Flag: i_APID_AvFlg
Is Correction Flag?: NA
Is Unsigned?: Yes
Product Minimum: 0
Product Maximum: 255
Description: Note that these bits are always set to 0 on the first shot of a science run and when auto gain is disabled.
bit 0x1: 0 if the gain loop was run for this shot;
1 if the gain loop was bypassed for this shot;
bit 0x2: 0 if the gain loop did not time out;
1 if the gain loop timed out and was reset;
Comments:

Product Var Name: i_gainStatus
Is element of: GLA01_Short_Record
Short Description: Gain Status Bits
Product Data Type: i1b (20)
Total Bytes: 20
Product Units: n/a
Invalid Value/Flag: i_APID_AvFlg
Is Correction Flag?: NA
Is Unsigned?: NA
Product Minimum: 0
Product Maximum: 255
Description: Note that these bits are always set to 0 on the first shot of a science run and when auto gain is disabled.
bit 0x1: 0 if the gain loop was run for this shot;
1 if the gain loop was bypassed for this shot;
bit 0x2: 0 if the gain loop did not time out;
1 if the gain loop timed out and was reset;
Comments:

Product Var Name: i_gdHt
Is element of: GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record
Short Description: Geoid
Product Data Type: i2b (2)
Total Bytes: 4
Product Units: cm
Invalid Value/Flag: gi_invalid_i2b
Is Correction Flag?: NA
Is Unsigned?: No
Product Minimum: -20000
Product Maximum: 20000
Description: The height of the geoid above the ellipsoid for the first and last shot in the record.
Comments:

Product Var Name: i_gla01_rectype
Is element of: GLA01 Main Record
Short Description: GLA01 Record Type
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: 2

Description: Record type indicating whether this record is a main=1, long=2, or short=3 waveform record.
Comments:

Product Var Name: i_gla01_rectype
Is element of: GLA01 Long Waveform Record
Short Description: GLA01 Record Type
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: 2
Description: Record type indicating whether this record is a main=1, long=2, or short=3 waveform record.
Comments:

Product Var Name: i_gla01_rectype
Is element of: GLA01_Short_Record
Short Description: GLA01 Record Type
Product Data Type: i2b
Total Bytes: 2
Product Units: null
Invalid Value/Flag: No
Is Correction Flag?: NA
Is Unsigned?: No
Product Minimum: 0
Product Maximum: 2
Description: Record type indicating whether this record is a main=1, long=2, or short=3 waveform record.
Comments:

Product Var Name: i_gpCntRngOff
Is element of: GLA14 Record
Short Description: Centroid Range Increment for Gaussian Fits
Product Data Type: i4b (6, 40)
Total Bytes: 960
Product Units: mm
Invalid Value/Flag: gi_invalid_i4b
Is Correction Flag?: NA
Is Unsigned?: No
Product Minimum: -150000

Product Maximum: 0
Description: i_gpCntRngOff is a 6-element array that contains offsets from the reference range to the peak locations of the received waveform alternate Gaussian fits. There are at least one and at most six fits, which can be overlapping. The first offset in the array corresponds to the location of the fit with the lowest elevation (furthest from the spacecraft), and the last to the highest.
Comments:

Product Var Name: i_gval_rcv
Is element of: GLA05 record, GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record
Short Description: Gain Value used for Received Pulse
Product Data Type: i2b (40)
Total Bytes: 80
Product Units: counts
Invalid Value/Flag: gi_invalid_i2b
Is Correction Flag?: NA
Is Unsigned?: No
Product Minimum: 0
Product Maximum: 255
Description: Gain value used for received pulse - uncalibrated.
Comments: This value is in counts and needs to be calibrated before calculating energy from it. Same as variable in GLA01_Long/i_gainSet1064.

Product Var Name: i_gval_tx
Is element of: GLA05 record
Short Description: Gain Value used for Transmitted Pulse - uncalibrated
Product Data Type: i2b
Total Bytes: 2
Product Units: counts
Invalid Value/Flag: gi_invalid_i2b
Is Correction Flag?: NA
Is Unsigned?: No
Product Minimum: 0
Product Maximum: 255
Description: Gain value used for transmitted pulse - uncalibrated
Comments: This value is in counts and needs to be calibrated before calculating energy from it. Same as variable in GLA01_Main/i_ADdetOutGn.

Product Var Name: i_highElev
Is element of: GLA15 Record
Short Description: Highest Elevation
Product Data Type: i4b (40)
Total Bytes: 160

Product Units: mm
Invalid Value/Flag: gi_invalid_i4b
Is Correction Flag?: NA
Is Unsigned?: No
Product Minimum: -500000
Product Maximum: 10000000
Description: Highest elevation in footprint, with all corrections applied (corresponds to signal begin) using standard parameters.
Comments:

Product Var Name: i_isRngOff
Is element of: GLA06 record, GLA12 Record, GLA14 Record
Short Description: Ice Sheet Range Offset
Product Data Type: i4b (40)
Total Bytes: 160
Product Units: mm
Invalid Value/Flag: gi_invalid_i4b
Is Correction Flag?: NA
Is Unsigned?: No
Product Minimum: -150000
Product Maximum: 0
Description: Range offset to be added to i_refRngNs to calculate the range using the algorithm deemed appropriate for ice sheets.
Comments: Can be used for comparing elevations computed from results standard and alternate fitting.

Product Var Name: i_kurt1
Is element of: GLA05 record, GLA14 Record
Short Description: Kurtosis of Received Echo (alternative)
Product Data Type: i2b (40)
Total Bytes: 80
Product Units: unitless * 100
Invalid Value/Flag: gi_invalid_i2b
Is Correction Flag?: NA
Is Unsigned?: No
Product Minimum: -1000
Product Maximum: 1000
Description: Kurtosis of the received echo from signal begin to signal end using alternative parameters
Comments: Note that the received echo was calibrated and converted to voltage before calculation.

Product Var Name: i_kurt2
Is element of: GLA05 record, GLA06 record, GLA12 Record

Short Description: Kurtosis of the Received Echo (standard)
Product Data Type: i2b (40)
Total Bytes: 80
Product Units: unitless * 100
Invalid Value/Flag: gi_invalid_i2b
Is Correction Flag?: NA
Is Unsigned?: No
Product Minimum: -1000
Product Maximum: 1000
Description: Kurtosis of the received echo from signal begin to signal end using standard parameters
Comments: Note that the received echo was calibrated and converted to voltage before calculation.

Product Var Name: i_lat
Is element of: GLA12 Record
Short Description: Coordinate Data, Latitude, specific to ice sheet range
Product Data Type: i4b (40)
Total Bytes: 160
Product Units: microdeg
Invalid Value/Flag: gi_invalid_i4b
Is Correction Flag?: NA
Is Unsigned?: No
Product Minimum: -90000000
Product Maximum: 90000000
Description: The geodetic latitude of the 40 laser spots in the 1 second time frame, computed from the Precision orbit determined GLAS laser antenna ground nadir coordinates, precision attitude, and ice sheet-specific range after all instrument corrections, atmospheric delays and tides have been applied. The values are in north latitude.
Comments:

Product Var Name: i_lat
Is element of: GLA14 Record
Short Description: Coordinate Data, Latitude, specific to land range
Product Data Type: i4b (40)
Total Bytes: 160
Product Units: microdeg
Invalid Value/Flag: gi_invalid_i4b
Is Correction Flag?: NA
Is Unsigned?: No
Product Minimum: -90000000
Product Maximum: 90000000
Description: The geodetic latitude of the forty laser spots in the 1 second time frame, computed from the Precision orbit determined GLAS laser antenna ground nadir coordinates, precision

attitude, and land-specific range after all instrument corrections, atmospheric delays and tides have been applied. The values are in north latitude.
Comments:

Product Var Name: i_lat
Is element of: GLA15 Record
Short Description: Coordinate Data, Latitude, specific to ocean range
Product Data Type: i4b (40)
Total Bytes: 160
Product Units: microdeg
Invalid Value/Flag: gi_invalid_i4b
Is Correction Flag?: NA
Is Unsigned?: No
Product Minimum: -90000000
Product Maximum: 90000000
Description: The geodetic latitude of the forty laser spots in the 1 second time frame, computed from the Precision orbit determined GLAS laser antenna ground nadir coordinates, precision attitude, and ocean-specific range after all instrument corrections, atmospheric delays and tides have been applied. The values are in north latitude.
Comments:

Product Var Name: i_lat
Is element of: GLA13 Record
Short Description: Coordinate Data, Latitude, specific to sea ice range
Product Data Type: i4b (40)
Total Bytes: 160
Product Units: microdeg
Invalid Value/Flag: gi_invalid_i4b
Is Correction Flag?: NA
Is Unsigned?: No
Product Minimum: -90000000
Product Maximum: 90000000
Description: The geodetic latitude of the 40 laser spots in the 1 second time frame, computed from the Precision orbit determined GLAS laser antenna ground nadir coordinates, PAD, and sea ice specific range after all atmospheric corrections and tides have been applied.
Comments:

Product Var Name: i_lat
Is element of: GLA06 record
Short Description: Spot 1 Coordinate Data, Latitude Corrected
Product Data Type: i4b (40)
Total Bytes: 160
Product Units: microdeg
Invalid Value/Flag: gi_invalid_i4b

Is Correction Flag?: NA
Is Unsigned?: No
Product Minimum: -90000000
Product Maximum: 90000000
Description: The geodetic latitude of the 40 laser spots in the 1 second time frame, computed from the Precision orbit, precision attitude, and ice-sheet specific range after instrument corrections, atmospheric delays and tides have been applied. The values are in north latitude.
Comments:

Product Var Name: i_lat
Is element of: GLA05 record
Short Description: Spot Coordinate Data - Latitude (Uncorrected)
Product Data Type: i4b (40)
Total Bytes: 160
Product Units: Microdegrees
Invalid Value/Flag: gi_invalid_i4b
Is Correction Flag?: NA
Is Unsigned?: No
Product Minimum: -90000000
Product Maximum: 90000000
Description: The geodetic latitude of the forty laser spots in this record, computed from the Precision orbit, precision attitude, and preliminary range. The preliminary range is used with no geodetic corrections applied.
Comments: This latitude may differ from that on GLA06 and the level 2 elevation products where a corrected range is used in the calculation

Product Var Name: i_ldElv
Is element of: GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record
Short Description: Load Tide Elevation
Product Data Type: i2b (4)
Total Bytes: 8
Product Units: mm
Invalid Value/Flag: gi_invalid_i2b
Is Correction Flag?: NA
Is Unsigned?: No
Product Minimum: -10000
Product Maximum: 10000
Description: The load tide elevation applied to each shot. Elements 1-4 of the load tide vector are applied to shots 1-10, 11-20, 21-30, and 31-40, respectively.Comments: The load tide is NOT NECESSARILY the load tide for shots 1,11,21,31. It is calculated for the first valid shot in each group of 10 and applied to all valid shots in the group.

Product Var Name: i_ldRngOff

Is element of: GLA06 record, GLA14 Record
Short Description: Land Range Offset
Product Data Type: i4b (40)
Total Bytes: 160
Product Units: mm
Invalid Value/Flag: gi_invalid_i4b
Is Correction Flag?: NA
Is Unsigned?: No
Product Minimum: -150000
Product Maximum: 0
Description: Range offset to be added to i_refRngNs to calculate the range using the algorithm deemed appropriate for land.
Comments:

Product Var Name: i_locTr
Is element of: GLA05 record
Short Description: Centroid of Transmitted Pulse in time relative to gate 1 of tr wf
Product Data Type: i4b (40)
Total Bytes: 160
Product Units: 0.01 ns
Invalid Value/Flag: gi_invalid_i4b
Is Correction Flag?: NA
Is Unsigned?: No
Product Minimum: 0
Product Maximum: 4800
Description: Time from gate 1 of the transmitted pulse to the centroid of transmitted pulse calculated from 48 gates telemetered
Comments: Note that the pulse was calibrated and converted to voltage before calculation.

Product Var Name: i_lon
Is element of: GLA12 Record
Short Description: Coordinate Data, Longitude, specific to ice sheet range
Product Data Type: i4b (40)
Total Bytes: 160
Product Units: microdeg
Invalid Value/Flag: gi_invalid_i4b
Is Correction Flag?: NA
Is Unsigned?: No
Product Minimum: 0
Product Maximum: 360000000
Description: The longitude of the 40 laser spots in the 1 second time frame, computed from the Precision orbit determined GLAS laser antenna ground nadir coordinates, precision attitude, and ice sheet-specific range after all instrument corrections, atmospheric delays and tides have been applied. The values are in east longitude.

Comments:

Product Var Name: i_lon
Is element of: GLA14 Record
Short Description: Coordinate Data, Longitude, specific to land range
Product Data Type: i4b (40)
Total Bytes: 160
Product Units: microdeg
Invalid Value/Flag: gi_invalid_i4b
Is Correction Flag?: NA
Is Unsigned?: No
Product Minimum: 0
Product Maximum: 360000000
Description: The longitude of the forty laser spots in the 1 second time frame, computed from the Precision orbit determined GLAS laser antenna ground nadir coordinates, precision attitude, and land-specific range after all instrument corrections, atmospheric delays and tides have been applied. The values are in east longitude.
Comments:

Product Var Name: i_lon
Is element of: GLA15 Record
Short Description: Coordinate Data, Longitude, specific to ocean range
Product Data Type: i4b (40)
Total Bytes: 160
Product Units: microdeg
Invalid Value/Flag: gi_invalid_i4b
Is Correction Flag?: NA
Is Unsigned?: No
Product Minimum: 0
Product Maximum: 360000000
Description: The longitude of the forty laser spots in the 1 second time frame, computed from the Precision orbit determined GLAS laser antenna ground nadir coordinates, precision attitude, and ocean-specific range after all instrument corrections, atmospheric delays and tides have been applied. The values are in east longitude.
Comments:

Product Var Name: i_lon
Is element of: GLA13 Record
Short Description: Coordinate Data, Longitude, specific to sea ice range
Product Data Type: i4b (40)
Total Bytes: 160
Product Units: microdeg
Invalid Value/Flag: gi_invalid_i4b
Is Correction Flag?: NA

Is Unsigned?: No
Product Minimum: 0
Product Maximum: 360000000
Description: The longitude of the 40 laser spots in the 1 second time frame, computed from the Precision orbit determined GLAS laser antenna ground nadir coordinates, PAD, and sea ice specific range after all atmospheric corrections and tides have been applied. The values are in east longitude.
Comments:

Product Var Name: i_lon
Is element of: GLA06 record
Short Description: Spot 1 Coordinate Data, Longitude Corrected
Product Data Type: i4b (40)
Total Bytes: 160
Product Units: microdeg
Invalid Value/Flag: gi_invalid_i4b
Is Correction Flag?: NA
Is Unsigned?: No
Product Minimum: 0
Product Maximum: 360000000
Description: The longitude of the 40 laser spots in the 1 second time frame, computed from the Precision orbit, precision attitude, and ice-sheet specific range after instrument corrections, atmospheric delays and tides have been applied. The values are in east longitude.
Comments:

Product Var Name: i_lon
Is element of: GLA05 record
Short Description: Spot Coordinate Data - Longitude (Uncorrected)
Product Data Type: i4b (40)
Total Bytes: 160
Product Units: Microdegrees
Invalid Value/Flag: gi_invalid_i4b
Is Correction Flag?: NA
Is Unsigned?: No
Product Minimum: 0
Product Maximum: 360000000
Description: The longitude of the forty laser spots in this record, computed from the Precision orbit,precision attitude, and preliminary range. The preliminary range is used with no geodetic corrections applied.
Comments: This longitude may differ from that on GLA06 and the level 2 products where a corrected range is used in the calculation

Product Var Name: i_lowElev
Is element of: GLA15 Record

Short Description: Lowest Elevation
Product Data Type: i4b (40)
Total Bytes: 160
Product Units: mm
Invalid Value/Flag: gi_invalid_i4b
Is Correction Flag?: NA
Is Unsigned?: No
Product Minimum: -500000
Product Maximum: 10000000
Description: Lowest elevation in footprint, with all corrections applied (corresponds to signal end) using standard parameters.
Comments:

Product Var Name: i_maxRecAmp
Is element of: GLA05 record, GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record
Short Description: Max Amplitude of Received Echo
Product Data Type: i2b (40)
Total Bytes: 80
Product Units: Tenth of millivolts
Invalid Value/Flag: gi_invalid_i2b
Is Correction Flag?: NA
Is Unsigned?: No
Product Minimum: -300
Product Maximum: 30000
Description: Maximum Amplitude of the Received Echo.
Comments: This is calculated after converting the return to voltage. Use for scaling model fit RMS between normalized and un-normalized units.

Product Var Name: i_maxSmAmp
Is element of: GLA05 record, GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record
Short Description: Peak Amplitude of Smoothed Received Echo
Product Data Type: i2b (40)
Total Bytes: 80
Product Units: Tenth of millivolts
Invalid Value/Flag: No
Is Correction Flag?: NA
Is Unsigned?: No
Product Minimum: -300
Product Maximum: 30000
Description: The peak amplitude of the received echo after it has been smoothed to remove high frequency noise (see ATBD).
Comments: This is calculated after converting the return to voltage.

Product Var Name: i_maxTrAmp
Is element of: GLA05 record
Short Description: Maximum Amp of Transmitted Pulse
Product Data Type: i2b (40)
Total Bytes: 80
Product Units: 0.1 millivolts
Invalid Value/Flag: gi_invalid_i2b
Is Correction Flag?: NA
Is Unsigned?: No
Product Minimum: -300
Product Maximum: 30000
Description: Maximum amplitude of transmitted pulse calculated from all (48) gates telemetered
Comments: Note that the pulse was calibrated and converted to voltage before calculation.

Product Var Name: i_minRngOff1
Is element of: GLA05 record
Short Description: Minimum Range Offset (alternative)
Product Data Type: i4b (40)
Total Bytes: 160
Product Units: 0.01 ns
Invalid Value/Flag: gi_invalid_i4b
Is Correction Flag?: NA
Is Unsigned?: No
Product Minimum: -100000
Product Maximum: 0
Description: Offset to be added to i_refRngNs to give the two-way range in time to the location on the received echo calculated as the beginning of signal (closest to the spacecraft) using alternate parameters.
Comments: This is calculated after the received echo and noise values are calibrated and converted from counts to voltage as the first received gate where the voltage is > n*sigma (see ATBD). The value of n may be different than threshold retracker.

Product Var Name: i_minRngOff2
Is element of: GLA05 record
Short Description: Minimum Range Offset (standard)
Product Data Type: i4b (40)
Total Bytes: 160
Product Units: 0.01 ns
Invalid Value/Flag: gi_invalid_i4b
Is Correction Flag?: NA
Is Unsigned?: No
Product Minimum: -100000

Product Maximum: 0
Description: Offset to be added to i_refRngNs to give the two-way range in time to the location on the received echo calculated as the beginning of signal (closest to the spacecraft) closest to the spacecraft using standard parameters.
Comments: This is calculated after the received echo and noise values are calibrated and converted from counts to voltage as the first received gate where the voltage is > n*sigma (see ATBD). The value of n may be different than threshold retracker.

Product Var Name: i_nPeaks1
Is element of: GLA05 record, GLA06 record, GLA14 Record
Short Description: Initial Number of Peaks in received echo (alternate)
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: 50
Description: The initial number of peaks of the received echo; determined from the smoothed waveform, using alternative parameters
Comments:

Product Var Name: i_nPeaks2
Is element of: GLA05 record
Short Description: Initial Number of Peaks in received echo (standard)
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: 50
Description: The initial number of peaks found in the received echo; determined from the smoothed waveform, using standard parameters
Comments:

Product Var Name: i_numIters
Is element of: GLA05 record
Short Description: Number of iterations performed during fit
Product Data Type: i1b (40)
Total Bytes: 40
Product Units: N/A

Invalid Value/Flag: No
Is Correction Flag?: NA
Is Unsigned?: NA
Product Minimum: 0
Product Maximum: 15
Description: The algorithm variable gla05%i_numIters(40,2) contains the number of iterations for both the standard fit (shot,2), and the alternate fit (shot,1). These numbers are packed into forty bytes on the product:
GLA05_prod%i_numIters(1) contains:
bits 0-3: number of iterations for alternate fit for shot 1,
bits 4-7: number of iterations for standard fit for shot 1

GLA05_prod%i_numIters(2) contains:
bits 0-3: number of iterations for alternate fit for shot 2,
bits 4-7: number of iterations for standard fit for shot 2

...

GLA05_prod%i_numIters(40) contains:
bits 0-3: number of iterations for alternate fit for shot 40,
bits 4-7: number of iterations for standard fit for shot 40
Comments:

Product Var Name: i_numPk
Is element of: GLA06 record, GLA12 Record, GLA13 Record, GLA15 Record
Short Description: Number of Peaks found in the Return
Product Data Type: i1b (40)
Total Bytes: 40
Product Units: N/A
Invalid Value/Flag: No
Is Correction Flag?: NA
Is Unsigned?: No
Product Minimum: 0
Product Maximum: 6
Description: The number of peaks in the return echo found by the Gaussian fitting procedure, using standard parameters.
Comments:

Product Var Name: i_numPk
Is element of: GLA14 Record
Short Description: Number of Peaks found in the Return
Product Data Type: i1b (40)
Total Bytes: 40

Product Units: N/A
Invalid Value/Flag: No
Is Correction Flag?: NA
Is Unsigned?: No
Product Minimum: 0
Product Maximum: 6
Description: The number of peaks in the waveform producted by the Gaussian filtering, using alternate parameters.
Comments:

Product Var Name: i_ocElv
Is element of: GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record
Short Description: Ocean Tide Elevation (at first & last shot)
Product Data Type: i2b (40)
Total Bytes: 80
Product Units: mm
Invalid Value/Flag: gi_invalid_i2b
Is Correction Flag?: NA
Is Unsigned?: No
Product Minimum: -10000
Product Maximum: 10000
Description: The ocean tide elevation at first & last shot
Comments:

Product Var Name: i_ocRngOff
Is element of: GLA06 record, GLA15 Record
Short Description: Ocean Range Offset
Product Data Type: i4b (40)
Total Bytes: 160
Product Units: mm
Invalid Value/Flag: gi_invalid_i4b
Is Correction Flag?: NA
Is Unsigned?: No
Product Minimum: -150000
Product Maximum: 0
Description: Range offset to be added to i_refRngNs to calculate the range using the algorithm deemed appropriate for oceans.
Comments:

Product Var Name: i_parm1
Is element of: GLA05 record
Short Description: Parameters from the Gaussian fit to the received echo (alternative)
Product Data Type: i4b (19, 40)
Total Bytes: 3040

Product Units: 0.0001 volts, 6 * (0.0001 volts, 0.01 ns, 0.01 ns)
Invalid Value/Flag: gi_invalid_i4b
Is Correction Flag?: NA
Is Unsigned?: No
Product Minimum: -30, 6 * (0, -100000, 0)
Product Maximum: 30000, 6 * (30000, 0, 32766)
Description: Parameters (in physical units) determined from the fit of the received echo using the alternative parameterization. In the order of: item1=noise (millivolts), then 6 sets of three Gaussian parameters (subitem1=amplitude (millivolts), subitem2=peak location (ns), and subitem3=sigma (ns)). Items 2-4 are the Gaussian parameters for the last (closest-to-the-ground or 1st) peak. Items 5-7 are the Gaussian parameters for the next-to-last (2nd) peak. ..Items 17-19 are the Gaussian parameters for the closest-to-the-satellite peak. If there are fewer than six peaks, the unused parameters are set invalid. Adding the location to i_refRngNs gives the two-way range in time to the center of that peak.
Comments: The received echo was calibrated and converted from counts to voltage using table in header records before the fit was performed.

Product Var Name: i_parm2
Is element of: GLA05 record
Short Description: Parameters from Gaussian fit to the received echo (standard)
Product Data Type: i4b (19, 40)
Total Bytes: 3040
Product Units: 0.0001 volts, 6 * (0.0001 volts, 0.01 ns, 0.01 ns)
Invalid Value/Flag: gi_invalid_i4b
Is Correction Flag?: NA
Is Unsigned?: No
Product Minimum: -30, 6 * (0, -100000, 0)
Product Maximum: 30000, 6 * (30000, 0, 32766)
Description: Parameters (in physical units) determined from the fit of the received echo using the standard parameterization. In the order of : item1=noise (millivolts), then 6 sets of Gaussian parameters (subitem1=amplitude (millivolts), subitem2=peak location (ns), and subitem3=sigma (ns)). Items 2-4 are the Gaussian parameters for the last (closest-to-the-ground or 1st) peak. Items 5-7 are the Gaussian parameters for the next-to-last (2nd) peak. ..Items 17-19 are the Gaussian parameters for the closest-to-the-satellite peak. If there are fewer than six peaks, the unused parameters are set invalid. Adding the location to i_refRngNs gives the two-way range in time to the center of that peak.
Comments: The received echo was calibrated and converted from counts to voltage using table in header records before the fit was performed.

Product Var Name: i_parmTr
Is element of: GLA05 record
Short Description: Parameters of the Gaussian fit to the Transmitted Pulse
Product Data Type: i4b (4, 40)
Total Bytes: 640

Product Units: microvolts*100, microvolts*100, 0.01 ns, 0.01 ns
Invalid Value/Flag: gi_invalid_i4b
Is Correction Flag?: NA
Is Unsigned?: No
Product Minimum: -30, -30, 0, 0
Product Maximum: 30000, 30000, 4800, 32766
Description: Parameters from the Gaussian fit to the transmitted pulse: item1=noise (millivolts), item2=amplitude (millivolts), Item3=peak location (ns), and item 4=sigma (ns). Peak location is relative to gate 1 of the transmit pulse.
Comments: Note that the pulse was calibrated and converted to voltage before calculation.

Product Var Name: i_pctSAT
Is element of: GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record
Short Description: Percent Saturation
Product Data Type: i1b (40)
Total Bytes: 40
Product Units: percent
Invalid Value/Flag: gi_invalid_i1b
Is Correction Flag?: Yes
Is Unsigned?: NA
Product Minimum: -127
Product Maximum: 127
Description: Percent saturation (i_pctSAT) is calculated using the formula: i_pctSAT= 100*(saturation index)/ (signal end - signal begin in nanoseconds). The alternate signal end/begin are used for GLA14 i_pctSAT, while the standard fit values are used for GLA06, 12, 13, and 15. The Saturation elevation correction is not applied in the geolocation processing computation of lat, lon and elev. Because the saturation corrections are small and data is acquired within 5 deg off nadir, effects on lat and lon can be ignored. To apply the saturation elevation correction to the elevations on the products it must be ADDED to the elevation estimates. Reported elevations for returns with invalid satElevCorr values and satCorrFlg values of 3 or 4 are likely to have large, uncorrectable errors and should be excluded from analyses.
Comments: See also Saturation Correction Guidance.

Product Var Name: i_preRngOff1
Is element of: GLA05 record
Short Description: Preliminary Uncorrected Range Offset (alternative)
Product Data Type: i4b (40)
Total Bytes: 160
Product Units: 0.01 ns
Invalid Value/Flag: gi_invalid_i4b
Is Correction Flag?: NA
Is Unsigned?: No
Product Minimum: -100000
Product Maximum: 0

Description: Offset to be added to i_refRngNs to give the two-way range in time to the location on the received echo calculated as the end of signal (farthest from the spacecraft) using alternative parameters.
Comments: This is calculated after the received echo and noise values are calibrated and converted from counts to voltage (see ATBD).

Product Var Name: i_preRngOff2
Is element of: GLA05 record
Short Description: Preliminary Uncorrected Range Offset (standard)
Product Data Type: i4b (40)
Total Bytes: 160
Product Units: 0.01 ns
Invalid Value/Flag: gi_invalid_i4b
Is Correction Flag?: NA
Is Unsigned?: No
Product Minimum: -100000
Product Maximum: 0
Description: Offset to be added to i_refRngNs to give the two-way range in time to the location on the received echo calculated as the end of signal (farthest from the spacecraft) using standard parameters.
Comments: This is calculated after the received echo and noise values are calibrated and converted from counts to voltage (see ATBD). This is the range used to calulate the geodetic coordinates of the footprint and elevations on this record.

Product Var Name: i_r_val
Is element of: GLA01 Main Record , GLA05 record
Short Description: Value of r
Product Data Type: i2b
Total Bytes: 2
Product Units: counts
Invalid Value/Flag: i_APID_AvFlg
Is Correction Flag?: NA
Is Unsigned?: No
Product Minimum: 0
Product Maximum: 8
Description: Value of r used for waveform compression for frame. From APID19, Offset 238. Not valid if APID19 is missing.
Comments: After M shots with no valid return, the 'p' and 'q' averaging of the normal downlinked waveform compression type will be overridden and instead the telemetered received echo will consist of average samples averaged over 'r' raw samples.

Product Var Name: i_rawPkHt
Is element of: GLA01 Long Waveform Record
Short Description: Height of Peak in Raw Waveform

Product Data Type: i1b (8)
Total Bytes: 8
Product Units: n/a
Invalid Value/Flag: i_APID_AvFlg
Is Correction Flag?: NA
Is Unsigned?: Yes
Product Minimum: 0
Product Maximum: 255
Description: The maximum raw value in a specified range at the end of the return waveform. This value is used as the input to the gain control loop in place of the 8ns peak height.
Comments:

Product Var Name: i_rawPkHt
Is element of: GLA01_Short_Record
Short Description: Height of Peak in Raw Waveform
Product Data Type: i1b (20)
Total Bytes: 20
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 maximum raw value in a specified range at the end of the return waveform. This value is used as the input to the gain control loop in place of the 8ns peak height.
Comments:

Product Var Name: i_rdu
Is element of: GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record
Short Description: Range Delay Uncertainty
Product Data Type: i2b
Total Bytes: 2
Product Units: Millimeters
Invalid Value/Flag: gi_invalid_i2b
Is Correction Flag?: NA
Is Unsigned?: No
Product Minimum: 0
Product Maximum: 10000
Description: Estimated uncertainty value in the range delay distance.
Comments:

Product Var Name: i_rec_ndx
Is element of: GLA01 Long Waveform Record, GLA01 Main Record , GLA01_Short_Record, GLA05 record, GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 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_refRng
Is element of: GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record
Short Description: Reference Range
Product Data Type: i4b (40)
Total Bytes: 160
Product Units: mm
Invalid Value/Flag: gi_invalid_i4b
Is Correction Flag?: NA
Is Unsigned?: No
Product Minimum: 400000000
Product Maximum: 1000000000
Description: Range in distance calculated from the time between the peak of the transmit pulse and the farthest gate from the spacecraft of the received pulse. See the rngcorrflg to determine any corrections that have been applied.
Comments:

Product Var Name: i_refRngNs
Is element of: GLA05 record
Short Description: Reference Range
Product Data Type: i4b (40)
Total Bytes: 160
Product Units: .01 ns
Invalid Value/Flag: gi_invalid_i4b
Is Correction Flag?: NA
Is Unsigned?: No
Product Minimum: 400000000
Product Maximum: 1000000000
Description: Two-way Reference range in time measured from the centroid of the transmit pulse to the last received echo digitizer gate telemetered (farthest from the spacecraft).
Comments: This is not the range measurement, but a reference value from which the offsets to calculate the range measurement are given. The range measurement will be to a specific

location on the received echo that represents the surface response.

Product Var Name: i_reflCor_atm
Is element of: GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record
Short Description: Reflectivity Correction Factor For Atmospheric Effects
Product Data Type: i4b
Total Bytes: 4
Product Units: Unitless*1E06
Invalid Value/Flag: gi_invalid_i4b
Is Correction Flag?: NA
Is Unsigned?: No
Product Minimum: 0
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. reflectance_corrected_for_atm = i_reflctUncorr * i_reflCor_atm
Comments:

Product Var Name: i_reflctUC
Is element of: GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record
Short Description: reflctUC
Product Data Type: i4b (40)
Total Bytes: 160
Product Units: Unitless*1E06
Invalid Value/Flag: gi_invalid_i4b
Is Correction Flag?: NA
Is Unsigned?: No
Product Minimum: 0
Product Maximum: 1000000
Description: Reflectivity, not corrected for atmospheric effects, is calculated as Refl = R/T, where R is the received energy after it has been scaled for range, and T is the transmitted energy. i_reflctUC has also been calibrated for gain non-linearity (only for non-saturated waveforms), ground truth calibration and boresight shift shadowing (BSS). It is not corrected for saturation effects. If the shot is saturated (satindex above 2) then to correct for saturation the reflectivity estimate needs to be multiplied by the ratio of the corrected energy to the uncorrected energy (sat corrected reflectivity = i_reflctUC * (i_RecNrgAll + i_satNrgCorr)/i_RecNrgAll). The atmospheric corrected reflectivity may be calculated from this uncorrected reflectivity by multiplying it by d_reflCor_atm. i_reflctUC is invalid where GLA06%d_satNrgCorr is invalid.
Comments: This uses all signal between signal begin and signal end.

Product Var Name: i_reflctUncorr

Is element of: GLA05 record, GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record
Short Description: Reflectivity not corrected for Atmospheric Effects
Product Data Type: i4b (40)
Total Bytes: 160
Product Units: Unitless*1E06
Invalid Value/Flag: gi_invalid_i4b
Is Correction Flag?: NA
Is Unsigned?: No
Product Minimum: 0
Product Maximum: 1000000
Description: Reflectivity, not corrected for atmospheric effects, is calculated as Refl = R/T, where R is the received energy after it has been scaled for range, and T is the transmitted energy. i_reflctUncorr has also been calibrated for gain non-linearity (only for non-saturated waveforms), ground truth calibration and boresight shift shadowing (BSS). It is not corrected for saturation effects. If the shot is saturated (satindex above 2) then to correct for saturation the reflectivity estimate needs to be multiplied by the ratio of the corrected energy to the uncorrected energy (sat corrected reflectivity = i_reflctUncorr * (i_RecNrgAll + i_satNrgCorr)/i_RecNrgAll)

The atmospheric corrected reflectivity may be calculated from this uncorrected reflectivity by multiplying it by i_reflCor_atm. Comments: This uses all signal between signal begin and signal end.

Product Var Name: i_reflctuncmxpk
Is element of: GLA05 record
Short Description: Reflectivity Not Corrected For Atmospheric Effects from max peak
Product Data Type: i4b (40)
Total Bytes: 160
Product Units: unitless x1.E06
Invalid Value/Flag: gi_invalid_i4b
Is Correction Flag?: NA
Is Unsigned?: No
Product Minimum: 0
Product Maximum: 1000000
Description: Reflectivity, not corrected for atmospheric effects from max peak, is calculated as Refl = R/T, where R is the received energy from the maximum amplitude peak of the waveform after it has been scaled for range, and T is the transmitted energy. i_reflctUncorr has also been calibrated for gain non-linearity (only for non-saturated waveforms), ground truth calibration and boresight shift shadowing (BSS). It is not corrected for saturation effects. If the shot is saturated (satindex above 2) then to correct for saturation the reflectivity estimate needs to be multiplied by the ratio of the corrected energy to the uncorrected energy (sat corrected reflectivity = i_reflctUncorr * (i_RecNrgAll + i_satNrgCorr)/i_RecNrgAll)

The atmospheric corrected reflectivity may be calculated from this uncorrected reflectivity by

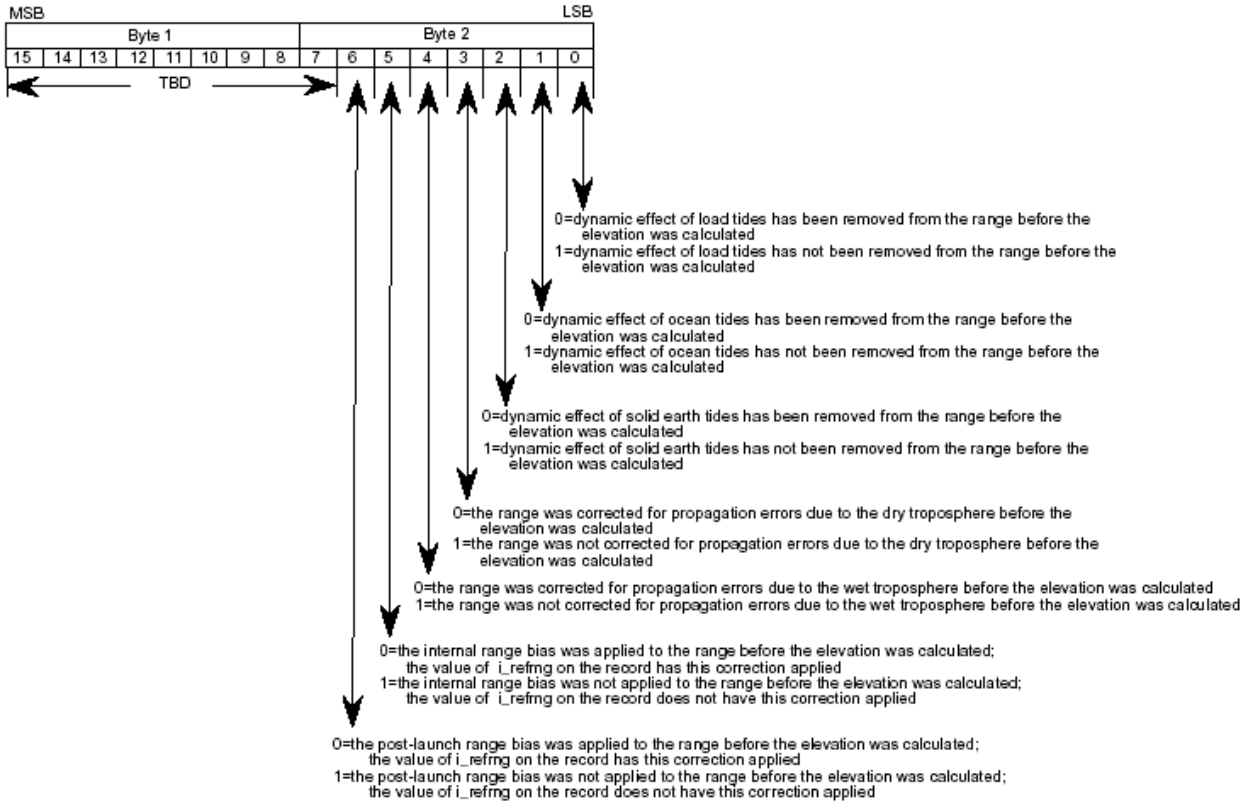
multiplying it by i_reflCor_atm. Comments: This uses only the signal surrounding the maximum peak.

Product Var Name: i_rngCorrFlg
Is element of: GLA05 record, GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record
Short Description: Range Correction 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: 0
Product Maximum: 32767
Description: Denotes which geophysical or instrument corrections have been applied to the range in the calculation of the elevation on this record.

i_rngCorrFlg [1/sec for GLA05, 06, 12-15]: Range Correction Flag

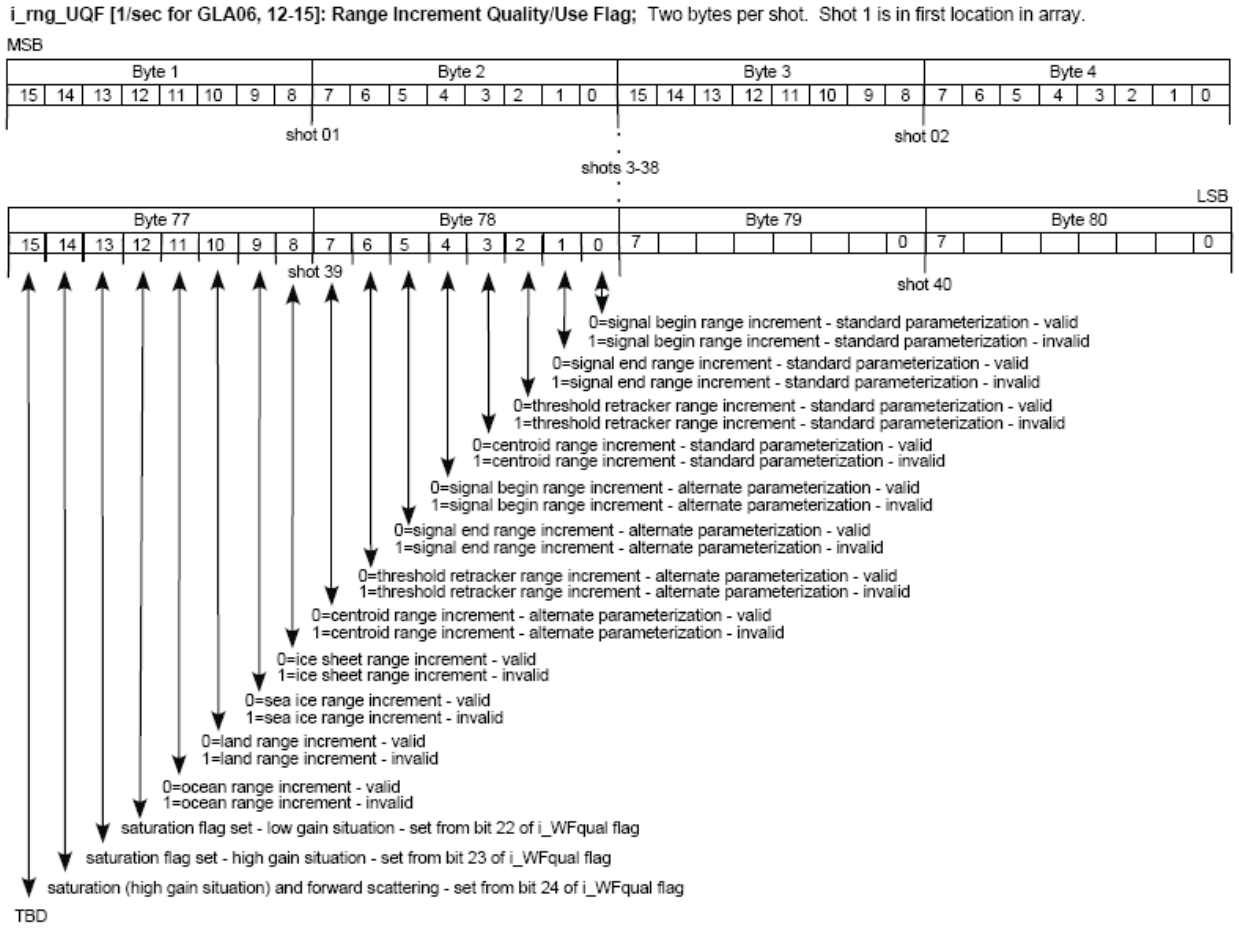
2 byte set of 1 bit values: 0=used, 1=not used

Note: This is a range correction flag. Some of the corrections are applied to the reference range, i_refrng on the data record, and some of them are used in the calculation of the elevation but are not applied to the reference range.



Comments:

Product Var Name: i_rng_UQF
Is element of: GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record
Short Description: Range Offset Quality/Use Flag
Product Data Type: i2b (40)
Total Bytes: 80
Product Units: N/A
Invalid Value/Flag: No
Is Correction Flag?: NA
Is Unsigned?: No
Product Minimum: 0
Product Maximum: 32767
Description: Data quality flag for the range offsets on this record.



Comments:

Product Var Name: i_rng_wf
Is element of: GLA01 Long Waveform Record
Short Description: 1064 nm Range Waveform
Product Data Type: i1b (544, 8)
Total Bytes: 4352
Product Units: counts

Invalid Value/Flag: i_APID_AvFlg
Is Correction Flag?: NA
Is Unsigned?: Yes
Product Minimum: 0
Product Maximum: 255
Description: The 1064 nm echo waveform digitizer sample output, at 544 samples per shot over land and ice sheet and 200 samples per shot over sea ice and ocean. The surface type is determined by the instrument from the on-board DEM. The digitized data was averaged according to the waveform compression parameters (M,N) and the compression ratio (p, q, and r).
Comments: This has no calibration applied. The calibration is applied internally during ground science algorithm processing. The calibration constants are available on ANC07 file.

Product Var Name: i_rng_wf
Is element of: GLA01_Short_Record
Short Description: 1064 nm Range Waveform
Product Data Type: i1b (200, 20)
Total Bytes: 4000
Product Units: counts
Invalid Value/Flag: i_APID_AvFlg
Is Correction Flag?: NA
Is Unsigned?: Yes
Product Minimum: 0
Product Maximum: 255
Description: The 1064 nm echo waveform digitizer sample output, at 544 samples per shot over land and ice sheet and 200 samples per shot over sea ice and ocean. The surface type is determined by the instrument from the on-board DEM. The digitized data was averaged according to the waveform compression parameters (M,N) and the compression ratio (p, q, and r).
Comments: This has no calibration applied. The calibration is applied internally during ground science algorithm processing. The calibration constants are available on ANC07 file.

Product Var Name: i_sDevFitTr
Is element of: GLA05 record
Short Description: Standard deviation of fit of transmitted pulse
Product Data Type: i2b (40)
Total Bytes: 80
Product Units: microvolts*10
Invalid Value/Flag: gi_invalid_i2b
Is Correction Flag?: NA
Is Unsigned?: No
Product Minimum: 0
Product Maximum: 30000
Description: Standard deviation of fit of a gaussian model to the transmitted pulse

Comments: Note that the pulse was calibrated and converted to voltage before calculation.

Product Var Name: i_sDevNsOb1
Is element of: GLA05 record, GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record
Short Description: Standard deviation of 1064 nm Background noise, (alternate)
Product Data Type: i2b (40)
Total Bytes: 80
Product Units: 0.0001 volts
Invalid Value/Flag: gi_invalid_i2b
Is Correction Flag?: NA
Is Unsigned?: No
Product Minimum: 0
Product Maximum: 30000
Description: The standard deviation of the background noise (alternative parameters).
Comments: Can be used for computing signal-to-noise ratio along with unsmoothed max amplitude.

Product Var Name: i_sDevNsOb2
Is element of: GLA05 record
Short Description: Standard deviation of 1064 nm Background noise, (standard)
Product Data Type: i2b (40)
Total Bytes: 80
Product Units: 0.0001 volts
Invalid Value/Flag: gi_invalid_i2b
Is Correction Flag?: NA
Is Unsigned?: No
Product Minimum: 0
Product Maximum: 30000
Description: The standard deviation of the background noise (standard parameters).
Comments:

Product Var Name: i_samp_pad
Is element of: GLA01 Long Waveform Record
Short Description: Echo Sample Padding
Product Data Type: i2b (8)
Total Bytes: 16
Product Units: counts
Invalid Value/Flag: i_APID_AvFlg
Is Correction Flag?: NA
Is Unsigned?: No
Product Minimum: 0
Product Maximum: 544
Description: Surface echo sample padding. Number of zero bytes used to pad the surface echo

data samples after averaging. From APID12/13, Offset 152.
Comments:

Product Var Name: i_samp_pad
Is element of: GLA01_Short_Record
Short Description: Echo Sample Padding
Product Data Type: i2b (20)
Total Bytes: 40
Product Units: counts
Invalid Value/Flag: i_APID_AvFlg
Is Correction Flag?: NA
Is Unsigned?: No
Product Minimum: 0
Product Maximum: 544
Description: Surface echo sample padding. Number of zero bytes used to pad the surface echo data samples after averaging. From APID12/13, Offset 152.
Comments:

Product Var Name: i_satCorrFlg
Is element of: GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record
Short Description: Saturation Correction Flag
Product Data Type: i1b (40)
Total Bytes: 40
Product Units: NA
Invalid Value/Flag: No
Is Correction Flag?: Yes
Is Unsigned?: NA
Product Minimum: NA
Product Maximum: NA
Description: See also Saturation Correction Guidance.

Bits 0-3: i_satElevCorr flag (4 bits); values indicated below:

0= Not Saturated (i_satNdx < 2) or No Signal
1= Sat. Correction is Inconsequential (i_satNdx >= 2 & i_pctSat < 2.0)
2= Sat. Correction is Applicable (i_satNdx >= 2 & i_pctSat >= 2.0 & Full Width* < 100ns)
3= Sat. Correction is Not Computable effects elevations can not be corrected
4= Sat. Correction model is Not Applicable so data can not be corrected (i_satNdx >= 2 & i_pctSat >= 2.0 & Full Width* >= 100ns) there are errors in the data but the effects on elevations can not be corrected

values 5-15=TBD

Bits 4-5: i_satNrgCorr flag (2 bits):
0=TBD
1=TBD
2=TBD
3=TBD

Bits 6-7: TBD :
0=TBD
1=TBD
2=TBD
3=TBD

Comments: See also Saturation Correction Guidance.

Product Var Name: i_satElevCorr
Is element of: GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record
Short Description: Saturation Elevation Correction
Product Data Type: i2b (40)
Total Bytes: 80
Product Units: mm
Invalid Value/Flag: gi_invalid_i2b
Is Correction Flag?: No
Is Unsigned?: No
Product Minimum: 0
Product Maximum: 3000
Description: Correction to elevation for saturated waveforms. This correction has not been applied to the data so to apply it SUBTRACT the correction from the range estimate. To apply the correction to the elevations it must be ADDED to the elevation estimates.
Comments: See also Saturation Correction Guidance.

Product Var Name: i_satNdx
Is element of: GLA05 record, GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record
Short Description: Saturation Index
Product Data Type: i1b (40)
Total Bytes: 40
Product Units: ns
Invalid Value/Flag: gi_invalid_i1b
Is Correction Flag?: NA
Is Unsigned?: No
Product Minimum: 0
Product Maximum: 126
Description: The count of the number of gates in a waveform which have an amplitude greater than or equal to i_satNdxTh (set in anc07_0004). The value 126 means 126 or more gates are

above the saturation index threshold (i_satNdxth).
Comments:

Product Var Name: i_satNrgCorr
Is element of: GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record
Short Description: Saturation Energy Correction
Product Data Type: i2b (40)
Total Bytes: 80
Product Units: .01fJ
Invalid Value/Flag: gi_invalid_i2b
Is Correction Flag?: NA
Is Unsigned?: No
Product Minimum: 0
Product Maximum: 100
Description: Correction to energy for saturated waveforms. This correction has not been applied to the energy. It should be ADDED to any echo pulse energy calculated from the pulse area under the waveform. Also any reflectivity estimates need to be corrected for this error in energy measurement.
Comments: See also Saturation Correction Guidance.

Product Var Name: i_shot_ctr
Is element of: GLA01 Long Waveform Record
Short Description: Shot Counter
Product Data Type: i2b (8)
Total Bytes: 16
Product Units: counts
Invalid Value/Flag: i_APID_AvFlg
Is Correction Flag?: NA
Is Unsigned?: No
Product Minimum: 0
Product Maximum: 200
Description: The shot number for each of the 40 shots in this record. The shot count rolls over after reaching 200. From APID12/13, Offset 16.
Comments:

Product Var Name: i_shot_ctr
Is element of: GLA01_Short_Record
Short Description: Shot Counter
Product Data Type: i2b (20)
Total Bytes: 40
Product Units: counts
Invalid Value/Flag: i_APID_AvFlg
Is Correction Flag?: NA
Is Unsigned?: No

Product Minimum: 0
Product Maximum: 200
Description: The shot number for each of the 40 shots in this record. The shot count rolls over after reaching 200. From APID12/13, Offset 16.
Comments:

Product Var Name: i_siRngOff
Is element of: GLA06 record, GLA13 Record
Short Description: Sea Ice Range Offset
Product Data Type: i4b (40)
Total Bytes: 160
Product Units: mm
Invalid Value/Flag: gi_invalid_i4b
Is Correction Flag?: NA
Is Unsigned?: No
Product Minimum: -150000
Product Maximum: 0
Description: Range offset to be added to i_refRngNs to calculate the range using the algorithm deemed appropriate for sea ice.
Comments:

Product Var Name: i_sigmaatt
Is element of: GLA05 record, GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record
Short Description: Attitude Quality Indicator
Product Data Type: i2b (40)
Total Bytes: 80
Product Units: Unitless
Invalid Value/Flag: gi_invalid_i2b
Is Correction Flag?: NA
Is Unsigned?: No
Product Minimum: 0
Product Maximum: 6000
Description: Attitude quality indicator. Values: 0=good; 50=warning; 100=bad.
Comments: This indicator currently has only 3 values: 0, 50, and 100, leaving open the opportunity to use numbers in between for further resolution of the degradation as our knowledge improves.

Product Var Name: i_skew1
Is element of: GLA05 record, GLA14 Record
Short Description: Skewness of Received Echo (alternative)
Product Data Type: i2b (40)
Total Bytes: 80
Product Units: unitless * 100

Invalid Value/Flag: gi_invalid_i2b
Is Correction Flag?: NA
Is Unsigned?: No
Product Minimum: -10000
Product Maximum: 10000
Description: Skewness of the received echo from signal begin to signal end using alternative parameters
Comments: Note that the received echo was calibrated and converted to voltage before calculation.

Product Var Name: i_skew2
Is element of: GLA05 record, GLA06 record, GLA12 Record, GLA13 Record, GLA15 Record
Short Description: Skewness
Product Data Type: i2b (40)
Total Bytes: 80
Product Units: unitless * 100
Invalid Value/Flag: gi_invalid_i2b
Is Correction Flag?: NA
Is Unsigned?: No
Product Minimum: -10000
Product Maximum: 10000
Description: The skewness of the received echo from signal begin to signal end using standard parameters.
Comments: Note that the received echo was calibrated and converted to voltage before calculation.

Product Var Name: i_skewTr
Is element of: GLA05 record
Short Description: Skewness of Transmitted Pulse
Product Data Type: i4b (40)
Total Bytes: 160
Product Units: NA
Invalid Value/Flag: gi_invalid_i4b
Is Correction Flag?: NA
Is Unsigned?: No
Product Minimum: -1000
Product Maximum: 1000
Description: Skewness of transmitted pulse
Comments: Note that the pulse was calibrated and converted to voltage before calculation.

Product Var Name: i_solnSigmas1
Is element of: GLA05 record
Short Description: Sigmas of fit parameters (alternative)
Product Data Type: i2b (19, 40)

Total Bytes: 1520
Product Units: 0.0001 volts, 6 * (0.0001 volts, 0.001 ns, 0.001 ns)
Invalid Value/Flag: gi_invalid_i2b
Is Correction Flag?: NA
Is Unsigned?: No
Product Minimum: 0
Product Maximum: 30000, 6 * (30000, 3000, 3000)
Description: Standard deviation of each fit parameter from diagonal of final covariance matrix from alternative parameterization. In the order of: item1=noise (millivolts), then 6 sets of three parameters (subitem1=amplitude (millivolts), subitem2=peak location (ns), and subitem3=sigma (ns)). Items 2-4 are the parameters for the last (closest-to-the-ground or 1st) peak. Items 5-7 are the parameters for the next-to-last (2nd) peak. ..Items 17-19 are the parameters for the closest-to-the-satellite peak. If there are fewer than six peaks, the unused parameters are set invalid.
Comments: Note that the received echo was calibrated and converted from counts to voltage using table in header records before the fit was performed.

Product Var Name: i_solnSigmas2
Is element of: GLA05 record
Short Description: Sigmas of fit parameters (standard)
Product Data Type: i2b (19, 40)
Total Bytes: 1520
Product Units: 0.0001 volts, 6 * (0.0001 volts, 0.001 ns, 0.001 ns)
Invalid Value/Flag: gi_invalid_i2b
Is Correction Flag?: NA
Is Unsigned?: No
Product Minimum: 0
Product Maximum: 30000, 6 * (30000, 3000, 3000)
Description: Standard deviation of each fit parameter from diagonal of final covariance matrix from standard parameterization. In the order of: item1=noise (millivolts), then 6 sets of three parameters (subitem1=amplitude (millivolts), subitem2=peak location (ns), and subitem3=sigma (ns)). Items 2-4 are the parameters for the last (closest-to-the-ground or 1st) peak. Items 5-7 are the parameters for the next-to-last (2nd) peak. ..Items 17-19 are the parameters for the closest-to-the-satellite peak. If there are fewer than six peaks, the unused parameters are set invalid.
Comments: Note that the received echo was calibrated and converted from counts to voltage using table in header records before the fit was performed.

Product Var Name: i_spElv
Is element of: GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record
Short Description: Tide Elevations, Specific
Product Data Type: i2b (4)
Total Bytes: 8
Product Units: mm
Invalid Value/Flag: gi_invalid_i2b
Is Correction Flag?: NA

Is Unsigned?: No
Product Minimum: -10000
Product Maximum: 10000
Description: A tide elevation calculated from alternate tide models for specific regions for shots 1, 11, 21, and 31.
Comments:

Product Var Name: i_spare1
Is element of: GLA01 Main Record
Short Description: Spares
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: 0
Description: Spares
Comments:

Product Var Name: i_spare1
Is element of: GLA01 Long Waveform Record
Short Description: Spares
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: 0
Description: Spares
Comments:

Product Var Name: i_spare1
Is element of: GLA01_Short_Record
Short Description: Spares
Product Data Type: i2b
Total Bytes: 2
Product Units: null
Invalid Value/Flag: No
Is Correction Flag?: NA
Is Unsigned?: No

Product Minimum: 0
Product Maximum: 0
Description: Spares
Comments:

Product Var Name: i_spare1
Is element of: GLA05 record
Short Description: i_spare1
Product Data Type: i1b (2)
Total Bytes: 2
Product Units: NA
Invalid Value/Flag: No
Is Correction Flag?: NA
Is Unsigned?: No
Product Minimum: null
Product Maximum: null
Description:
Comments:

Product Var Name: i_spare10
Is element of: GLA13 Record
Short Description: spares
Product Data Type: i1b (160)
Total Bytes: 160
Product Units: null
Invalid Value/Flag: No
Is Correction Flag?: No
Is Unsigned?: No
Product Minimum: null
Product Maximum: null
Description:
Comments:

Product Var Name: i_spare11
Is element of: GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record
Short Description: Spare 11
Product Data Type: i1b (3)
Total Bytes: 3
Product Units: n/a
Invalid Value/Flag: n/a
Is Correction Flag?: NA
Is Unsigned?: No
Product Minimum: n/a
Product Maximum: n/a

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

Product Var Name: i_spare12
Is element of: GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record
Short Description: Spares
Product Data Type: i2b (2)
Total Bytes: 4
Product Units: N/A
Invalid Value/Flag: None
Is Correction Flag?: NA
Is Unsigned?: No
Product Minimum: null
Product Maximum: null
Description:
Comments:

Product Var Name: i_spare13
Is element of: GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record
Short Description: Spares
Product Data Type: i2b (40)
Total Bytes: 80
Product Units: null
Invalid Value/Flag: null
Is Correction Flag?: NA
Is Unsigned?: No
Product Minimum: null
Product Maximum: null
Description:
Comments:

Product Var Name: i_spare14
Is element of: GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record
Short Description: Spares
Product Data Type: i1b (120)
Total Bytes: 120
Product Units: n/a
Invalid Value/Flag: No
Is Correction Flag?: NA
Is Unsigned?: No
Product Minimum: 0
Product Maximum: 0
Description: Spares

Comments:

Product Var Name: i_spare15
Is element of: GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record
Short Description: Spare 15
Product Data Type: i1b (8)
Total Bytes: 8
Product Units: n/a
Invalid Value/Flag: n/a
Is Correction Flag?: NA
Is Unsigned?: No
Product Minimum: n/a
Product Maximum: n/a
Description: This variable consists of spare bytes reserved for architectural consistency of the data file. It contains no meaningful information.
Comments:

Product Var Name: i_spare16
Is element of: GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record
Short Description: Spare 16
Product Data Type: i1b (4)
Total Bytes: 4
Product Units: n/a
Invalid Value/Flag: n/a
Is Correction Flag?: NA
Is Unsigned?: No
Product Minimum: n/a
Product Maximum: n/a
Description: This variable consists of spare bytes reserved for architectural consistency of the data file. It contains no meaningful information.
Comments:

Product Var Name: i_spare2
Is element of: GLA01 Long Waveform Record
Short Description: Spares
Product Data Type: i1b (108)
Total Bytes: 108
Product Units: n/a
Invalid Value/Flag: No
Is Correction Flag?: NA
Is Unsigned?: No
Product Minimum: 0
Product Maximum: 0
Description: Spares

Comments:

Product Var Name: i_spare2
Is element of: GLA01_Short_Record
Short Description: Spares
Product Data Type: i1b (184)
Total Bytes: 184
Product Units: n/a
Invalid Value/Flag: No
Is Correction Flag?: NA
Is Unsigned?: No
Product Minimum: 0
Product Maximum: 0
Description: Spares
Comments:

Product Var Name: i_spare2
Is element of: GLA01 Main Record
Short Description: Spares
Product Data Type: i1b (10)
Total Bytes: 10
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_spare2
Is element of: GLA15 Record
Short Description: Spare 2
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: This variable consists of spare bytes reserved for architectural consistency of the data file. It contains no meaningful information.
Comments: GLA15 spare2.

Product Var Name: i_spare3
Is element of: GLA05 record
Short Description: i_spare3
Product Data Type: i1b
Total Bytes: 1
Product Units: NA
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: GLA05 record
Short Description: Spares
Product Data Type: i1b
Total Bytes: 1
Product Units: NA
Invalid Value/Flag: N/A
Is Correction Flag?: NA
Is Unsigned?: No
Product Minimum: 0
Product Maximum: 0
Description:
Comments:

Product Var Name: i_spare4
Is element of: GLA13 Record
Short Description: spares
Product Data Type: i1b (160)
Total Bytes: 160
Product Units: null
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: GLA06 record, GLA12 Record, GLA14 Record, GLA15 Record
Short Description: spares
Product Data Type: i1b (160)
Total Bytes: 160
Product Units: null
Invalid Value/Flag: No
Is Correction Flag?: NA
Is Unsigned?: NA
Product Minimum: null
Product Maximum: null
Description:
Comments:

Product Var Name: i_spare5
Is element of: GLA06 record
Short Description: Spares
Product Data Type: i1b
Total Bytes: 1
Product Units: NA
Invalid Value/Flag: N/A
Is Correction Flag?: NA
Is Unsigned?: No
Product Minimum: 0
Product Maximum: 0
Description:
Comments:

Product Var Name: i_spare5
Is element of: GLA12 Record
Short Description: Spares
Product Data Type: i1b
Total Bytes: 1
Product Units: NA
Invalid Value/Flag: N/A
Is Correction Flag?: NA
Is Unsigned?: No
Product Minimum: 0
Product Maximum: 0
Description:
Comments:

Product Var Name: i_spare5
Is element of: GLA13 Record
Short Description: Spares

Product Data Type: i1b
Total Bytes: 1
Product Units: NA
Invalid Value/Flag: N/A
Is Correction Flag?: NA
Is Unsigned?: No
Product Minimum: 0
Product Maximum: 0
Description:
Comments:

Product Var Name: i_spare5
Is element of: GLA14 Record
Short Description: Spares
Product Data Type: i1b
Total Bytes: 1
Product Units: NA
Invalid Value/Flag: N/A
Is Correction Flag?: NA
Is Unsigned?: No
Product Minimum: 0
Product Maximum: 0
Description:
Comments:

Product Var Name: i_spare5
Is element of: GLA15 Record
Short Description: Spares
Product Data Type: i1b
Total Bytes: 1
Product Units: NA
Invalid Value/Flag: N/A
Is Correction Flag?: NA
Is Unsigned?: No
Product Minimum: 0
Product Maximum: 0
Description:
Comments:

Product Var Name: i_spare5
Is element of: GLA05 record
Short Description: Spares
Product Data Type: i1b (2)
Total Bytes: 2

Product Units: NA
Invalid Value/Flag: N/A
Is Correction Flag?: No
Is Unsigned?: No
Product Minimum: NA
Product Maximum: NA
Description:
Comments:

Product Var Name: i_Spare6
Is element of: GLA05 record
Short Description: Spare6
Product Data Type: i1b (70)
Total Bytes: 70
Product Units: NA
Invalid Value/Flag: N/A
Is Correction Flag?: No
Is Unsigned?: No
Product Minimum: NA
Product Maximum: NA
Description:
Comments:

Product Var Name: i_spare8
Is element of: GLA13 Record, GLA14 Record
Short Description: i_Spare8
Product Data Type: i1b (2)
Total Bytes: 2
Product Units: NA
Invalid Value/Flag: No
Is Correction Flag?: NA
Is Unsigned?: No
Product Minimum: null
Product Maximum: null
Description:
Comments:

Product Var Name: i_spare9
Is element of: GLA13 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: null
Product Maximum: null
Description:
Comments:

Product Var Name: i_spare9
Is element of: GLA15 Record
Short Description: spares
Product Data Type: i1b (40)
Total Bytes: 40
Product Units: null
Invalid Value/Flag: No
Is Correction Flag?: No
Is Unsigned?: No
Product Minimum: null
Product Maximum: null
Description:
Comments:

Product Var Name: i_spare9
Is element of: GLA06 record, GLA12 Record, GLA14 Record
Short Description: spares
Product Data Type: i1b (40)
Total Bytes: 40
Product Units: null
Invalid Value/Flag: N/A
Is Correction Flag?: NA
Is Unsigned?: NA
Product Minimum: null
Product Maximum: null
Description:
Comments:

Product Var Name: i_spare40
Is element of: GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record
Short Description: Spare 40
Product Data Type: i2b
Total Bytes: 2
Product Units: n/a
Invalid Value/Flag: n/a
Is Correction Flag?: No
Is Unsigned?: No

Product Minimum: n/a
Product Maximum: n/a
Description: This variable consists of spare bytes reserved for architectural consistency of the data file. It contains no meaningful information.
Comments: Spare 40.

Product Var Name: i_spare41
Is element of: GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record
Short Description: Spare 41
Product Data Type: i4b (7)
Total Bytes: 28
Product Units: n/a
Invalid Value/Flag: n/a
Is Correction Flag?: NA
Is Unsigned?: No
Product Minimum: n/a
Product Maximum: n/a
Description: This variable consists of spare bytes reserved for architectural consistency of the data file. It contains no meaningful information.
Comments: Spare 41.

Product Var Name: i_GmC
Is element of: GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record
Short Description: GmC
Product Data Type: i2b (40)
Total Bytes: 80
Product Units: n/a
Invalid Value/Flag: n/a
Is Correction Flag?: NA
Is Unsigned?: No
Product Minimum: n/a
Product Maximum: n/a
Description: This variable is defined as the difference in the transmit pulse gaussian fit and the centroid of the transmit pulse.
Comments: GmC

Product Var Name: i_spare42
Is element of: GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record
Short Description: Spare 42
Product Data Type: i2b (3, 40)
Total Bytes: 240
Product Units: n/a

Invalid Value/Flag: n/a
Is Correction Flag?: NA
Is Unsigned?: No
Product Minimum: n/a
Product Maximum: n/a
Description: This variable consists of spare bytes reserved for architectural consistency of the data file. It contains no meaningful information.
Comments: Spare 42

Product Var Name: i_GmCns
Is element of: GLA05 record
Short Description: GmCns
Product Data Type: i4b (40)
Total Bytes: 160
Product Units: NA
Invalid Value/Flag: NA
Is Correction Flag?: No
Is Unsigned?: No
Product Minimum:NA
Product Maximum: NA
Description:GmCns is defined as the difference in the transmit pulse gaussian fit and the centroid of the transmit pulse.
Comments: GLA05 GmCns

Product Var Name: i_spare43
Is element of: GLA05 record
Short Description: Spare 43
Product Data Type: i4b (12, 40)
Total Bytes: 1920
Product Units: NA
Invalid Value/Flag: NA
Is Correction Flag?: No
Is Unsigned?: No
Product Minimum:NA
Product Maximum: NA
Description: This variable consists of spare bytes reserved for architectural consistency of the data file. It contains no meaningful information.
Comments: GLA05 Spare43

Product Var Name: i_spare44
Is element of: GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record
Short Description: Spare 44
Product Data Type: i1b (120)

Total Bytes: 120
Product Units: n/a
Invalid Value/Flag: n/a
Is Correction Flag?: NA
Is Unsigned?: No
Product Minimum: n/a
Product Maximum: n/a
Description: This variable consists of spare bytes reserved for architectural consistency of the data file. It contains no meaningful information.
Comments:

Product Var Name: i_spare48
Is element of: GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record
Short Description: Spare 48
Product Data Type: i1b (36)
Total Bytes: 36
Product Units: n/a
Invalid Value/Flag: n/a
Is Correction Flag?: NA
Is Unsigned?: No
Product Minimum: n/a
Product Maximum: n/a
Description: This variable consists of spare bytes reserved for architectural consistency of the data file. It contains no meaningful information.
Comments:

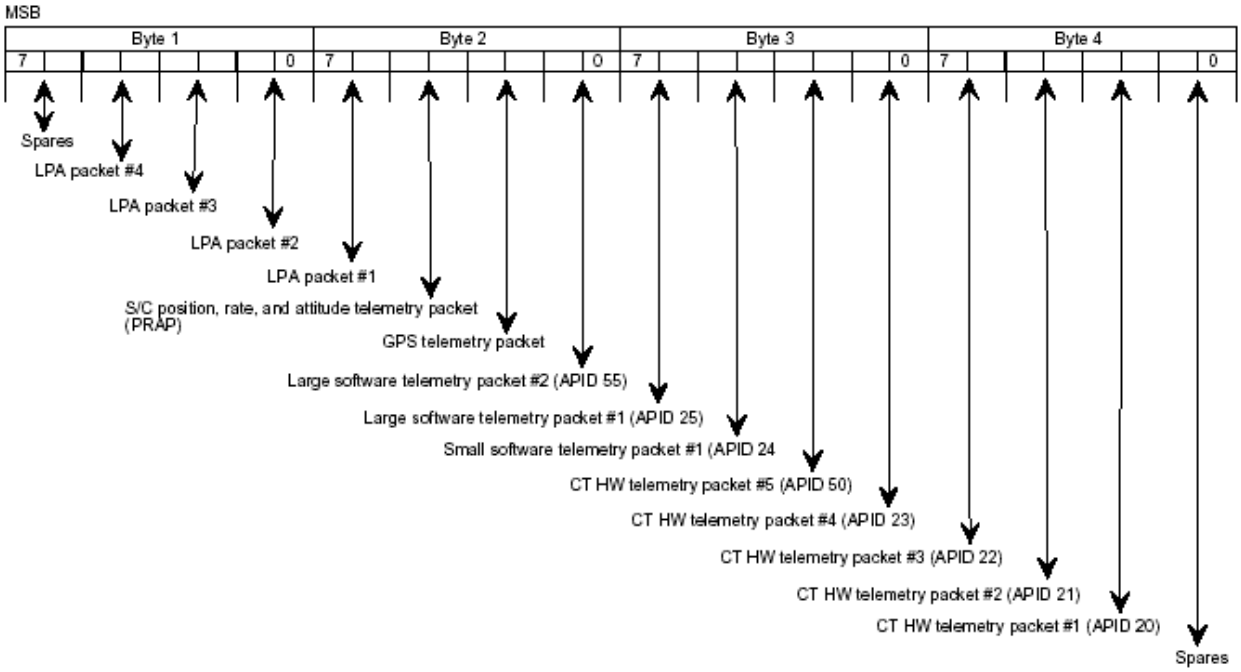
Product Var Name: i_spare49
Is element of: GLA05 record, GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record
Short Description: Spare 49
Product Data Type: i1b (10)
Total Bytes: 10
Product Units: N/A
Invalid Value/Flag: No
Is Correction Flag?: NA
Is Unsigned?: No
Product Minimum: 0
Product Maximum: 1
Description: This variable consists of spare bytes reserved for architectural consistency of the data file. It contains no meaningful information.
Comments:

Product Var Name: i_statflags
Is element of: GLA01 Long Waveform Record

Short Description: Range Window Status Word
Product Data Type: i4b (8)
Total Bytes: 32
Product Units: n/a
Invalid Value/Flag: i_APID_AvFlg
Is Correction Flag?: NA
Is Unsigned?: No
Product Minimum: 0
Product Maximum: 262144
Description: Range Window Status word: Bit 0: No first crossing found on 4-nsec filter Bit 1: No first crossing found on 8-nsec filter Bit 2: No first crossing found on 16-nsec filter Bit 3: No first crossing found on 32-nsec filter Bit 4: No first crossing found on 64-nsec filter Bit 5: No first crossing found on 128-nsec filter Bit 6: No second crossing found on 4-nsec filter Bit 7: No second crossing found on 8-nsec filter Bit 8: No second crossing found on 6-nsec filter Bit 9: No second crossing found on 32-nsec filter Bit 10: No second crossing found on 64-nsec filter Bit 11: No second crossing found on 128-nsec filter Bit 12: First sample in range greater than or equal to threshold for 4 nsec filter Bit 13: First sample in range >= to threshold for 8 nsec filter Bit 14: First sample in range >= threshold for 16 nsec filter Bit 15: First sample in range >= threshold for 32 nsec filter Bit 16: First sample in range >= threshold for 64 nsec filter Bit 17: First sample in range >= threshold for 128 nsec filter Bit 18: All filters were rejected flag. 0 = FALSE, 1 = TRUE. This flag will be set to true (1) if bits 0 through 5 in Range_Status are set. Bits 19-31 are unused spares.

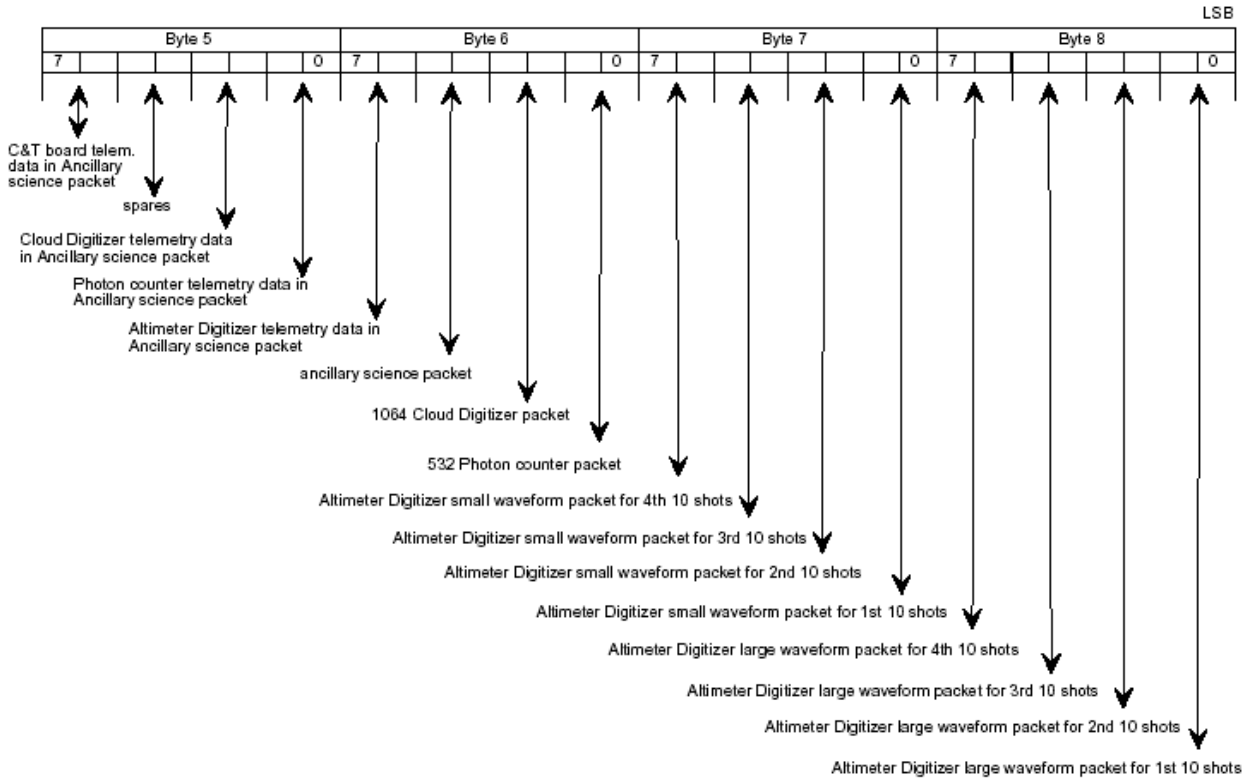
i_APID_AvFlg [1/sec for GLA01, 02, 04-07, 12-15], [1/16 sec for GLA03]: APID Data Availability Flag

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



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

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



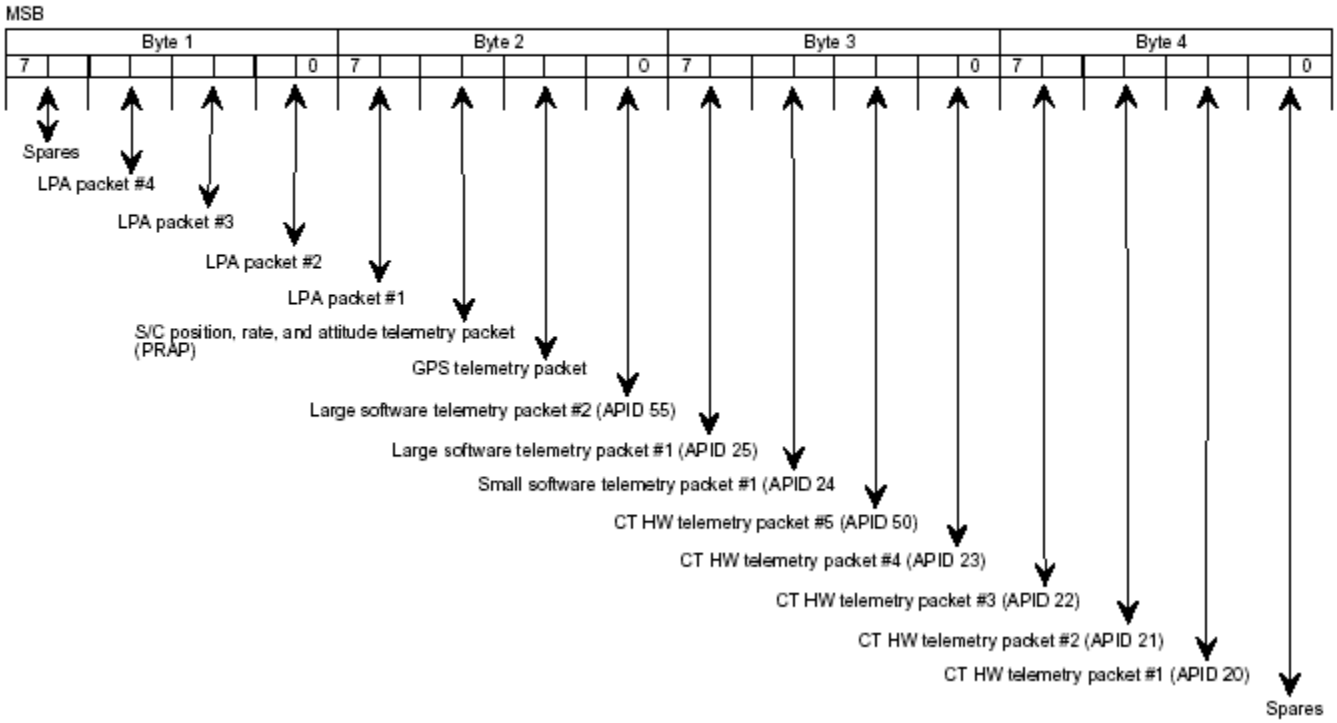
From APID12/13, Offset 120.
Comments:

Product Var Name: i_statflags
Is element of: GLA01_Short_Record
Short Description: Range Window Status Word
Product Data Type: i4b (20)
Total Bytes: 80
Product Units: n/a
Invalid Value/Flag: i_APID_AvFlg
Is Correction Flag?: NA
Is Unsigned?: No
Product Minimum: 0
Product Maximum: 262144
Description: Range Window Status word: Bit 0: No first crossing found on 4-nsec filter Bit 1: No first crossing found on 8-nsec filter Bit 2: No first crossing found on 16-nsec filter Bit 3: No first crossing found on 32-nsec filter Bit 4: No first crossing found on 64-nsec filter Bit 5: No first crossing found on 128-nsec filter Bit 6: No second crossing found on 4-nsec filter Bit 7: No second crossing found on 8-nsec filter Bit 8: No second crossing found on 6-nsec filter Bit 9: No

second crossing found on 32-nsec filter Bit 10: No second crossing found on 64-nsec filter Bit 11: No second crossing found on 128-nsec filter Bit 12: First sample in range greater than or equal to threshold for 4 nsec filter Bit 13: First sample in range >= to threshold for 8 nsec filter Bit 14: First sample in range >= threshold for 16 nsec filter Bit 15: First sample in range >= threshold for 32 nsec filter Bit 16: First sample in range >= threshold for 64 nsec filter Bit 17: First sample in range >= threshold for 128 nsec filter Bit 18: All filters were rejected flag. 0 = FALSE, 1 = TRUE. This flag will be set to true (1) if bits 0 through 5 in Range_Status are set. Bits 19-31 are unused spares.

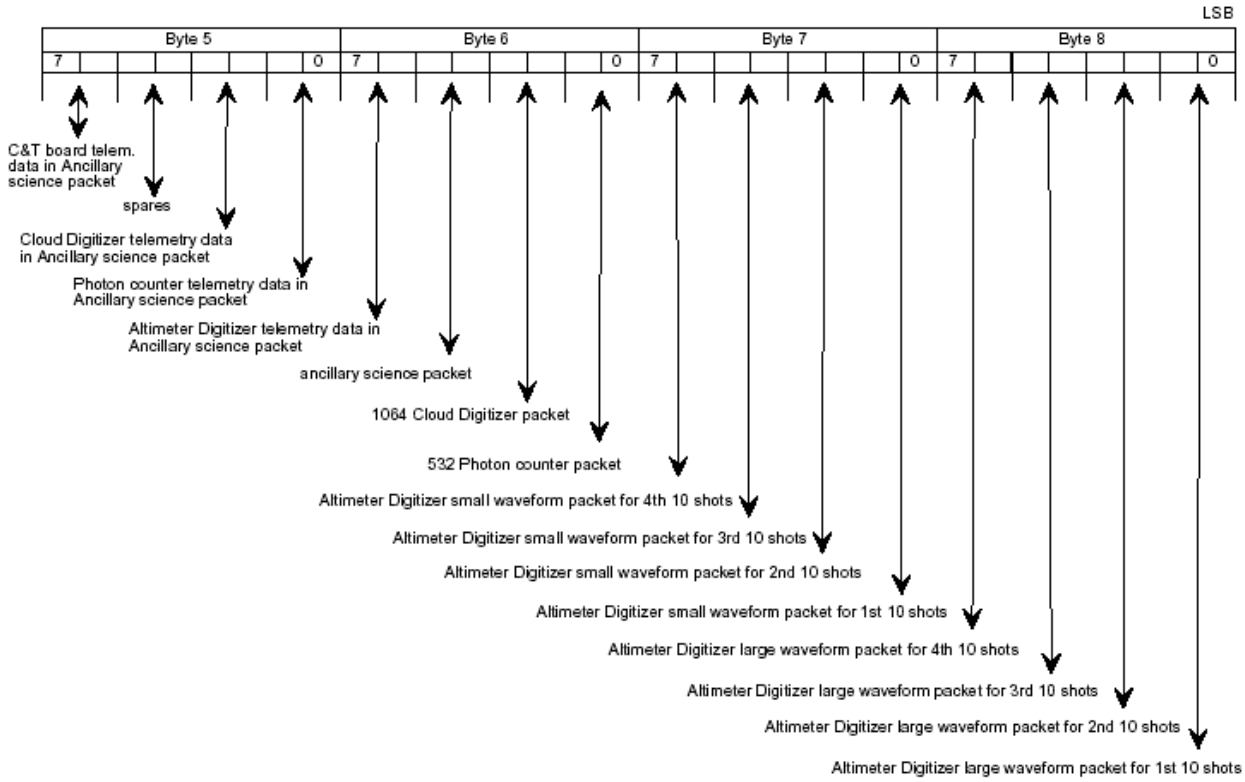
i_APID_AvFlg [1/sec for GLA01, 02, 04-07, 12-15], [1/16 sec for GLA03]: APID Data Availability Flag

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



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

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

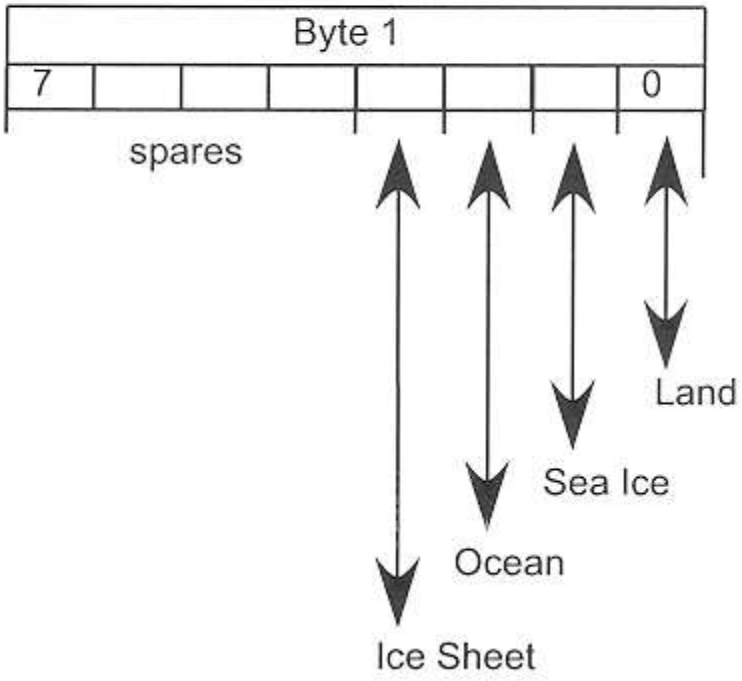


From APID12/13, Offset 120.
Comments:

Product Var Name: i_surfType
Is element of: GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record
Short Description: Region Type
Product Data Type: i1b
Total Bytes: 1
Product Units: N/A
Invalid Value/Flag: No
Is Correction Flag?: NA
Is Unsigned?: No
Product Minimum: 1
Product Maximum: 15
Description: Describes the region type or types associated with each shot Ice Sheet, ocean, sea ice, or Land.

i_surfType [GLA06, 12-15]: Region Type

1 byte of 1 bit values



Comments:

Product Var Name: i_thRtkRngOff1
Is element of: GLA05 record
Short Description: Threshold Retracker Range Offset (alternative)
Product Data Type: i4b (40)
Total Bytes: 160
Product Units: 0.01 ns
Invalid Value/Flag: gi_invalid_i4b
Is Correction Flag?: NA
Is Unsigned?: No
Product Minimum: -100000
Product Maximum: 0
Description: Offset to be added to i_refRngNs to give the two-way range in time to the threshold retracker location on the received echo calculated using alternative parameters.
Comments: The position on the received echo for threshold retracking is calculated as the first received gate where the voltage is > n*sigma (see ATBD). This is calculated after converting the noise and waveform from counts to voltage.

Product Var Name: i_thRtkRngOff2

Is element of: GLA05 record
Short Description: Threshold Retracker Range Offset (standard)
Product Data Type: i4b (40)
Total Bytes: 160
Product Units: 0.01 ns
Invalid Value/Flag: gi_invalid_i4b
Is Correction Flag?: NA
Is Unsigned?: No
Product Minimum: -100000
Product Maximum: 0
Description: Offset to be added to i_refRngNs to give the two-way range in time to the threshold retracker location on the received echo using standard parameters.
Comments: The position on the received echo for threshold retracking is calculated as the first received gate where the voltage is > n*sigma (see ATBD). This is calculated after converting the noise and waveform from counts to voltage.

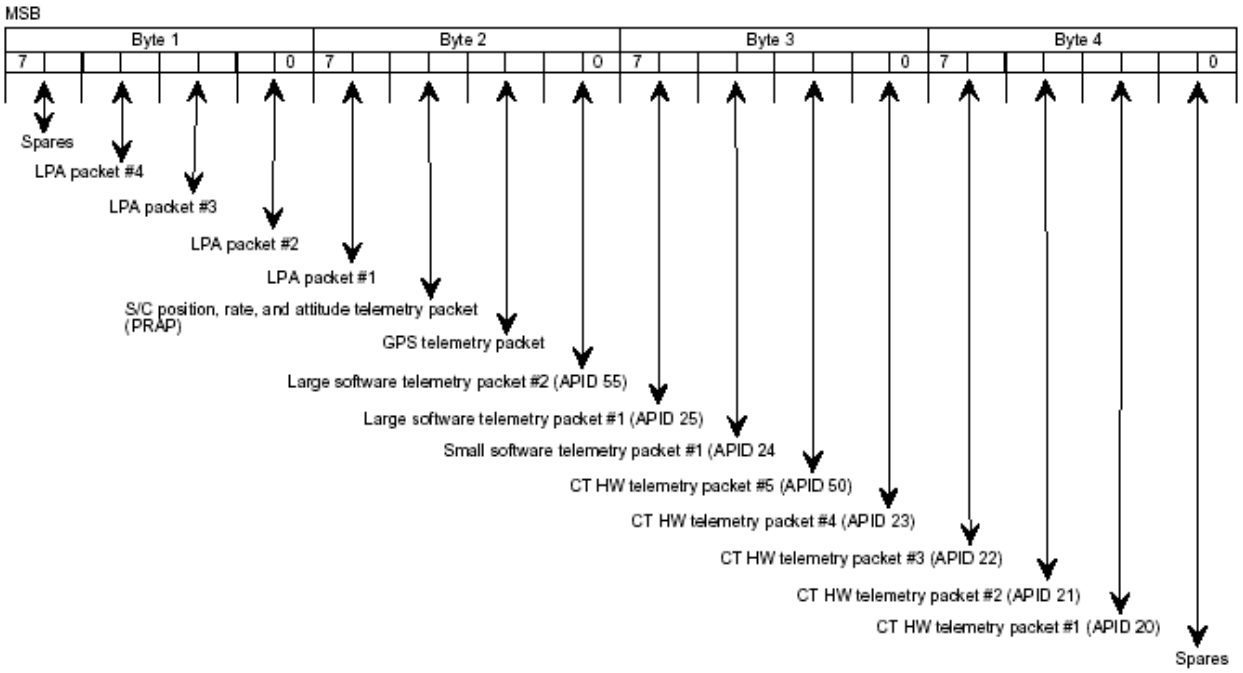
Product Var Name: i_time_txWfPk
Is element of: GLA01 Main Record
Short Description: Transmit Pulse Peak Location
Product Data Type: i4b (40)
Total Bytes: 160
Product Units: ns
Invalid Value/Flag: i_APID_AvFlg
Is Correction Flag?: NA
Is Unsigned?: No
Product Minimum: 0
Product Maximum: 500000
Description: Address in digitizer counts of the Transmit Pulse Peak as measured from the start of Acquisition Memory, i.e. start of digitization. From APID12/13, Offset 68.
Comments: The range measurement starts from this time. To accurately time stamp the transmit pulse, it is necessary to add the delay to start of digitizer.

Product Var Name: i_timecorflg
Is element of: GLA01 Main Record , GLA05 record, GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 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.

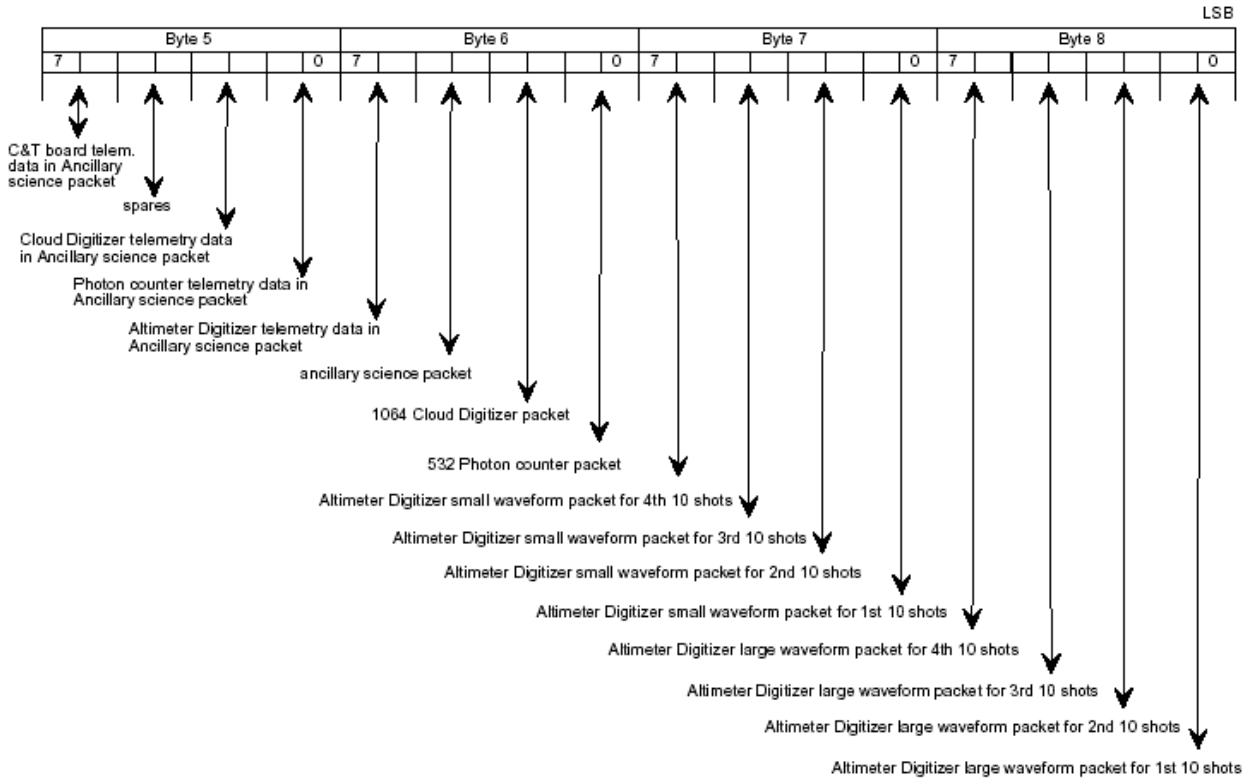
i_APID_AvFlg [1/sec for GLA01, 02, 04-07, 12-15], [1/16 sec for GLA03]: APID Data Availability Flag

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



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

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



Comments:

Product Var Name: i_tpCentX
Is element of: GLA05 record
Short Description: LPA Centroid X
Product Data Type: i2b (40)
Total Bytes: 80
Product Units: arcsec*10
Invalid Value/Flag: gi_invalid_i2b
Is Correction Flag?: NA
Is Unsigned?: No
Product Minimum: 0
Product Maximum: 32766
Description: X position of the centroid of the transmit pulse in the LPA, in arcsec from the left edge of the LPA (outer edge of pixel column 0). From ANC09.
Comments:

Product Var Name: i_tpCentY
Is element of: GLA05 record
Short Description: LPA Centroid Y
Product Data Type: i2b (40)

Total Bytes: 80
Product Units: arcsec*10
Invalid Value/Flag: gi_invalid_i2b
Is Correction Flag?: NA
Is Unsigned?: No
Product Minimum: 0
Product Maximum: 32766
Description: Y position of the centroid of the transmit pulse in the LPA, in arcsec from the upper edge of the LPA (outer edge of pixel row 0). From ANC09.
Comments:

Product Var Name: i_tpOrX
Is element of: GLA05 record
Short Description: Pulse Orientation
Product Data Type: i2b (40)
Total Bytes: 80
Product Units: degrees*10
Invalid Value/Flag: gi_invalid_i2b
Is Correction Flag?: NA
Is Unsigned?: No
Product Minimum: 0
Product Maximum: 3600
Description: Pulse Orientation (Angle measured counter-clockwise from LPA X-axis)
Comments:

Product Var Name: i_tpazimuth
Is element of: GLA05 record
Short Description: Transmit pulse azimuth
Product Data Type: i2b (40)
Total Bytes: 80
Product Units: deg*10
Invalid Value/Flag: gi_invalid_i2b
Is Correction Flag?: NA
Is Unsigned?: No
Product Minimum: 0
Product Maximum: 3600
Description: Transmit pulse azimuth. Angle eastwards from north of the major axis of the transmit pulse, as seen by the LPA. From ANC09.
Comments:

Product Var Name: i_tpazimuth_avg
Is element of: GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record
Short Description: Transmit Pulse azimuth - frame avg
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: Transmit pulse azimuth. Average over the 1-second frame. Angle eastwards from north of the major axis of the transmit pulse, as seen by the LPA. From ANC09.
Comments:

Product Var Name: i_tpeccentricity
Is element of: GLA05 record
Short Description: Transmit pulse eccentricity
Product Data Type: i2b (40)
Total Bytes: 80
Product Units: e*1000
Invalid Value/Flag: gi_invalid_i2b
Is Correction Flag?: NA
Is Unsigned?: No
Product Minimum: 0
Product Maximum: 1000
Description: Transmit pulse eccentricity as measured by the LPA. From ANC09.
Comments:

Product Var Name: i_tpeccentricity_avg
Is element of: GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record
Short Description: Transmit Pulse eccentricity - frame avg
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: 1000
Description: Transmit pulse eccentricity as measured by the LPA. Average over the 1-second frame. From ANC09.
Comments:

Product Var Name: i_tpintensity
Is element of: GLA05 record
Short Description: Transmit pulse intensity
Product Data Type: i4b (40)

Total Bytes: 160
Product Units: counts
Invalid Value/Flag: gi_invalid_i4b
Is Correction Flag?: NA
Is Unsigned?: No
Product Minimum: 0
Product Maximum: 25500
Description: Transmit pulse intensity as measured by the LPA. From ANC09.
Comments:

Product Var Name: i_tpintensity_avg
Is element of: GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record
Short Description: Transmit Pulse intensity - frame avg
Product Data Type: i4b
Total Bytes: 4
Product Units: counts
Invalid Value/Flag: gi_invalid_i4b
Is Correction Flag?: NA
Is Unsigned?: No
Product Minimum: 0
Product Maximum: 25500
Description: Transmit pulse intensity as measured by the LPA. Average over the 1-second frame. From ANC09.
Comments:

Product Var Name: i_tpmajoraxis
Is element of: GLA05 record
Short Description: Transmit pulse major axis
Product Data Type: i2b (40)
Total Bytes: 80
Product Units: cm
Invalid Value/Flag: gi_invalid_i2b
Is Correction Flag?: NA
Is Unsigned?: No
Product Minimum: 0
Product Maximum: 10000
Description: Transmit pulse major axis as measured by the LPA. From ANC09.
Comments:

Product Var Name: i_tpmajoraxis_avg
Is element of: GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record
Short Description: Transmit Pulse major axis - frame avg
Product Data Type: i2b
Total Bytes: 2

Product Units: cm
Invalid Value/Flag: gi_invalid_i2b
Is Correction Flag?: NA
Is Unsigned?: No
Product Minimum: 0
Product Maximum: 10000
Description: Trasmit pulse major axis as measured by the LPA. Average over the 1-second time frame. From ANC09.
Comments:

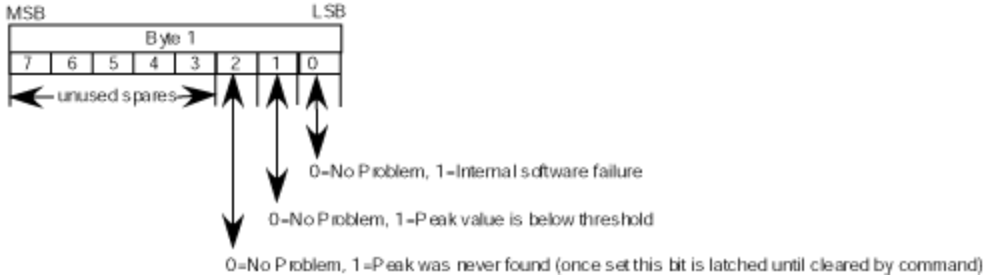
Product Var Name: i_transtime
Is element of: GLA05 record, GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record
Short Description: One way transit time
Product Data Type: i2b
Total Bytes: 2
Product Units: microseconds
Invalid Value/Flag: gi_invalid_i2b
Is Correction Flag?: NA
Is Unsigned?: No
Product Minimum: 0
Product Maximum: 4000
Description: One way transit time calculated using the preliminary range offset. This is added to the UTC time tag to get the ground bounce times at which to calculate the orbit
Comments:

Product Var Name: i_txWfPk_Flag
Is element of: GLA01 Main Record
Short Description: Transmit Waveform Peak Status Flag
Product Data Type: i1b (40)
Total Bytes: 40
Product Units: n/a
Invalid Value/Flag: i_APID_AvFlg
Is Correction Flag?: No
Is Unsigned?: No
Product Minimum: 0
Product Maximum: 8
Description: Transmit_Peak_Status. Status Word: Bit 0: If bit is set to 1 (true), then internal software failure. Bit 1: If bit is set to 1 (true), then peak is below threshold. Bit 2: If bit is set to 1 (true), peak was not found. Note: once set to true, Bit 2 is latched and is only cleared by a DSP board reset or by a ground command. From APID12/13, Offset 72.

i_txWfPk_Flag [GLA01_Main, GLA04-01(LPA)]: Transmit Waveform Peak Status Flag

Note: i_txWfPk_Flag is a 1 byte flag. One byte corresponds to 1/40 of a second.
The first byte flag corresponds to the first 1/40 second of data.

1 bit flags, 40 per second



Comments:

Product Var Name: i_tx_wf
Is element of: GLA01 Main Record
Short Description: Sampled Transmit Pulse Waveform
Product Data Type: i1b (48, 40)
Total Bytes: 1920
Product Units: counts
Invalid Value/Flag: i_APID_AvFlg
Is Correction Flag?: NA
Is Unsigned?: Yes
Product Minimum: 0
Product Maximum: 255
Description: Transmit Pulse; 48 bytes of raw data samples.
Comments:

Product Var Name: i_wTrop
Is element of: GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record
Short Description: Range Correction_Wet Troposphere
Product Data Type: i2b (2)
Total Bytes: 4
Product Units: mm
Invalid Value/Flag: gi_invalid_i2b
Is Correction Flag?: NA
Is Unsigned?: No
Product Minimum: -1000
Product Maximum: 0
Description: The range correction due to the wet troposphere at first & last shot.
Comments:

Product Var Name: i_wfFitSDev_1
Is element of: GLA05 record
Short Description: The received echo fit standard deviation (alternative)

Product Data Type: i2b (40)
Total Bytes: 80
Product Units: unitless
Invalid Value/Flag: gi_invalid_i2b
Is Correction Flag?: NA
Is Unsigned?: No
Product Minimum: 0
Product Maximum: 30000
Description: The standard deviation of the difference between the functional fit and the received echo using alternative parameters.
Comments: Note that the received echo was calibrated and converted from counts to voltage using table in header records before the fit was performed.

Product Var Name: i_wfFitSDev_2
Is element of: GLA05 record
Short Description: The received echo fit standard deviation (standard)
Product Data Type: i2b (40)
Total Bytes: 80
Product Units: microvolts*10
Invalid Value/Flag: gi_invalid_i2b
Is Correction Flag?: NA
Is Unsigned?: No
Product Minimum: 0
Product Maximum: 30000
Description: The standard deviation of the difference between the functional fit and the received echo using the standard parameters
Comments: Note that the received echo was calibrated and converted from counts to voltage using table in header records before the fit was performed.

Product Var Name: i_wfnoiseOb1
Is element of: GLA05 record
Short Description: 1064 nm Background noise, (alternate)
Product Data Type: i2b (40)
Total Bytes: 80
Product Units: 0.0001 volts
Invalid Value/Flag: gi_invalid_i2b
Is Correction Flag?: NA
Is Unsigned?: No
Product Minimum: -300
Product Maximum: 30000
Description: Either the background noise mean value measured by the instrument, or the background noise calculated from the received echo using alternative parameters. See local flag definition for l_WFqual - a flag is set if the background noise is calculated.
Comments: This is in units of counts and must be calibrated and converted to voltage before

using it - see conversion table in header record.

Product Var Name: i_wfnoiseOb2
Is element of: GLA05 record
Short Description: 1064 nm Background noise, (standard)
Product Data Type: i2b (40)
Total Bytes: 80
Product Units: 0.0001 volts
Invalid Value/Flag: gi_invalid_i2b
Is Correction Flag?: NA
Is Unsigned?: No
Product Minimum: -300
Product Maximum: 30000
Description: Either the background noise mean value measured by the instrument, or the background noise calculated from the received echo using standard parameters. See local flag definition for l_WFqual - a flag is set if the background noise is calculated.
Comments: This is in units of counts and must be calibrated and converted to voltage before using it - see conversion table in header record.

Product Var Name: i_wt_fact_filt
Is element of: GLA01 Main Record
Short Description: Filter Weight Factors
Product Data Type: i4b (6, 40)
Total Bytes: 960
Product Units: unitless
Invalid Value/Flag: i_APID_AvFlg
Is Correction Flag?: NA
Is Unsigned?: No
Product Minimum: 0
Product Maximum: 2000000000
Description: Results of weight formulas for all FIR filters. There are a total of 6 filters. From APID12/13, offset 124.
Comments: