

**GPM/DPR
TRMM/PR
L2/3 Product Format Documentation**

Version 5.3

March 2024

Japan Aerospace Exploration Agency

Revision history

revision	date	section	content, reason
Version 1.0	Sept. 2 nd 2014	ALL	New
Version 2.0	Mar. 28 th 2016	p.ii~vi p.56~ p.60~ p.152~ P.156~ p.164~ p.168~ p.180~ All page	Correction of talble of contents Addition Chapter 3 "Level 2 (2HSLH) Data Format Structure" Addition Chapter 4 "Level 2(2HSLH) Contents of Objects in each Group" Addition Chapter 8 " Level 3 (3GSLH) Data Format Structure " Addition Chapter 9 " Level 3(3GSLH) Contents of Objects in each Group " Addition Chapter 10 " Level 3 (3HSLH) Data Format Structure " Addition Chapter 11 "Level 3(3HSLH) Contents of Objects in each Group " A list of elements of each chapter is gathered in Chapter 12 Change of the chapter constitution
Version 3.0	May 9 th 2017	P.7, P.15, P.25, P.56~P.61, P.226~227 P.11, P.41~42, P.190, P.198, P.206, P.214, P.222, P.231 P.12, P.47, P.191, P.199, P.207, P.215, P.223, P.232 P.13, P.51, P.224 P.17 P.78, P.84~85, P.141~P.150, P.248~249	Addition of TRG Group to MS swath of 2ADPR. Addition of adjustFactor and snowIceCover to PRE Group. Addition of flagHeavyIcePrecip and flagAnvil to CSF Group. Addition of flagSurfaceSnowfall and surfaceSnowfallIndex to Experimental Group. Addition of DOIauthority and DOIshortName to FileHeader meta data. Addition of the new channels to each data elements of 3DPRD.

revision	date	section	content, reason
Version 3.1	July 11 th 2017	P.63, P.257~258 P.64,67 P.72~73 P.160 P.161, P.165~168, P.170, P.259-260 P.175 P.176,177 P.182~183, P.186,189, P.191, P.261-263	Change of “number of layers” for 2HSLH. In figure 3.2-1 and figure 4.1-1, addition of “AlgorithmRuntimeInfo”. In 4.2.7, addition of the value detail for rainTypeSLH Change of “number of latitude”, “number of longitude” and “number of layers” for 3GSLH. Addition of the following variables to Grid Group for 3GSLH: shallowLHMean otherLHMean shallowQ1RMean otherQ1RMean shallowQ2Mean otherQ2Mean shallowPix otherPix Change of “number of latitude”, “number of longitude” and “number of layers” for 3HSLH. Addition of the following variables to Grid Group for 3HSLH: otherLHMean otherLHDev otherQ1RMean otherQ1RDev otherQ2Mean otherQ2RDev otherPix
Version 3.2	July 19 th 2017	P.181~189, P.261~262	Change of a range of values that the variable excluding “the number of pixel” to Grid Group for 3HSLH can take.
Version 4.0	Sept. 20 th 2018	Chapter, 1,3,4,8~12 Section 1.5, 2.2 Section 3.2, 4.2 Section 5.2, 5.3, 5.4, 6.2	Addition of TRMM/PR products. Addition of explanation of PRE Group. Addition of variable of CSF, SRT, FLG Group. Addition of explanation of CSF, PRE, SLV Group. Change of variable name of SLH. Addition of variable of PR and DPR level 3 products.

revision	date	section	content, reason
		Section 8.2, 8.3, 9.2,10.2, 11.2 Chapter 12	Addition of variable of SLH level 3 products. Addition and change of variables.
Version 4.1	Nov. 28 th 2018	Section 2.2	Revise explanation of DPR Level2 products.
Version 5.0	Dec. 6 th 2021	All chapter	Revise for the DPR, PR, and SLH of Level2/3 products.
Version 5.1	June 2 nd 2022	Section 9.2, 11.2	Revise explanation of SLH and SLHT Level3(Orbital) and Level3(Monthly) products.
Version 5.2	July 1 st 2023	All chapter Section 1.1 Section 2.2	Update “TBD” to the latest information Addition of some dimension “nfreq” and “nfreqHI”. Revise explanation of variable of navigation, PRE, CSF, SRT, DSD, Experimental, SLV and FLG.
Version 5.3	March 5 th 2024	Section 2.2	Revises due to change in satellite altitude (GPM Orbit Boost) Correction of errors

Reference

- (1) PRECIPITATION PROCESSING SYSTEM GLOBAL PRECIPITATION MEASUREMENT
“File Specification for GPM Products”,
- (2) PRECIPITATION PROCESSING SYSTEM GLOBAL PRECIPITATION MEASUREMENT
“Metadata for GPM Products”,
- (3) PRECIPITATION PROCESSING SYSTEM GLOBAL PRECIPITATION MEASUREMENT
“File Specification for GPM Products”,
- (4) NOAA NESDIS CENTER FOR SATELLITE APPLICATIONS AND RESEARCH GLOBAL 4KM
MULTISENSOR AUTOMATED SNOW/ICE MAP (GMASI) ALGORITHM THEORETICAL BASIS
DOCUMENT

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1. Level 2 Data Format Structure

In the V06X (experimental product), a new format was implemented including “FS” which is defined as the full swath dual-frequency product with 125 m range resolution. In the V07A and later version, this FS format is applied to data taken both before and after the scan pattern change of the KaPR in May 2018 (Figure 1).

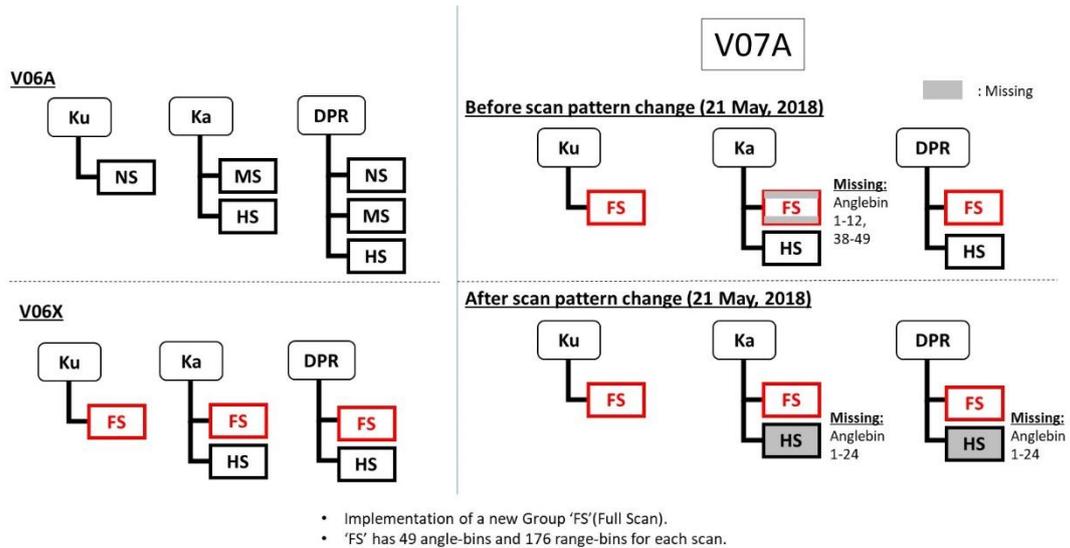


Figure 1 Changes of File structure from V06 to V07.

1.1. Dimension definition

Dimension definitions. All bin numbers are specified starting with 1.

- nscan
 - Number of scans in the granule.
- nray
 - Number of angle bins in each scan.
 - 49 angle bins in each scan in the FS swath (1–49).
 - 24 angle bins in each scan in the HS swath (1–24).
- nbin
 - Number of range bins in each ray.
 - 176 range bins in each ray in the FS swath (1–176).
 - 88 range bins in each ray in the HS swath (1–88).
- nbin SZP
 - 7 Number of range bins for sigmaZeroProfile. (FS)
 - 5 Number of range bins for sigmaZeroProfile. (HS)
- nfreq
 - 2 Number of frequency dependency (2ADPR FS).
- nfreqHI
 - 3 Number of frequency dependency (2ADPR FS).
- nNP
 - 4 Number of NP kinds.
- nearFar
 - 2 Near reference, Far reference.
- foreBack
 - 2 Forward, Backword.
- method
 - 6 Number of SRT methods.
- nNode
 - 5 Number of binNode.
- nDSD
 - 2 Number of DSD parameters. Parameters are N0 and D0.
- LS
 - 2 Liquid, Solid.
- nNUBF
 - 3 Number of NUBF parameters.
- nsdew

1.1 Dimension definition

➤ 3 Number of SRT parameters.

“FS” is called as Full scan Swath in 2AKu, 2AKa, 2ADPR and 2APR.

“HS” is called as High sensitivity beam scan Swath in 2AKa and 2ADPR respectively.

1.2. Data Format Structure for 2AKu and 2APR

The Ku Level-2A product, 2AKu, “Ku precipitation”, is defined as a swath structure, which is called “FS”. The PR Level-2A product, 2APR, “Ku precipitation”, is the same with 2AKu and there are no differences between 2AKu and 2APR.

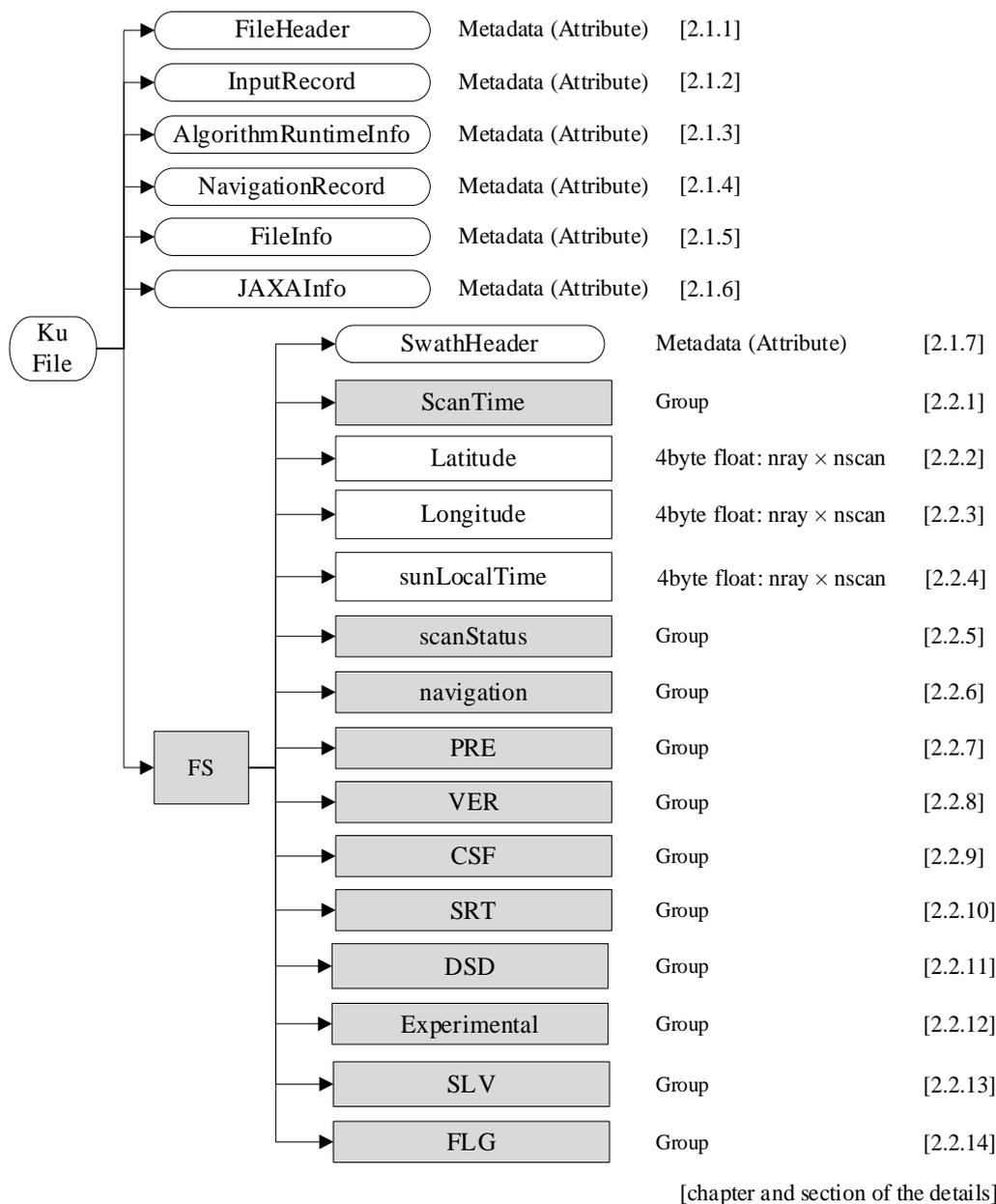


Figure 1.2-1 Data Format Structure for 2AKu and 2APR

1.3. Data Format Structure for 2AKa

The Ka Level-2A product, 2AKa, “Ka precipitation”, is defined as two-swath structures, which are called “FS” and “HS”.

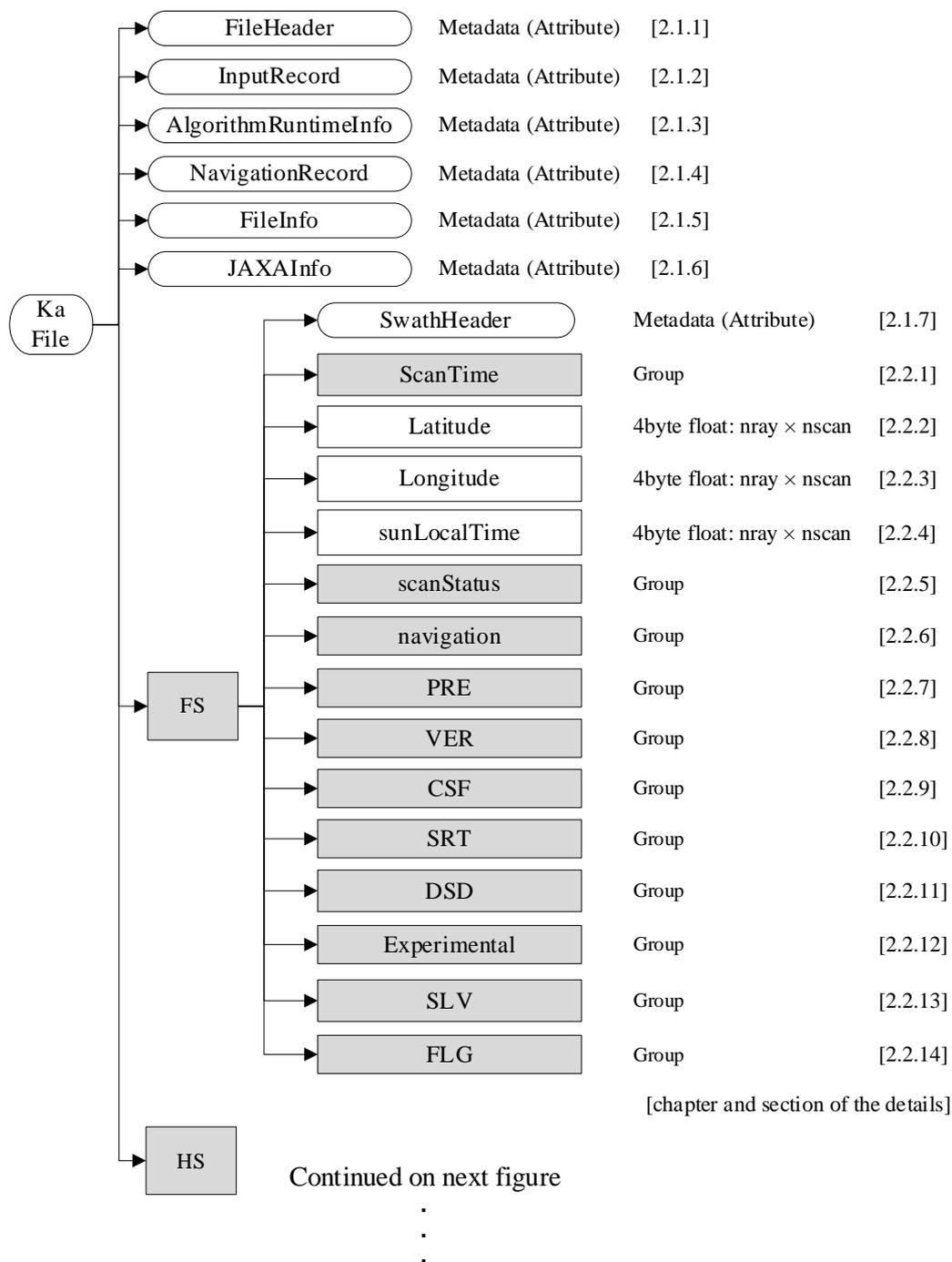


Figure 1.3-1 Data Format Structure for 2AKa

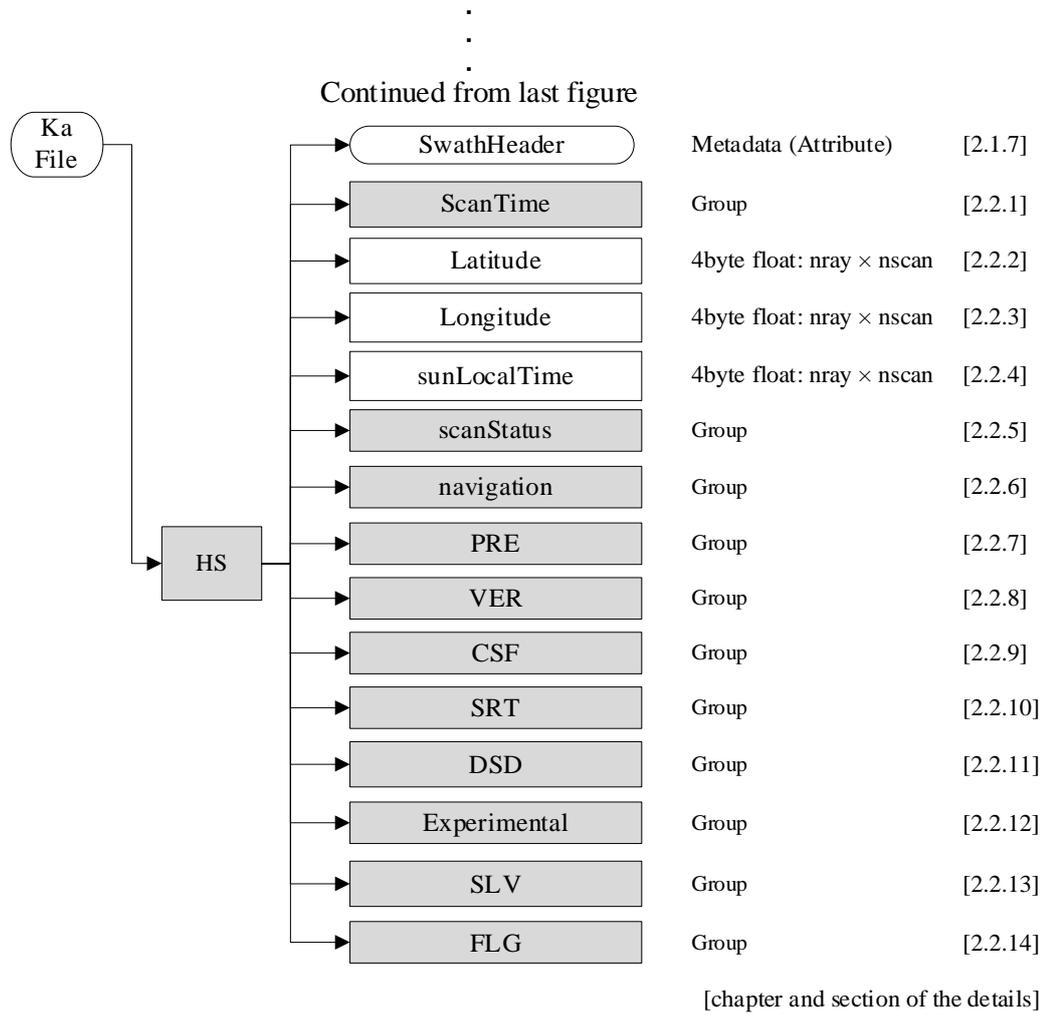


Figure 1.3-2 Data Format Structure for 2AKa

1.4. Data Format Structure for 2ADPR

The DPR Level-2A product, 2ADPR, “DPR precipitation”, is defined as two swath structures, which are called “FS” and “HS”. Some variables which have a frequency dependency have an array of “nfreq” and “nfreqHI”. See the description of each variable for details.

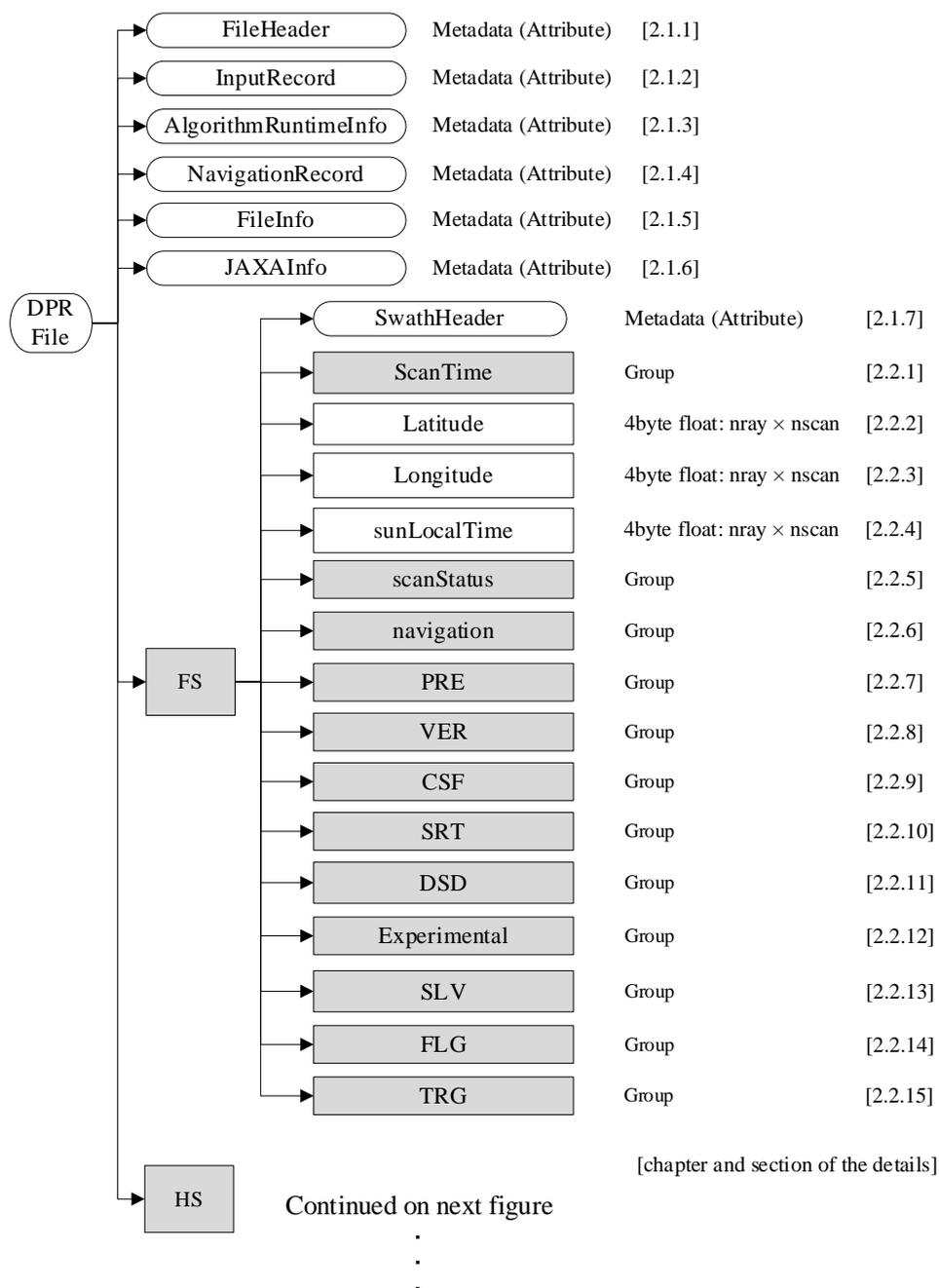


Figure 1.4-1 Data Format Structure for 2ADPR

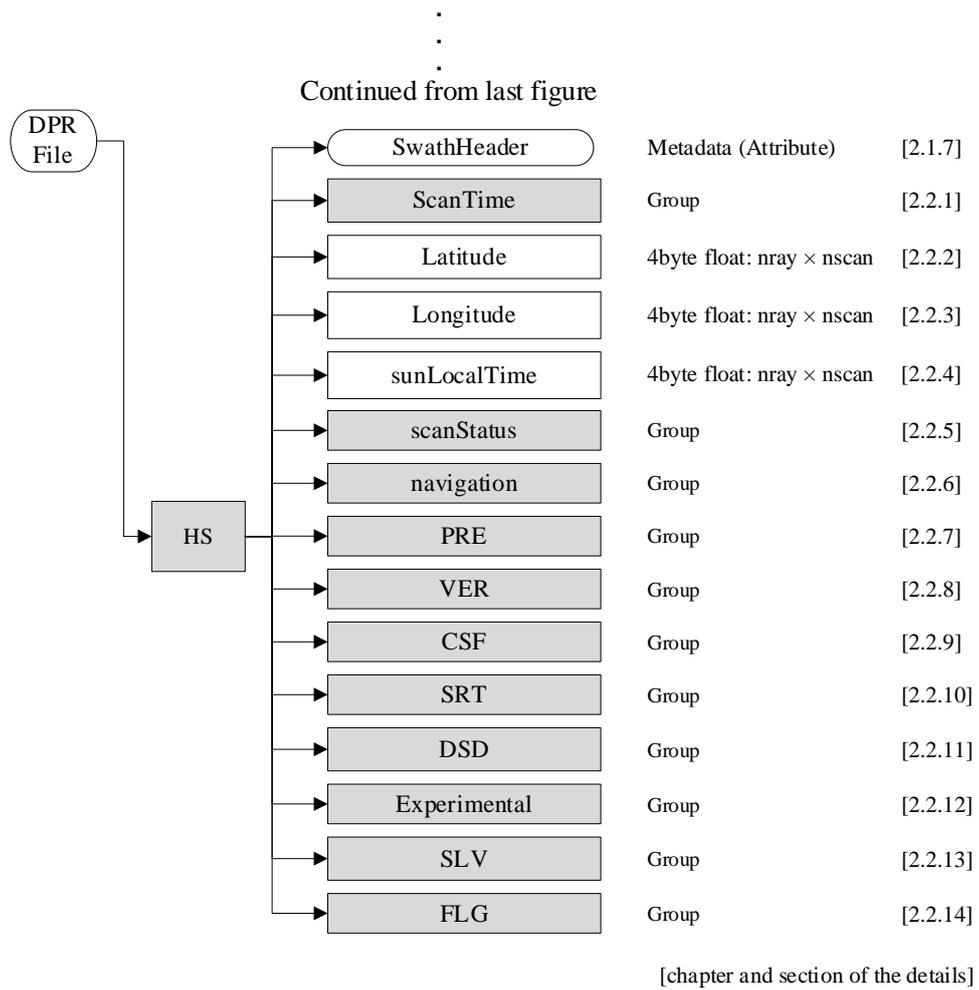


Figure 1.4-2 Data Format Structure for 2ADPR

1.5. Data Format Structure for each Group

Each group's structure is shown in this section. Structures in each grid are common. However, the number of rays and range bins are different as shown in section 1.1.

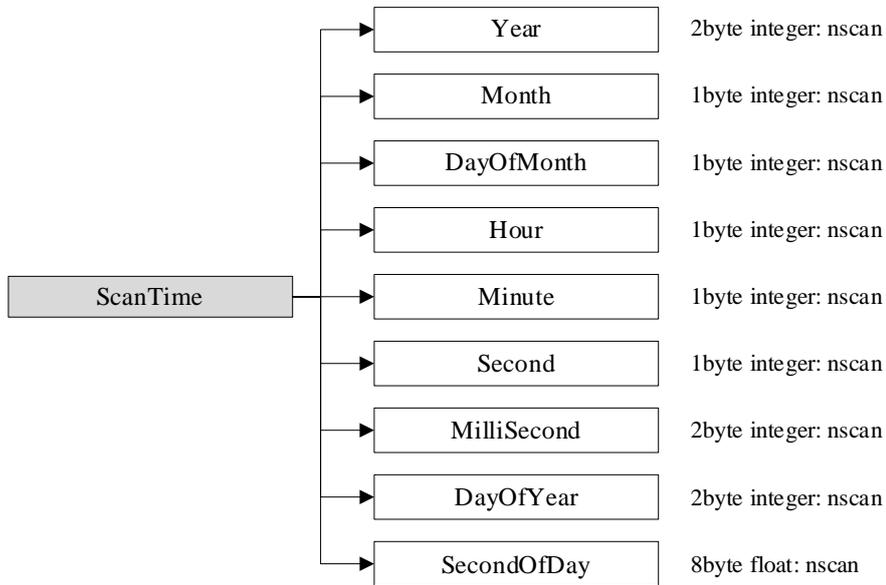


Figure 1.5-1 Data Format Structure for ScanTime Group

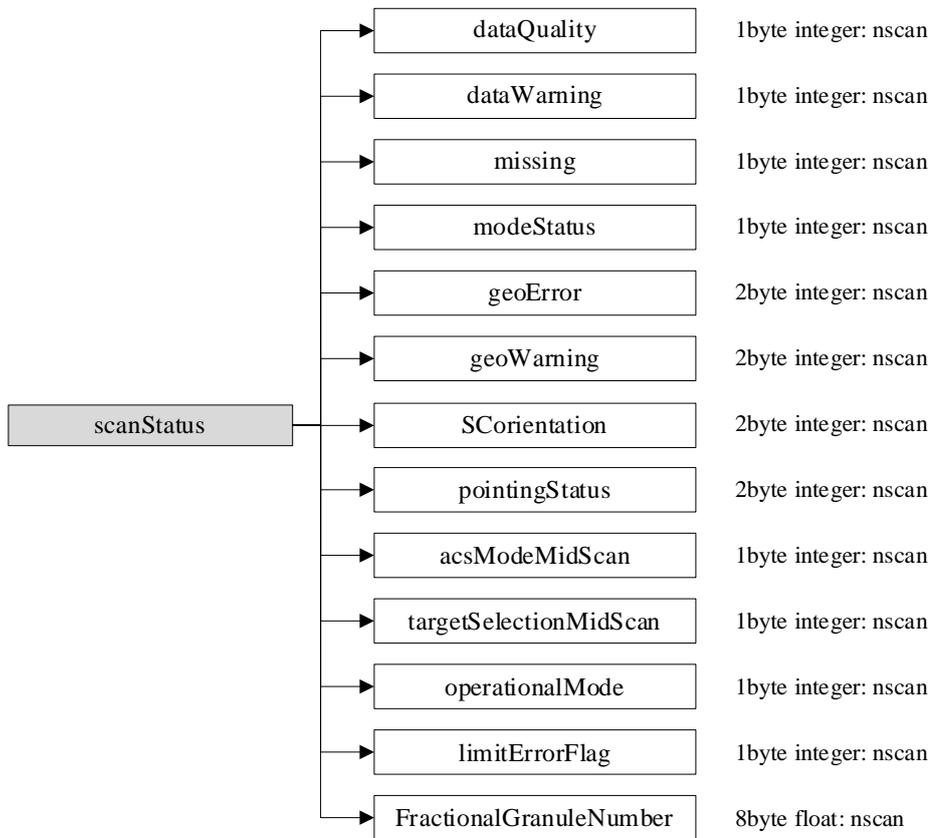


Figure 1.5-2 Data Format Structure for scanStatus Group

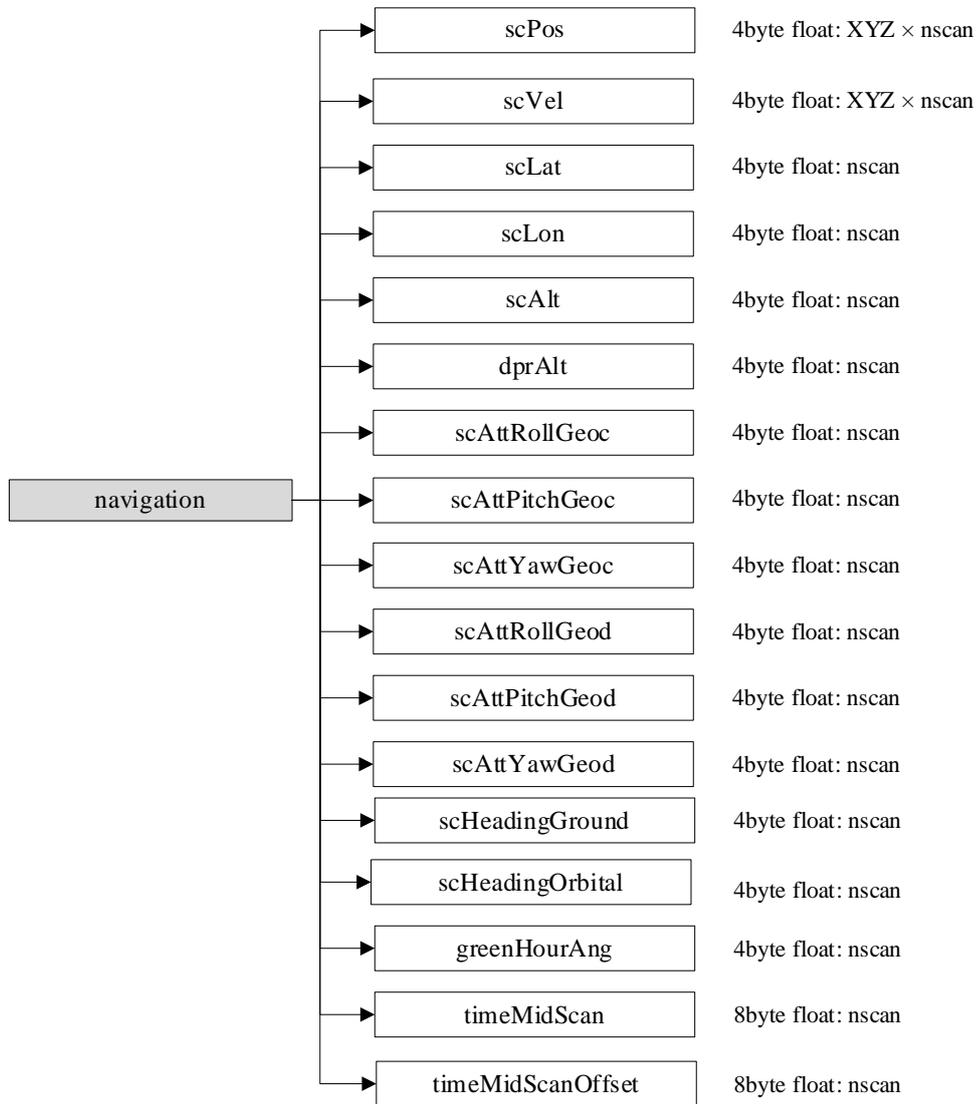


Figure 1.5-3 Data Format Structure for navigation Group

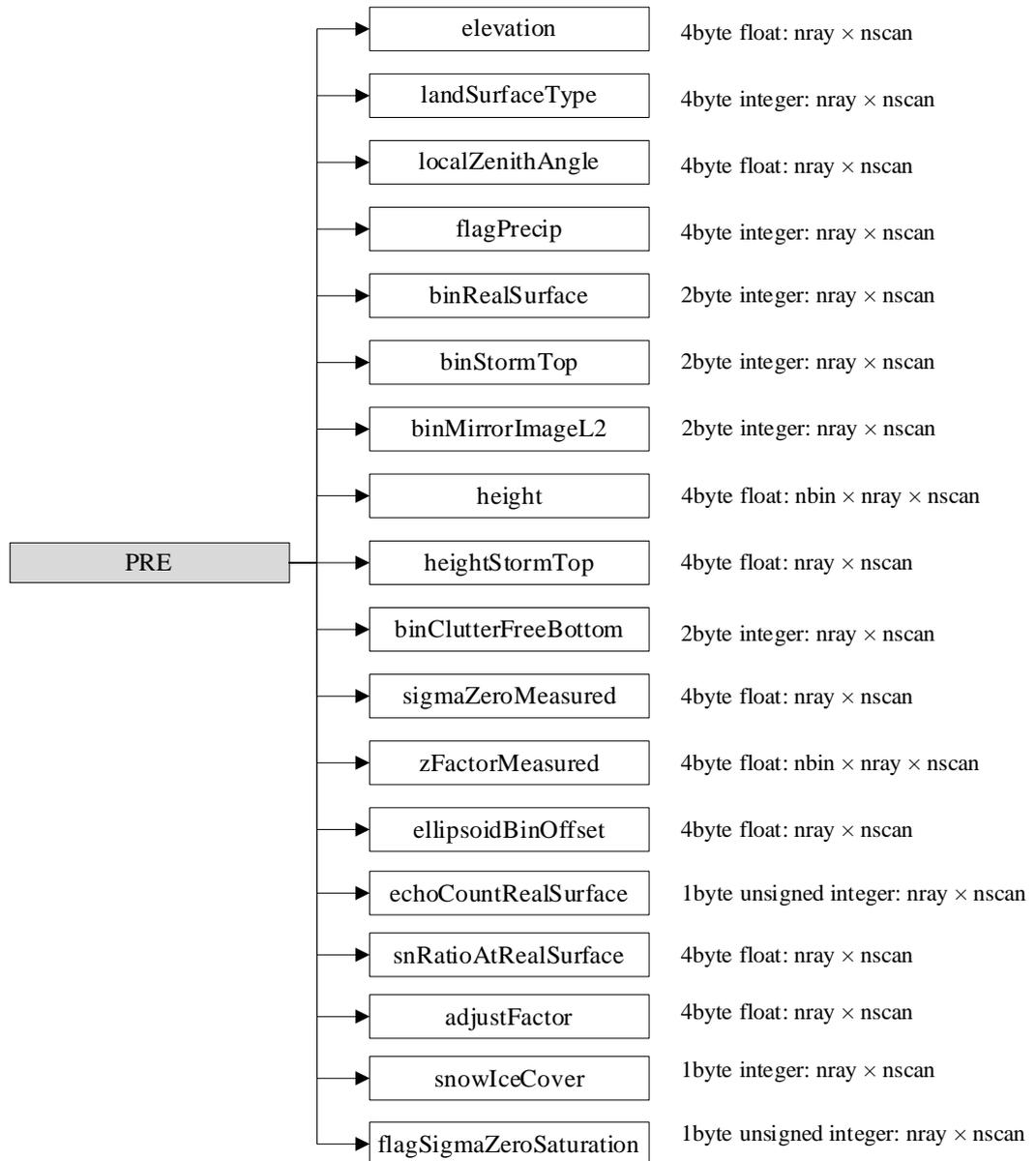


Figure 1.5-4 Data Format Structure for PRE Group

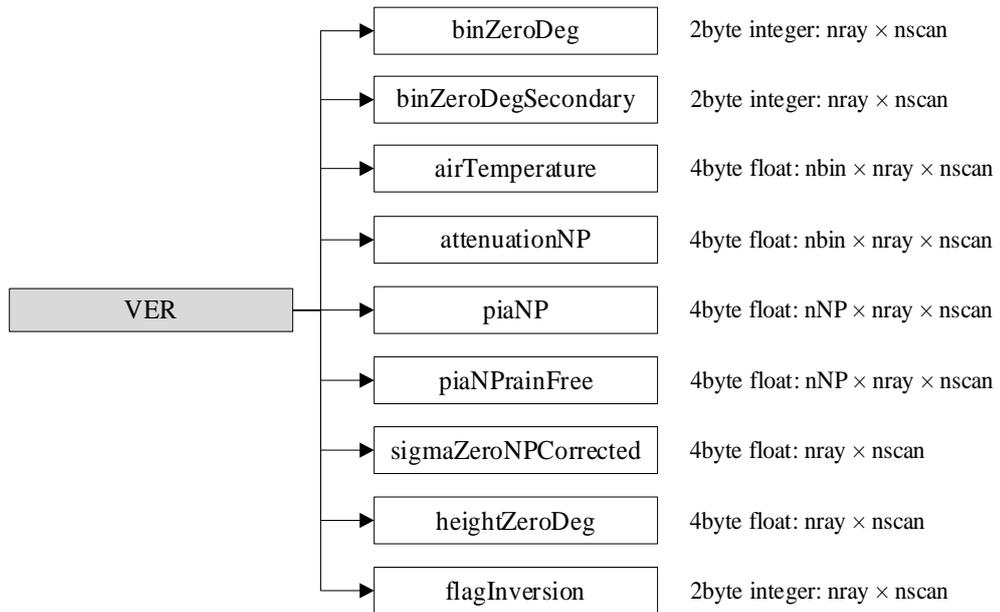


Figure 1.5-5 Data Format Structure for VER Group

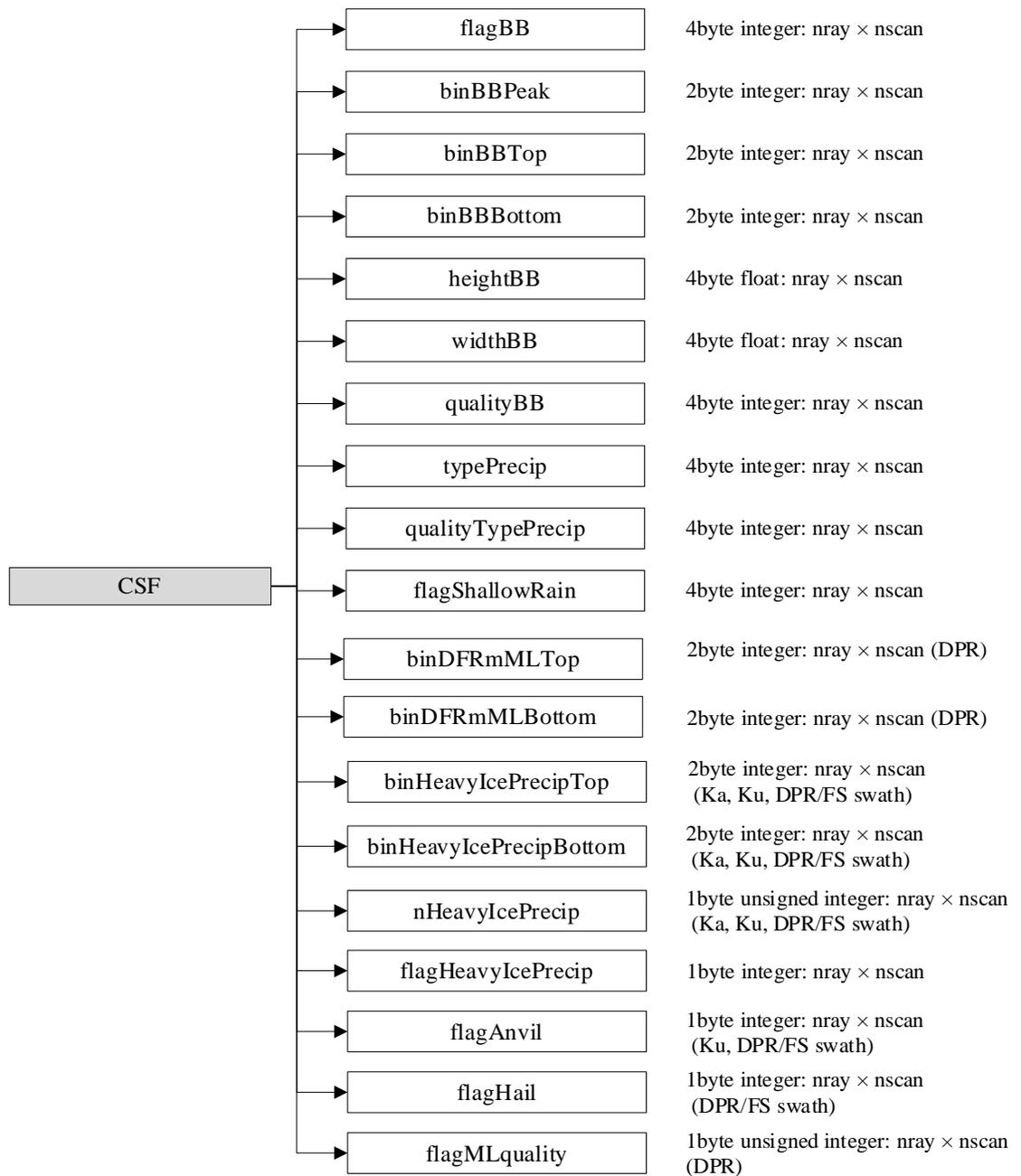


Figure 1.5-6 Data Format Structure for CSF Group

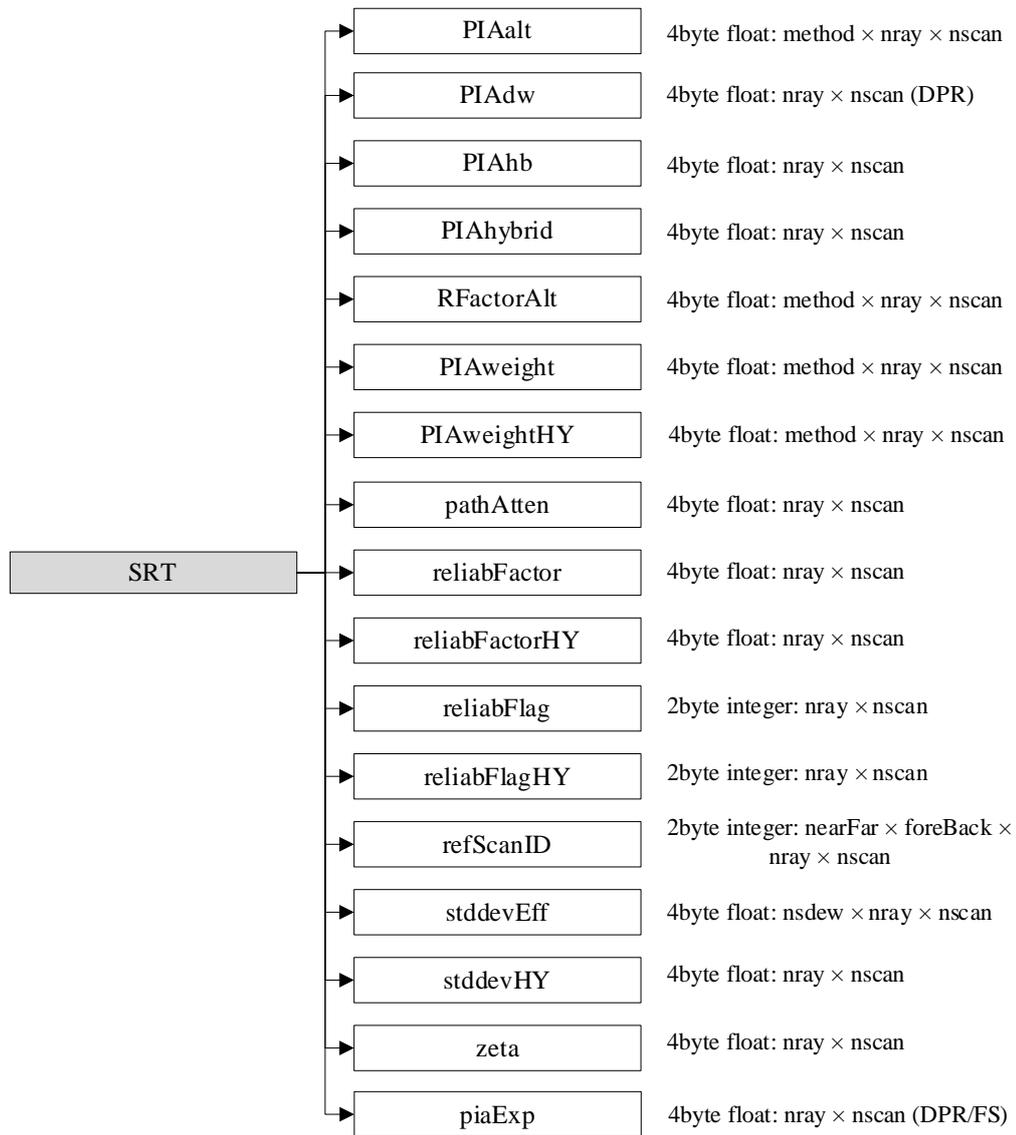


Figure 1.5-7 Data Format Structure for SRT Group

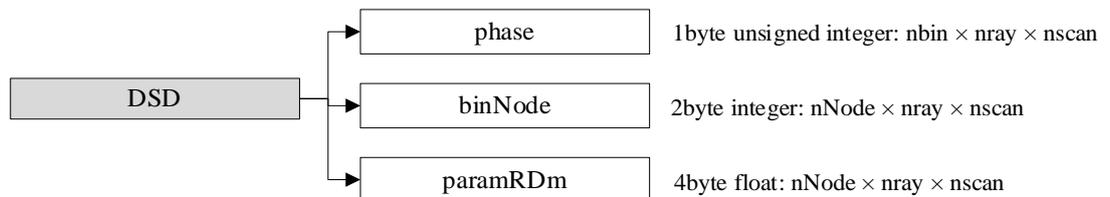


Figure 1.5-8 Data Format Structure for DSD Group

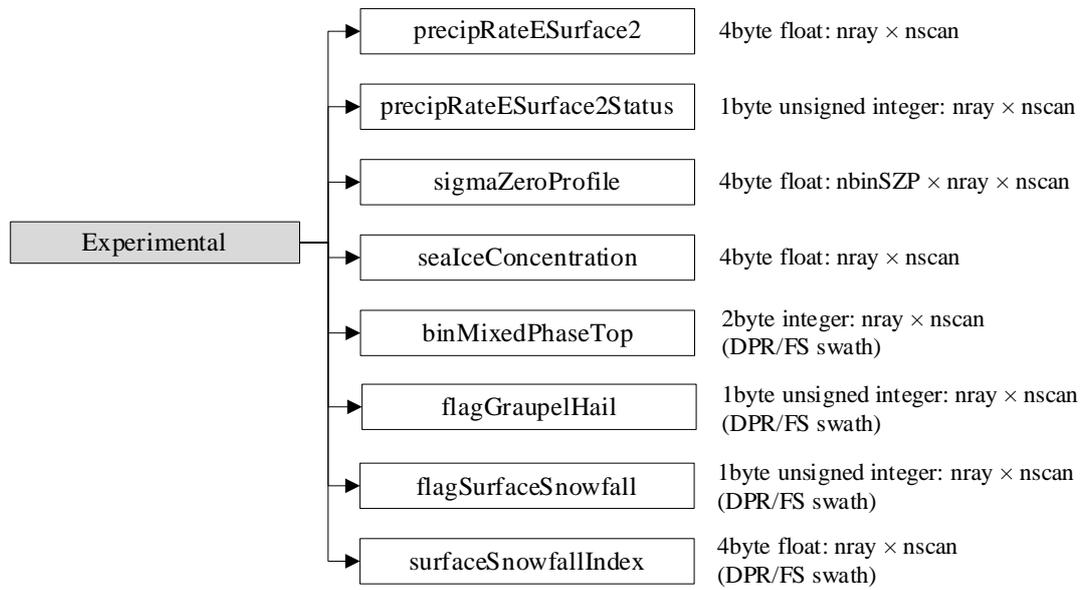


Figure 1.5-9 Data Format Structure for Experimental Group

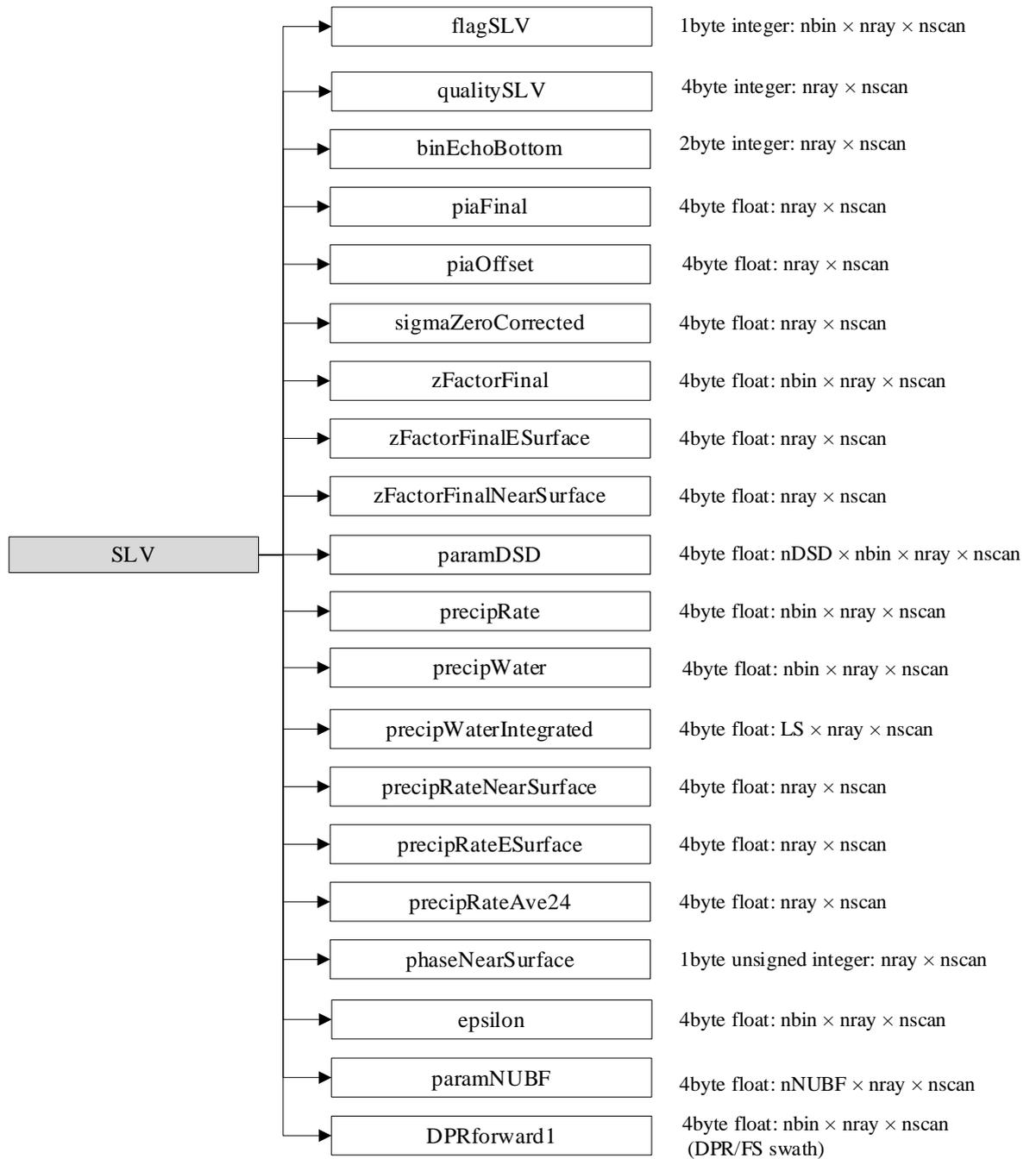


Figure 1.5-10 Data Format Structure for SLV Group

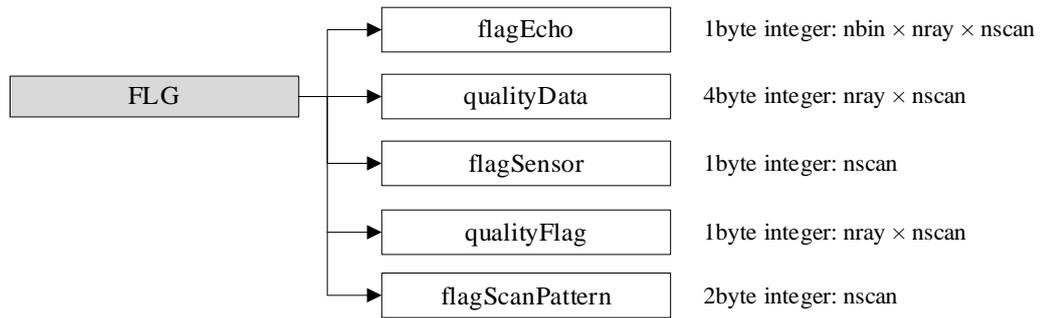


Figure 1.5-11 Data Format Structure for FLG Group

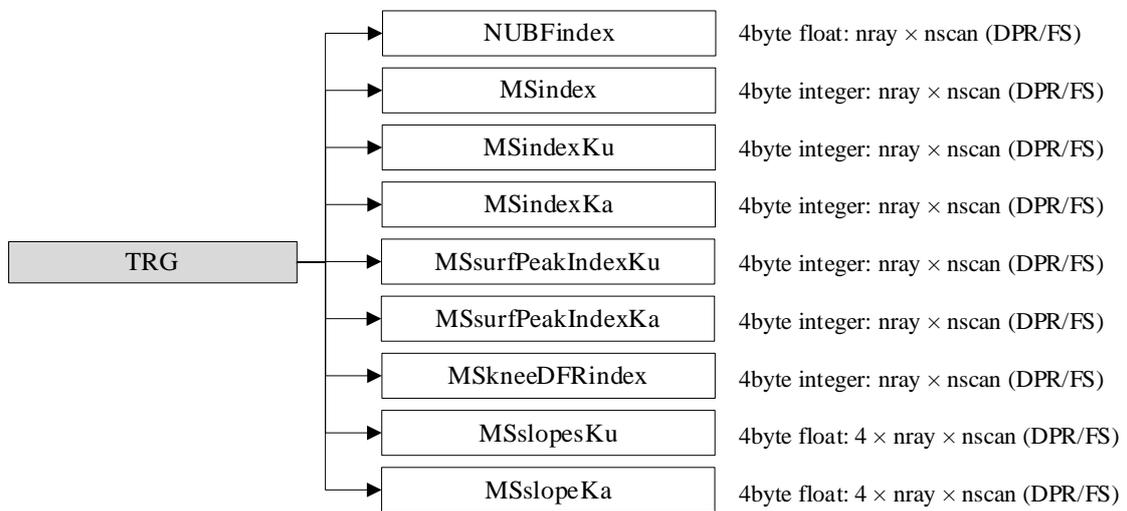


Figure 1.5-12 Data Format Structure for TRG Group

2. Level 2 Contents of Objects in each Group

2.1. Metadata

Metadata has seven elements. Figure 2.1-1 shows metadata structure.

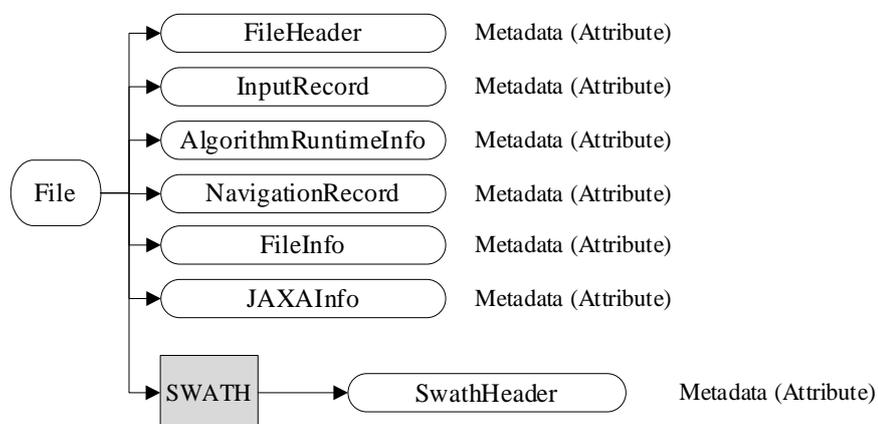


Figure 2.1-1 L2 Metadata

2.1.1. FileHeader

FileHeader contains metadata of general interest. This group appears in all data products. Table 2.1-1 shows each metadata elements in FileHeader.

Table 2.1-1 FileHeader Elements

No	Element	Description	Data size (bytes)
1	DOI	Digital Object Identifier. *Value is blank currently.	256
2	DOIauthority	Digital Object Identifier Authority.	256
3	DOIshortName	Digital Object Identifier Short Name. *Value is blank currently.	256
4	AlgorithmID	The algorithm that generated this product, e.g., 2A12.	50
5	AlgorithmVersion	The version of the algorithm that generated this product.	50
6	FileName	The file name of this granule.	50

2.1 Metadata

No	Element	Description	Data size (bytes)
7	SatelliteName	Values are: TRMM GPM MULTI F10 ... F18 AQUA GCOMW1 CORIOLIS MT1 NOAA15 ... NOAA19 METOPA NPP. More values will be added as they are known.	10
8	InstrumentName	Values are: PR TMI VIRS PRTMI KU KA DPR GMI DPRGMI MERGED SSMI SSMIS AMSRE AMSR2 WINDSAT MADRAS AMSUA AMSUB SAPHIR MHS ATMS. More values will be added as they are known.	10
9	GenerationDateTime	The date and time this granule were generated. The format is YYYY-MM-DDTHH:MM:SS.sssZ, where YYYY is 4-digit year, MM is month number, DD is day of month, T is "T", HH is hour, MM is minute, SS is second, sss is millisecond, and Z is "Z". All fields are zero-filled. The missing value is constructed by replacing all digits with 9, i.e., 9999-99-99T99:99:99.999Z.	50
10	StartGranuleDateTime	The start time defining this granule. The format is the same as GenerationDateTime. DETAILS: An orbital granule starts when the satellite is at the position defined by GranuleStart. Thus, the start time is not the first scan time. Some algorithms have overlap scans in the file before the start time as defined in SwathHeader. A monthly granule starts on the first ms of the month, for example March 1998 would be 1998-03-01T00:00:00.000Z.	50
11	StopGranuleDateTime	The stop time defining this granule. The format is the same as GenerationDateTime. DETAILS: An orbital granule stops when the satellite is at the position defined by GranuleStart. Thus, the stop time is not the last scan time. Some algorithms have overlap scans in the file after the stop time as defined in SwathHeader. A monthly granule stops on the last ms of the month, for example March 1998 would be 1998-03-31T23:59:59.999Z.	50
12	GranuleNumber	The number of this granule, which starts as in GranuleStart. If the GranuleStart is identical to the orbit start, then the GranuleNumber will be the same as the orbit number. The GranuleNumber will have 6 digits, including leading zeroes, for example 001234.	50
13	NumberOfSwaths	The number of swaths in this granule.	50
14	NumberOfGrids	The number of grid structures in this granule.	50
15	GranuleStart	The starting place in the orbit of this granule. Currently defined values are "SOUTHERNMOST LATITUDE" and "NORTHBOUND EQUATOR CROSSING".	50

2.1 Metadata

No	Element	Description	Data size (bytes)
16	TimeInterval	The time interval covered by this granule. Values are "ORBIT", "HALF ORBIT", "HALF HOUR", "HOUR", "3 HOUR", "DAY", "DAY ASC", DAY DES", "MONTH", "CONTACT".	50
17	ProcessingSystem	The name of the processing system, e.g., "PPS", "JAXA".	50
18	ProductVersion	The data version assigned by the processing system.	50
19	EmptyGranule	Whether a granule is empty. Values are "EMPTY" or "NOT EMPTY".	50
20	MissingData	The number of missing scans.	50

2.1.2. InputRecord

InputRecord contains a record of input files for this granule. This group appears in Level1, Level 2, and Level 3 orbital data products. Level 3 times averaged products have the same information separated into 3 groups since they have many inputs. Table 2.1-2 shows each metadata elements in InputRecord.

Table 2.1-2 InputRecord Elements

No	Element	Description	Data size (bytes)
1	InputFileNames	A list of input file names for this granule.	1000
2	InputAlgorithmVersions	A list of algorithm versions of the input files for this granule.	1000
3	InputGenerationDateTimes	A list of generation date times of the input files for this granule. The format is the same as GenerationDateTime.	1000

2.1.3. AlgorithmRuntimeInfo

AlgorithmRuntimeInfo contains text runtime information written by the algorithm. This group is a "Long Metadata Group", which has no elements. This group appears in products if the algorithm developer asks for it.

2.1.4. NavigationRecord

NavigationRecord contains navigation metadata for this granule. This group appears in Level 1, Level 2, and Level 3 orbital data products. Table 2.1-3 shows each metadata elements in NavigationRecord.

Table 2.1-3 NavigationRecord Elements

No	Element	Description	Data size (bytes)
1	LongitudeOnEquator	The longitude where the satellite crosses the equator going from south to north.	50
2	UTCDateTimeOnEquator	The UTC time when the satellite crosses the equator going from south to north. The format is the same as GenerationDate Time.	50
3	MeanSolarBetaAngle	The average solar beta angle in this granule.	50
4	EphemerisFileName	Name of the ephemeris file input for processing.	50
5	AttitudeFileName	Name of the attitude file input for processing.	50
6	GeoControlFileName	Name of the GeoTK Control Parameters File input for processing.	50
7	EphemerisSource	Values are "0 CONSTANT INPUT TEST VALUE", "1 GROUND ESTIMATED STATE (GES)", "2 GPS FILTERED SOLUTION (GEONS)", "3 GPS POINT SOLUTION (PVT)", "4 ON BOARD PROPAGATED (OBP)", "5 OEM GROUND EPHEMERIS FILE", "6 GEONS WITH FALLBACK AS FLAGGED", "7 PVT WITH FALLBACK AS FLAGGED", "8 OBP WITH FALLBACK AS FLAGGED", "9 GES WITH FALLBACK AS FLAGGED".	50
8	AttitudeSource	values are "0 CONSTANT INPUTS FOR TESTING", "1 ON BOARD CALCULATED PITCH ROLL YAW"	50
9	GeoToolkitVersion	Version of the GeoToolkit.	50

2.1 Metadata

No	Element	Description	Data size (bytes)
10	SensorAlignmentFirstRotationAngle	Alignment angle, first rotation, in degrees. Rotation adjustment from sensor coordinates to the Attitude Control System Flight Coordinates.	50
11	SensorAlignmentSecondRotationAngle	Alignment angle, second rotation, in degrees.	50
12	SensorAlignmentThirdRotationAngle	Alignment angle, third rotation, in degrees.	50
13	SensorAlignmentFirstRotationAxis	Euler rotation sequence, first rotation axis. Values are "1","2", "3" (representing X, Y, Z).	50
14	SensorAlignmentSecondRotationAxis	Euler rotation sequence, second rotation axis. Values are "1","2", "3" (representing X, Y, Z).	50
15	SensorAlignmentThirdRotationAxis	Euler rotation sequence, third rotation axis. Values are "1","2", "3" (representing X, Y, Z).	50

2.1.5. FileInfo

FileInfo contains metadata used by the PPS I/O Toolkit. This group appears in all data products.

Table 2.1-4 shows each metadata elements in FileInfo.

Table 2.1-4 FileInfo Elements

No	Element	Description	Data size (bytes)
1	DataFormatVersion	The version of the data format used to write this file. This version is separate for each AlgorithmID. The order is: "a" "b" ... "z" "aa" "ab" ... "az" "ba" "bb".	50
2	TKCodeBuildVersion	Usually TK CodeBuildVersion is "1". If the I/O routines built by TKIO change even though the DataFormatVersion is unchanged, then TK CodeBuildVersion increments to "2", "3", ...If subsequently DataFormatVersion changes, TKCodeBuildVersion becomes "1" again.	50
3	MetadataVersion	The version of metadata used to write this file. This version is separate for each AlgorithmID. The order is: "a" "b" ... "z" "aa" "ab" ... "az" "ba" "bb" ...	50
4	FormatPackage	The underlying format of this granule. Values are "HDF4", "HDF5", "NETCDF", "TKBINARY".	50
5	BlueprintFilename	The filename of the primary blueprint file that defined the format used to write this file.	50
6	BlueprintVersion	The BlueprintVersion of the format definition.	50
7	TKIOVersion	The version of TKIO used to create I/O routines to write this file. TKIOVersion does not define the format used to write this file.	50
8	MetadataStyle	The style in which the metadata was written, e.g., "PVL". "PVL" means < parameter >=< value >.	50
9	EndianType	The endian type of the system that wrote this file. Values are "BIG ENDIAN" and "LITTLE ENDIAN".	50

2.1.6. JAXAInfo

JAXAInfo contains metadata requested by JAXA. Used by DPR algorithms and GSMaP. Table 2.1-5 shows each metadata elements in JAXAInfo.

Table 2.1-5 JAXAInfo Elements

No	Element	Description	Data size (bytes)
1	GranuleFirstScanUTCDateTime	The date and time of first scan (incl. missing scan). The format is YYYY-MM-DDTHH:MM:SS.sssZ, where YYYY is 4-digit year, MM is month number, DD is day of month, T is "T", HH is hour, MM is minute, SS is second, sss is millisecond, and Z is "Z". All fields are zero-filled. The missing value is constructed by replacing all digits with 9, i.e., 9999-99-99T99:99:99.999Z.	50
2	GranuleLastScanUTCDateTime	Granule Last Scan UTC Date. Date is a 24 character string. The format is YYYY-MM-DDTHH:MM:SS.sssZ, where YYYY is 4-digit year, MM is month number, DD is day of month, T is "T", HH is hour, MM is minute, SS is second, sss is millisecond, and Z is "Z". All fields are zero-filled.	50
3	TotalQualityCode	<p>The total quality of product is defined based on the quality of input data. Quality meaning are</p> <p>(a) GPM KuPR/KaPR TRMM PR L2 product</p> <p>Good: The total quality of input data (Ku/Ka/PR L1B) is Good.</p> <p>Fair: The GPM KuPR/KaPR L2 is not JMA's global weather forecast (FCST) or JMA's Global ANALsis model data (GANAL) but weather DB file.</p> <p>EG (Empty Granule): The total quality of input data (Ku/Ka/PR L1B) is EG</p> <p>(b) GPM DPR L2 product</p> <p>Good: The total quality of both Ku L2 and Ka L2 is Good.</p> <p>Fair: (i)The total quality of either Ku L2 or Ka L2 is EG</p> <p>(ii)The input data used in GPM DPR L2 is not JMA's global weather forecast (FCST) or JMA's Global ANALysis model data (GANAL) but weather DB file.</p> <p>EG (Empty Granule): The total quality of both Ku L2 and Ka L2 is EG.</p> <p>(c) GPM DPR SLH L2 product</p> <p>Good: The total quality of input data (DPR L2) is Good</p> <p>Fair: The total quality of input data is Fair.</p> <p>EG (Empty Granule): The total quality of input data (DPR L2) is EG.</p>	50

2.1 Metadata

No	Element	Description	Data size (bytes)
4	FirstScanLat	Latitude of orbit first scan.	50
5	FirstScanLon	Longitude of orbit first scan.	50
6	LastScanLat	Latitude of orbit last scan.	50
7	LastScanLon	Longitude of orbit last scan.	50
8	NumberOfRainPixelsFS	Number of rain pixels in the FS swath, judged at DPR L2 algorithm. At DPR L1, value is "-9999".	50
10	NumberOfRainPixelsHS	Number of rain pixels in the HS swath, judged at DPR L2 algorithm. At DPR L1, value is "-9999".	50
11	ProcessingSubSystem	The name of the processing sub-system, e.g., "ALGORITHM", "PCS".	50
12	ProcessingMode	The name of the processing mode, e.g., "STD", "NRT".	50
13	Lightspeed	Constant value of light speed.	50
14	DielectricFactorKu	The dielectric factor $ K^2 $ at Ku.	50
15	DielectricFactorKa	The dielectric factor $ K^2 $ at Ka.	50

2.1.7. SwathHeader

SwathHeader contains metadata for swaths. This group appears in Level 1 and Level 2 data products. Table 2.1-6 shows each metadata elements in SwathHeader.

Table 2.1-6 SwathHeader Elements

No	Element	Description	Data size (bytes)
1	NumberScansInSet	The scans read by TKreadScan are a "set". For single swath data, one scan is read so NumberScansInSet=1. For multiple swath data, one TKreadScan may read more than one scan. For example, for SSM/I data one TKreadScan reads one low frequency scan and two high frequency scans. Therefore NumberScansInSet=1 for the low frequency swath and Number-ScansInSet=2 for the high frequency swath.	50
2	MaximumNumberScansTotal	The maximum allowed number of total scans in this swath. Total scans = overlap scans before granule + scans in granule + overlap scans after granule.	50
3	NumberScansBeforeGranule	The number of overlap scans before the first scan of the granule in this swath.	50
4	NumberScansGranule	The number of scans in the granule in this swath.	50
5	NumberScansAfterGranule	The number of overlap scans after the last scan of the granule in this swath.	50
6	NumberPixels	The number of IFOV in each scan in this swath.	50
7	ScanType	The type of scan in this swath. Values are: "CROSSTRACK" and "CONICAL".	50

2.2. Data Group

Elements of data group are explained in detail in this section. Each swath has 11 data group (12 data group for FS swath of 2ADPR) and 3 data (Latitude, Longitude and sunLocalTime) commonly.

Figure 2.2-1 shows data group structure.

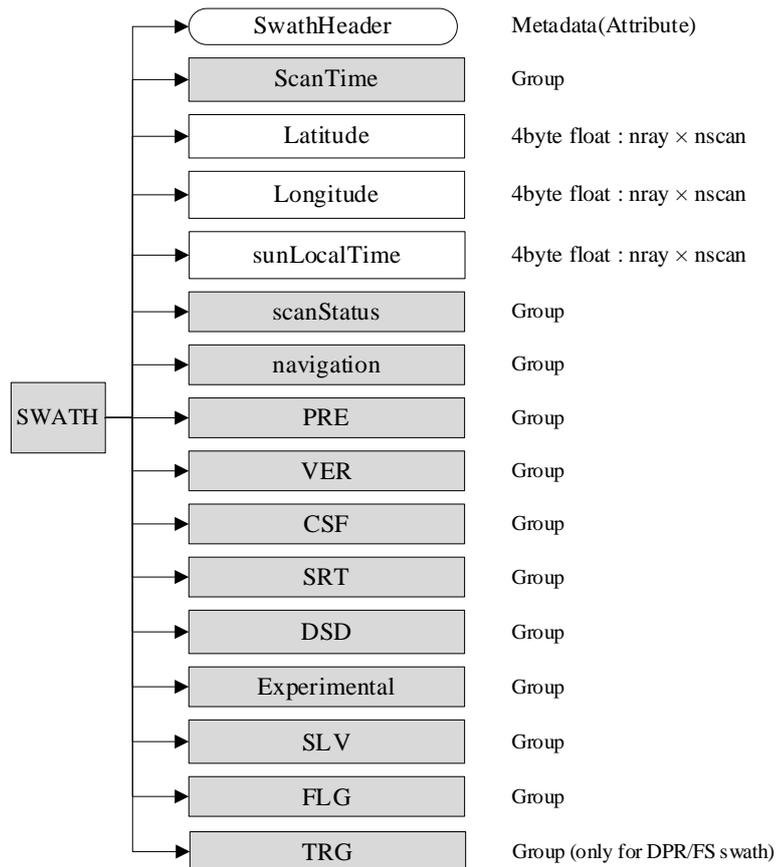


Figure 2.2-1 Data Format Structure for Data Group

2.2.1. ScanTime (Group)

(1) Year

Type	Array	Unit
2-byte integer	nscan	year

4-digit year, e.g., 1998. Values range from 1950 to 2100 years:

Missing Value: -9999

(2) Month

Type	Array	Unit
1-byte integer	nscan	month

Month of the year. Values range from 1 to 12 months.

Missing Value: -99

(3) DayOfMonth

Type	Array	Unit
1-byte integer	nscan	day

Day of the month. Values range from 1 to 31 days.

Missing Value: -99

(4) Hour

Type	Array	Unit
1-byte integer	nscan	hour

UTC hour of the day. Values range from 0 to 23 hours.

Missing Value: -99

(5) Minute

Type	Array	Unit
1-byte integer	nscan	minute

Minute of the hour. Values range from 0 to 59 minutes.

Missing Value: -99

(6) Second

Type	Array	Unit
1-byte integer	nscan	s

Second of the minute. Values range from 0 to 60 s.

Missing Value: -99

(7) MilliSecond

Type	Array	Unit
2-byte integer	nscan	ms

Thousandths of the second. Values range from 0 to 999 ms.

Missing Value: -9999

(8) DayOfYear

Type	Array	Unit
2-byte integer	nscan	day

Day of the year. Values range from 1 to 366 days.

Missing Value: -9999

(9) SecondOfDay

Type	Array	Unit
8-byte float	nscan	s

A time associated with the scan. It is expressed as the UTC seconds of the day.

Values range from 0 to 86400 s.

Missing Value: -9999.9

2.2.2. Latitude**(1) Latitude**

Type	Array	Unit
4-byte float	nray * nscan	degree

The earth latitude of the center of the IFOV at the altitude of the earth ellipsoid. Latitude is positive north, negative south.

Values range from -90 to 90 degrees.

Missing Value: -9999.9

2.2.3. Longitude**(1) Longitude**

Type	Array	Unit
4-byte float	nray * nscan	degree

The earth longitude of the center of the IFOV at the altitude of the earth ellipsoid. Longitude is positive east, negative west. A point on the 180th meridian has the value -180 degrees.

Values range from -180 to 180 degrees.

Missing Value: -9999.9

2.2.4. sunLocalTime**(1) sunLocalTime**

Type	Array	Unit
4-byte float	nray * nscan	hour

The local hour angle of the Sun at the pixel location, where 0 is midnight and 12 is local noon when the Sun crosses the local meridian. Also known as apparent solar time at any location. In V07 TMI and GMI products will have values but partner products will be filled with the missing value.

Values range from 0 to 24 hours.

Missing Value: -9999.9

2.2.5. scanStatus (Group)

(1) dataQuality

Type	Array	Array (2ADPR FS)	Unit
1-byte integer	nscan	nfreq * nscan	N/A

A summary of data quality in the scan. Unless this is 0 (normal), the scan data is meaningless to higher precipitation processing. Bit 0 is the least significant bit (i.e., if bit $i = 1$ and other bits = 0, the unsigned integer value is 2^{*i}).

In the 2ADPR FS,

nfreq (1): Estimated by KuPR single-frequency algorithm.

nfreq (2): Estimated by KaPR single-frequency algorithm.

<p>Bit Meaning</p> <p>0: missing</p> <p>5: geoError is not zero</p> <p>6: modeStatus is not zero</p>
--

(2) dataWarning

Type	Array	Array (2ADPR FS)	Unit
1-byte integer	nscan	nfreq * nscan	N/A

Flag of data warning for each scan. Bit Meaning is below.

In the 2ADPR FS,

nfreq (1): Estimated by KuPR single-frequency algorithm.

nfreq (2): Estimated by KaPR single-frequency algorithm.

<p>Bit Meaning</p> <p>0: beam Matching is abnormal</p> <p>1: VPRF table is abnormal</p> <p>2: surface Table is abnormal</p> <p>3: geoWarning is not Zero</p> <p>4: operational mode is not observation mode.</p> <p>5: GPS status is abnormal</p>

(3) missing

Type	Array	Array (2ADPR FS)	Unit
1-byte integer	nscan	nfreq * nscan	N/A

Indicates whether information is contained in the scan data. The values are as follows.

In the 2ADPR FS,

nfreq (1): Estimated by KuPR single-frequency algorithm.

nfreq (2): Estimated by KaPR single-frequency algorithm.

<p>Bit Meaning</p> <p>0: Scan is missing</p> <p>1: Science telemetry packet missing</p> <p>2: Science telemetry segment within packet missing</p> <p>3: Science telemetry other missing</p> <p>4: Housekeeping (HK) telemetry packet missing</p> <p>5: Spare (always 0)</p> <p>6: Spare (always 0)</p> <p>7: Spare (always 0)</p>

(4) modeStatus

Type	Array	Array (2ADPR FS)	Unit
1-byte integer	nscan	nfreq * nscan	N/A

A summary of status modes. If all status modes are routine, all bits in modeStatus = 0. Routine means that scan data has been measured in the normal operational situation as far as the status modes are concerned. modeStatus does not assess geolocation quality. modeStatus is broken into 8 bit flags. Each bit = 0 if the status is routine but the bit = 1 if the status is not routine. Bit 0 is the least significant bit (i.e., if bit i = 1 and other bits = 0, the unsigned integer value is 2**i). The non-routine situations follow:

In the 2ADPR FS,

nfreq (1): Estimated by KuPR single-frequency algorithm.

nfreq (2): Estimated by KaPR single-frequency algorithm.

Bit Meaning

0: Spare (always 0)

1: SCorientation not 0 or 180

2: pointingStatus not 0

3: Non-routine limitErrorFlag

4: Non-routine operationalMode (not 1 or 11)

5: Spare (always 0)

6: Spare (always 0)

7: Spare (always 0)

(5) geoError

Type	Array	Array (2ADPR FS)	Unit
2-byte integer	nscan	nfreq * nscan	N/A

A summary of geolocation errors in the scan. geoError is used to set a bit in dataQuality. A zero integer value of geoError indicates 'good' geolocation. A non-zero value broken down into the bit flags below indicates the specified reason, where bit 0 is the least significant bit (i.e., if bit $i = 1$ and other bits = 0 the unsigned integer value is 2^{**i}). Bits 0, 4, 5, 8 and 9 are per pixel error flags. If the number of bad pixels (for any of the reasons specified by these flags) is greater than the threshold then bit 7 = 1 and each of these flags is set to 1 if any pixel is bad for that reason. At launch this threshold is zero, so data is flagged if any pixel is bad. If the number of bad pixels is less than or equal to the threshold then bit 7 = 0 and all of these flags are also 0.

In the 2ADPR FS,

nfreq (1): Estimated by KuPR single-frequency algorithm.

nfreq (2): Estimated by KaPR single-frequency algorithm.

Bit Meaning

- 0: Latitude limit exceeded for viewed pixel locations
- 1: Negative scan time, invalid input
- 2: Error getting spacecraft attitude at scan mid-time
- 3: Error getting spacecraft ephemeris at scan mid-time
- 4: Invalid input non-unit ray vector for any pixel
- 5: Ray misses Earth for any pixel with normal pointing
- 6: Nadir calculation error for subsatellite position
- 7: Pixel count with geolocation error over threshold
- 8: Error in getting spacecraft attitude for any pixel
- 9: Error in getting spacecraft ephemeris for any pixel
- 10: Spare (always 0)
- 11: Spare (always 0)
- 12: Spare (always 0)
- 13: Spare (always 0)
- 14: Spare (always 0)
- 15: Spare (always 0)

(6) geoWarning

Type	Array	Array (2ADPR FS)	Unit
2-byte integer	nscan	nfreq * nscan	N/A

A summary of geolocation warnings in the scan. geoWarning does not set a bit in dataQuality. Warnings indicate unusual conditions. These conditions do not indicate bad geolocation but are flagged as a warning that further review of the data may be useful. A zero integer value indicates usual geolocation. A non-zero value broken down into the following bit flags indicates the following, where bit 0 is the least significant bit (i.e., if bit $i = 1$ and other bits = 0 the unsigned integer value is 2^{**i}):

In the 2ADPR FS,

nfreq (1): Estimated by KuPR single-frequency algorithm.

nfreq (2): Estimated by KaPR single-frequency algorithm.

Bit Meaning

- 0: Ephemeris Gap Interpolated
- 1: Attitude Gap Interpolated
- 2: Attitude jump/discontinuity
- 3: Attitude out of range
- 4: Anomalous Time Step
- 5: GHA not calculated due to error
- 6: SunData (Group) not calculated due to error
- 7: Failure to calculate Sun in inertial coordinates
- 8: Fallback to GES ephemeris
- 9: Fallback to GEONS ephemeris
- 10: Fallback to PVT ephemeris
- 11: Fallback to OBP ephemeris
- 12: Spare (always 0)
- 13: Spare (always 0)
- 14: Spare (always 0)
- 15: Spare (always 0)

(7) SCorientation

Type	Array	Unit
2-byte integer	nscan	degree

The positive angle of the spacecraft vector (v) from the satellite forward direction of motion, measured clockwise facing down. We define v in the same direction as the spacecraft axis +X, which is also the center of the GMI scan. If SCorientation is not 0 or 180, a bit is set to 1 in modeStatus.

Value Meaning

0: +X forward (yaw 0)

180: -X forward (yaw 180)

-8000: Non-nominal pointing

-9999: Missing

(8) pointingStatus

Type	Array	Array (2ADPR FS)	Unit
2-byte integer	nscan	nfreq * nscan	N/A

It is provided by the GeoTK. A value of zero means the pointing is good. Non-zero values indicate non-nominal pointing. If pointingStatus is non-zero, a bit in modeStatus is set to 1.

In the 2ADPR FS,

nfreq (1): Estimated by KuPR single-frequency algorithm.

nfreq (2): Estimated by KaPR single-frequency algorithm.

Value Meaning

0: Nominal pointing in Mission Science Mode

1: GPS point solution stale and PVT ephemeris used

2: GEONS solution stale and GEONS ephemeris used

-8000: Non-nominal mission science orientation

-9999: Missing

(9) acsModeMidScan

Type	Array	Unit
1-byte integer	nscan	N/A

It is provided by the GeoTK as taken from Attitude Control System telemetry and is provided in this format for information only.

<p>Value Meaning</p> <p>0: LAUNCH</p> <p>1: RATENULL</p> <p>2: SUNPOINT</p> <p>3: GSPM (Gyro-less Sun Point)</p> <p>4: MSM (Mission Science Mode)</p> <p>5: SLEW</p> <p>6: DELTAH</p> <p>7: DELTAV</p>
--

(10) targetSelectionMidScan

Type	Array	Unit
1-byte integer	nscan	N/A

It is provided by the GeoTK as taken from Attitude Control System telemetry and is provided in this format for information only.

<p>Value Meaning</p> <p>0: S/C Z axis nadir, +X in flight direction</p> <p>1: Flight Z axis nadir, +X in flight direction</p> <p>2: S/C Z axis nadir, -X in flight direction</p> <p>3: Flight Z axis nadir, -X in flight direction</p> <p>4: +90 yaw for DPR antenna pattern calibration</p> <p>5: -90 yaw for DPR antenna pattern calibration</p> <p>-99: Missing</p>
--

(11) operationalMode

Type	Array	Array (2ADPR FS)	Unit
1-byte integer	nscan	nfreq * nscan	N/A

The operational mode of KuPR/KaPR/PR stored in science telemetry basically. However, if science telemetry is not made like as stand-by mode, KuPR/KaPR L1B algorithm decides it using HK telemetry. PR L1B algorithm stored missing value. The values range is 1 to 20 for KuPR/KaPR. The values range is 1 to 3, 5, 6, 10, -99. The value meaning is shown below.

In the 2ADPR FS,

nfreq (1): Estimated by KuPR single-frequency algorithm.

nfreq (2): Estimated by KaPR single-frequency algorithm.

Value Meaning

- 1: Ku/Ka/PR Observation
- 2: Ku/Ka/PR External Calibration
- 3: Ku/Ka/PR Internal Calibration
- 4: Ku/Ka SSPA Analysis
- 5: Ku/Ka/PR LNA Analysis
- 6: Ku/Ka/PR Health-Check
- 7: Ku/Ka Standby VPRF Table OUT
- 8: Ku/Ka Standby Phase Out
- 9: Ku/Ka Standby Dump Out
- 10: Ku/Ka Standby (No Science Data)
- 11: Ku/Ka/PR Independent Observation
- 12: Ku/Ka Independent External Calibration
- 13: Ku/Ka Independent Internal Calibration
- 14: Ku/Ka Independent SSPA Analysis
- 15: Ku/Ka Independent LNA Analysis
- 16: Ku/Ka Independent Health-Check
- 17: Ku/Ka Independent Standby VPRF Table OUT
- 18: Ku/Ka Independent Standby Phase Out
- 19: Ku/Ka Independent Standby Dump Out
- 20: Ku/Ka Independent Standby (No Science Data)
- 99: PR missing value (No Science Data)

(12) limitErrorFlag

Type	Array	Array (2ADPR FS)	Unit
1-byte integer	nscan	nfreq * nscan	N/A

It has 2 error information. One is as for noise power limit, another one is as for binEllipsoid limit. The former is defined that if there are more than 2 overlimited rays in a swath, limitErrorFlag (at 0bit) is adapted. On the other hand, the latter is defined that if there is even an overlimited ray, limitErrorFlag (at 1bit) is adapted. Then, limitErrorFlag is used in modeStatus, dataQuality in scanStatus Group picks it up consequently.

In the 2ADPR FS,

nfreq (1): Estimated by KuPR single-frequency algorithm.

nfreq (2): Estimated by KaPR single-frequency algorithm.

The values are

Bit Meaning
0: noise power limit error
1: binEllipsoid is missing
2: Spare (always 0)
3: Spare (always 0)
4: Spare (always 0)
5: Spare (always 0)
6: Spare (always 0)
7: Spare (always 0)

(13) FractionalGranuleNumber

Type	Array	Unit
8-byte float	nscan	N/A

The floating-point granule numbers. The granule begins at the Southern-most point of the spacecraft's trajectory. For example, FractionalGranuleNumber = 10.5 means the spacecraft is halfway through granule 10 and starting the descending half of the granule. Values range from 0 to 100000. In Near Real Time (NRT) process, granule number is stored only '0', so Fractional Granule Number less than 1.0.

Missing value: -9999.9

2.2.6. navigation (Group)

(1) scPos

Type	Array	Unit
4-byte float	XYZ * nscan	m

For 2AKu, 2AKa and 2ADPR, the position vector (m) of the spacecraft in Earth-Centered Earth Fixed (ECEF) Coordinates at the Scan mid-Time (i.e., time at the middle pixel/IFOV of the active scan period). For 2APR, the position vector (m) of the spacecraft in True of Date (TOD) Earth-Centered Inertial (ECI) Coordinates at the Scan mid-Time. Values range from -10000000 to 10000000 m.

Missing value: -9999.9

(2) scVel

Type	Array	Unit
4-byte float	XYZ * nscan	m/s

For 2AKu, 2AKa and 2ADPR, the velocity vector (m/s) of the spacecraft in ECEF Coordinates at the Scan mid-Time. For 2APR, the velocity vector (m/s) of the spacecraft in TOD ECI Coordinates at the Scan mid-Time. Values range from -10000000 to 10000000 m/s.

Missing value: -9999.9

(3) scLat

Type	Array	Unit
4-byte float	nscan	degrees

The geodesic latitude (decimal degrees) of the spacecraft at the Scan mid-Time. Values range from -70 to 70 degrees.

Missing value: -9999.9

(4) scLon

Type	Array	Unit
4-byte float	nscan	degrees

The geodesic longitude (decimal degrees) of the spacecraft at the Scan mid-Time. Values range from -180 to 180 degrees.

Missing value: -9999.9

(5) scAlt

Type	Array	Unit
4-byte float	nscan	m

The altitude (m) of the real spacecraft above the Earth Ellipsoid at the Scan mid-Time. It is computed by GeoTK. Values range from 350000 to 500000 m. Note that originally scAlt has been almost the same value as dprAlt, but after the GPM altitude change operated in November 2023, only scAlt represents the altitude of the satellite.

Missing value: -9999.9

(6) dprAlt

Type	Array	Unit
4-byte float	nscan	m

The altitude (m) of the spacecraft above the Earth Ellipsoid at the Scan mid-Time from DPR science telemetry for DPR operation. This is empty in non-DPR products. It is stored 'GPS Altitude Data' with LSB equal to 10m in DPR science telemetry. Values range from 350000 to 500000 m.

After the change of satellite altitude operated in November 2023 (GPM Orbit Boost), dprAlt is stored as scAlt minus 35 km. The following equation shows the relation between dprAlt and scAlt.

$$dprAlt = scAlt - 35000$$

Missing value:

-9999.9: at missing scan and internal calibration mode.

(7) scAttRollGeoc

Type	Array	Unit
4-byte float	nscan	degrees

The geocentric satellite attitude Euler roll angle (degrees) at the Scan mid-Time. The order of the components in the file is roll, pitch, and yaw. However, the angles are computed using a 3-2-1 Euler rotation sequence representing the rotation order yaw, pitch, and roll for the rotation from Orbital Coordinates to the spacecraft body coordinates. Orbital Coordinates represent an orthogonal triad in Geocentric Inertial Coordinates where the Z-axis is toward the geocentric nadir, the Y-axis is perpendicular to the spacecraft velocity opposite the orbit normal direction, and the X-axis is approximately in the velocity direction for a near circular orbit. Note this is geocentric, not geodetic, referenced, so that pitch and roll will have twice orbital frequency components due to the onboard control system following the oblate geodetic Earth horizon. Note also that the yaw value will show an orbital frequency component relative to the Earth fixed ground track due to the Earth rotation relative to inertial coordinates. Values range from -180 to 180 degrees.

Missing value: -9999.9

(8) scAttPitchGeoc

Type	Array	Unit
4-byte float	nscan	degrees

The geocentric satellite attitude Euler pitch angle (degrees) at the Scan mid-Time. Values range from -180 to 180 degrees.

Missing value: -9999.9

(9) scAttYawGeoc

Type	Array	Unit
4-byte float	nscan	degrees

The geocentric satellite attitude Euler yaw angle (degrees) at the Scan mid-Time. Values range from -135 to 225 degrees.

Missing value: -9999.9

(10) scAttRollGeod

Type	Array	Unit
4-byte float	nscan	degrees

The geodetic satellite attitude Euler roll angle (degrees) at the Scan mid-Time. The order of the components in the file is roll, pitch, and yaw. However, the angles are computed using a 3-2-1 Euler rotation sequence representing the rotation order yaw, pitch, and roll for the rotation from Geodetic Coordinates to the spacecraft body coordinates. Geodetic Coordinates represent an orthogonal triad in Geocentric Inertial Coordinates where the Z-axis is toward the geodetic nadir, the Y-axis is perpendicular to the spacecraft velocity opposite the orbit normal direction, and the X-axis is approximately in the velocity direction for a near circular orbit. Values range from -180 to 180 degrees.

Missing value: -9999.9

(11) scAttPitchGeod

Type	Array	Unit
4-byte float	nscan	degrees

The geodetic satellite attitude Euler pitch angle (degrees) at the Scan mid-Time. Values range from -180 to 180 degrees.

Missing value: -9999.9

(12) scAttYawGeod

Type	Array	Unit
4-byte float	nscan	degrees

The geodesic satellite attitude Euler yaw angle (degrees) at the Scan mid-Time. Values range from -135 to 225 degrees.

Missing value: -9999.9

(13) scHeadingGround

Type	Array	Unit
4-byte float	nscan	degrees

The spacecraft ground track heading measured about the geodetic nadir with respect to North at the scan mid-Time. This is the apparent direction of spacecraft motion over the Earth's surface, accounting for Earth rotation effects.

Values range from -180 to 180 degrees.

Missing value: -9999.9

(14) scHeadingOrbital

Type	Array	Unit
4-byte float	nscan	degrees

The spacecraft orbital reference heading measured about the geodetic nadir with respect to North at the subsatellite point at the scan mid-Time. This is the apparent direction of the inertial velocity and the zero-yaw angle reference direction for spacecraft control.

Values range from -180 to 180 degrees.

Missing value: -9999.9

(15) greenHourAng

Type	Array	Unit
4-byte float	nscan	degrees

The rotation angle (degrees) from Geocentric Inertial Coordinates to Earth Fixed Coordinates. Values range from 0 to 390 degrees.

Missing value: -9999.9

(16) timeMidScan

Type	Array	Unit
8-byte float	nscan	s

The Scan mid-Time in GPS Atomic time, namely the seconds since 0000 UTC, 6 Jan 1980. timeMidScan is used as the reference time for the scPos and scVel values. Values range from 0 to 10000000000 s.

Missing value: -9999.9

(17) timeMidScanOffset

Type	Array	Unit
8-byte float	nscan	s

Offset from the secondary header packet time to the timeMidScan. Values range from 0 to 100 s. Missing value: -9999.9

2.2.7. PRE (Group)

(1) elevation

Type	Array	Unit
4-byte float	nray * nscan	m

Elevation of the measurement point. It is a copy of DEMHmean of level 1B product.

In the 2ADPR, it is estimated by dual-frequency algorithm.

Missing Value: -9999.9

(2) landSurfaceType

Type	Array	Unit
4-byte integer	nray * nscan	N/A

Land surface type.

In the 2ADPR, it is estimated by dual-frequency algorithm.

The values are

Value Meaning
0-99: Ocean
100 - 199: Land
200 - 299: Coast
300 - 399: Inland water
-9999: Missing

(3) localZenithAngle

Type	Array	Array (2ADPR FS)	Unit
4-byte float	nray * nscan	nfreq * nray * nscan	degree

Local zenith angle of each ray. It is a copy of scLocalZenith of level 1B product.

In the 2ADPR FS,

nfreq (1): Estimated by KuPR single-frequency algorithm.

nfreq (2): Estimated by KaPR single-frequency algorithm.

Missing Value: -9999.9

(4) flagPrecip

Type	Array	Unit
4-byte integer	nray * nscan	N/A

The values estimated by single frequency algorithm are

<p>Value Meaning</p> <p>0: No precipitation (including the case of missing)</p> <p>1: Precipitation (1-D judgement)</p> <p>2: Precipitation (3-D judgement)</p>

To know the detailed data quality of the pixel, it is helpful to read /FLG/qualityData.

In the 2ADPR, the values are defined as:

$$\text{flagPrecip}_{\text{DPR}} = 10\text{flagPrecip}_{\text{Ku}} + \text{flagPrecip}_{\text{Ka}}$$

Values Meaning:

flagPrecip _{DPR}	flagPrecip _{Ku}	flagPrecip _{Ka}
0	0 (No precipitation)	0 (No precipitation)
1	0 (No precipitation)	1 (1-D judgement)
2	0 (No precipitation)	2 (3-D judgement)
10	1 (1-D judgement)	0 (No precipitation)
11	1 (1-D judgement)	1 (1-D judgement)
12	1 (1-D judgement)	2 (3-D judgement)
20	2 (3-D judgement)	0 (No precipitation)
21	2 (3-D judgement)	1 (1-D judgement)
22	2 (3-D judgement)	2 (3-D judgement)

(5) binRealSurface

Type	Array	Array (2ADPR FS)	Unit
2-byte integer	nray * nscan	nfreq * nray * nscan	

Range bin number for real surface.

In the 2ADPR FS,

nfreq (1): Estimated by KuPR single-frequency algorithm.

nfreq (2): Estimated by dual-frequency algorithm.

Missing Value: -9999

(6) binStormTop

Type	Array	Unit
2-byte integer	nray * nscan	

Range bin number for the storm top.

In the 2ADPR, it is estimated by dual-frequency algorithm.

Missing Value: -9999

(7) binMirrorImageL2

Type	Array	Unit
2-byte integer	nray * nscan	

The lowest range bin number where a mirror image echo may appear. For FS swaths, the bin numbers are 1-based ranging from 1 at the top of the data window with 176 at the Ellipsoid. For HS swaths, the bin number are 1-based ranging from 1 at the top of the data window with 88 at the Ellipsoid.

Missing Value: -9999

(8) height

Type	Array	Unit
4-byte float	nbin * nray * nscan	m

Height of each received echo.

In the 2ADPR, it is estimated by KuPR single-frequency algorithm.

Missing Value: -9999.9

(9) heightStormTop

Type	Array	Unit
4-byte float	nray * nscan	m

Height of storm top.

In the 2ADPR, it is estimated by dual-frequency algorithm.

Missing Value: -9999.9

(10) binClutterFreeBottom

Type	Array	Unit
2-byte integer	nray * nscan	

Range bin number for clutter free bottom.

In the 2ADPR, it is estimated by KuPR single-frequency algorithm.

Missing Value: -9999

(11) sigmaZeroMeasured

Type	Array	Array (2ADPR FS)	Unit
4-byte float	nray * nscan	nfreq * nray * nscan	dB

Surface backscattering cross section without attenuation correction (as measured).

In the 2ADPR FS,

nfreq (1): Estimated by KuPR single-frequency algorithm.

nfreq (2): Ka-band sigmaZeroMeasured estimated by dual-frequency algorithm.

Missing Value: -9999.9

(12) zFactorMeasured

Type	Array	Array (2ADPR FS)	Unit
4-byte float	nbin * nray * nscan	nfreq * nbin * nray * nscan	dBZ

Vertical profile of reflectivity factor (Z) without attenuation correction (as measured).

$10\log_{10}(Z)$ where Z is in mm^6/m^3 .

In the 2ADPR FS,

nfreq (1): Estimated by KuPR single-frequency algorithm.

nfreq (2): Estimated by KaPR single-frequency algorithm.

Missing Value: -9999.9

(13) ellipsoidBinOffset

Type	Array	Unit
4-byte float	nray * nscan	m

Distance between the ellipsoid and a center range bin of binEllipsoid defined by level 1B algorithm.

$\text{ellipsoidBinOffset} = \text{scRangeEllipsoid} - (\text{startBinRange} + (\text{binEllipsoid} - 1) \times \text{rangeBinSize})$

scRangeEllipsoid: Distance between a sensor and the ellipsoid [m]

startBinRange: Distance between a sensor and a center of the highest observed range bin [m]

binEllipsoid: Range bin number of the Ellipsoid (1 - 260)

rangeBinSize: Range bin size [m]

Missing Value: -9999.9

(14) echoCountRealSurface

Type	Array	Array (2ADPR FS)	Unit
1-byte unsigned integer	nray * nscan	nfreq * nray * nscan	N/A

Echo count at a surface position (binRealSurface).

In 2ADPR FS,

nfreq (1): Estimated by KuPR single-frequency algorithm.

nfreq (2): Estimated by KaPR single-frequency algorithm.

Missing Value: 0

(15) snRatioAtRealSurface

Type	Array	Array (2ADPR FS)	Unit
4-byte float	nray * nscan	nfreq * nray * nscan	N/A

Signal/Noise ratio at real surface range bin.

$\text{snRatioAtRealSurface} = 10 \times \log_{10}(\text{echoPower [mW]}/\text{noisePower [mW]})$

In the 2ADPR FS,

nfreq (1): Estimated by KuPR single-frequency algorithm.

nfreq (2): Estimated by KaPR single-frequency algorithm.

Missing Value: -9999

(16) adjustFactor

Type	Array	Array (2ADPR FS)	Unit
4-byte float	nray * nscan	nfreq * nray * nscan	dB

Adjustment factor (dB) for zFactorMeasured (dBZm') and sigmaZeroMeasured (dBs0m'). dBZm' and dBs0m' are used and stored as follows:

$$\text{dBZm}' = \text{dBZm} - \text{adjustFactor}$$

$$\text{dBs0m}' = \text{dBs0m} - \text{adjustFactor}$$

The adjustment factor is the sum of 3 components:

- base adjustment for instrument dependency,
- angle-bin adjustment for angle-bin dependency, and
- temporal adjustment for orbit number dependency.

In the 2ADPR FS,

nfreq (1): Estimated by KuPR single-frequency algorithm.

nfreq (2): Estimated by KaPR single-frequency algorithm.

Missing Value:

-9999.9

(17) snowIceCover

Type	Array	Unit
1-byte integer	nray * nscan	N/A

Snow and ice cover information. It refers to ancillary data (multisensor snow/ice cover maps) provided by NOAA.

In the 2ADPR, it is estimated by KuPR single-frequency algorithm.

In the 2APR, 0 is set everywhere since the current TRMM/PR algorithm does not input the ancillary data provided by the NOAA.

The values are

Value	Meaning
0:	Open water
1:	Land, no snow
2:	Snow cover on land
3:	Ice on water
-99:	Missing

(18) flagSigmaZeroSaturation

Type	Array	Array (2ADPR FS)	Unit
1-byte unsigned integer	nray * nscan	nfreq * nray * nscan	N/A

A flag to show whether echoPower is under a saturated level or not at a range bin with a calculation of sigmaZeroMeasured.

The values are as follows:

Value Meaning 0: Normal (under saturated level) 1: Possible saturated level at real surface 2: Saturated level at real surface 99: Missing
--

In the 2ADPR FS,

nfreq (1): Estimated by KuPR single-frequency algorithm.

nfreq (2): Estimated by KaPR single-frequency algorithm.

2.2.8. VER (Group)**(1) binZeroDeg**

Type	Array	Unit
2-byte integer	nray * nscan	

Range bin number with 0 degrees C level.

Missing Value: -9999

(2) binZeroDegSecondary

Type	Array	Unit
2-byte integer	nray * nscan	

When the inversion layers are detected, the “binZeroDegSecondary” is used to output the binZeroDeg related to the inversion layer. A peak level with the ground surface of $T < 0$ deg.C. (“binZeroDeg” is 177). A missing value when there are no inversion layers and T of the ground surface of $T > 0$ deg.C.

Missing Value: -9999

(3) airTemperature

Type	Array	Unit
4-byte float	nbin * nray * nscan	K

Air Temperature.

Missing Value: -9999.9

(4) attenuationNP

Type	Array	Array (2ADPR FS)	Unit
4-byte float	nbin * nray * nscan	nfreq * nbin * nray * nscan	dB/km

Vertical profile of attenuation by non-precipitation particles (cloud liquid water, cloud ice water, water vapor, and oxygen molecules).

In the 2ADPR FS,

nfreq (1): Estimated by KuPR single-frequency algorithm.

nfreq (2): Estimated by KaPR single-frequency algorithm.

Missing Value: -9999.9

(5) piaNP

Type	Array	Array (2ADPR FS)	Unit
4-byte float	nNP * nray * nscan	nfreq * nNP * nray * nscan	dB

Path integrated attenuation caused by non-precipitation particles (cloud liquid water, cloud ice water, water vapor, and oxygen molecules).

nNP (1): Total (sum of 2, 3, and 4)

nNP (2): Water Vapor

nNP (3): Oxygen molecules

nNP (4): Cloud liquid water

In the 2ADPR FS,

nfreq (1): Estimated by KuPR single-frequency algorithm.

nfreq (2): Estimated by KaPR single-frequency algorithm.

Missing Value: -9999.9

(6) piaNPPrainFree

Type	Array	Array (2ADPR FS)	Unit
4-byte float	nNP * nray * nscan	nfreq * nNP * nray * nscan	dB

“Rain-free” path-integrated attenuation due to non-precipitation (piaNP).

nNP (1): Total (sum of 2, 3, and 4)

nNP (2): Water Vapor

nNP (3): Oxygen molecules

nNP (4): Cloud liquid water

In the 2ADPR FS,

nfreq (1): Estimated by KuPR single-frequency algorithm.

nfreq (2): Estimated by KaPR single-frequency algorithm.

Missing Value: -9999.9

(7) sigmaZeroNPCorrected

Type	Array	Array (2ADPR FS)	Unit
4-byte float	nray * nscan	nfreq * nray * nscan	dB

Surface backscattering cross section with attenuation correction only for non-precipitation particles.

In the 2ADPR FS,

nfreq (1): Estimated by KuPR single-frequency algorithm.

nfreq (2): Estimated by KaPR single-frequency algorithm.

Missing Value: -9999.9

(8) heightZeroDeg

Type	Array	Unit
4-byte float	nray * nscan	m

Height of freezing level (0 degrees C level) Values are in m.

Missing Value: -9999.9

(9) flagInversion

Type	Array	Unit
2-byte integer	nray * nscan	N/A

Flag of inversion layers of air temperature related to 0 degrees C level.

-1: The surface ground below 0 deg.C

0: The VER code detect a level of 0 deg.C without the inversion layers.

>=1: The VER code detect a level of 0 deg.C with the inversion layers.

Missing Value: -9999

2.2.9. CSF (Group)

In some variables in the CSF module, no-rain values are used for the missing. To know the detailed data quality of the pixel, it is helpful to read /FLG/qualityData.

(1) flagBB

Type	Array	Unit
4-byte integer	nray * nscan	N/A

Bright band (BB) exists or not.

In case of 2AKu and 2AKa,

The values are

Value	Meaning
0	BB not detected
1	BB detected
-1111	No rain value (including the case of missing)
-9999	Missing

In case of 2ADPR,

The values are

Value	Meaning
0	BB not detected
≥ 1	BB detected
1	BB detected by both single-frequency (Ku-band) and dual-frequency algorithm.
2	BB detected by single-frequency (Ku-band) algorithm only.
3	BB detected by dual-frequency algorithm only.
-1111	No rain value (including the case of missing)
-9999	Missing

(2) binBBPeak

Type	Array	Unit
2-byte integer	nray * nscan	

Range bin number for the peak of bright band.

Missing Value: -9999

(3) binBBTop

Type	Array	Unit
2-byte integer	nray * nscan	

Range bin number for the top of bright band.

Missing Value: -9999

(4) binBBBottom

Type	Array	Unit
2-byte integer	nray * nscan	

Range bin number for the bottom of bright band.

The values are

Value Meaning
0: BB not detected
-1111: No rain value (including the case of missing)
-9999: Missing

(5) heightBB

Type	Array	Unit
4-byte float	nray * nscan	m

Height of bright band.

The values are

Value Meaning
0.0: BB not detected
-1111.1: No rain value (including the case of missing)
-9999.9: Missing

(6) widthBB

Type	Array	Unit
4-byte float	nray * nscan	m

The width of bright band.

The values are

Value Meaning
0.0: BB not detected
-1111.1: No rain value (including the case of missing)
-9999.9: Missing

(7) qualityBB

Type	Array	Unit
4-byte integer	nray * nscan	N/A

Quality of the bright band.

The values are

Value Meaning
1: Good
0: BB not detected in the case of rain
-1111: No rain value (including the case of missing)
-9999: Missing

(8) typePrecip

Type	Array	Unit
4-byte integer	nray * nscan	N/A

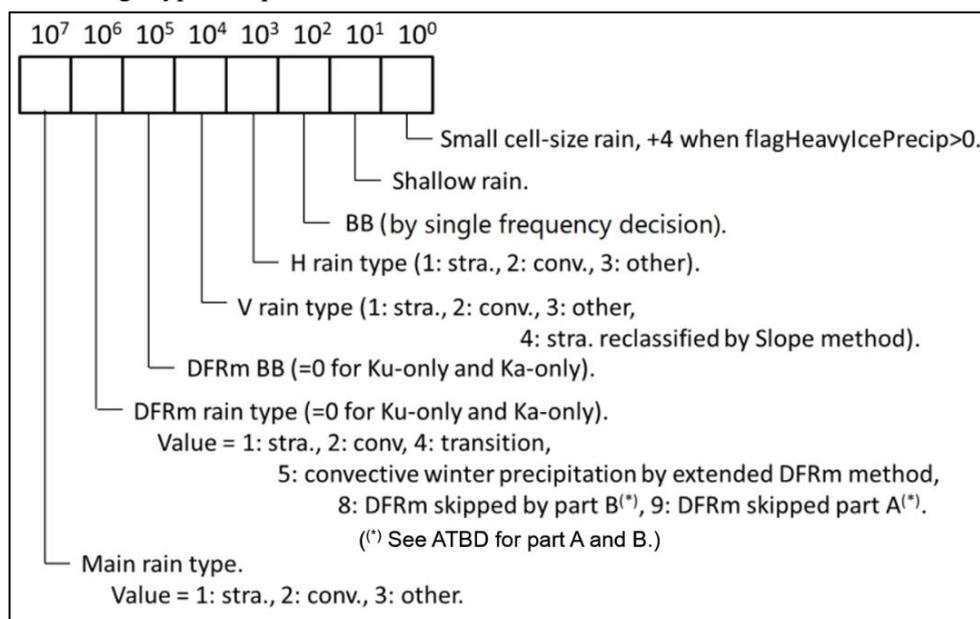
When positive, typePrecip shows precipitation type by an 8-digit number as shown in the next box.

The negative typePrecip means as follows:

-1111: No rain,

-9999: Missing.

Details of 8-digit typePrecip:



The three major rain categories, stratiform, convective, and other, can be obtained from typePrecip as follows:

When typePrecip is greater than zero,
 Main rain type = typePrecip/10000000
 1: stratiform
 2: convective
 3: other

In the DPR product, rain type by the CSU's DFRm (measured dual frequency ratio) method is also included in typePrecip and can be obtained as follows:

DFRm rain type = (typePrecip%10000000)/1000000 in C
 DFRm rain type = (MOD(typePrecip,10000000)/1000000 in FORTRAN
 DFRm rain type
 1: stratiform
 2: convective
 4: transition
 5: Decided winter precipitation as convective by extended DFRm method.
 8: DFRm method cannot be applicable at Part B (in this case the conventional method determines the major rain type)
 9: DFRm method cannot be applicable at Part A (in this case the conventional method determines the major rain type)
 -1111: No rain value (including the case of missing)
 -9999: Missing

(9) qualityTypePrecip

Type	Array	Unit
4-byte integer	nray * nscan	N/A

Quality of the precipitation type.

The values are

Value Meaning
 1: Good
 -1111: No rain value (including the case of missing)
 -9999: Missing

(10) flagShallowRain

Type	Array	Unit
4-byte integer	nray * nscan	N/A

Type of shallow rain.

The values are

Value Meaning
 0: No shallow rain
 10: Shallow isolated (maybe)
 11: Shallow isolated (certain)
 20: Shallow non-isolated (maybe)
 21: Shallow non-isolated (certain)
 -1111: No rain value (including the case of missing)
 -9999: Missing

(11) binDFRmMLTop (2ADPR FS, 2ADPR HS)

Type	Array	Unit
2-byte integer	nray * nscan	N/A

The DFRm method detects melting layer (ML) the meaning of which is wider than that of BB. Since ML and BB are different, new output item binDFRmMLBottom and binDFRmMLTop are added to FS and HS data.

Range bin number for ML top detected by the DFRm method.

The values are

<p>Value: Meaning</p> <p>> 0: Range bin number when ML top is detected</p> <p>0: ML top is not detected</p> <p>-1111: Value for no rain in FS (HS) mode at Ka band (including the case of missing)</p> <p>-9999: Missing</p>

(12) binDFRmMLBottom (2ADPR FS, 2ADPR HS)

Type	Array	Unit
2-byte integer	nray * nscan	

The DFRm method detects melting layer (ML) the meaning of which is wider than that of BB. Since ML and BB are different, new output item binDFRmMLBottom and binDFRmMLTop are added to FS and HS data.

Range bin number for ML bottom detected by the DFRm method.

The values are

<p>Value: Meaning</p> <p>> 0: Range bin number when ML bottom is detected</p> <p>0: ML bottom is not detected</p> <p>-1111: Value for no rain in MS (HS) mode at Ka band (including the case of missing)</p> <p>-9999: Missing</p>

(13) binHeavyIcePrecipTop (except for 2ADPR HS)

Type	Array	Array (2ADPR FS)	Unit
2-byte integer	nray * nscan	nfreqHI * nray * nscan	N/A

Range bin number for the top of heavy ice precip. For FS swaths, bin numbers are 1-based ranging from 1 at the top of the data window with 176 at the Ellipsoid. For HS swaths, bin numbers are 1-based ranging from 1 at the top of the data window with 88 at the Ellipsoid.

Value: Meaning

(A) In the single frequency 2AKu,

>0: Range bin corresponding to the Ku-band top height for HIP when it is detected

0: When HIP is not detected

(B) In the single frequency 2AKa,

>0: Range bin corresponding to the Ka-band top height for HIP when it is detected

0: When HIP is not detected

(C) In the 2ADPR,

nfreqHI (1): Same to the above (A)

nfreqHI (2): Same to the above (B)

nfreqHI (3):

>0: Range bin corresponding to the top height for HIP detected by the dual frequency method

0: When HIP is not detected by the dual frequency method

-1111: no precipitation is present.

-9999: Missing

(14) binHeavyIcePrecipBottom (except for 2ADPR HS)

Type	Array	Array (2ADPR FS)	Unit
2-byte integer	nray * nscan	nfreqHI * nray * nscan	N/A

Range bin number for the bottom of heavy ice precip. For FS swaths, bin numbers are 1-based ranging from 1 at the top of the data window with 176 at the Ellipsoid. For HS swaths, bin numbers are 1-based ranging from 1 at the top of the data window with 88 at the Ellipsoid.

Value: Meaning

(A) In the single frequency 2AKu,

>0: Range bin corresponding to the Ku-band bottom height for HIP when it is detected

0: When HIP is not detected

(B) In the single frequency 2AKa,

>0: Range bin corresponding to the Ka-band bottom height for HIP when it is detected

0: When HIP is not detected

(C) In the 2ADPR,

nfreqHI (1): Same to the above (A)

nfreqHI (2): Same to the above (B)

nfreqHI (3):

>0: Range bin corresponding to the bottom height for HIP detected by the dual frequency method

0: When HIP is not detected by the dual frequency method

-1111: no precipitation is present.

-9999: Missing

(15) nHeavyIcePrecip (except for 2ADPR HS)

Type	Array	Array (2ADPR FS)	Unit
1-byte unsigned integer	nray * nscan	nfreqHI * nray * nscan	N/A

Range bin number for the bottom of heavy ice precip.

<p>Value: Meaning</p> <p>(A) In the single frequency 2AKu, >0: The total number of bins where Ku-band HIP is detected 0: When Ku-band HIP is not detected or No rain or Missing</p> <p>(B) In the single frequency 2AKa, >0: The total number of bins where Ka-band HIP is detected 0: When Ka-band HIP is not detected or No rain or Missing (in FS and HS before the antenna scan pattern change of the V07 data) 255: Missing (in HS of the V07 data after the antenna scan pattern change)</p> <p>(C) In the 2ADPR, nfreqHI (1): Same to the above (A) nfreqHI (2): Same to the above (B) nfreqHI (3): >0: The total number of bins where HIP is detected by the dual frequency method 0: When HIP is not detected by the dual frequency method or No rain or Missing</p>
--

(16) flagHeavyIcePrecip

Type	Array	Unit
1-byte signed integer	nray * nscan	N/A

This flag denotes detection of solid ice hydrometeors which cause severely strong Z factor or huge DFRm in the sky less than -10 degrees C temperature.

Value Meaning

(A) The case of Ka band FS (and HS before the antenna scan pattern change):

1 (=0x01): 35 dBZ \geq Zm (Ka) > 30 dBZ

2 (=0x02): 40 dBZ \geq Zm (Ka) > 35dBZ

3 (=0x03): Zm (Ka) > 40 dBZ

(B) The case of Ku band FS:

4 (=0x04): 40 dBZ \geq Zm (Ku) > 35 dBZ

8 (=0x08): 45 dBZ \geq Zm (Ku) > 40 dBZ

12 (=0x0c): Zm (Ku) > 45 dBZ

(C) The case of DPR FS:

If Zm (Ku) > 27 dBZ and DFRm > 7 dB, the following value is added in addition to (A) and (B).

16 (=0x10)

(However, before the antenna scan pattern change, this rule applies to inner swath only; outer swaths are same as (B).)

0: Not detected (including the case of missing)

Negative value: Missing in 2ADPR HS of V07 data after the antenna scan pattern change

(17) flagAnvil (2AKu FS, 2ADPR FS)

Type	Array	Unit
1-byte signed integer	nray * nscan	N/A

flagAnvil is positive values when anvil precipitation is detected by the Ku-band radar. 0 when anvil precipitation is not detected.

The values are

Value Meaning
(A) The case of 2AKu FS:
1: Type 1 (without rain downward)
2: Type 2 (with rain downward)
0: Not detected (which includes the case of missing)
(B) The case of 2ADPR FS:
1: Type 1 (without rain downward)
2: Type 2 (with rain downward)
0: Not detected
-99: Missing

(18) flagHail (2ADPR FS)

Type	Array	Unit
1-byte signed integer	nray * nscan	N/A

Value Meaning
0: Hail not detected (including the case of missing)
1: Hail detected

(19) flagMLquality (2ADPR FS, 2ADPR HS)

Type	Array	Unit
1-byte unsigned integer	nray * nscan	N/A

This flag indicates the quality of detected ML by the following values.

Value Meaning
0: ML is not detected (including the case of missing).
1: ML top and bottom is detected by the standard DFRm method.
2: ML top and bottom is detected by an extension, but the result is not used in the V07 rain type decision.
255: Missing in 2ADPR HS of V07 data after the antenna scan pattern change.

2.2.10. SRT (Group)

(1) PIAalt

Type	Array	Array (2ADPR FS)	Unit
4-byte float	method * nray * nscan	nfreq * method * nray * nscan	dB

The path-integrated attenuation (dB) from the j th estimate, (PIA $_j$ in the notation above), where

PIAalt (j=1) = PIA derived from the forward along-track spatial reference data

PIAalt (j=2) = PIA derived from the backward along-track spatial reference data

PIAalt (j=3) = PIA derived from the forward hybrid/cross-track reference data

PIAalt (j=4) = PIA derived from the backward hybrid/cross-track reference data

PIAalt (j=5) = PIA derived from standard temporal reference data

PIAalt (j=6) = PIA derived from the light-rain temporal reference data

Note that for product versions 1 through 3, the standard temporal path-attenuation estimate, PIAalt (5), is set to missing but is defined for versions 4 and higher. For product versions 1 through 6, the light-rain temporal estimate, PIAalt (6), is set to missing. Note also that the forward/backward hybrid/cross-track path attenuations are defined only over ocean and are set to missing over land.

In the 2ADPR FS,

nfreq (1): Estimated by KuPR single-frequency algorithm.

nfreq (2): Estimated by KaPR single-frequency algorithm.

Missing Value: -9999.9

(2) PIAdw(2ADPR FS, 2ADPR HS)

Type	Array	Array (2ADPR FS)	Unit
4-byte float	nray * nscan	nfreq * nray * nscan	dB

PIAdw (dB) is the path attenuation estimate derived from the standard dual-wavelength method.

In the 2ADPR FS,

nfreq (1): Estimated by KuPR single-frequency algorithm.

nfreq (2): Estimated by KaPR single-frequency algorithm.

Missing Value: -9999.9

(3) PIAhb

Type	Array	Array (2ADPR FS)	Unit
4-byte float	nray * nscan	nfreq * nray * nscan	dB

PIAhb (dB) is the path attenuation estimate derived from the Hitschfeld-Bordan equation.

In the 2ADPR FS,

nfreq (1): Estimated by KuPR single-frequency algorithm.

nfreq (2): Estimated by KaPR single-frequency algorithm.

Missing Value: -9999.9

(4) PIAhybrid

Type	Array	Array (2ADPR FS)	Unit
4-byte float	nray * nscan	nfreq * nray * nscan	dB

For the dual-frequency output, PIAhybrid (dB) is a weighted sum of the path attenuations from the SRT, HB, and DW methods. For the single-frequency outputs, PIAhybrid is a weighted sum of the SRT and HB methods.

In the 2ADPR FS,

nfreq (1): Estimated by KuPR single-frequency algorithm.

nfreq (2): Estimated by KaPR single-frequency algorithm.

Missing Value: -9999.9

(5) RFactorAlt

Type	Array	Unit
4-byte float	method * nray * nscan	N/A

The reliability factors associated with the individual PIA estimates in PIAalt. As with PIAalt (6), RFactorAlt (6) is set to missing.

$$RFactorAlt_j = Rel_j = PIA_j / \sigma_j; j = 1, \dots, 6$$

method (j): The reliability factor associated with PIAalt (j): j=1....,6

Missing Value: -9999.9

(6) PIAweight

Type	Array	Unit
4-byte float	method * nray * nscan	dB

The weights, w, of the individual PIA estimates used in deriving the effective PIA. The weight for a particular PIA estimate is proportional to the inverse of the error variance associated with the method. The sum of the weights should equal one. As with PIAalt (6), PIAweight (6) is set to missing.

$$w_j = \frac{1}{\sigma_j^2} \frac{1}{\sum \frac{1}{\sigma_j^2}} \equiv \frac{u_j}{\sum u_j}$$

where

$$u_j = 1 / \sigma_j^2$$

$$\sum w_j = 1$$

method (j): The weights of the PIAalt (j): j=1...., 6

Missing Value:

-9999.9

(7) PIAweightHY

Type	Array	Unit
4-byte float	method * nray * nscan	dB

The weights of the individual PIA Ku estimates used in deriving the effective path attenuation estimate, pathAtten. The sum of the weights should equal one. Where j is method and sigma j is the standard deviation of reference data for method j.

$$PIAweight_j = 1/\sigma_j^2 (1/\sum_j(1/\sigma_j^2)).$$

method (1): SRT method

method (2): HB method

method (3): DF method (2ADPR FS only)

Missing Value: -9999.9

(8) pathAtten

Type	Array	Array (2ADPR FS)	Unit
4-byte float	nray * nscan	nfreq * nray * nscan	dB

The estimated effective 2-way path-attenuation in (dB) where

$$pathAtten = 2 \int_0^r k(s)ds$$

where k(s) is the attenuation coefficient in dB/km where the integral is taken from the storm top to the surface. The path attenuation is often designated as the PIA, the path-integrated attenuation. In the notation used above and in ATBD:

$$pathAtten = PIA_{eff} = (\sum u_j)^{-1} \sum u_j PIA_j$$

Where u_j is equal to the inverse of the variance associated with the jth reference data point:

$$u_j = 1/\sigma_j^2$$

In the 2ADPR FS,

nfreq (1): Estimated by KuPR single-frequency algorithm.

nfreq (2): Estimated by KaPR single-frequency algorithm.

Missing Value: -9999.9

(9) reliabFactor

Type	Array	Unit
4-byte float	nray * nscan	N/A

Reliability Factor for the effective PIA estimate, pathAtten. This is defined as:

$$reliabFactor = Rel_{eff} = (\sum u_j)^{-1/2} \sum u_j PIA_j$$

Missing Value: -9999.9

(10) reliabFactorHY

Type	Array	Unit
4-byte float	nray * nscan	N/A

reliabFactorHY is the reliability factor associated with the PIAhybrid estimate and is defined as the mean over the standard deviation of the estimate.

Missing Value: -9999.9

(11) reliabFlag

Type	Array	Unit
2-byte integer	nray * nscan	N/A

The reliability flag for the effective PIA estimate (pathAtten) based on the reliability factor (Rel_eff) in reliabFactor. Reliability Flag is:

- = 1 if $Rel_eff > 3$; PIAeff estimate is considered reliable
- = 2 if $3 \geq Rel_eff > 1$; PIAeff estimate is considered marginally reliable
- = 3 if $Rel_eff \leq 1$; PIAeff is unreliable
- = 4 if SNR at surface < 2dB ; provides a lower bound to the path-attenuation
- = 9 (no-rain case)

Missing Value: -9999

(12) reliabFlagHY

Type	Array	Unit
2-byte integer	nray * nscan	N/A

reliabFlagHY is the reliability flag for the PIAhybrid and is defined in the same way as reliabFlag where PIAeff is replaced by PIAhybrid.

Missing Value: -9999

(13) refScanID

Type	Array	Unit
2-byte integer	nearFar * foreBack * nray * nscan	Number

refScanID gives the number of scan lines between the current scan and the beginning (or end) of the along-track reference data at each angle bin. The values are computed by the equation: Current Scan Number - Reference Scan Number. The values are positive for the Forward estimates and negative for the Backward estimates. The Fortran indices are:

Bit Meaning

1, 1: Forward - Near reference

2, 1: Forward - Far reference

1, 2: Backward - Near reference

2, 2: Backward - Far reference

-9999: Missing

To illustrate, consider the following example. At a certain incidence angle assume that rain is present at scan numbers from 100 to 105 and from 110 to 120. At scan number 112, refScanID (1, 1) = 3, refScanID (2, 1) = 16; i.e., the eight rain-free NRCS data points, used to estimate the mean and standard deviation of the rain-free NRCS, begin at scan $112-16 = 96$ and end at scan $112-3=109$. These numbers provide information on the distance (in terms of the numbers of scans where 1 scan ~5 km) of the rain-free reference data from the rain pixel of interest. See section 6 for further details.

(14) stddevEff

Type	Array	Array (2ADPR FS)	Unit
4-byte float	nsdew * nray * nscan	nfreq * nsdew * nray * nscan	N/A

stddevEff (1) contains the standard deviation of the PIAeff (i.e., the composite or effective SRT or hybrid path attenuation estimate). It is given by

$$\sigma_1 = (\sum 1/\sigma_{e,j}^2)^{-1/2} = (\sum u_j)^{-1/2}$$

It is important to note that in the definition of the reliability factor, it is this standard deviation that is used. In other words, with the notation in ATBD, we have $\sigma_1 = \sigma_{eff}$.

stddevEff (2) is a weighted root mean square error and provides a measured of the error of the individual PIA estimates from the effective PIA estimate. It is given by

$$\sigma_2 = [\sum w_j (A_{eff} - A_j)^2]^{1/2}$$

stddevEff (3) is given by

$$\sigma_3 = [\sigma_1^2 + \sigma_2^2]^{1/2}$$

In the 2ADPR FS,

nfreq (1): Estimated by KuPR single-frequency algorithm.

nfreq (2): Estimated by KaPR single-frequency algorithm.

Missing Value: -9999.9

(15) stddevHY

Type	Array	Array (2ADPR FS)	Unit
4-byte float	nray * nscan	nfreq * nray * nscan	N/A

stddevHY is the standard deviation (dB) of the hybrid estimate of path attenuation.

In the 2ADPR FS,

nfreq (1): Estimated by KuPR single-frequency algorithm.

nfreq (2): Estimated by KaPR single-frequency algorithm.

Missing Value: -9999.9

(16) zeta

Type	Array	Array (2ADPR FS)	Unit
4-byte float	nray * nscan	nfreq * nray * nscan	N/A

zeta (unitless) is a parameter in the Hitschfeld-Bordan equation.

In the 2ADPR FS,

nfreq (1): Estimated by KuPR single-frequency algorithm.

nfreq (2): Estimated by KaPR single-frequency algorithm.

Missing Value: -9999.9

(17) piaExp (2ADPR FS)

Type	Array	Unit
4-byte float	nfreq * nray * nscan	N/A

TBD

nfreq (1): TBD

nfreq (2): TBD

Missing Value: -9999.9

2.2.11. DSD (Group)**(1) phase**

Type	Array	Unit
1-byte unsigned integer	nbin * nray * nscan	N/A

Phase state of the precipitation. As an unsigned byte value this represents:

phase < 100 Temperature(C)=phase-100

phase > 200 Temperature(C)=phase-200

phase = 100 Top of the bright band

phase = 200 Bottom of the bright band

phase = 125 is used for the range bins between
the top and peak of bright band

phase = 175 is used for the range bins between
the peak and bottom of bright band

Integer values of phase/100 =

0 - solid

1 - mixed phase

2 - liquid

Missing Value: 255

(2) binNode

Type	Array	Unit
2-byte integer	nNode * nray * nscan	N/A

The bin number of the 5 nodes defined as:

1 - Bin number of storm top.

2 - Stratiform: 500m above center of bright band.

Convective: 750m above 0deg C level.

3 - Stratiform: center of bright band.

Convective: 0deg C level.

4 - Stratiform: 500m below center of bright band.

Convective: 750m below 0deg C level.

5 - Bin number of real surface equal to binRealSurface in PRE group.

For FS swaths, bin numbers are 1-based ranging from 1 at the top of the data window with 176 at the Ellipsoid. For HS swaths, bin numbers are 1-based ranging from 1 at the top of the data window with 88 at the Ellipsoid.

Missing Value: -9999

(3) paramRDm

Type	Array	Unit
4-byte float	nNode * nray * nscan	N/A

The parameters in R-Dm relation are $p = 0.392$, $q = 6.131$, and $r = 4.815$. They are the same and the definition of ε is the same for all precipitation types. In the single-frequency algorithm or if the DSD database is not applied, μ is 0 for stratiform precipitation but μ is $\log_{10}(1.25) \sim 0.0969$ for convective precipitation. The details of these parameters are described in ATBD.

nNode (1): p-value in R-Dm relation.

nNode (2): q-value in R-Dm relation

nNode (3): r-value in R-Dm relation

nNode (4): μ -value for stratiform and convective precipitation

nNode (5): σ -value for stratiform and convective precipitation

Missing Value: -9999

2.2.12. Experimental (Group)

(1) precipRateESurface2

Type	Array	Unit
4-byte float	nray * nscan	mm/hr

Surface precipitation estimate based on an a priori low-level precipitation profiles, based upon Hirose et al. (2021, <https://doi.org/10.2151/jmsj.2021-060>).

Missing Value: -9999.9

(2) precipRateESurface2Status

Type	Array	Unit
1-byte unsigned integer	nray * nscan	N/A

Status of the estimated surface precipitation using alternate method.

Missing Value: 255

(3) sigmaZeroProfile

Type	Array	Array (2ADPR FS)	Unit
4-byte float	nbinSZP * nray * nscan	nfreq * nbinSZP * nray * nscan	dB

The profiles of surface backscattering cross section around the binDEM (the range-bin number of averaged DEM). nbinSZP =7 for FS and nbinSZP = 5 for HS.

In the 2ADPR FS,

nfreq (1): Estimated by KuPR single-frequency algorithm.

nfreq (2): Estimated by KaPR single-frequency algorithm.

Missing Value: -9999.9

(4) seaIceConcentration

Type	Array	Unit
4-byte float	nray * nscan	%

Sea ice concentration (30.0 – 100.0%) estimated by Ku.

Missing Value: -9999.9

(5) binMixedPhaseTop (2ADPR FS)

Type	Array	Unit
2-byte integer	nray * nscan	N/A

Range bin number of MixedPhaseTop when it is detected. Definition of the MixedPhaseTop is described in ATBD.

Missing Value: -9999

(6) flagGraupelHail (2ADPR FS)

Type	Array	Unit
1-byte unsigned integer	nray * nscan	N/A

This flag takes the following value:

1: Flag = 1 indicates graupel or hail exists along vertical profile.

0: Flag = 0 indicates no graupel or hail exists along profile.

Missing Value: 255

(7) flagSurfaceSnowfall (2ADPR FS)

Type	Array	Unit
1-byte unsigned integer	nray * nscan	N/A

This flag takes the following value:

1: when surface snowfall exists (on surface, not aloft).

0: when surface snowfall doesn't exist.

Missing Value: 255

(8) surfaceSnowfallIndex (2ADPR FS)

Type	Array	Unit
4-byte float	nray * nscan	N/A

flagSurfaceSnowfall is 1 when this index exceeds the defined threshold.

When no rain or skipped, the value is 0.0.

Missing Value: -9999.9

2.2.13. SLV (Group)**(1) flagSLV**

Type	Array	Unit
1-byte integer	nbin * nray * nscan	N/A

A flag for each range bin data. At rain range bins, flagSLV is positive. At no-rain range bins, flagSLV is 0. If a range bin is located below ESurface, flagSLV is negative (-64). When the retrieval is abnormally terminated or data quality is bad, flagSLV is negative (-128).

The values are

flagSLV%2
0: no rain
1: rain
flagSLV%4
3: Zm is used for the retrieval
(1: extrapolated Ze is used for the retrieval)
(0: no rain)
flagSLV%16
(0-3: no rain)
4-7: only KuPR is used for the retrieval
8-11: only KaPR is used for the retrieval
12-15: Both KuPR and KaPR's Zm are used for the retrieval
flagSLV%64
0-15: Dm takes normal value (or no-rain)
16-31: Dm takes the minimum value
32-47: Dm takes the maximum value
48-63: Dm takes an abnormal value
flagSLV% 256
0-63: R takes a normal value (or no-rain)
64-127: R takes the maximum value
(128: bad data quality)
(192: below ESurface)

Missing Value: -99

(2) qualitySLV

Type	Array	Unit
4-byte integer	nray * nscan	N/A

A flag to show methods in which precipRateNearSurface is retrieved. See the Appendix of Seto et al. (2021, JMSJ)

Special values are defined as:

Negative value indicates processing error.

Missing Value: -9999

(3) binEchoBottom

Type	Array	Unit
2-byte integer	nray * nscan	N/A

The bin number of bottom of echo. For FS swaths, bin numbers are 1-based ranging from 1 at the top of the data window with 176 at the Ellipsoid. For HS swaths, bin numbers are 1-based ranging from 1 at the top of the data window with 88 at the Ellipsoid.

Missing Value: -9999

(4) piaFinal

Type	Array	Array (2ADPR FS)	Unit
4-byte float	nray * nscan	nfreq * nray * nscan	dB

The final estimates of path integrated attenuation caused by precipitation particles. It is calculated from the retrieved DSD profiles. It includes the attenuation only by precipitation.

In the 2ADPR FS,

nfreq (1): Estimated by KuPR single-frequency algorithm.

nfreq (2): Estimated by KaPR single-frequency algorithm.

Missing Value: -9999.9

(5) piaOffset

Type	Array	Array (2ADPR FS)	Unit
4-byte float	nray * nscan	nfreq * nray * nscan	dB

Increments of PIA estimates by SRT for considering the soil moisture effect (over land only).

In the 2ADPR FS,

nfreq (1): Estimated by KuPR single-frequency algorithm.

nfreq (2): Estimated by KaPR single-frequency algorithm.

Missing Value: -9999.9

(6) sigmaZeroCorrected

Type	Array	Array (2ADPR FS)	Unit
4-byte float	nray * nscan	nfreq * nray * nscan	dB

Surface backscatter cross section with attenuation correction.

In the 2ADPR FS,

nfreq (1): Estimated by KuPR single-frequency algorithm.

nfreq (2): Estimated by KaPR single-frequency algorithm.

Missing Value: -9999.9

(7) zFactorFinal

Type	Array	Array (2ADPR FS)	Unit
4-byte float	nbin * nray * nscan	nfreq * nbin * nray * nscan	dBZ

Vertical profile of reflectivity factor calculated from DSD estimates.

$10 \log_{10}(Z)$ where Z is in mm^6/m^3 .

In the 2ADPR FS,

nfreq (1): Estimated by KuPR single-frequency algorithm.

nfreq (2): Estimated by KaPR single-frequency algorithm.

Missing Value: -9999.9

(8) zFactorFinalESurface

Type	Array	Array (2ADPR FS)	Unit
4-byte float	nray * nscan	nfreq * nray * nscan	dBZ

Reflectivity factor calculated from DSD estimates at estimated surface.

$10 \log_{10}(Z)$ where Z is in mm^6/m^3 .

In the 2ADPR FS,

nfreq (1): Estimated by KuPR single-frequency algorithm.

nfreq (2): Estimated by KaPR single-frequency algorithm.

Missing Value: -9999.9

(9) zFactorFinalNearSurface

Type	Array	Array (2ADPR FS)	Unit
4-byte float	nray * nscan	nfreq * nray * nscan	dBZ

Reflectivity factor calculated from DSD estimates at near surface.

$10 \log_{10}(Z)$ where Z is in mm^6/m^3 .

In the 2ADPR FS,

nfreq (1): Estimated by KuPR single-frequency algorithm.

nfreq (2): Estimated by KaPR single-frequency algorithm.

Missing Value: -9999.9

(10) paramDSD

Type	Array	Unit
4-byte float	nDSD * nbin * nray * nscan	nDSD (1): $10 \log_{10}(Nw)$ nDSD (2): mm

Parameters of DSD functions, Nw and Dm. Nw in $1/m^3$ mm

nDSD (1): $10 \log_{10}(Nw)$

nDSD (2): Dm

Missing Value: -9999.9

(11) precipRate

Type	Array	Unit
4-byte float	nbin * nray * nscan	mm/hr

Precipitation rate.

Missing Value: -9999.9

(12) precipWater

Type	Array	Unit
4-byte float	nbin * nray * nscan	g/m^3

The amount of precipitable water. Note that the incorrect unit of "precipWater" is defined as " kg/m^3 " in the HDF products. " g/m^3 " is correct.

Missing Value: -9999.9

(13) precipWaterIntegrated

Type	Array	Unit
4-byte float	LS * nray * nscan	g/m^2

Precipitation water vertically integrated.

For LS=1, sum of liquid water (phase ≥ 200)

For LS=2, sum of non-liquid water (phase < 200)

Missing Value: -9999.9

(14) precipRateESurface

Type	Array	Unit
4-byte float	nray * nscan	mm/hr

Precipitation rate for the estimated surface, i.e., at binRealSurface.

Missing Value: -9999.9

(15) precipRateNearSurface

Type	Array	Unit
4-byte float	nray * nscan	mm/hr

Precipitation rate for the nearSurface bin, i.e., at binClutterFreeBottom.

Missing Value: -9999.9

(16) precipRateAve24

Type	Array	Unit
4-byte float	nray * nscan	mm/hr

Average of precipitation rate for 2 to 4km height.

Missing Value: -9999.9

(17) phaseNearSurface

Type	Array	Unit
1-byte unsigned integer	nray * nscan	N/A

Value of the Phase parameter in the DSD module at binClutterFreeBottom (nearSurface bin).

Missing Value: 255

(18) epsilon

Type	Array	Unit
4-byte float	nbin * nray * nscan	N/A

Epsilon is the indication of the adjustment away from the initial drop size distribution, epsilon = 1 is no adjustment.

Missing Value: -9999.9

(19) paramNUBF

Type	Array	Unit
4-byte float	nNUBF * nray * nscan	N/A

The parameter to adjustment of None Uniform Beam Filling (NUBF).

paramNUBF (1) is σ_T^2 where $\sigma_T = \sqrt{\frac{\sigma^2+1}{p}} - 1$.

paramNUBF (2) is σ^2 where σ is the coefficient of variation of Nw.

paramNUBF (3) is p where p is the ratio of the raining area to the total area in FOV. (Currently p is set to 1.)

Missing Value (in the pixel with zero precipitation or in the case of poor data quality): -9999.9

(20) DFRforward1 (2ADPR FS)

Type	Array	Unit
4-byte float	nbin * nray * nscan	N/A

Difference of Zf (calculated by attenuation correction) between KaPR and KuPR.

Missing Value: -9999.9

2.2.14. FLG (Group)**(1) flagEcho**

Type	Array	Unit
1-byte integer	nbin * nray * nscan	N/A

The values are

Bit Meaning
0: For L2 Ku/PR: Precipitation judged by L2 Ku algorithm (copy of bit 2)
0: For L2 Ka: Precipitation judged by L2 Ka algorithm (copy of bit 3)
0: For L2 DPR: Precipitation judged by L2 DPR algorithm (copy of bit 1)
1: Precipitation judged by L2 DPR algorithm
2: Precipitation judged by L2 Ku algorithm
3: Precipitation judged by L2 Ka algorithm
4: Main lobe clutter judged by L2 Ku algorithm
5: Main lobe clutter judged by L2 Ka algorithm
6: Side lobe clutter judged by L2 Ku algorithm
7: Side lobe clutter judged by L2 Ka algorithm

(2) qualityData

Type	Array	Unit
4-byte integer	nray * nscan	N/A

Normal data gives "0". Non-zero values mean the kinds of errors

The values are

The 2 bit flag for each module has values: [higher bit lower bit]
[0 0]: Good
[0 1]: Warning but usable
[1 0]: NG or error
The bits of qualityData are assigned as follows:
0 - 7: Copy of dataQuality in level 1B product
8 - 9: Flag by input module
10 - 11: Flag by preparation module
12 - 13: Flag by vertical module
14 - 15: Flag by classification module
16 - 17: Flag by SRT module
18 - 19: Flag by DSD module
20 - 21: Flag by solver module
22 - 23: Flag by output module
24 - 31: Spare
-9999: Missing

(3) flagSensor

Type	Array	Array (2ADPR FS)	Unit
1-byte integer	nscan	nfreq * nscan	N/A

Flag of input Ku/Ka data condition

In the 2ADPR FS,

nfreq (1): Estimated by KuPR single-frequency algorithm.

nfreq (2): Estimated by KaPR single-frequency algorithm.

The values are

1: Valid -99: Invalid (judged by dataQuality)
--

(4) qualityFlag

Type	Array	Array (2ADPR FS)	Unit
1-byte integer	nray*nscan	nfreq * nray*nscan	N/A

qualityFlag is a sample flag generated by qualityData.

In the 2ADPR FS,

nfreq (1): Estimated by KuPR single-frequency algorithm.

nfreq (2): Estimated by KaPR single-frequency algorithm.

The values are

0: High quality. No issues. 1: Low quality. (DPR modules had warnings but still made a retrieval) 2: Bad. (DPR modules had errors or dataQuality is bad and retrieval is missing) -99: Missing value

(5) flagScanPattern

Type	Array	Array (2ADPR FS)	Unit
2-byte integer	nscan	nfreq * nscan	N/A

Flag of scan pattern information. Ku and PR are always "0".

In the 2ADPR FS,

nfreq (1): Estimated by KuPR single-frequency algorithm.

nfreq (2): Estimated by KaPR single-frequency algorithm.

The values are

0: Original scan pattern. (from the beginning of the mission until May 21, 2018) 1: KaHS outer swath scan pattern (After May 21, 2018) -99: Others or Missing

2.2.15. TRG (Group)**(1) NUBFindex**

Type	Array	Unit
4-byte float	nray * nscan	N/A

Qualitative index for presence of NUBF. Not to be used, just for our development and debugging.

Values range from 0 to 100.

Missing value: -9999.9

(2) MSindex

Type	Array	Unit
4-byte integer	nray * nscan	N/A

Index for presence of MS based on Ku and Ka return signal.

Values [0,50,100]

(3) MSindexKu

Type	Array	Unit
4-byte integer	nray * nscan	N/A

Index for presence of MS based on Ku return signal only.

Values [0,50,100]

(4) MSindexKa

Type	Array	Unit
4-byte integer	nray * nscan	N/A

Index for presence of MS based on Ka return signal only.

Values [0,50,100]

(5) MSsurfPeakIndexKu

Type	Array	Unit
4-byte integer	nray * nscan	N/A

Index for detection of surface peak for Ku return signal.

Values [0,50,100].

(6) MSsurfPeakIndexKa

Type	Array	Unit
4-byte integer	nray * nscan	N/A

Index for detection of surface peak for Ka return signal.

Values [0,50,100]

(7) MSkneeDFRindex

Type	Array	Unit
4-byte integer	nray * nscan	N/A

Index for detection of knee feature in DFR.

Values [0,50,100].

(8) MSslopesKu

Type	Array	Unit
4-byte float	4 * nray * nscan	N/A

Slope values in different portion of the Ku signal around the surface peak.

Values [0,50,100]

(9) MSslopesKa

Type	Array	Unit
4-byte float	4 * nray * nscan	N/A

Slope values in different portion of the Ka signal around the surface peak.

Values [0,50,100]

3. Level 2 (2HSLH, 2HSLHT) Data Format Structure

3.1. Dimension Definition

Dimension definitions:

- nscan
 - var Number of scans in the granule.
- nray
 - 49 Number of angle bins in each scan
- nlayer
 - 80 Number of layers at the fixed height of 0.00–0.25 km, 0.25–0.50 km, ..., 19.50–19.75 km, and 19.75–20.00 km.

3.2. Data Format Structure for 2HSLH, 2HSLHT Spectral Latent Heating

The Level 2 products, 2HSLH and 2HSLHT, “Spectral Latent Heating”, are defined as a swath structure, which is called "Swath".

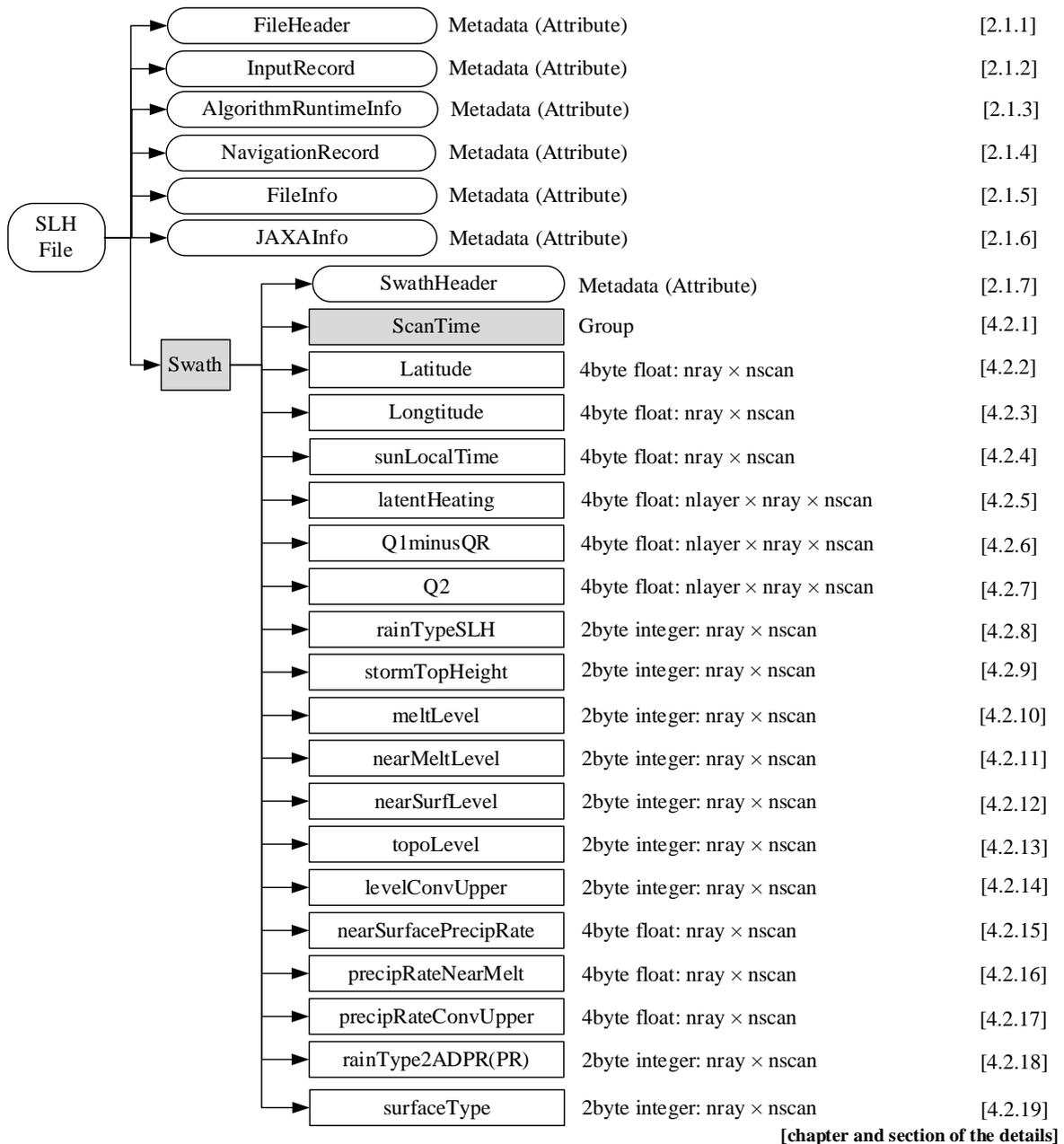


Figure 3.2-1 Data Format Structure for 2HSLH and 2HSLHT

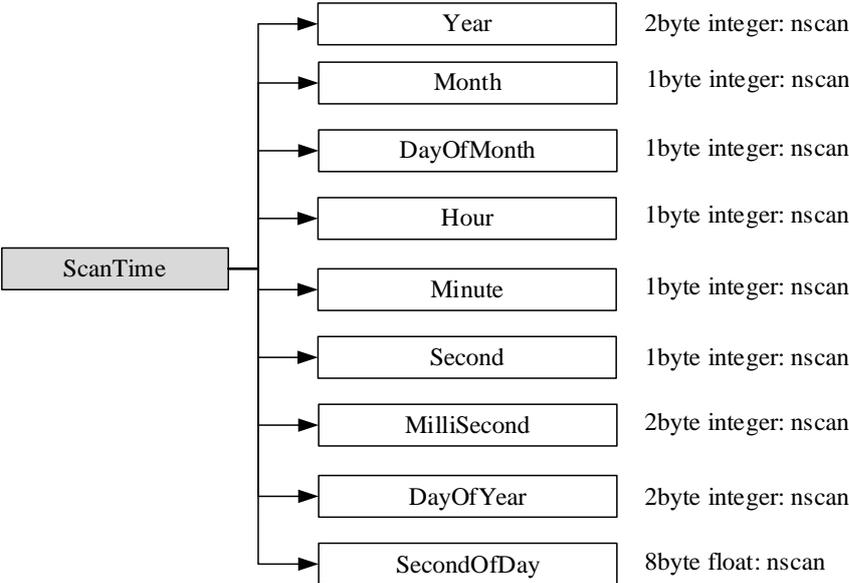


Figure 3.2-2 Data Format Structure for Scan Time Group of 2HSLH and 2HSLHT

4. Level 2 (2HSLH, 2HSLHT) Contents of Objects in each Group

4.1. Metadata

Metadata has six elements. Figure 4.1-1 shows metadata structure. The explanations of each metadata refer to 2.1.

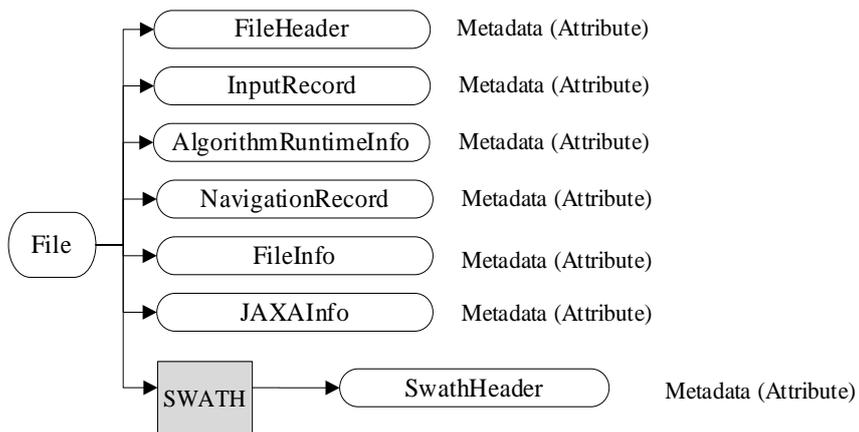


Figure 4.1-1 The structure of L2 (2HSLH, 2HSLHT) Metadata

4.2. Data Group

Elements of data group and array are explained in detail in this section. Each swath has 1 data group, 17 arrays and 3 data (Latitude, Longitude and sunLocalTime) commonly. Figure 4.2-1 shows “Swath” of Spectral Latent Heating and Figure 4.2-2 shows “Scan Time” data group structures.

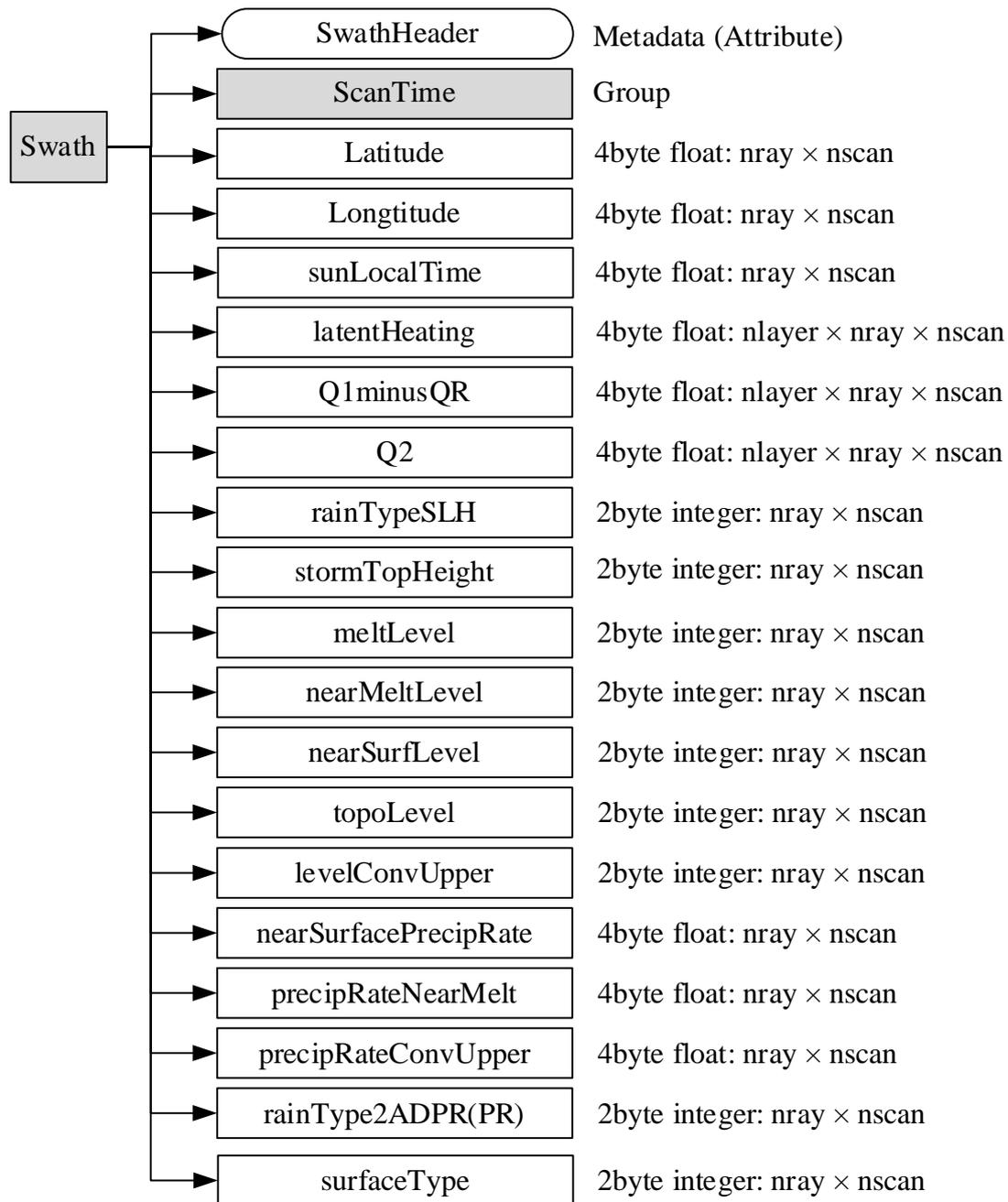


Figure 4.2-1 Data Format Structure for 2HSLH and 2HSLHT, Spectral Latent Heating

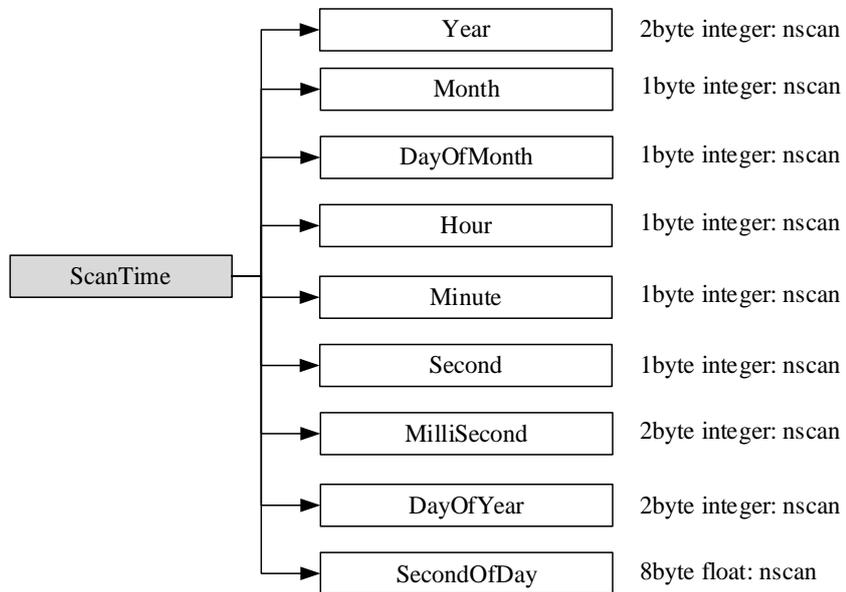


Figure 4.2-2 L2 (2HSLH) Data Format Structure for 2HSLH and 2HSLHT, ScanTime

4.2.1. ScanTime (Group)

(1) Year

Type	Array	Unit
2-byte integer	nscan	year

4-digit year, e.g., 1998. Value range from 1950 to 2100 years.

Missing Value: -9999

(2) Month

Type	Array	Unit
1-byte integer	nscan	month

Month of the year. Value range from 1 to 12 months.

Missing Value: -99

(3) DayOfMonth

Type	Array	Unit
1-byte integer	nscan	day

Day of the month. Values range from 1 to 31 days.

Missing Value: -99

(4) Hour

Type	Array	Unit
1-byte integer	nscan	hour

UTC hour of the day. Values range from 0 to 23 hours.

Missing Value: -99

(5) Minute

Type	Array	Unit
1-byte integer	nscan	minute

Minute of the hour. Values range from 0 to 59 minutes.

Missing Value: -99

(6) Second

Type	Array	Unit
1-byte integer	nscan	s

Second of the minute. Values range from 0 to 60 minutes.

Missing Value:

-99

(7) Millisecond

Type	Array	Unit
2-byte integer	nscan	ms

Thousandths of the second. Value range from 0 to 999 ms.

Missing Value:

-9999

(8) DayOfYear

Type	Array	Unit
2-byte integer	nscan	day

Day of the year. Values range from 1 to 366 days.

Missing Value:

-9999

(9) SecondOfDay

Type	Array	Unit
8-byte float	nscan	s

A time associated with the scan. It is expressed as the UTC seconds of the day. Value range from 0 to 86400 s.

Missing Value:

-9999.9

4.2.2. Latitude

(1) Latitude

Type	Array	Unit
4-byte float	nray * nscan	degree

The earth latitude of the center of the IFOV at the altitude of the earth ellipsoid. Latitude is positive north, negative south.

Missing Value:

-9999.9

4.2.3. Longitude

(1) Longitude

Type	Array	Unit
4-byte float	nray * nscan	degree

The earth longitude of the center of the IFOV at altitude of the earth ellipsoid. Longitude is positive east, negative west. A point on the 180th meridian has the value -180 degrees.

Missing Value:

-9999.9

4.2.4. sunLocalTime

(1) sunLocalTime

Type	Array	Unit
4-byte float	nray * nscan	hour

The local hour angle of the Sun at the pixel location, where 0 is midnight and 12 is local noon when the Sun crosses the local meridian. Also known as apparent solar time at any location. In V7 TMI and GMI products will have values but partner products will be filled with the missing value. Values range from 0 to 24 hours.

Missing Value:

-9999.9

4.2.5. latentHeating

(1) latentHeating

Type	Array	Unit
4-byte float	nlayer * nray * nscan	K/hr

Latent heating. Value range from -400 to 400 K/hr.

Missing Value:

-9999.9

4.2.6. Q1minusQR

(1) Q1minusQR

Type	Array	Unit
4-byte float	nlayer * nray * nscan	K/hr

Apparent heat source minus radiative heating rate; Q1-QR. Q1R is missing in V07A when rainTypeSLH is for great mountain ranges in the tropical precipitation regime (200-268). Value range from -400 to 400 K/hr.

Missing Value:

-9999.9

4.2.7. Q2

(1) Q2

Type	Array	Unit
4-byte float	nlayer * nray * nscan	K/hr

Apparent moisture sink Q2. Q2 is missing in V07A when rainTypeSLH is for great mountain ranges in the tropical precipitation regime (200-268). Value range from -400 to 400 K/hr.

Missing Value:

-9999.9

4.2.8. rainTypeSLH

(1) rainTypeSLH

Type	Array	Unit
2-byte integer	nray * nscan	-

Precipitation type decided by SLH algorithm.

The values are listed below.

(a) tropical regions (*)

0: No precipitation

11: Convective

21: Shallow stratiform

31: Deep stratiform

32: Deep stratiform, downward increasing (Intermediary)

61: Other

(b) middle-latitude (*)

100: No precipitation

111: Convective

121: Shallow stratiform

131: Deep stratiform, downward decreasing, Pmax aloft

132: Deep stratiform, downward decreasing, Pmax near surface

133: Deep stratiform, downward increasing, Pmax aloft

134: Deep stratiform, downward increasing, Pmax near surface

135: Deep stratiform, subzero, Pmax aloft

136: Deep stratiform, subzero, Pmax near surface

161: Other

(*) Concept of Retrieval method (Lookup Table) is different between (a) and (b). Which tables ((a) or (b)) to adopt is decided by the monthly-based precipitation regime database.

(c) Great mountain ranges in the tropical precipitation regime

200: No precipitation

211: Convective over high-elevation areas

212: Convective over low-elevation areas

- 221: Shallow stratiform over high-elevation areas
- 222: Shallow stratiform over low-elevation areas
- 231: Deep stratiform, downward decreasing, Pmax aloft
- 232: Deep stratiform, downward decreasing, Pmax near surface
- 233: Deep stratiform, downward increasing, Pmax aloft
- 234: Deep stratiform, downward increasing, Pmax near surface
- 235: Deep stratiform, subzero, Pmax aloft
- 236: Deep stratiform, subzero, Pmax near surface
- 261: Other, Applying table for rainTypeSLH=221
- 262: Other, Applying table for rainTypeSLH=222
- 263: Other, Applying table for rainTypeSLH=231
- 264: Other, Applying table for rainTypeSLH=232
- 265: Other, Applying table for rainTypeSLH=233
- 266: Other, Applying table for rainTypeSLH=234
- 267: Other, Applying table for rainTypeSLH=235
- 268: Other, Applying table for rainTypeSLH=236

Masks:

900: Areas with low melting levels including some mountains except for of great mountain ranges in the tropical precipitation regime

910: Suspicious extreme

920: No precipitation in SLH (precipRate < 0.3 mm/h OR precipitation depth < 500 m for tropics, precipRate < 0.2 mm/h OR precipitation depth < 500m for midlatitudes) but precipitation exists in 2AKu

Missing Value:

-9999

4.2.9. stormTopHeight

(1) stormTopHeight

Type	Array	Unit
2-byte integer	nray * nscan	m

For tropical types, height of storm top. For midlatitude types and great mountain range types, precipitation-top height of the lowest precipitation layer. Value range from 0 to 32000 [m].

Missing Value:

-9999

4.2.10. meltLevel

(1) meltLevel

Type	Array	Unit
2-byte integer	nray * nscan	m

Melting level defined as a height of the closest SLH bin to the heightZeroDeg in 2AKu. Value range from 0 to 32000 [m].

Missing Value:

-9999

4.2.11. nearMeltLevel

(1) nearMeltLevel

Type	Array	Unit
2-byte integer	nray * nscan	m

Height with maximum precipitation rate around the heightZeroDeg level when rainTypeSLH is 31 (Deep stratiform), or height of surface level when rainTypeSLH is 32 (Deep stratiform with low melting level). All missing for midlatitude types, great mountain range types and other tropical types. Value range from 0 to 32000 [m].

Missing Value:

-9999

4.2.12. nearSurfLevel

(1) nearSurfLevel

Type	Array	Unit
2-byte integer	nray * nscan	m

For tropical types, height of the clutter free bottom. For midlatitude types and great mountain range types, precipitation-bottom height of the lowest precipitation layer. Value range from 0 to 32000 [m].

Missing Value:

-9999

4.2.13. topoLevel

(1) topoLevel

Type	Array	Unit
2-byte integer	nray * nscan	m

Height of topography estimated from binRealSurface and localZenithAngle in 2AKu. Value range from 0 to 32000 [m].

Missing Value:

-9999

4.2.14. levelConvUpper

(1) levelConvUpper

Type	Array	Unit
2-byte integer	nray * nscan	m

For tropical convective types with high storm top height, height 500-m higher from the height at closest SLH bin to the heightZeroDeg in 2AKu except for precipitation profiles with maximum well above the heightZeroDeg. All missing for midlatitude types and great mountain range types. Value range from 0 to 32000 [m].

Missing Value:

-9999

4.2.15. nearSurfacePrecipRate

(1) nearSurfacePrecipRate

Type	Array	Unit
4-byte float	nray * nscan	mm/hr

For tropical types, precipitation rate at the near-surface level. For midlatitude types and great mountain range types, precipitation rate at the bottom level of the lowest precipitation layer. Value range from 0 to 500 [mm/hr].

Missing Value:

-9999.9

4.2.16. precipRateNearMelt

(1) precipRateNearMelt

Type	Array	Unit
4-byte float	nray * nscan	mm/hr

For tropical deep stratiform types, precipitation rate at the nearMeltLevel. All missing for midlatitude types and great mountain range types. Value range from 0 to 500 [mm/hr].

Missing Value:

-9999.9

4.2.17. precipRateConvUpper

(1) precipRateConvUpper

Type	Array	Unit
4-byte float	nray * nscan	mm/hr

For tropical convective types with high storm top height, precipitation rate at the “levelConvUpper” to determine the upper-level heating due to ice processes. All missing for midlatitude types and great mountain range types. Value range from 0 to 500 [mm/hr].

Missing Value:

-9999.9

4.2.18. rainType2ADPR, rainType2APR**(1) rainType2ADPR, rainType2APR**

Type	Array	Unit
2-byte integer	nray * nscan	-

Rain type by 2ADPR and 2APR.

Missing Value:

-9999

4.2.19. surfaceType**(1) surfaceType**

Type	Array	Unit
2-byte integer	nray * nscan	-

Land surface type.

The values are listed below.

0: Ocean

1: Land

2: Coast

3: Inland water

Missing Value:

-9999

5. Level 3 (HDF) Data Format Structure

5.1. Dimension definition

Dimension definitions:

- ltL
 - 28 Number of low resolution 5° grid intervals of latitude from 70°S to 70°N.
- lnL
 - 72 Number of low resolution 5° grid intervals of longitude from 180°W to 180°E.
- ltH
 - 536 Number of high resolution 0.25° grid intervals of latitude from 67°S to 67°N.
- lnH
 - 1440 Number of high resolution 0.25° grid intervals of longitude from 180°W to 180°E.
- chn3
 - 3 Number of channels. The elements change depending on the Swath
 - For FS: 1: KuFS, 2: KaFS, 3: DPRFS.
 - For MS: 1: KuMS, 2: KaMS, 3: DPRMS.
 - For HS: KaHS (No dimension).
- chn4
 - 4 Number of channels. The elements change depending on the Swath
 - For FS: 1: KuFS, 2: KaFS, 3: DPRKuFS, 4: DPRKaFS.
 - For MS: 1: KuMS, 2: KaMS, 3: DPRKuMS, 4: DPRKaMS.
 - For HS: KaHS (No dimension).
- hgt
 - 5 Number of heights above the earth ellipsoid: 2, 4, 6, 10, and 15 km.
- tim
 - 24 Number of hours (local time).
- ang7
 - 7 Number of angles for FS.
 - For FS: 1: 24, 2: (20,28), 3: (16,32), 4: (12,36), 5: (8,40), 6: (3,44), and 7: (0,48).
- ang7
 - 4 Number of angles for MS and HS.
 - For MS: 1: 12, 2: (8,16), 3: (4,20), 4: (0,24)
 - For HS: 1: (11,2), 2: (7,16), 3: (3,20), 4: (0,23)
- rt
 - 3 Number of rain types: 1: all, 2: convective, 3: stratiform

- st
 - 3 Number of surface types: 1: all, 2: ocean, 3: land.
- bin
 - 30 Number of bins in histogram. The thresholds are different for different variables. See the introduction to this algorithm.
- nlat
 - 536 Number of high resolution 0.25° grid intervals of latitude from 67°S to 67°N .
- nlon
 - 1440 Number of high resolution 0.25° grid intervals of longitude from 180°W to 180°E .
- nalt
 - 5 Number of heights above the earth ellipsoid: 2km, 4km, 6km, 10km, and 15km.
- nvar
 - 3 Number of phase bins. Bins are counts of phase less than 100, counts of phase greater than or equal to 100 and less than 200, counts of phase greater than or equal to 200.
- chd
 - 2 Number of channels for 3DPRD: KuFS, DPRMS.
- AD
 - 2 Ascending or descending half of the orbit.

5.2. Data Format Structure of 3DPR and 3PR

3DPR, “DPR Full (Monthly) Product”, and 3PR, “PR Full (Monthly) Product”, compute statistics of the DPR and PR measurements at both a low horizontal resolution (G1, $5^\circ \times 5^\circ$ latitude/longitude) and a high horizontal resolution (G2, $0.25^\circ \times 0.25^\circ$ latitude/longitude).

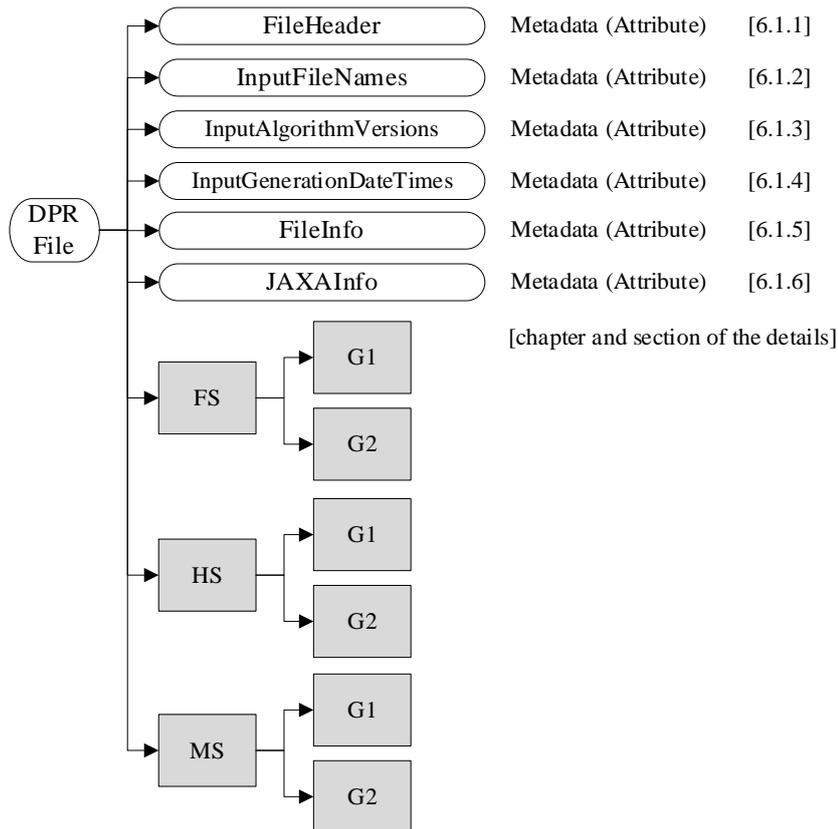
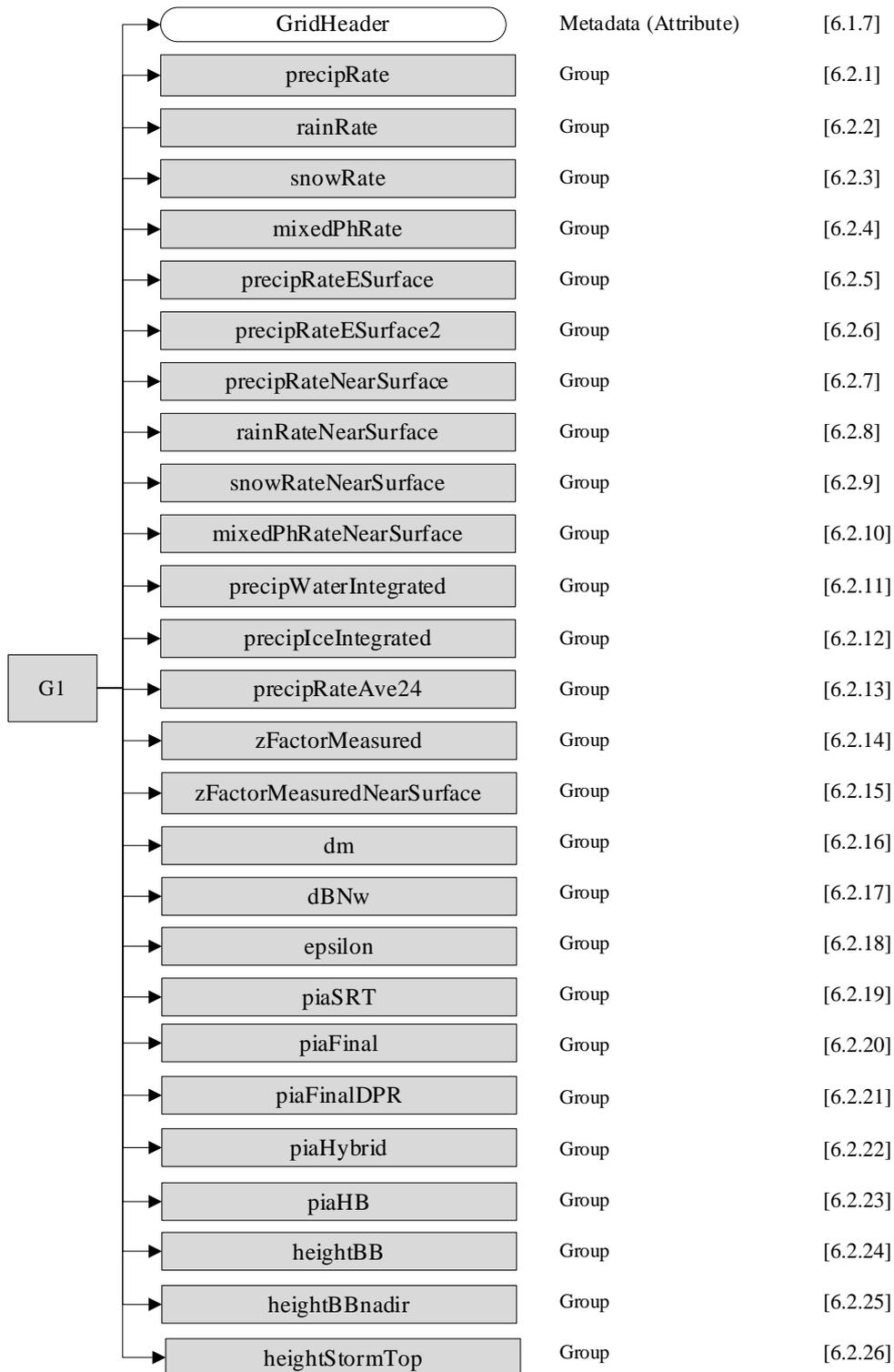


Figure 5.2-1 Data Format Structure for 3DPR and 3PR



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Figure 5.2-2 Data Format Structure for 3DPR and 3PR

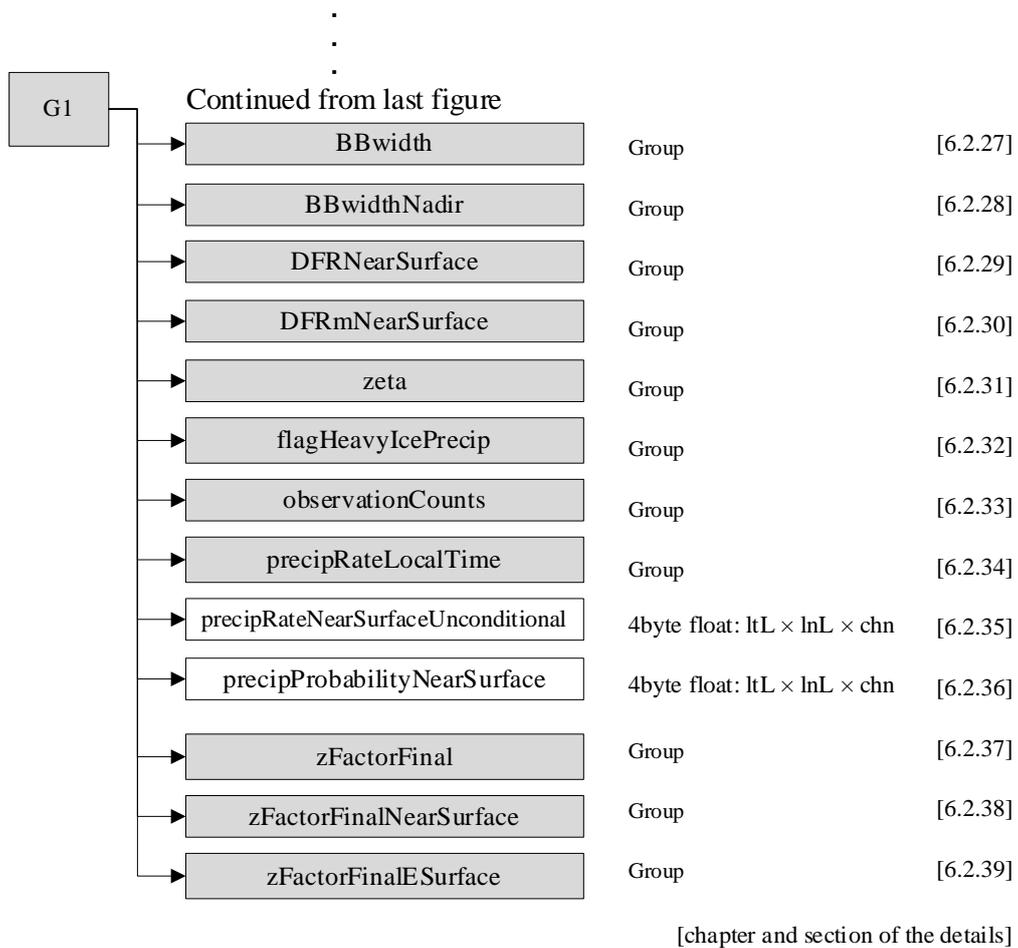
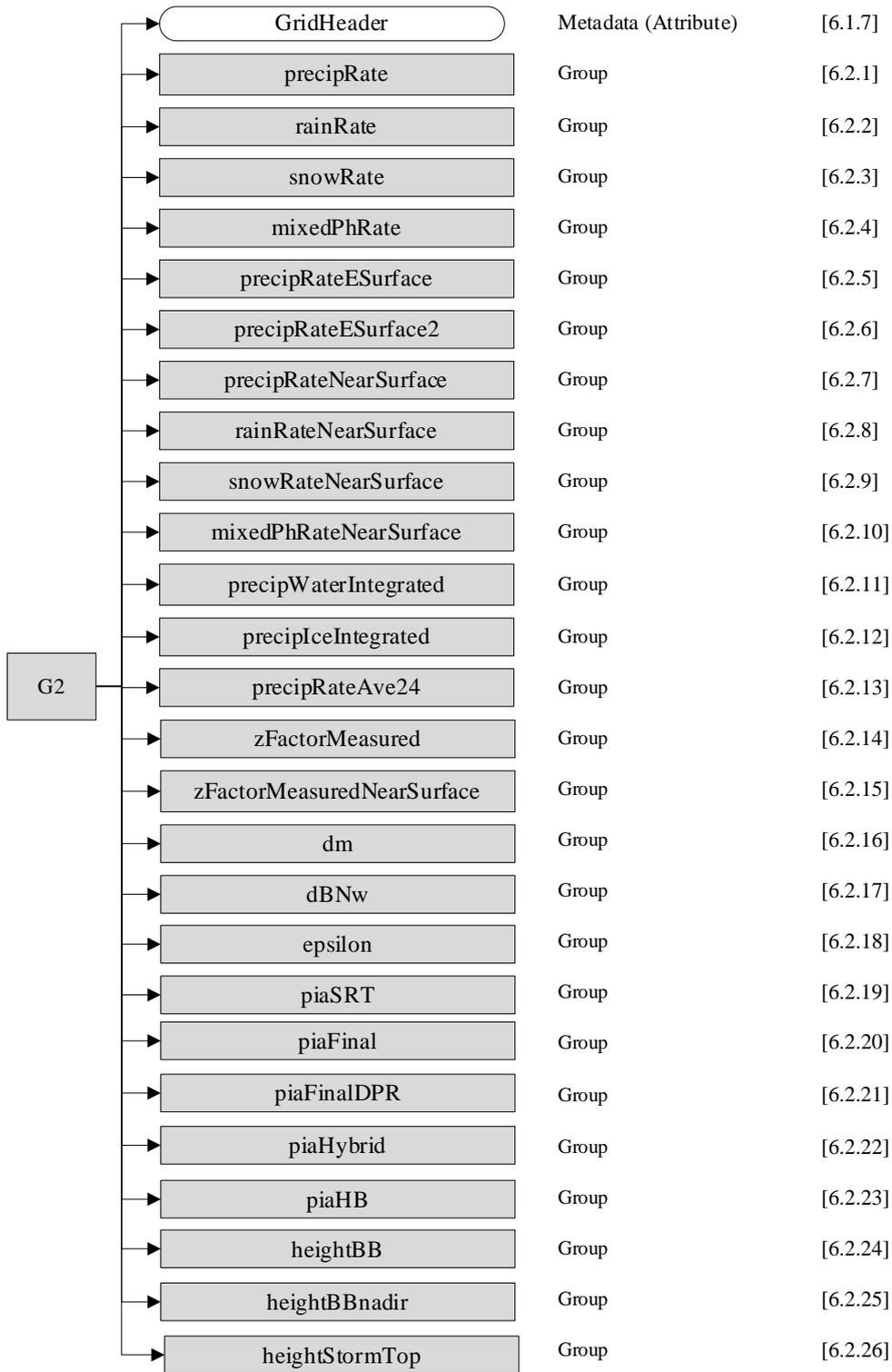


Figure 5.2-3 Data Format Structure for 3DPR and 3PR



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Figure 5.2-4 Data Format Structure for 3DPR and 3PR

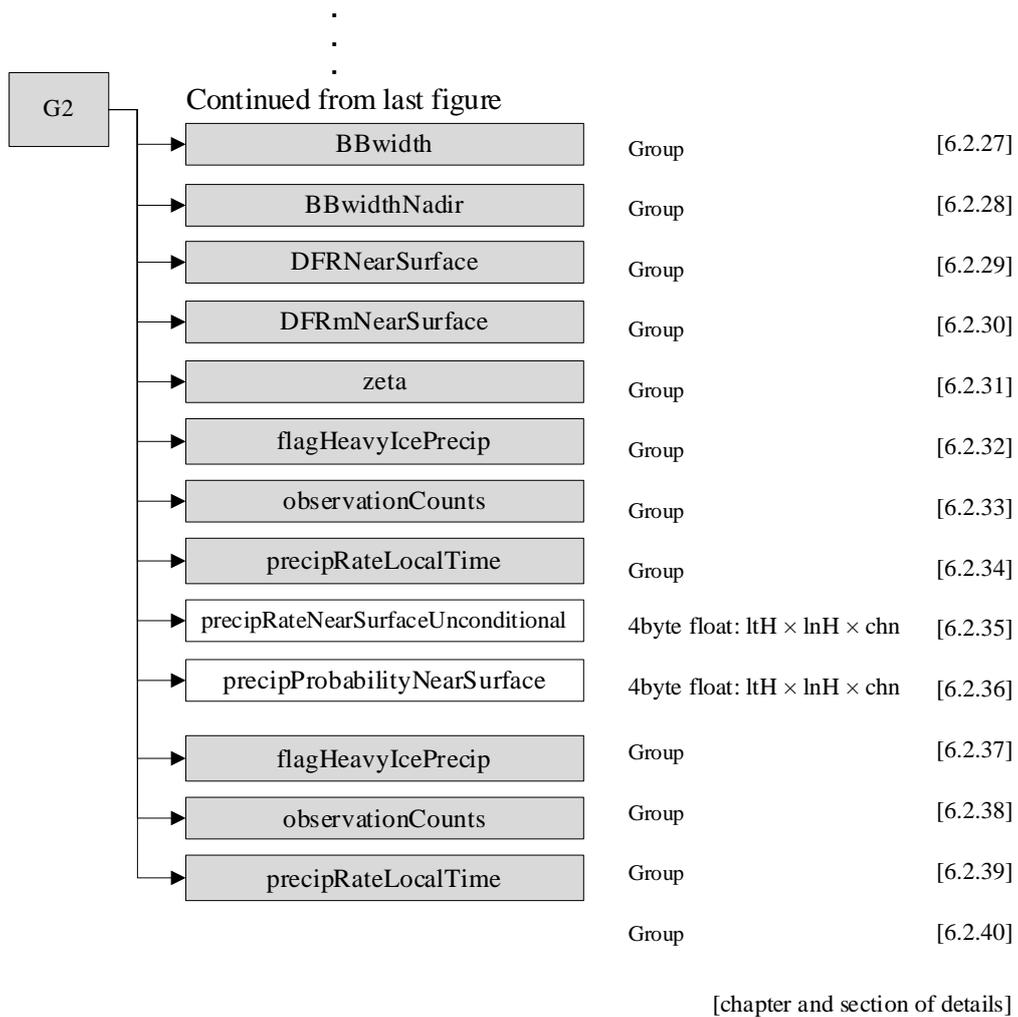
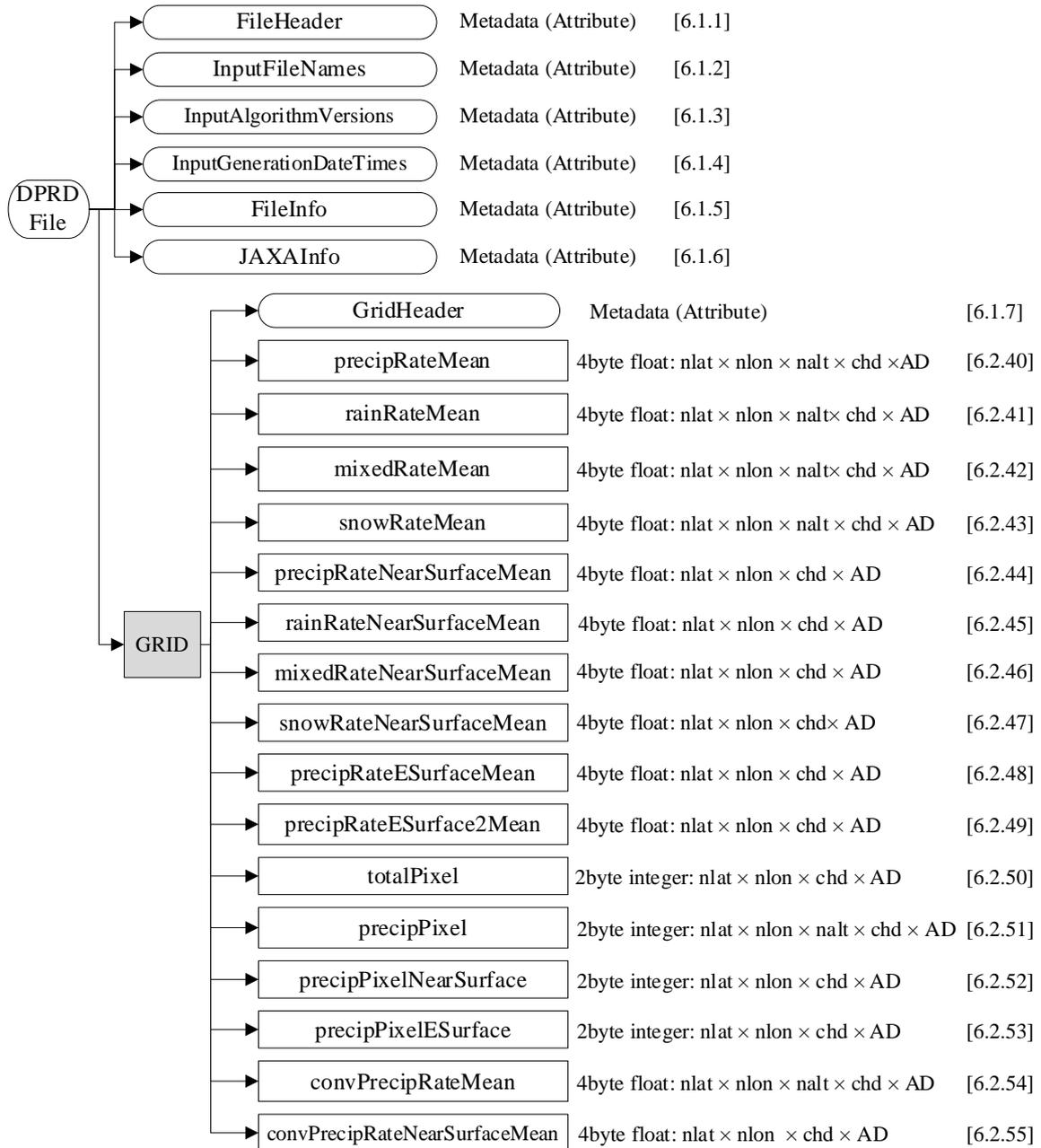


Figure 5.2-5 Data Format Structure for 3DPR and 3PR

5.3. Data Format Structure for 3DPRD and 3PRD

3DPRD, “DPR Daily Product”, and 3PRD, “PR Daily Product”, compute daily statistics of the DPR and PR measurements at a high horizontal resolution ($0.25^\circ \times 0.25^\circ$ latitude/longitude).



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Figure 5.3-1 Data Format Structure for 3DPRD and 3PRD

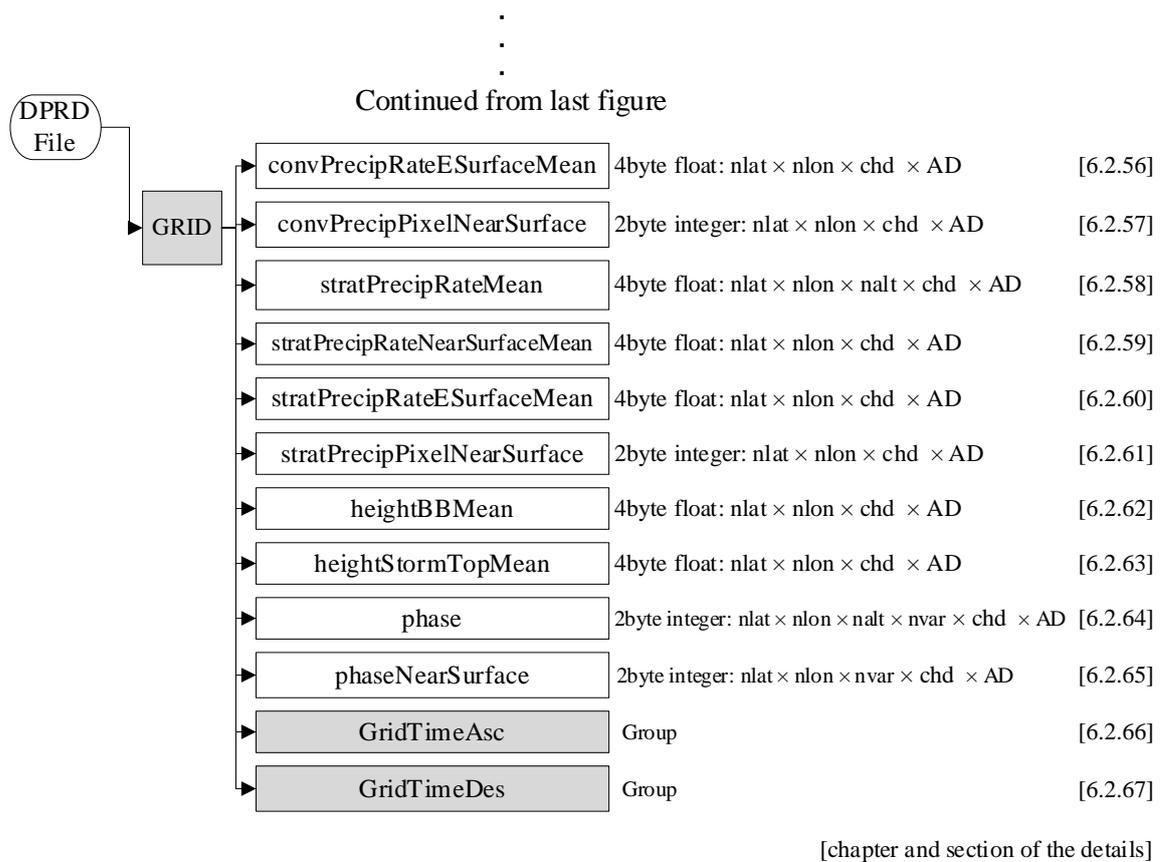


Figure 5.3-2 Data Format Structure for 3DPRD and 3PRD

5.4. Data Format Structure for each Group

Each group's structure is shown in this section.

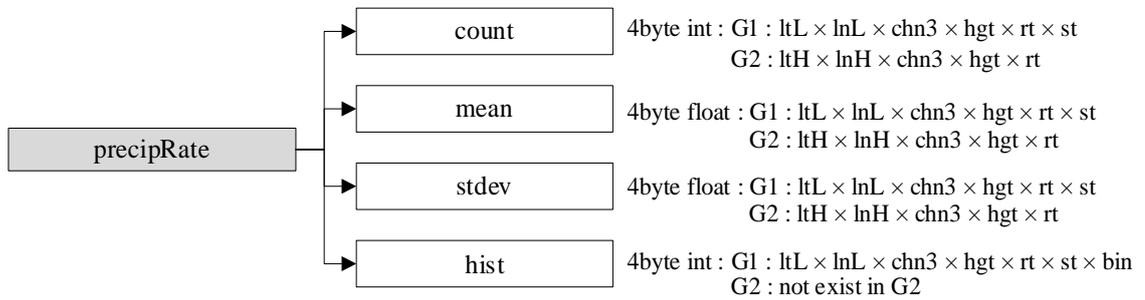


Figure 5.4-1 Data Format Structure for precipRate Group

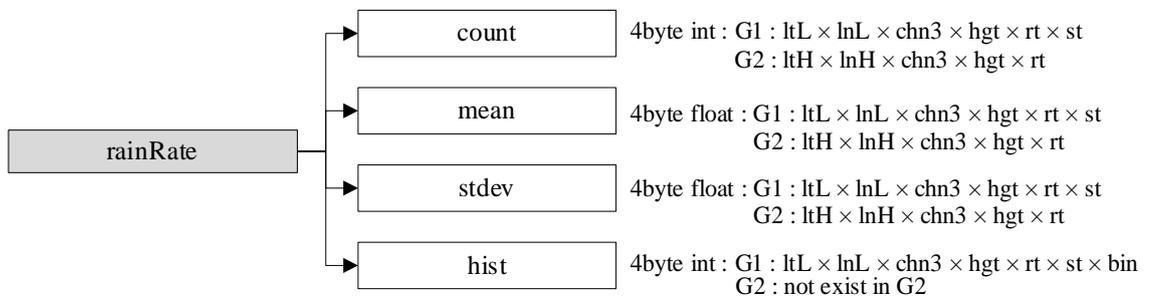


Figure 5.4-2 Data Format Structure for rainRate Group

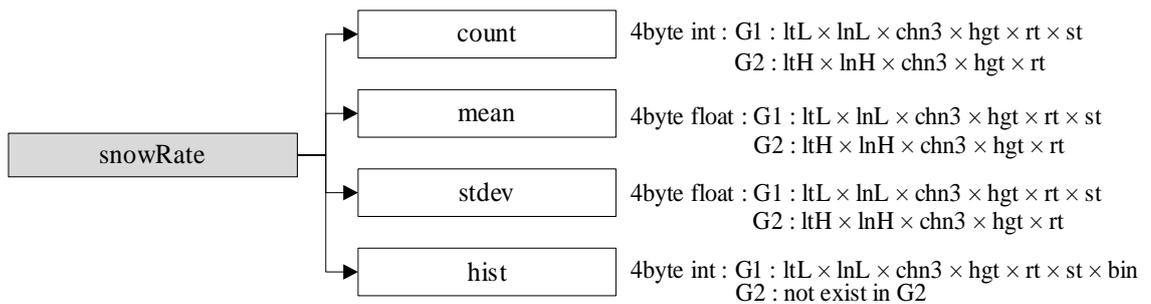


Figure 5.4-3 Data Format Structure for snowRate Group

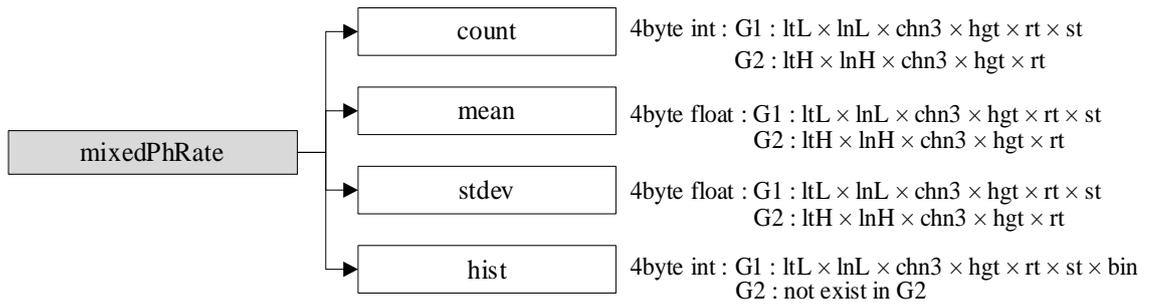


Figure 5.4-4 Data Format Structure for mixedPhRate Group

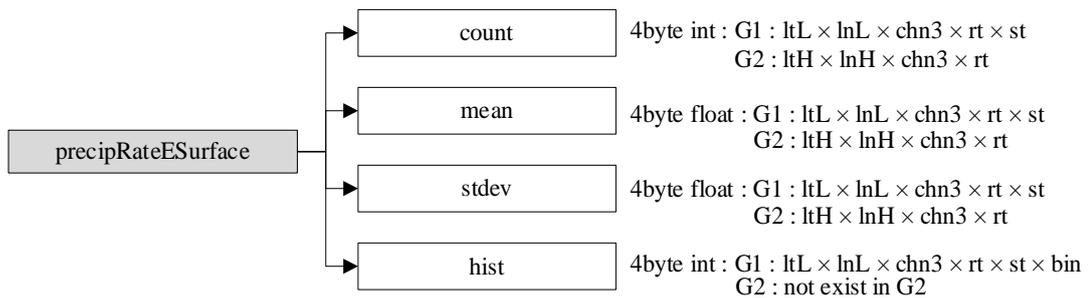


Figure 5.4-5 Data Format Structure for precipRateESurface Group

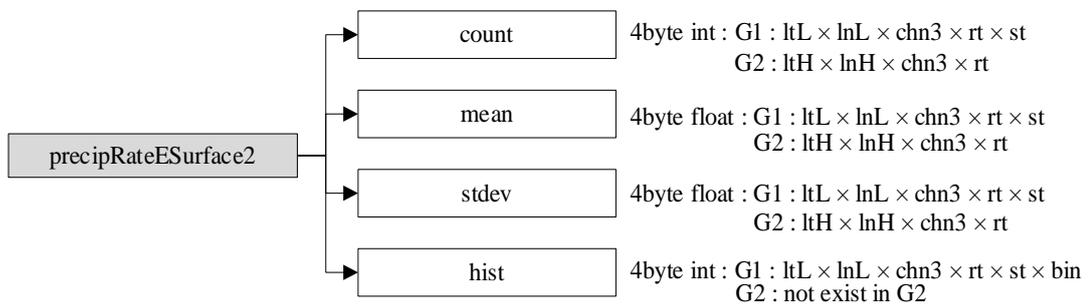


Figure 5.4-6 Data Format Structure for precipRateESurface2 Group

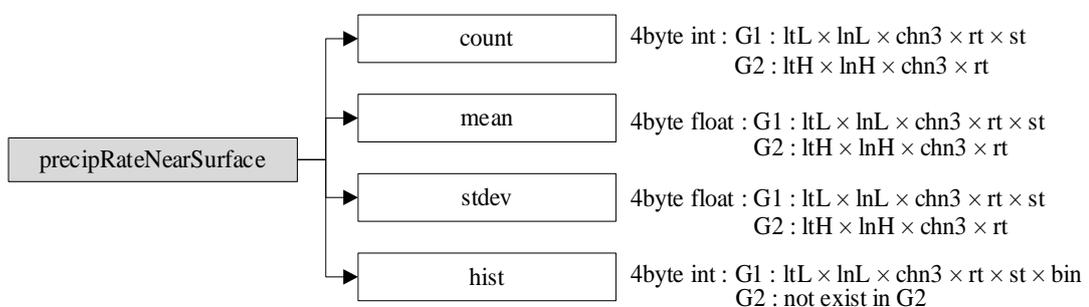


Figure 5.4-7 Data Format Structure for precipRateNearSurface Group

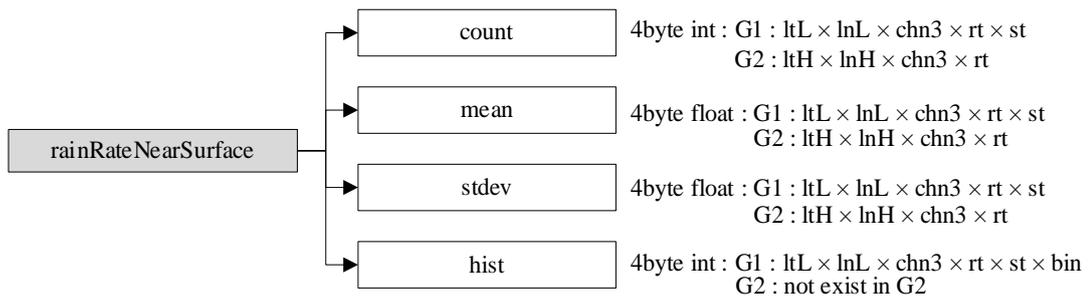


Figure 5.4-8 Data Format Structure for rainRateNearSurface Group

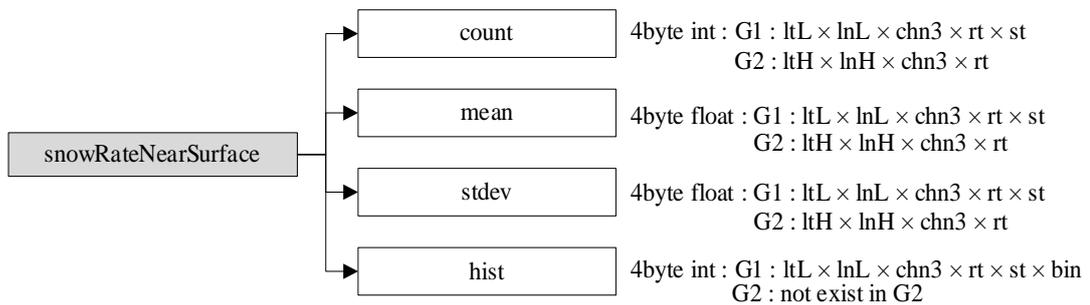


Figure 5.4-9 Data Format Structure for snowRateNearSurface Group

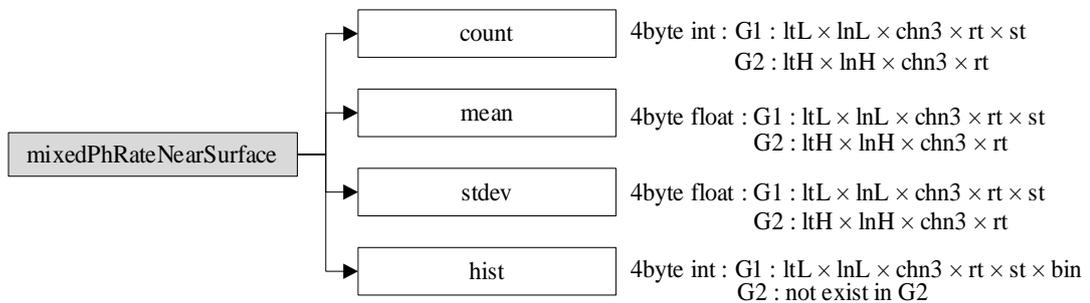


Figure 5.4-10 Data Format Structure for mixedPhRateNearSurface Group

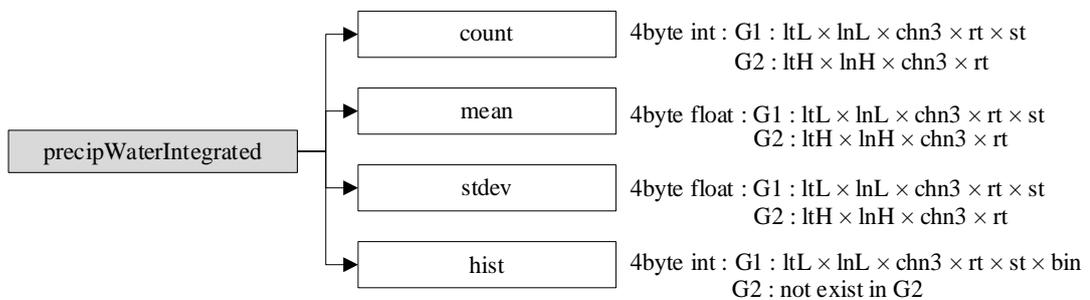


Figure 5.4-11 Data Format Structure for precipWaterIntegrated Group

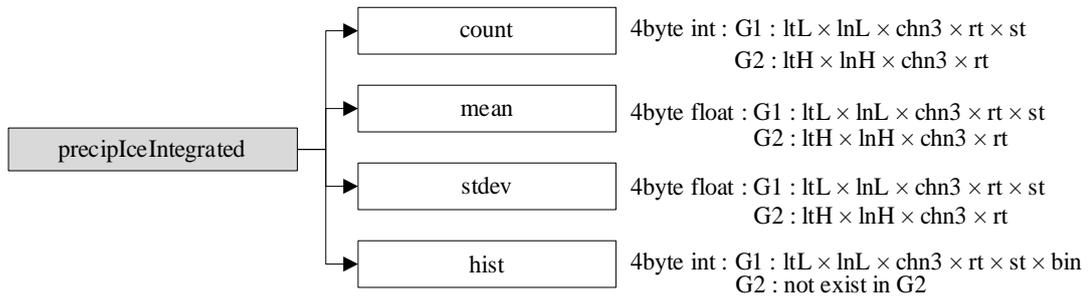


Figure 5.4-12 Data Format Structure for precipIceIntegrated Group

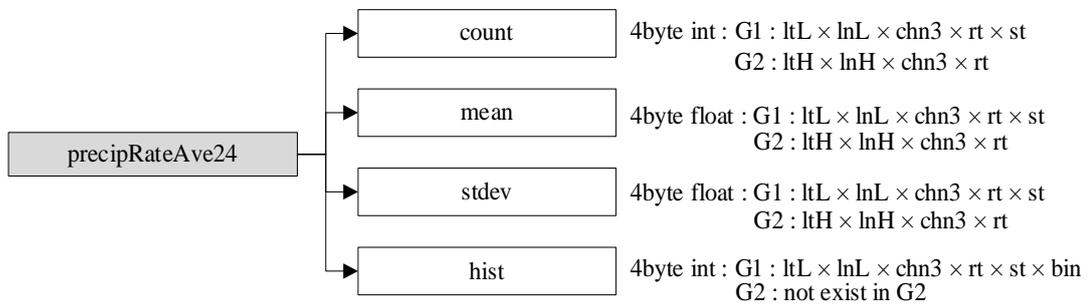


Figure 5.4-13 Data Format Structure for precipRateAve24 Group

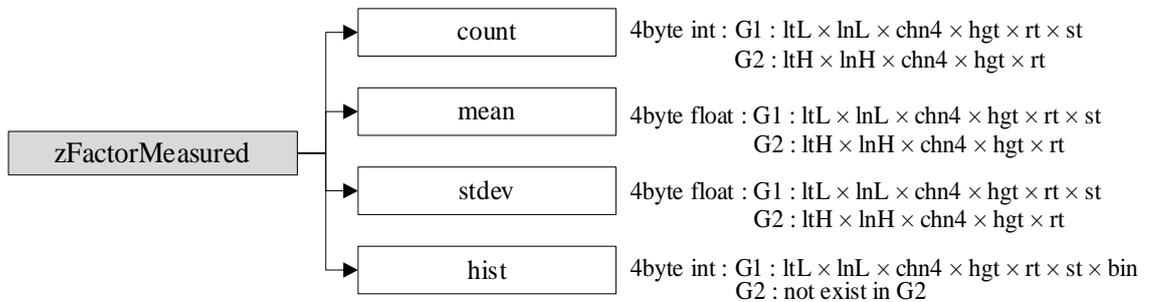


Figure 5.4-14 Data Format Structure for zFactorMeasured Group

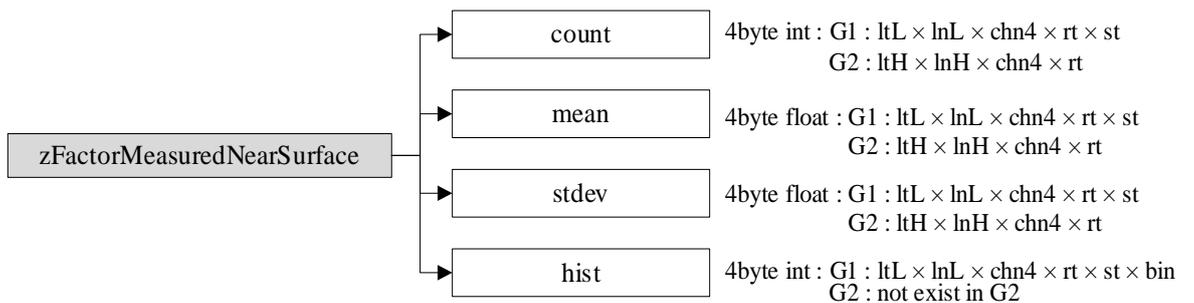


Figure 5.4-15 Data Format Structure for zFactorMeasuredNearSurface Group

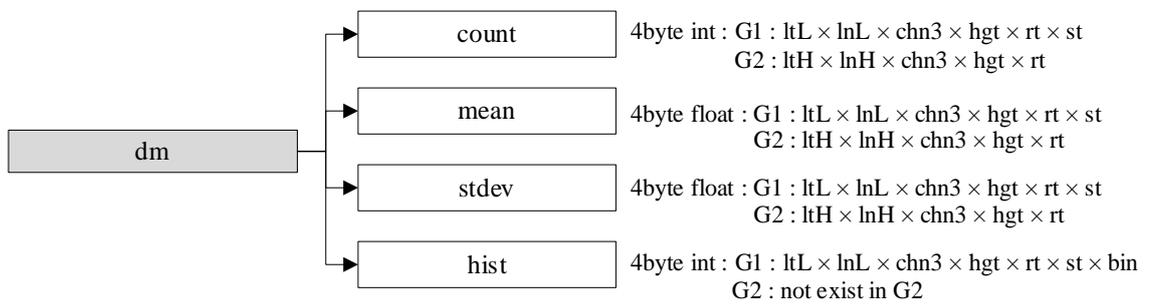


Figure 5.4-16 Data Format Structure for dm Group

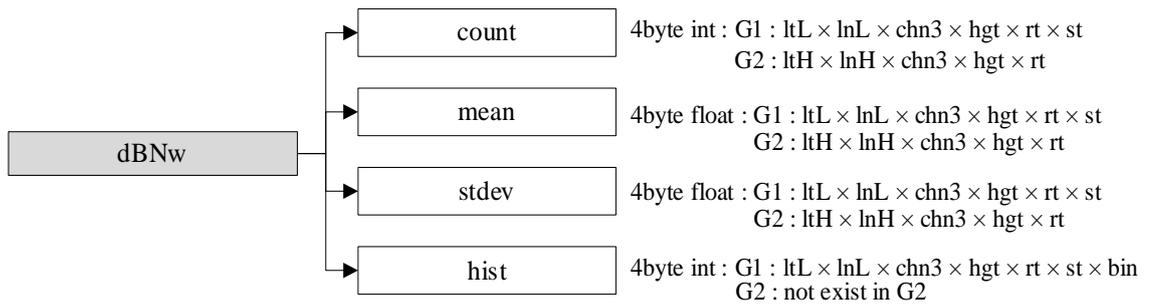


Figure 5.4-17 Data Format Structure for dBNw Group

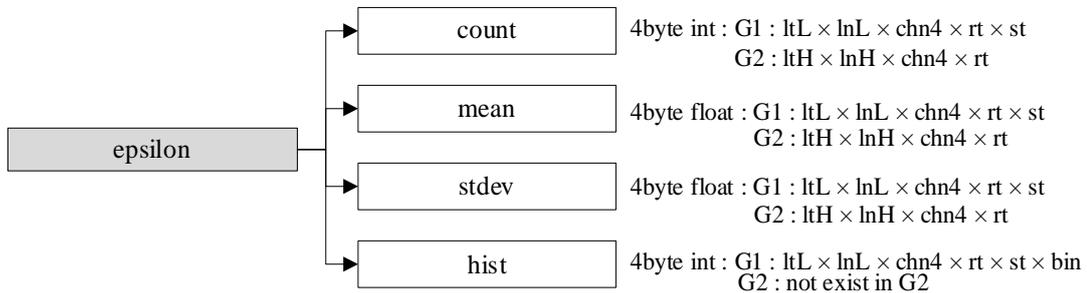


Figure 5.4-18 Data Format Structure for epsilon Group

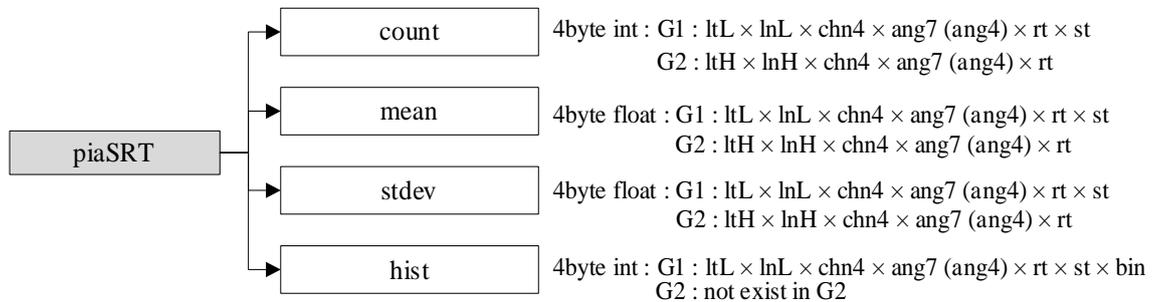


Figure 5.4-19 Data Format Structure for piaSRT Group

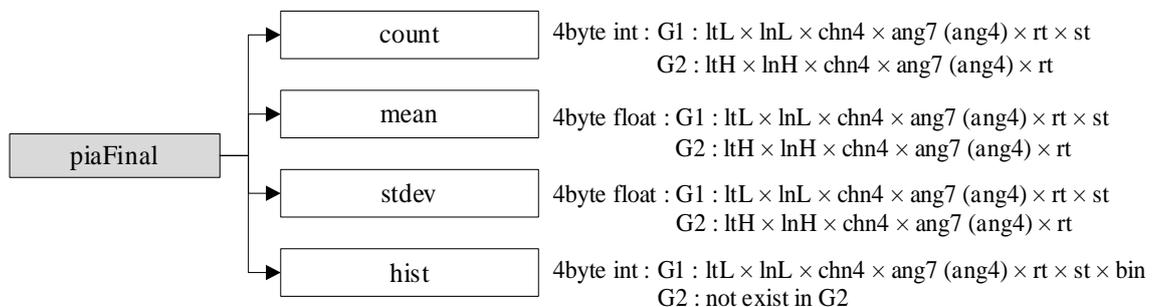


Figure 5.4-20 Data Format Structure for piaFinal Group

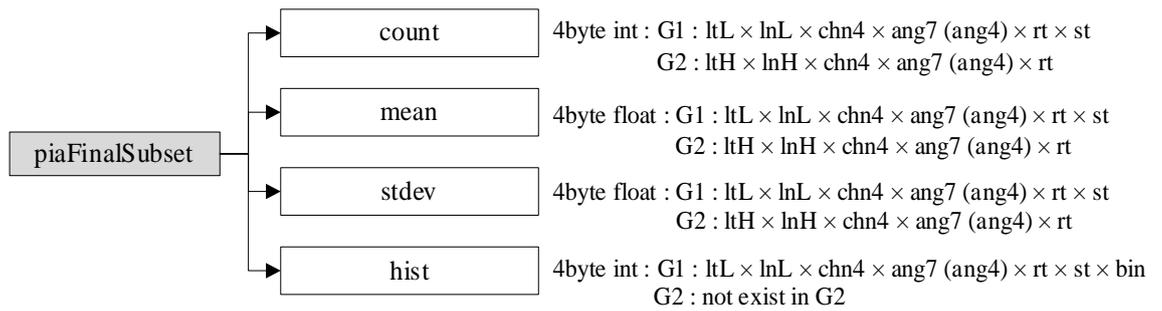


Figure 5.4-21 Data Format Structure for piaFinalSubset Group

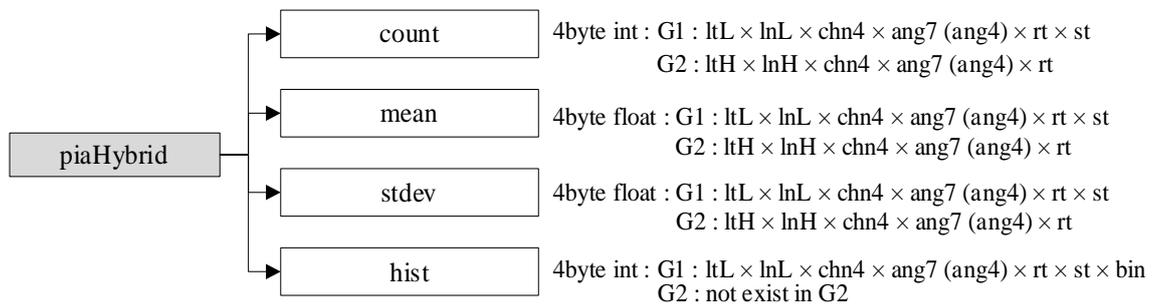


Figure 5.4-22 Data Format Structure for piaHybrid Group

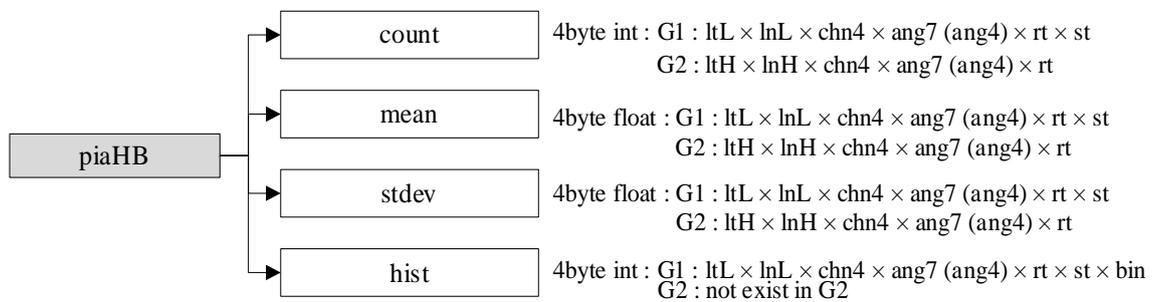


Figure 5.4-23 Data Format Structure for piaHB Group

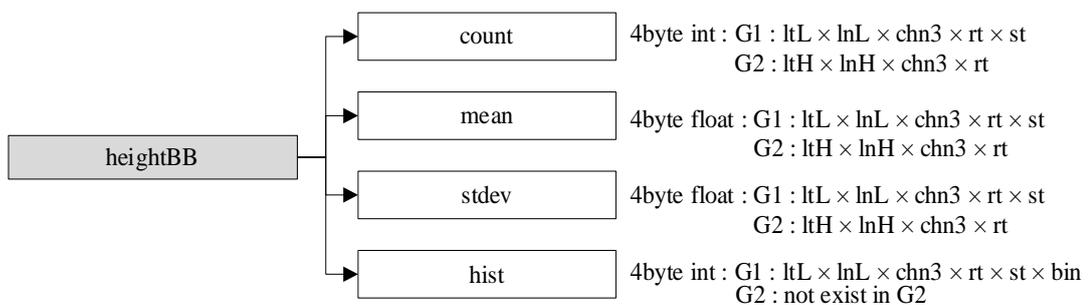


Figure 5.4-24 Data Format Structure for heightBB Group

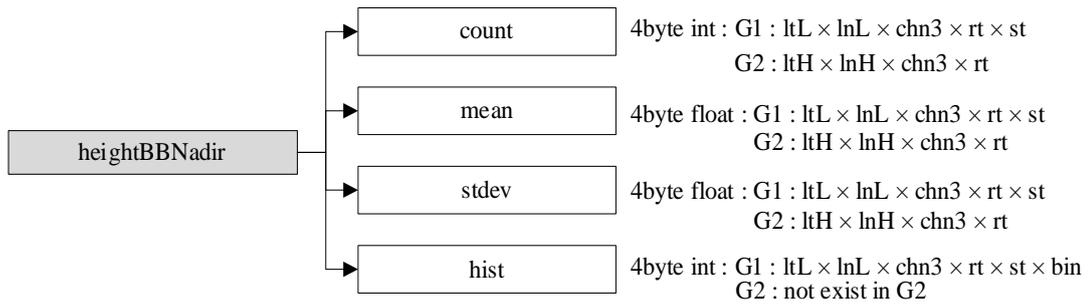


Figure 5.4-25 Data Format Structure for heightBBNadir Group

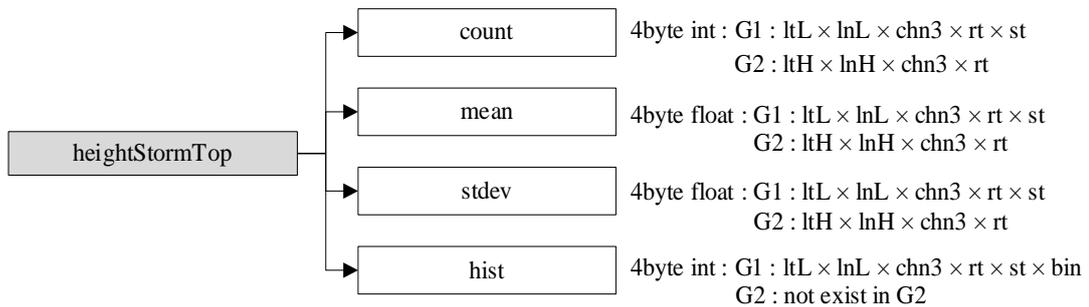


Figure 5.4-26 Data Format Structure for heightStormTop Group

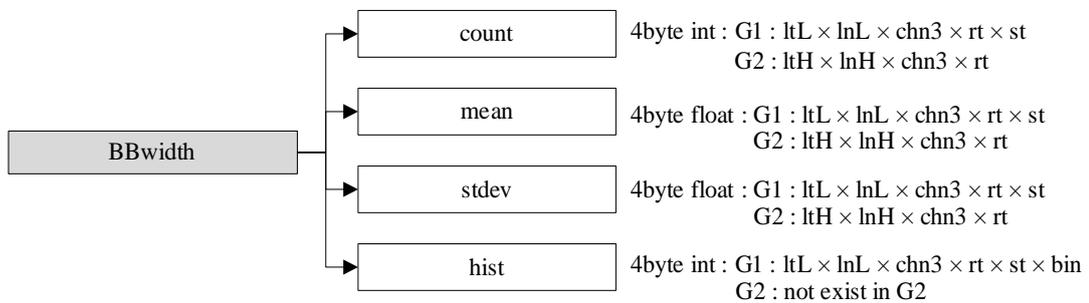


Figure 5.4-27 Data Format Structure for BBwidth Group

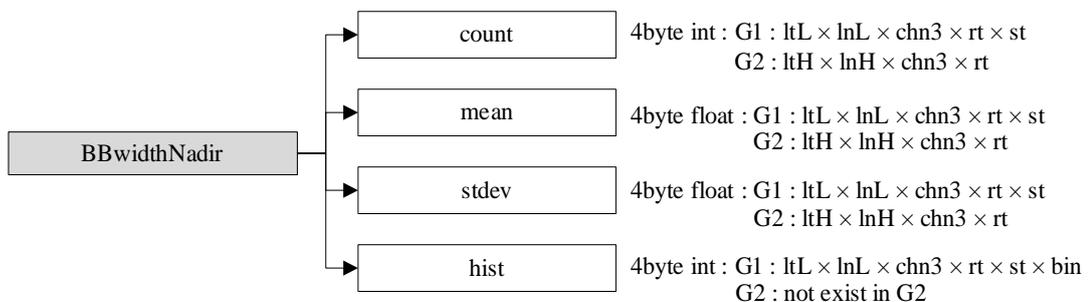


Figure 5.4-28 Data Format Structure for BBwidthNadir Group

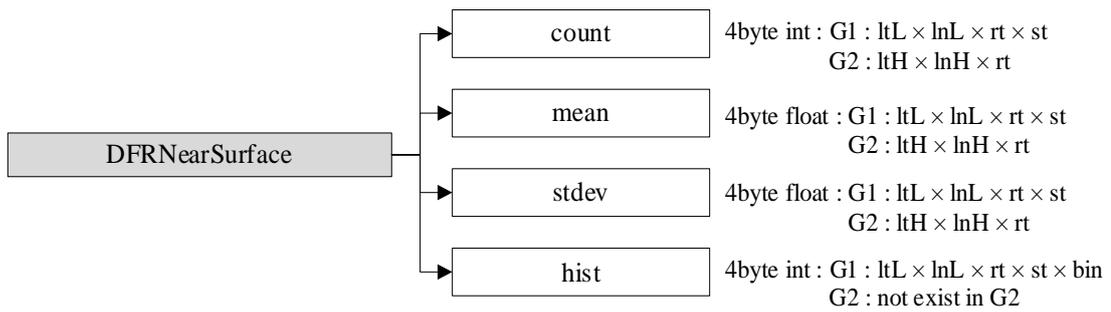


Figure 5.4-29 Data Format Structure for DFRNearSurface Group

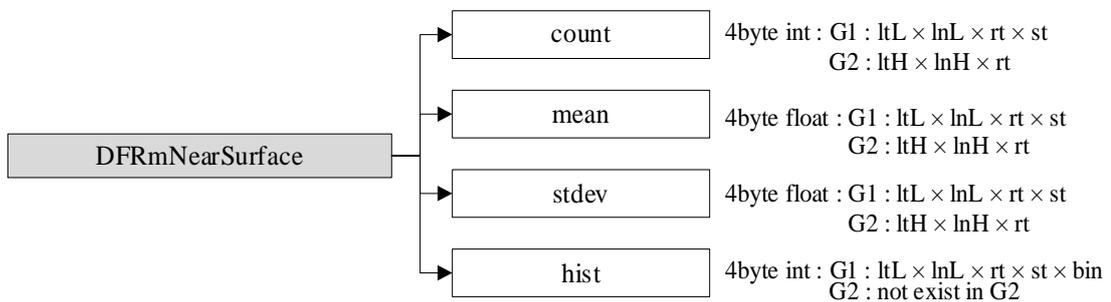


Figure 5.4-30 Data Format Structure for DFRmNearSurface Group

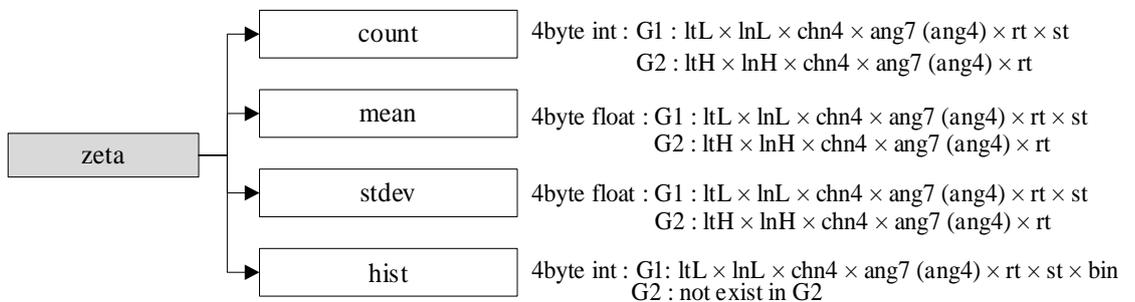


Figure 5.4-31 Data Format Structure for zeta Group

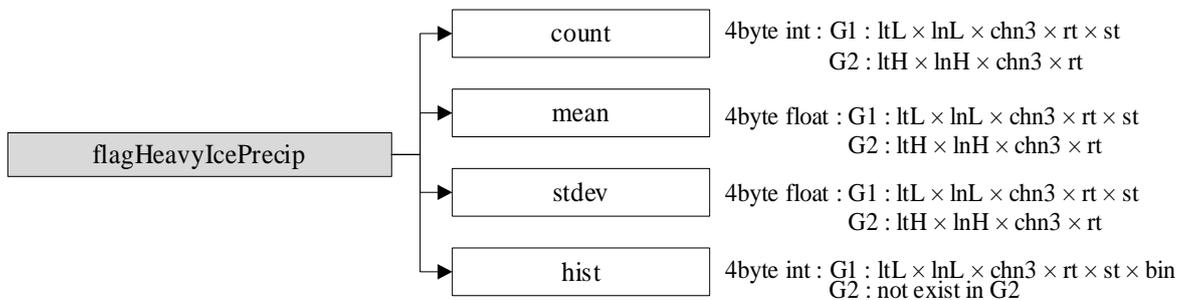


Figure 5.4-32 Data Format Structure for flagHeavyIcePrecip Group

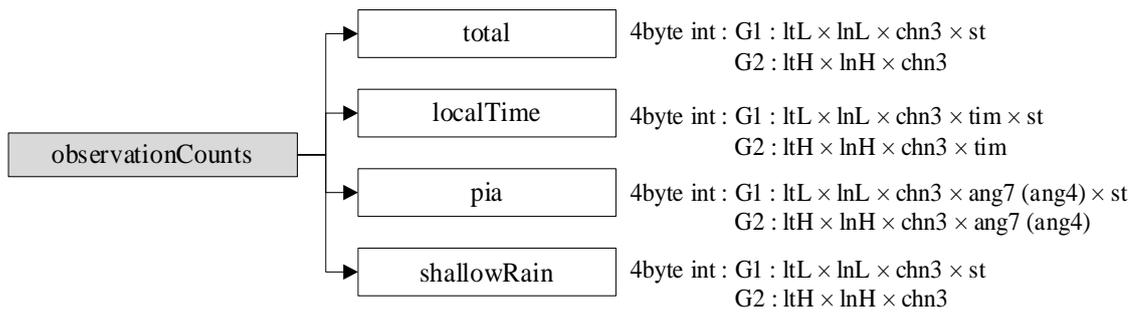


Figure 5.4-33 Data Format Structure for observationCounts Group

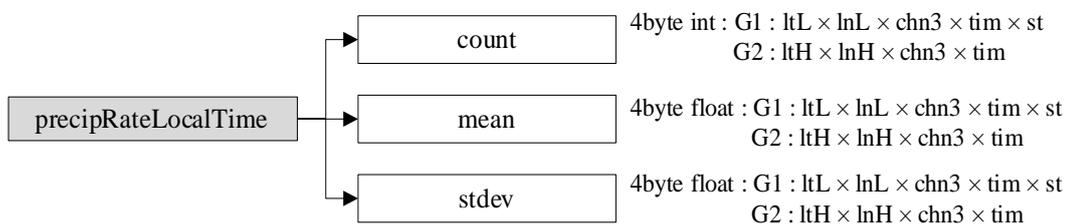


Figure 5.4-34 Data Format Structure for precipRateLocalTime Group

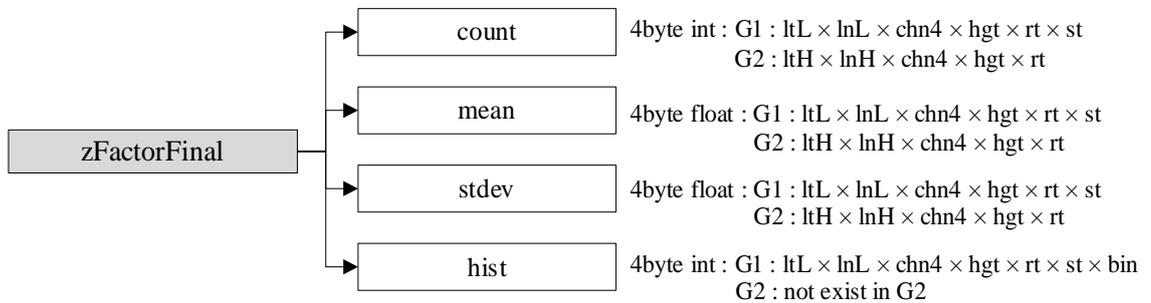


Figure 5.4-35 Data Format Structure for zFactorFinal Group

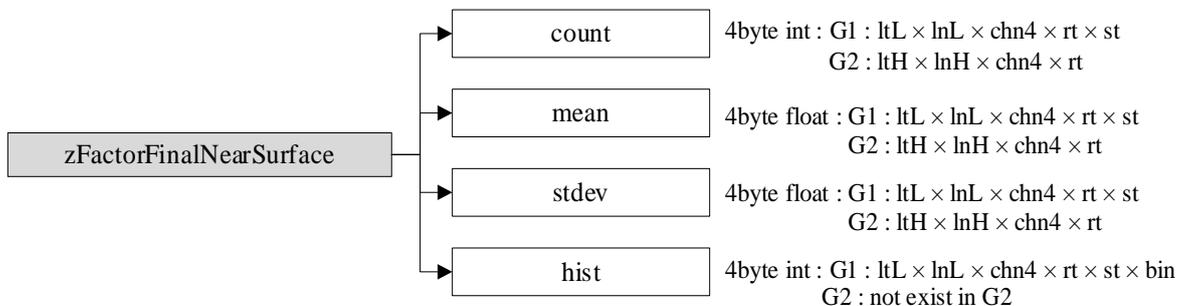


Figure 5.4-36 Data Format Structure for zFactorFinalNearSurface Group

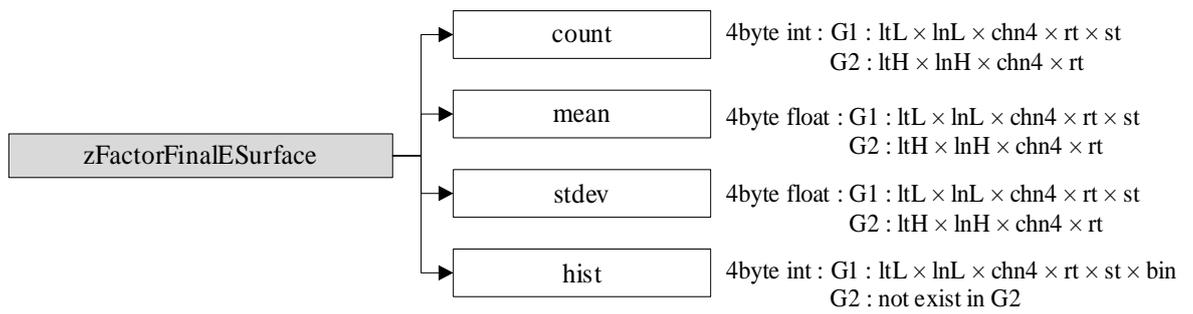


Figure 5.4-37 Data Format Structure for zFactorFinalESurface Group

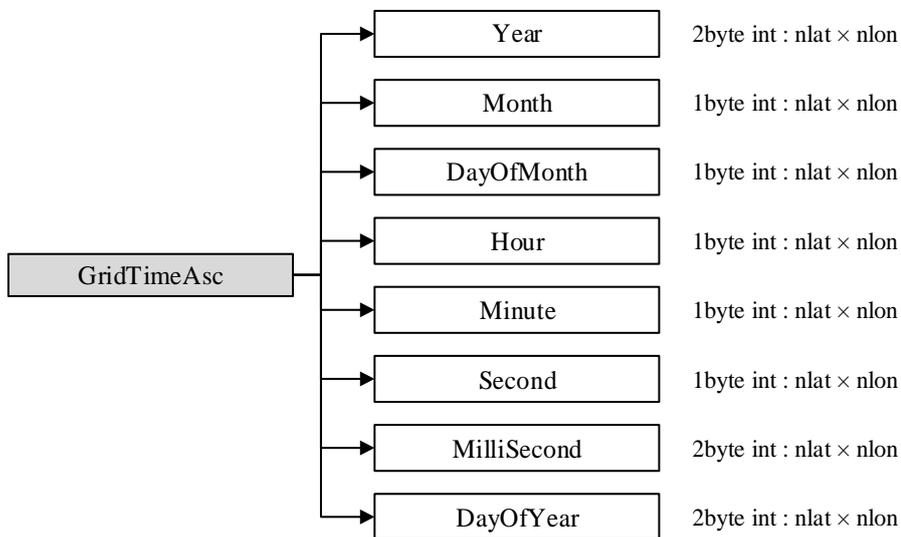


Figure 5.4-38 Data Format Structure for GridTimeAsc Group

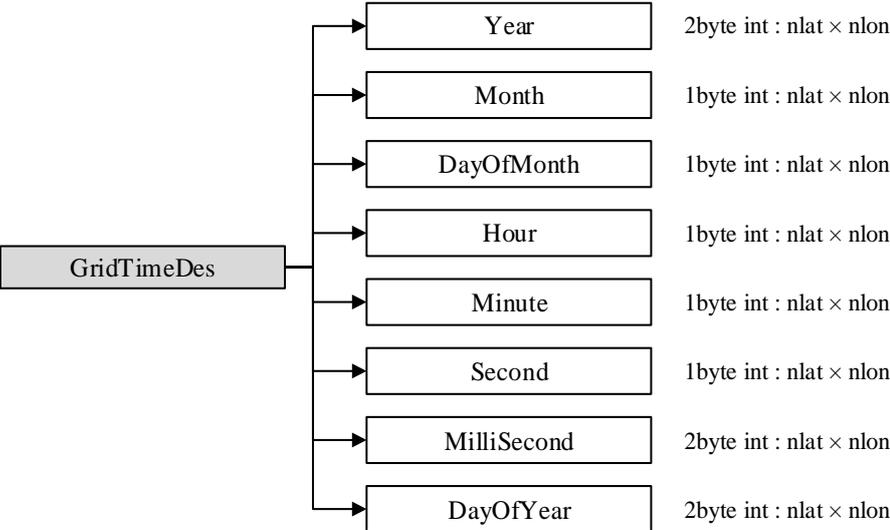


Figure 5.4-39 Data Format Structure for GridTimeDes Group

6. Level 3 (HDF) Contents of Objects in each Group

6.1. Metadata

Metadata has seven elements. Figure 6.1-1 shows metadata structure.

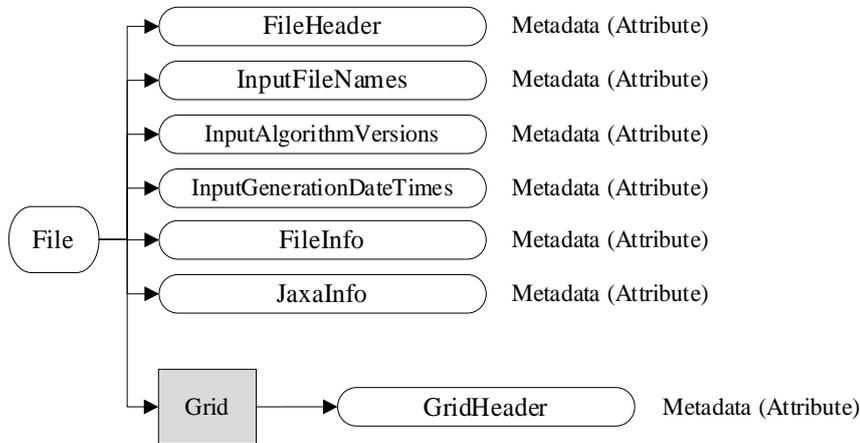


Figure 6.1-1 L3 Metadata

6.1.1. FileHeader

FileHeader contains metadata of general interest. This group appears in all data products. Please see 2.1.1.

6.1.2. InputFileNames

InputFileNames contains a list of input file names for this granule. Since some algorithms may have 2000 input files, this group is a “Long Metadata Group”, which has no elements. This group appears in Level 3 time averaged products.

6.1.3. InputAlgorithmVersions

InputAlgorithmVersions contains a list of input algorithm versions for this granule. Since some algorithms may have 2000 input files, this group is a “Long Metadata Group”, which has no elements. This group appears in Level 3 time averaged products.

6.1.4. InputGenerationDateTimes

InputGenerationDateTimes contains a list of input generation datetimes for this granule. Since some algorithms may have 2000 input files, this group is a “Long Metadata Group”, which has no elements. This group appears in Level 3 time averaged products.

6.1.5. FileInfo

FileInfo contains metadata used by the PPS I/O Toolkit. This group appears in all data products. This group appears in L2 Metadata. Please see 0.

6.1.6. JAXAInfo

JAXAInfo contains metadata requested by JAXA. Used by DPR algorithms and GSMaP. This group appears in L2 Metadata. Please see 2.1.6 except TotalQualityCode. Table 6.1-1 shows TotalQualityCode in JAXAInfo.

Table 6.1-1 TotalQualityCode Elements

No	Element	Description	Data size (bytes)
3	TotalQualityCode	<p>The total quality of product is defined based on the quality of input data or missing pixels ratio.</p> <p>Quality meaning are</p> <p>(a) GPM DPR L3 and PR L3 product</p> <p>Good: missing pixels ratio \geq 50%</p> <p>Fair: missing pixels ration $<$ 50%</p> <p>(b) GPM DPR SLH L3 and PR SLH L3(Gridded orbit) product</p> <p>Good: The total quality of input data (L2) is Good.</p> <p>Fair: The total quality of input data (L2) is Fair.</p> <p>EG (Empty Granule): The total quality of input data (L2) is EG</p> <p>(c) GPM DPR SLH L3 and PR SLH L3 product</p> <p>Good: missing pixels ratio \geq 50%</p> <p>Fair: missing pixels ratio $<$ 50%</p>	50

6.1.7. GridHeader

GridHeader contains metadata defining the grids in the grid structure. This group appears in Level 3 products. Table 6.1-2 shows each metadata elements in GridHeader.

Table 6.1-2 GridHeader Elements

No	Element	Description	Data size (bytes)
1	BinMethod	Method used to obtain the value in each grid box. The only defined value is "ARITHMEAN".	50
2	Registration	Representative location within the grid box. The only defined value is "CENTER".	50
3	LatitudeResolution	North-south size of a bin (degrees latitude).	50
4	LongitudeResolution	East-west size of a bin (degrees longitude).	50

6.1 Metadata

No	Element	Description	Data size (bytes)
5	NorthBoundingCoordinate	Northern-most latitude (degrees) covered by the grid.	50
6	SouthBoundingCoordinate	Southern-most latitude (degrees) covered by the grid.	50
7	EastBoundingCoordinate	Eastern-most longitude (degrees) covered by the grid.	50
8	WestBoundingCoordinate	Western-most longitude (degrees) covered by the grid.	50
9	Origin	Origin of the grid indices, e.g., "SOUTHWEST".	50

6.2. Data Group

Elements of data group are explained in detail in this section.

Two-Grids exist in 3DPR and 3PR Data Format Structure. Both Grid G1 and G2 have 37 data group and 2 data. Please see Figure 5.2-2Figure 5.2-1 to Figure 5.2-5.

One-Grid exists in 3DPRD and 3PRD Data Format Structure. The grid has 26 data and 2 data groups. Please see Figure 5.3-1 to Figure 5.3-2.

6.2.1. precipRate (Group)**(1) count**

Type	Array		Unit
4-byte	G1	ltL * lnL * chn3 * hgt * rt * st	N/A
integer	G2	ltH * lnH * chn3 * hgt * rt	

Count

Missing Value:

-9999

(2) mean

Type	Array		Unit
4-byte	G1	ltL * lnL * chn3 * hgt * rt * st	N/A
float	G2	ltH * lnH * chn3 * hgt * rt	

Mean

Missing Value:

-9999.9

(3) stdev

Type	Array		Unit
4-byte	G1	ltL * lnL * chn3 * hgt * rt * st	N/A
float	G2	ltH * lnH * chn3 * hgt * rt	

Standard Deviation

Missing Value:

-9999.9

(4) hist

Type	Array	Unit
4-byte	ltL * lnL * chn3 * hgt * rt * st * bin	N/A
integer		

Histogram. This element does not exist in G2.

Missing Value:

-9999

6.2.2. rainRate (Group)**(1) count**

Type	Array		Unit
4-byte	G1	ltL * lnL * chn3 * hgt * rt * st	N/A
integer	G2	ltH * lnH * chn3 * hgt * rt	

Count

Missing Value:

-9999

(2) mean

Type	Array		Unit
4-byte	G1	ltL * lnL * chn3 * hgt * rt * st	N/A
float	G2	ltH * lnH * chn3 * hgt * rt	

Mean

Missing Value:

-9999.9

(3) stdev

Type	Array		Unit
4-byte	G1	ltL * lnL * chn3 * hgt * rt * st	N/A
float	G2	ltH * lnH * chn3 * hgt * rt	

Standard Deviation

Missing Value:

-9999.9

(4) hist

Type	Array		Unit
4-byte	ltL * lnL * chn3 * hgt * rt * st * bin		N/A
integer			

Histogram. This element does not exist in G2.

Missing Value:

-9999

6.2.3. snowRate (Group)**(1) count**

Type	Array		Unit
4-byte	G1	ltL * lnL * chn3 * hgt * rt * st	N/A
integer	G2	ltH * lnH * chn3 * hgt * rt	

Count

Missing Value:

-9999

(2) mean

Type	Array		Unit
4-byte	G1	ltL * lnL * chn3 * hgt * rt * st	N/A
float	G2	ltH * lnH * chn3 * hgt * rt	

Mean

Missing Value:

-9999.9

(3) stdev

Type	Array		Unit
4-byte	G1	ltL * lnL * chn3 * hgt * rt * st	N/A
float	G2	ltH * lnH * chn3 * hgt * rt	

Standard Deviation

Missing Value:

-9999.9

(4) hist

Type	Array		Unit
4-byte	ltL * lnL * chn3 * hgt * rt * st * bin		N/A
integer			

Histogram. This element does not exist in G2.

Missing Value:

-9999

6.2.4. mixedPhRate (Group)**(1) count**

Type	Array		Unit
4-byte	G1	ltL * lnL * chn3 * hgt * rt * st	N/A
integer	G2	ltH * lnH * chn3 * hgt * rt	

Count

Missing Value:

-9999

(2) mean

Type	Array		Unit
4-byte	G1	ltL * lnL * chn3 * hgt * rt * st	N/A
float	G2	ltH * lnH * chn3 * hgt * rt	

Mean

Missing Value:

-9999.9

(3) stdev

Type	Array		Unit
4-byte	G1	ltL * lnL * chn3 * hgt * rt * st	N/A
float	G2	ltH * lnH * chn3 * hgt * rt	

Standard Deviation

Missing Value:

-9999.9

(4) hist

Type	Array		Unit
4-byte	ltL * lnL * chn3 * hgt * rt * st * bin		N/A
integer			

Histogram. This element does not exist in G2.

Missing Value:

-9999

6.2.5. precipRateESurface (Group)

(1) count

Type	Array		Unit
4-byte	G1	ltL * lnL * chn3 * rt * st	N/A
integer	G2	ltH * lnH * chn3 * rt	

Count

Missing Value:

-9999

(2) mean

Type	Array		Unit
4-byte	G1	ltL * lnL * chn3 * rt * st	N/A
float	G2	ltH * lnH * chn3 * rt	

Mean

Missing Value:

-9999.9

(3) stdev

Type	Array		Unit
4-byte	G1	ltL * lnL * chn3 * rt * st	N/A
float	G2	ltH * lnH * chn3 * rt	

Standard Deviation

Missing Value:

-9999.9

(4) hist

Type	Array		Unit
4-byte	ltL * lnL * chn3 * rt * st * bin		N/A
integer			

Histogram. This element does not exist in G2.

Missing Value:

-9999

6.2.6. precipRateESurface2 (Group)**(1) count**

Type	Array		Unit
4-byte	G1	ltL * lnL * chn3 * rt * st	N/A
integer	G2	ltH * lnH * chn3 * rt	

Count

Missing Value:

-9999

(2) mean

Type	Array		Unit
4-byte	G1	ltL * lnL * chn3 * rt * st	N/A
float	G2	ltH * lnH * chn3 * rt	

Mean

Missing Value:

-9999.9

(3) stdev

Type	Array		Unit
4-byte	G1	ltL * lnL * chn3 * rt * st	N/A
float	G2	ltH * lnH * chn3 * rt	

Standard Deviation

Missing Value:

-9999.9

(4) hist

Type	Array		Unit
4-byte	ltL * lnL * chn3 * rt * st * bin		N/A
integer			

Histogram. This element does not exist in G2.

Missing Value:

-9999

6.2.7. precipRateNearSurface (Group)**(1) count**

Type	Array		Unit
4-byte	G1	ltL * lnL * chn3 * rt * st	N/A
integer	G2	ltH * lnH * chn3 * rt	

Count

Missing Value:

-9999

(2) mean

Type	Array		Unit
4-byte	G1	ltL * lnL * chn3 * rt * st	N/A
float	G2	ltH * lnH * chn3 * rt	

Mean

Missing Value:

-9999.9

(3) stdev

Type	Array		Unit
4-byte	G1	ltL * lnL * chn3 * rt * st	N/A
float	G2	ltH * lnH * chn3 * rt	

Standard Deviation

Missing Value:

-9999.9

(4) hist

Type	Array		Unit
4-byte	ltL * lnL * chn3 * rt * st * bin		N/A
integer			

Histogram. This element does not exist in G2.

Missing Value:

-9999

6.2.8. rainRateNearSurface (Group)**(1) count**

Type	Array		Unit
4-byte	G1	ltL * lnL * chn3 * rt * st	N/A
integer	G2	ltH * lnH * chn3 * rt	

Count

Missing Value:

-9999

(2) mean

Type	Array		Unit
4-byte	G1	ltL * lnL * chn3 * rt * st	N/A
float	G2	ltH * lnH * chn3 * rt	

Mean

Missing Value:

-9999.9

(3) stdev

Type	Array		Unit
4-byte	G1	ltL * lnL * chn3 * rt * st	N/A
float	G2	ltH * lnH * chn3 * rt	

Standard Deviation

Missing Value:

-9999.9

(4) hist

Type	Array		Unit
4-byte	ltL * lnL * chn3 * rt * st * bin		N/A
integer			

Histogram. This element does not exist in G2.

Missing Value:

-9999

6.2.9. snowRateNearSurface (Group)**(1) count**

Type	Array		Unit
4-byte	G1	ltL * lnL * chn3 * rt * st	N/A
integer	G2	ltH * lnH * chn3 * rt	

Count

Missing Value:

-9999

(2) mean

Type	Array		Unit
4-byte	G1	ltL * lnL * chn3 * rt * st	N/A
float	G2	ltH * lnH * chn3 * rt	

Mean

Missing Value:

-9999.9

(3) stdev

Type	Array		Unit
4-byte	G1	ltL * lnL * chn3 * rt * st	N/A
float	G2	ltH * lnH * chn3 * rt	

Standard Deviation

Missing Value:

-9999.9

(4) hist

Type	Array		Unit
4-byte	ltL * lnL * chn3 * rt * st * bin		N/A
integer			

Histogram. This element does not exist in G2.

Missing Value:

-9999

6.2.10. mixedPhRateNearSurface (Group)**(1) count**

Type	Array		Unit
4-byte	G1	ltL * lnL * chn3 * rt * st	N/A
integer	G2	ltH * lnH * chn3 * rt	

Count

Missing Value:

-9999

(2) mean

Type	Array		Unit
4-byte	G1	ltL * lnL * chn3 * rt * st	N/A
float	G2	ltH * lnH * chn3 * rt	

Mean

Missing Value:

-9999.9

(3) stdev

Type	Array		Unit
4-byte	G1	ltL * lnL * chn3 * rt * st	N/A
float	G2	ltH * lnH * chn3 * rt	

Standard Deviation

Missing Value:

-9999.9

(4) hist

Type	Array		Unit
4-byte	ltL * lnL * chn3 * rt * st * bin		N/A
integer			

Histogram. This element does not exist in G2.

Missing Value:

-9999

6.2.11. precipWaterIntegrated (Group)**(1) count**

Type	Array		Unit
4-byte	G1	ltL * lnL * chn3 * rt * st	N/A
integer	G2	ltH * lnH * chn3 * rt	

Count

Missing Value:

-9999

(2) mean

Type	Array		Unit
4-byte	G1	ltL * lnL * chn3 * rt * st	N/A
float	G2	ltH * lnH * chn3 * rt	

Mean

Missing Value:

-9999.9

(3) stdev

Type	Array		Unit
4-byte	G1	ltL * lnL * chn3 * rt * st	N/A
float	G2	ltH * lnH * chn3 * rt	

Standard Deviation

Missing Value:

-9999.9

(4) hist

Type	Array		Unit
4-byte	ltL * lnL * chn3 * rt * st * bin		N/A
integer			

Histogram. This element does not exist in G2.

Missing Value:

-9999

6.2.12. precipIceIntegrated (Group)**(1) count**

Type	Array		Unit
4-byte	G1	ltL * lnL * chn3 * rt * st	N/A
integer	G2	ltH * lnH * chn3 * rt	

Count

Missing Value:

-9999

(2) mean

Type	Array		Unit
4-byte	G1	ltL * lnL * chn3 * rt * st	N/A
float	G2	ltH * lnH * chn3 * rt	

Mean

Missing Value:

-9999.9

(3) stdev

Type	Array		Unit
4-byte	G1	ltL * lnL * chn3 * rt * st	N/A
float	G2	ltH * lnH * chn3 * rt	

Standard Deviation

Missing Value:

-9999.9

(4) hist

Type	Array		Unit
4-byte	ltL * lnL * chn3 * rt * st * bin		N/A
integer			

Histogram. This element does not exist in G2.

Missing Value:

-9999

6.2.13. precipRateAve24 (Group)**(1) count**

Type	Array		Unit
4-byte	G1	ltL * lnL * chn3 * rt * st	N/A
integer	G2	ltH * lnH * chn3 * rt	

Count

Missing Value:

-9999

(2) mean

Type	Array		Unit
4-byte	G1	ltL * lnL * chn3 * rt * st	N/A
float	G2	ltH * lnH * chn3 * rt	

Mean

Missing Value:

-9999.9

(3) stdev

Type	Array		Unit
4-byte	G1	ltL * lnL * chn3 * rt * st	N/A
float	G2	ltH * lnH * chn3 * rt	

Standard Deviation

Missing Value:

-9999.9

(4) hist

Type	Array		Unit
4-byte	ltL * lnL * chn3 * rt * st * bin		N/A
integer			

Histogram. This element does not exist in G2.

Missing Value:

-9999

6.2.14. zFactorMeasured (Group)**(1) count**

Type	Array		Unit
4-byte	G1	ltL * lnL * chn4 * hgt * rt * st	N/A
integer	G2	ltH * lnH * chn4 * hgt * rt	

Count

Missing Value:

-9999

(2) mean

Type	Array		Unit
4-byte	G1	ltL * lnL * chn4 * hgt * rt * st	N/A
float	G2	ltH * lnH * chn4 * hgt * rt	

Mean

Missing Value:

-9999.9

(3) stdev

Type	Array		Unit
4-byte	G1	ltL * lnL * chn4 * hgt * rt * st	N/A
float	G2	ltH * lnH * chn4 * hgt * rt	

Standard Deviation

Missing Value:

-9999.9

(4) hist

Type	Array		Unit
4-byte	ltL * lnL * chn4 * hgt * rt * st * bin		N/A
integer			

Histogram. This element does not exist in G2.

Missing Value:

-9999

6.2.15. zFactorMeasuredNearSurface (Group)**(1) count**

Type	Array		Unit
4-byte	G1	ltL * lnL * chn4 * rt * st	N/A
integer	G2	ltH * lnH * chn4 * rt	

Count

Missing Value:

-9999

(2) mean

Type	Array		Unit
4-byte	G1	ltL * lnL * chn4 * rt * st	N/A
float	G2	ltH * lnH * chn4 * rt	

Mean

Missing Value:

-9999.9

(3) stdev

Type	Array		Unit
4-byte	G1	ltL * lnL * chn4 * rt * st	N/A
float	G2	ltH * lnH * chn4 * rt	

Standard Deviation

Missing Value:

-9999.9

(4) hist

Type	Array		Unit
4-byte	ltL * lnL * chn4 * rt * st * bin		N/A
integer			

Histogram. This element does not exist in G2.

Missing Value:

-9999

6.2.16. dm (Group)**(1) count**

Type	Array		Unit
4-byte	G1	ltL * lnL * chn3 * hgt * rt * st	N/A
integer	G2	ltH * lnH * chn3 * hgt * rt	

Count

Missing Value:

-9999

(2) mean

Type	Array		Unit
4-byte	G1	ltL * lnL * chn3 * hgt * rt * st	N/A
float	G2	ltH * lnH * chn3 * hgt * rt	

Mean

Missing Value:

-9999.9

(3) stdev

Type	Array		Unit
4-byte	G1	ltL * lnL * chn3 * hgt * rt * st	N/A
float	G2	ltH * lnH * chn3 * hgt * rt	

Standard Deviation

Missing Value:

-9999.9

(4) hist

Type	Array		Unit
4-byte	ltL * lnL * chn3 * hgt * rt * st * bin		N/A
integer			

Histogram. This element does not exist in G2.

Missing Value:

-9999

6.2.17. dBNw (Group)**(1) count**

Type	Array		Unit
4-byte	G1	ltL * lnL * chn3 * hgt * rt * st	N/A
integer	G2	ltH * lnH * chn3 * hgt * rt	

Count

Missing Value:

-9999

(2) mean

Type	Array		Unit
4-byte	G1	ltL * lnL * chn3 * hgt * rt * st	N/A
float	G2	ltH * lnH * chn3 * hgt * rt	

Mean

Missing Value:

-9999.9

(3) stdev

Type	Array		Unit
4-byte	G1	ltL * lnL * chn3 * hgt * rt * st	N/A
float	G2	ltH * lnH * chn3 * hgt * rt	

Standard Deviation

Missing Value:

-9999.9

(4) hist

Type	Array		Unit
4-byte	ltL * lnL * chn3 * hgt * rt * st * bin		N/A
integer			

Histogram. This element does not exist in G2.

Missing Value:

-9999

6.2.18. epsilon (Group)**(1) count**

Type	Array		Unit
4-byte	G1	ltL * lnL * chn4 * rt * st	N/A
integer	G2	ltH * lnH * chn4 * rt	

Count

Missing Value:

-9999

(2) mean

Type	Array		Unit
4-byte	G1	ltL * lnL * chn4 * rt * st	N/A
float	G2	ltH * lnH * chn4 * rt	

Mean

Missing Value:

-9999.9

(3) stdev

Type	Array		Unit
4-byte	G1	ltL * lnL * chn4 * rt * st	N/A
float	G2	ltH * lnH * chn4 * rt	

Standard Deviation

Missing Value:

-9999.9

(4) hist

Type	Array		Unit
4-byte	ltL * lnL * chn4 * rt * st * bin		N/A
integer			

Histogram. This element does not exist in G2.

Missing Value:

-9999

6.2.19. piaSRT (Group)**(1) count**

Type	Array		Unit
4-byte	G1	ltL * lnL * chn4 * ang7 (ang4) * rt * st	N/A
integer	G2	ltH * lnH * chn4 * ang7 (ang4) * rt	

Count

Missing Value:

-9999

(2) mean

Type	Array		Unit
4-byte	G1	ltL * lnL * chn4 * ang7 (ang4) * rt * st	N/A
float	G2	ltH * lnH * chn4 * ang7 (ang4) * rt	

Mean

Missing Value:

-9999.9

(3) stdev

Type	Array		Unit
4-byte	G1	ltL * lnL * chn4 * ang7 (ang4) * rt * st	N/A
float	G2	ltH * lnH * chn4 * ang7 (ang4) * rt	

Standard Deviation

Missing Value:

-9999.9

(4) hist

Type	Array		Unit
4-byte	ltL * lnL * chn4 * ang7 (ang4) * rt * st * bin		N/A
integer			

Histogram. This element does not exist in G2.

Missing Value:

-9999

6.2.20. piaFinal (Group)**(1) count**

Type	Array		Unit
4-byte	G1	ltL * lnL * chn4 * ang7 (ang4) * rt * st	N/A
integer	G2	ltH * lnH * chn4 * ang7 (ang4) * rt	

Count

Missing Value:

-9999

(2) mean

Type	Array		Unit
4-byte	G1	ltL * lnL * chn4 * ang7 (ang4) * rt * st	N/A
float	G2	ltH * lnH * chn4 * ang7 (ang4) * rt	

Mean

Missing Value:

-9999.9

(3) stdev

Type	Array		Unit
4-byte	G1	ltL * lnL * chn4 * ang7 (ang4) * rt * st	N/A
float	G2	ltH * lnH * chn4 * ang7 (ang4) * rt	

Standard Deviation

Missing Value:

-9999.9

(4) hist

Type	Array		Unit
4-byte	ltL * lnL * chn4 * ang7 (ang4) * rt * st * bin		N/A
integer			

Histogram. This element does not exist in G2.

Missing Value:

-9999

6.2.21. piaFinalSubset (Group)**(1) count**

Type	Array		Unit
4-byte	G1	ltL * lnL * chn4 * ang7 (ang4) * rt * st	N/A
integer	G2	ltH * lnH * chn4 * ang7 (ang4) * rt	

Count

Missing Value:

-9999

(2) mean

Type	Array		Unit
4-byte	G1	ltL * lnL * chn4 * ang7 (ang4) * rt * st	N/A
float	G2	ltH * lnH * chn4 * ang7 (ang4) * rt	

Mean

Missing Value:

-9999.9

(3) stdev

Type	Array		Unit
4-byte	G1	ltL * lnL * chn4 * ang7 (ang4) * rt * st	N/A
float	G2	ltH * lnH * chn4 * ang7 (ang4) * rt	

Standard Deviation

Missing Value:

-9999.9

(4) hist

Type	Array		Unit
4-byte	ltL * lnL * chn4 * ang7 (ang4) * rt * st * bin		N/A
integer			

Histogram. This element does not exist in G2.

Missing Value:

-9999

6.2.22. piaHybrid (Group)**(1) count**

Type	Array		Unit
4-byte	G1	ltL * lnL * chn4 * ang7 (ang4) * rt * st	N/A
integer	G2	ltH * lnH * chn4 * ang7 (ang4) * rt	

Count

Missing Value:

-9999

(2) mean

Type	Array		Unit
4-byte	G1	ltL * lnL * chn4 * ang7 (ang4) * rt * st	N/A
float	G2	ltH * lnH * chn4 * ang7 (ang4) * rt	

Mean

Missing Value:

-9999.9

(3) stdev

Type	Array		Unit
4-byte	G1	ltL * lnL * chn4 * ang7 (ang4) * rt * st	N/A
float	G2	ltH * lnH * chn4 * ang7 (ang4) * rt	

Standard Deviation

Missing Value:

-9999.9

(4) hist

Type	Array		Unit
4-byte	ltL * lnL * chn4 * ang7 (ang4) * rt * st * bin		N/A
integer			

Histogram. This element does not exist in G2.

Missing Value:

-9999

6.2.23. piaHB (Group)**(1) count**

Type	Array		Unit
4-byte	G1	ltL * lnL * chn4 * ang7 (ang4) * rt * st	N/A
integer	G2	ltH * lnH * chn4 * ang7 (ang4) * rt	

Count

Missing Value:

-9999

(2) mean

Type	Array		Unit
4-byte	G1	ltL * lnL * chn4 * ang7 (ang4) * rt * st	N/A
float	G2	ltH * lnH * chn4 * ang7 (ang4) * rt	

Mean

Missing Value:

-9999.9

(3) stdev

Type	Array		Unit
4-byte	G1	ltL * lnL * chn4 * ang7 (ang4) * rt * st	N/A
float	G2	ltH * lnH * chn4 * ang7 (ang4) * rt	

Standard Deviation

Missing Value:

-9999.9

(4) hist

Type	Array		Unit
4-byte	ltL * lnL * chn4 * ang7 (ang4) * rt * st * bin		N/A
integer			

Histogram. This element does not exist in G2.

Missing Value:

-9999

6.2.24. heightBB (Group)**(1) count**

Type	Array		Unit
4-byte	G1	ltL * lnL * chn3 * rt * st	N/A
integer	G2	ltH * lnH * chn3 * rt	

Count

Missing Value:

-9999

(2) mean

Type	Array		Unit
4-byte	G1	ltL * lnL * chn3 * rt * st	N/A
float	G2	ltH * lnH * chn3 * rt	

Mean

Missing Value:

-9999.9

(3) stdev

Type	Array		Unit
4-byte	G1	ltL * lnL * chn3 * rt * st	N/A
float	G2	ltH * lnH * chn3 * rt	

Standard Deviation

Missing Value:

-9999.9

(4) hist

Type	Array		Unit
4-byte	ltL * lnL * chn3 * rt * st * bin		N/A
integer			

Histogram. This element does not exist in G2.

Missing Value:

-9999

6.2.25. heightBBnadir (Group)**(1) count**

Type	Array		Unit
4-byte	G1	ltL * lnL * chn3 * rt * st	N/A
integer	G2	ltH * lnH * chn3 * rt	

Count

Missing Value:

-9999

(2) mean

Type	Array		Unit
4-byte	G1	ltL * lnL * chn3 * rt * st	N/A
float	G2	ltH * lnH * chn3 * rt	

Mean

Missing Value:

-9999.9

(3) stdev

Type	Array		Unit
4-byte	G1	ltL * lnL * chn3 * rt * st	N/A
float	G2	ltH * lnH * chn3 * rt	

Standard Deviation

Missing Value:

-9999.9

(4) hist

Type	Array		Unit
4-byte	ltL * lnL * chn3 * rt * st * bin		N/A
integer			

Histogram. This element does not exist in G2.

Missing Value:

-9999

6.2.26. heightStormTop (Group)**(1) count**

Type	Array		Unit
4-byte	G1	ltL * lnL * chn3 * rt * st	N/A
integer	G2	ltH * lnH * chn3 * rt	

Count

Missing Value:

-9999

(2) mean

Type	Array		Unit
4-byte	G1	ltL * lnL * chn3 * rt * st	N/A
float	G2	ltH * lnH * chn3 * rt	

Mean

Missing Value:

-9999.9

(3) stdev

Type	Array		Unit
4-byte	G1	ltL * lnL * chn3 * rt * st	N/A
float	G2	ltH * lnH * chn3 * rt	

Standard Deviation

Missing Value:

-9999.9

(4) hist

Type	Array		Unit
4-byte	ltL * lnL * chn3 * rt * st * bin		N/A
integer			

Histogram. This element does not exist in G2.

Missing Value:

-9999

6.2.27. BBwidth (Group)**(1) count**

Type	Array		Unit
4-byte	G1	ltL * lnL * chn3 * rt * st	N/A
integer	G2	ltH * lnH * chn3 * rt	

Count

Missing Value:

-9999

(2) mean

Type	Array		Unit
4-byte	G1	ltL * lnL * chn3 * rt * st	N/A
float	G2	ltH * lnH * chn3 * rt	

Mean

Missing Value:

-9999.9

(3) stdev

Type	Array		Unit
4-byte	G1	ltL * lnL * chn3 * rt * st	N/A
float	G2	ltH * lnH * chn3 * rt	

Standard Deviation

Missing Value:

-9999.9

(4) hist

Type	Array		Unit
4-byte	ltL * lnL * chn3 * rt * st * bin		N/A
integer			

Histogram. This element does not exist in G2.

Missing Value:

-9999

6.2.28. BBwidthNadir (Group)**(1) count**

Type	Array		Unit
4-byte	G1	ltL * lnL * chn3 * rt * st	N/A
integer	G2	ltH * lnH * chn3 * rt	

Count

Missing Value:

-9999

(2) mean

Type	Array		Unit
4-byte	G1	ltL * lnL * chn3 * rt * st	N/A
float	G2	ltH * lnH * chn3 * rt	

Mean

Missing Value:

-9999.9

(3) stdev

Type	Array		Unit
4-byte	G1	ltL * lnL * chn3 * rt * st	N/A
float	G2	ltH * lnH * chn3 * rt	

Standard Deviation

Missing Value:

-9999.9

(4) hist

Type	Array		Unit
4-byte	ltL * lnL * chn3 * rt * st * bin		N/A
integer			

Histogram. This element does not exist in G2.

Missing Value:

-9999

6.2.29. DFRNearSurface (Group)**(1) count**

Type	Array		Unit
4-byte	G1	ltL * lnL * rt * st	N/A
integer	G2	ltH * lnH * rt	

Count

Missing Value:

-9999

(2) mean

Type	Array		Unit
4-byte	G1	ltL * lnL * rt * st	N/A
float	G2	ltH * lnH * rt	

Mean

Missing Value:

-9999.9

(3) stdev

Type	Array		Unit
4-byte	G1	ltL * lnL * rt * st	N/A
float	G2	ltH * lnH * rt	

Standard Deviation

Missing Value:

-9999.9

(4) hist

Type	Array		Unit
4-byte integer	ltL * lnL * rt * st * bin		N/A

Histogram. This element does not exist in G2.

Missing Value:

-9999

6.2.30. DFRmNearSurface (Group)**(1) count**

Type	Array		Unit
4-byte	G1	ltL * lnL * rt * st	N/A
integer	G2	ltH * lnH * rt	

Count

Missing Value:

-9999

(2) mean

Type	Array		Unit
4-byte	G1	ltL * lnL * rt * st	N/A
float	G2	ltH * lnH * rt	

Mean

Missing Value:

-9999.9

(3) stdev

Type	Array		Unit
4-byte	G1	ltL * lnL * rt * st	N/A
float	G2	ltH * lnH * rt	

Standard Deviation

Missing Value:

-9999.9

(4) hist

Type	Array		Unit
4-byte	ltL * lnL * rt * st * bin		N/A
integer			

Histogram. This element does not exist in G2.

Missing Value:

-9999

6.2.31. zeta (Group)**(1) count**

Type	Array		Unit
4-byte	G1	ltL * lnL * chn4 * ang7 (ang4) * rt * st	N/A
integer	G2	ltH * lnH * chn4 * ang7 (ang4) * rt	

Count

Missing Value:

-9999

(2) mean

Type	Array		Unit
4-byte	G1	ltL * lnL * chn4 * ang7 (ang4) * rt * st	N/A
float	G2	ltH * lnH * chn4 * ang7 (ang4) * rt	

Mean

Missing Value:

-9999.9

(3) stdev

Type	Array		Unit
4-byte	G1	ltL * lnL * chn4 * ang7 (ang4) * rt * st	N/A
float	G2	ltH * lnH * chn4 * ang7 (ang4) * rt	

Standard Deviation

Missing Value:

-9999.9

(4) hist

Type	Array		Unit
4-byte	ltL * lnL * chn4 * ang7 (ang4) * rt * st * bin		N/A
integer			

Histogram. This element does not exist in G2.

Missing Value:

-9999

6.2.32. flagHeavyIcePrecip (Group)**(1) count**

Type	Array		Unit
4-byte	G1	ltL * lnL * chn3 * rt * st	N/A
integer	G2	ltH * lnH * chn3 * rt	

Count

Missing Value:

-9999

(2) mean

Type	Array		Unit
4-byte	G1	ltL * lnL * chn3 * rt * st	N/A
float	G2	ltH * lnH * chn3 * rt	

Mean

Missing Value:

-9999.9

(3) stdev

Type	Array		Unit
4-byte	G1	ltL * lnL * chn3 * rt * st	N/A
float	G2	ltH * lnH * chn3 * rt	

Standard Deviation

Missing Value:

-9999.9

(4) hist

Type	Array		Unit
4-byte	ltL * lnL * chn3 * rt * st * bin		N/A
integer			

Histogram. This element does not exist in G2.

Missing Value:

-9999

6.2.33. observationCounts (Group)**(1) total**

Type	Array		Unit
4-byte	G1	ltL * lnL * chn3 * st	N/A
integer	G2	ltH * lnH * chn3	

Total Count

Missing Value:

-9999

(2) localTime

Type	Array		Unit
4-byte	G1	ltL * lnL * chn3 * tim * st	N/A
integer	G2	ltH * lnH * chn3 * tim	

Observation Time.

Missing Value:

-9999.9

(3) pia

Type	Array		Unit
4-byte	G1	ltL * lnL * chn3 * ang7 (ang4) * st	N/A
integer	G2	ltH * lnH * chn3 * ang4 (ang7)	

Observation PIA.

Missing Value:

-9999.9

(4) shallowRain

Type	Array		Unit
4-byte	G1	ltL * lnL * chn3 * st	N/A
integer	G2	ltH * lnH * chn3	

Observation time

Missing Value:

-9999

6.2.34. precipRateLocalTime (Group)**(1) count**

Type	Array		Unit
4-byte	G1	ltL * lnL * chn3 * tim * st	N/A
integer	G2	ltH * lnH * chn3 * tim	

Count

Missing Value:

-9999

(2) mean

Type	Array		Unit
4-byte	G1	ltL * lnL * chn3 * tim * st	N/A
float	G2	ltH * lnH * chn3 * tim	

Mean

Missing Value:

-9999.9

(3) stdev

Type	Array		Unit
4-byte	G1	ltL * lnL * chn3 * tim * st	N/A
float	G2	ltH * lnH * chn3 * tim	

Standard Deviation

Missing Value:

-9999.9

6.2.35. precipRateNearSurfaceUnconditional**(1) precipRateNearSurfaceUnconditional**

Type	Array		Unit
4-byte	G1	ltL * lnL * chn3	N/A
float	G2	ltH * lnH * chn3	

Rain, not conditioned on rain

Missing Value:

-9999.9

6.2.36. precipProbabilityNearSurface**(1) precipProbabilityNearSurface**

Type	Array		Unit
4-byte	G1	ltL * lnL * chn3	N/A
float	G2	ltH * lnH * chn3	

Probability

Missing Value:

-9999.9

6.2.37. zFactorFinal (Group)**(1) count**

Type	Array		Unit
4-byte	G1	ltL * lnL * chn4 * hgt * rt * st	N/A
integer	G2	ltH * lnH * chn4 * hgt * rt	

Count

Missing Value:

-9999

(2) mean

Type	Array		Unit
4-byte	G1	ltL * lnL * chn4 * hgt * rt * st	N/A
float	G2	ltH * lnH * chn4 * hgt * rt	

Mean

Missing Value:

-9999.9

(3) stdev

Type	Array		Unit
4-byte	G1	ltL * lnL * chn4 * hgt * rt * st	N/A
float	G2	ltH * lnH * chn4 * hgt * rt	

Standard Deviation

Missing Value:

-9999.9

(4) hist

Type	Array		Unit
4-byte	ltL * lnL * chn4 * hgt * rt * st * bin		N/A
integer			

Histogram. This element does not exist in G2.

Missing Value:

-9999

6.2.38. zFactorFinalNearSurface (Group)**(1) count**

Type	Array		Unit
4-byte	G1	ltL * lnL * chn4 * rt * st	N/A
integer	G2	ltH * lnH * chn4 * rt	

Count

Missing Value:

-9999

(2) mean

Type	Array		Unit
4-byte	G1	ltL * lnL * chn4 * rt * st	N/A
float	G2	ltH * lnH * chn4 * rt	

Mean

Missing Value:

-9999.9

(3) stdev

Type	Array		Unit
4-byte	G1	ltL * lnL * chn4 * rt * st	N/A
float	G2	ltH * lnH * chn4 * rt	

Standard Deviation

Missing Value:

-9999.9

(4) hist

Type	Array		Unit
4-byte	ltL * lnL * chn4 * rt * st * bin		N/A
integer			

Histogram. This element does not exist in G2.

Missing Value:

-9999

6.2.39. zFactorFinalESurface (Group)**(1) count**

Type	Array		Unit
4-byte	G1	ltL * lnL * chn4 * rt * st	N/A
integer	G2	ltH * lnH * chn4 * rt	

Count

Missing Value:

-9999

(2) mean

Type	Array		Unit
4-byte	G1	ltL * lnL * chn4 * rt * st	N/A
float	G2	ltH * lnH * chn4 * rt	

Mean

Missing Value:

-9999.9

(3) stdev

Type	Array		Unit
4-byte	G1	ltL * lnL * chn4 * rt * st	N/A
float	G2	ltH * lnH * chn4 * rt	

Standard Deviation

Missing Value:

-9999.9

(4) hist

Type	Array		Unit
4-byte	ltL * lnL * chn4 * rt * st * bin		N/A
integer			

Histogram. This element does not exist in G2.

Missing Value:

-9999

6.2.40. precipRateMean

(1) precipRateMean

Type	Array	Unit
4-byte float	nlat * nlon * nalt * chd * AD	mm/hr

Mean Precipitation rate, includes both liquid and solid phases at various height levels. First index is Ascending node, second index is Descending.

Missing Value:

-9999.9

6.2.41. rainRateMean

(1) rainRateMean

Type	Array	Unit
4-byte float	nlat * nlon * nalt * chd * AD	mm/hr

Mean rainfall rate, excludes solid precipitation at various height levels. First index is Ascending node, second index is Descending.

Missing Value:

-9999.9

6.2.42. mixedRateMean

(1) mixedRateMean

Type	Array	Unit
4-byte float	nlat * nlon * nalt * chd * AD	mm/hr

Mean rainfall rate of the mixed phase precipitation at various height levels. First index is Ascending node, second index is Descending.

Missing Value:

-9999.9

6.2.43. snowRateMean

(1) snowRateMean

Type	Array	Unit
4-byte float	nlat * nlon * nalt * chd * AD	mm/hr

Mean rainfall rate of solid precipitation at various height levels. First index is Ascending node, second index is Descending.

Missing Value:

-9999.9

6.2.44. precipRateNearSurfaceMean

(1) precipRateNearSurfaceMean

Type	Array	Unit
4-byte float	nlat * nlon * chd * AD	mm/hr

Mean precipitation rate in a grid box using only the Near Surface location along the slant path for each radar ray. First index is Ascending node, second index is Descending.

Missing Value:

-9999.9

6.2.45. rainRateNearSurfaceMean

(1) rainRateNearSurfaceMean

Type	Array	Unit
4-byte float	nlat * nlon * chd * AD	mm/hr

Mean rainfall rate of liquid precipitation in a grid box using only the Near Surface location along the slant path for each radar ray. First index is Ascending node, second index is Descending.

Missing Value:

-9999.9

6.2.46. mixedRateNearSurfaceMean**(1) mixedRateNearSurfaceMean**

Type	Array	Unit
4-byte float	nlat * nlon * chd * AD	mm/hr

Mean rainfall rate of mixed phase precipitation in a grid box using only the Near Surface location along the slant path for each radar ray. First index is Ascending node, second index is Descending.

Missing Value:

-9999.9

6.2.47. snowRateNearSurfaceMean**(1) snowRateNearSurfaceMean**

Type	Array	Unit
4-byte float	nlat * nlon * chd * AD	mm/hr

Mean rainfall rate of solid precipitation in a grid box using only the Near Surface location along the slant path for each radar ray. First index is Ascending node, second index is Descending.

Missing Value:

-9999.9

6.2.48. precipRateESurfaceMean**(1) precipRateESurfaceMean**

Type	Array	Unit
4-byte float	nlat * nlon * chd * AD	mm/hr

Mean precipitation rate in a grid box using only the Estimated Surface location along the slant path for each radar ray. First index is Ascending node, second index is Descending.

Missing Value:

-9999.9

6.2.49. precipRateESurface2Mean**(1) precipRateESurface2Mean**

Type	Array	Unit
4-byte float	nlat * nlon * chd * AD	mm/hr

Mean precipitation rate in a grid box using only the Estimated Surface 2 location along the slant path for each radar ray.

First index is Ascending node, second index is Descending.

Missing Value:

-9999.9

6.2.50. totalPixel**(1) totalPixel**

Type	Array	Unit
2-byte integer	nlat * nlon * chd * AD	N/A

The total number of measurements in each grid box. First index is Ascending node, second index is Descending.

Missing Value:

-9999

6.2.51. precipPixel**(1) precipPixel**

Type	Array	Unit
2-byte integer	nlat * nlon * nalt * chd * AD	mm/hr

The number of measurements in each grid box that included detectable precipitation at various height levels. First index is Ascending node, second index is Descending.

Missing Value:

-9999

6.2.52. precipPixelNearSurface

(1) precipPixelNearSurface

Type	Array	Unit
2-byte integer	nlat * nlon * chd * AD	N/A

The number of measurements in a grid box that included detectable precipitation at the Near Surface level. First index is Ascending node, second index is Descending.

Missing Value:

-9999

6.2.53. precipPixelESurface

(1) precipPixelESurface

Type	Array	Unit
2-byte integer	nlat * nlon * chd * AD	N/A

The number of measurements in a grid box that included detectable precipitation at the Estimated Surface level. First index is Ascending node, second index is Descending.

Missing Value:

-9999

6.2.54. convPrecipRateMean

(1) convPrecipRateMean

Type	Array	Unit
4-byte float	nlat * nlon * nalt * chd * AD	mm/hr

The mean precipitation rate of convective type at various height levels. First index is Ascending node, second index is Descending.

Missing Value:

-9999.9

6.2.55. convPrecipRateNearSurfaceMean**(1) convPrecipRateNearSurfaceMean**

Type	Array	Unit
4-byte float	nlat * nlon * chd * AD	mm/hr

The mean precipitation rate of convective type at the Near Surface level along the radar ray. First index is Ascending node, second index is Descending.

Missing Value:

-9999.9

6.2.56. convPrecipRateESurfaceMean**(1) convPrecipRateESurfaceMean**

Type	Array	Unit
4-byte float	nlat * nlon * chd * AD	mm/hr

The mean precipitation rate of convective type at the Estimated Surface level along the radar ray. First index is Ascending node, second index is Descending.

Missing Value:

-9999.9

6.2.57. convPrecipPixelNearSurface**(1) convPrecipPixelNearSurface**

Type	Array	Unit
2-byte integer	nlat * nlon * chd * AD	N/A

The number of convective precipitation measurements in a grid box at the Near Surface level. First index is Ascending node, second index is Descending.

Missing Value:

-9999

6.2.58. stratPrecipRateMean

(1) stratPrecipRateMean

Type	Array	Unit
4-byte float	nlat * nlon * nalt * chd * AD	mm/hr

The mean precipitation rate of stratiform type at various height levels. First index is Ascending node, second index is Descending.

Missing Value:

-9999.9

6.2.59. stratPrecipRateNearSurfaceMean

(1) stratPrecipRateNearSurfaceMean

Type	Array	Unit
4-byte float	nlat * nlon * chd * AD	mm/hr

The mean precipitation rate of stratiform type at the Near Surface level along the radar ray. First index is Ascending node, second index is Descending.

Missing Value:

-9999.9

6.2.60. stratPrecipRateESurfaceMean

(1) stratPrecipRateESurfaceMean

Type	Array	Unit
4-byte float	nlat * nlon * chd * AD	mm/hr

The mean precipitation rate of stratiform type at the Estimated Surface level along the radar ray. First index is Ascending node, second index is Descending.

Missing Value:

-9999.9

6.2.61. stratPrecipPixelNearSurface

(1) stratPrecipPixelNearSurface

Type	Array	Unit
2-byte integer	nlat * nlon * chd * AD	N/A

The number of stratiform precipitation measurements in a grid box at the Near Surface level. First index is Ascending node, second index is Descending.

Missing Value:

-9999

6.2.62. heightBBMean

(1) heightBBMean

Type	Array	Unit
4-byte float	nlat * nlon * chd * AD	m

The mean bright band height in a grid box. First index is Ascending node, second index is Descending.

Missing Value:

-9999.9

6.2.63. heightStormTopMean

(1) heightStormTopMean

Type	Array	Unit
4-byte float	nlat * nlon * chd * AD	m

The mean storm height in a grid box. First index is Ascending node, second index is Descending.

Missing Value:

-9999.9

6.2.64. phase**(1) phase**

Type	Array	Unit
4-byte float	nlat * nlon * nalt * nvar * chd * AD	N/A

The precipitation phase type in a grid box a various height. First index is Ascending node, second index is Descending.

Missing Value:

-9999.9

6.2.65. phaseNearSurface**(1) phaseNearSurface**

Type	Array	Unit
2-byte integer	nlat * nlon * nalt * chd * AD	N/A

The precipitation phase type in a grid box. First index is Ascending node, second index is Descending.

Missing Value:

-9999

6.2.66. GridTimeAsc (Group)**(1) Year**

Type	Array	Unit
2-byte integer	nlat * nlon	year

4-digit year, e.g., 1998. Values range from 1950 to 2100 years.

Missing Value:

-9999

(2) Month

Type	Array	Unit
1-byte integer	nlat * nlon	month

Month of the year. Values range from 1 to 12 months.

Missing Value:

-99

(3) DayOfMonth

Type	Array	Unit
1-byte integer	nlat * nlon	day

Day of the month. Values range from 1 to 31 days.

Missing Value:

-99

(4) Hour

Type	Array	Unit
1-byte integer	nlat * nlon	hour

UTC hour of the day. Values range from 0 to 23 hours.

Missing Value:

-99

(5) Minute

Type	Array	Unit
1-byte integer	nlat * nlon	minute

Minute of the hour. Values range from 0 to 59 minutes.

Missing Value:

-99

(6) Second

Type	Array	Unit
1-byte integer	nlat * nlon	s

Second of the minute. Values range from 0 to 60 s.

Missing Value:

-99

(7) MilliSecond

Type	Array	Unit
2-byte integer	nlat * nlon	ms

Thousandths of the second. Values range from 0 to 999 ms.

Missing Value:

-9999

(8) DayOfYear

Type	Array	Unit
2-byte integer	nlat * nlon	day

Day of the year. Values range from 1 to 366 days.

Missing Value:

-9999

6.2.67. GridTimeDes (Group)**(1) Year**

Type	Array	Unit
2-byte integer	nlat * nlon	year

4-digit year, e.g., 1998. Values range from 1950 to 2100 years.

Missing Value:

-9999

(2) Month

Type	Array	Unit
1-byte integer	nlat * nlon	Month

Month of the year. Values range from 1 to 12 months.

Missing Value:

-99

(3) DayOfMonth

Type	Array	Unit
1-byte integer	nlat * nlon	day

Day of the month. Values range from 1 to 31 days.

Missing Value:

-99

(4) Hour

Type	Array	Unit
1-byte integer	nlat * nlon	hour

UTC hour of the day. Values range from 0 to 23 hours.

Missing Value:

-99

(5) Minute

Type	Array	Unit
1-byte integer	nlat * nlon	minute

Minute of the hour. Values range from 0 to 59 minutes.

Missing Value:

-99

(6) Second

Type	Array	Unit
1-byte integer	nlat * nlon	s

Second of the minute. Values range from 0 to 60 s.

Missing Value:

-99

(7) MilliSecond

Type	Array	Unit
2-byte integer	nlat * nlon	ms

Thousandths of the second. Values range from 0 to 999 ms.

Missing Value:

-9999

(8) DayOfYear

Type	Array	Unit
2-byte integer	nlat * nlon	day

Day of the year. Values range from 1 to 366 days.

Missing Value:

-9999

7. Level 3 (Text) Data Format

7.1. Record Structure for Level 3 (Text) data

The level 3(Text) data are stored away with the record structure such as the table below by a text file.

Table 7.1-1 Record structure of level 3 (Text) data

Header (1 line)	Record 1
Data (N lines)	Record 1
	Record 2
	...
	...
	Record N

7.2. Header Structure for Level 3 (Text) data

The header structure for level 3 (Text) contains like the table below in one line.

Table 7.2-1 Header Structure of level 3 (Text) data

No.	Item	Contents
1	Longitude	“Lon” Fixed string
2	Separator	“, ” (one comma + single-byte spaces). Applies to all separators below.
3	Latitude	“Lat” Fixed string
4	Separator	
5	Precipitation intensity of surface	“precip” Fixed string
6	Separator	
7	Hour	“H” Fixed string
8	Separator	
9	Minute	“M” Fixed string
10	Separator	
11	A/D flag	“A” or “D” Fixed string
12	Line break	0x0A

7.3. Data Structure for Level 3 (Text) data

The data structure for level 3 (Text) contains like the table below in N line.

Table 7.3-1 Data structure of level 3 (Text) data

No.	Item	Contents
1	Longitude	NNN.NN Arbitrary real number of 2 decimal places Unit: degree
2	Separator	","(one comma). Applies to all separators below.
3	Latitude	(-) NN.NN Arbitrary real number of 2 decimal places Unit: degree
4	Separator	
5	Precipitation intensity of surface	NNN.NN Arbitrary real number of 2 decimal places Unit: mm/hr
6	Separator	
7	Hour	HH Arbitrary integer (00–23) Unit: Hour (UTC)
8	Separator	
9	Minute	MM Arbitrary integer (00–59) Unit: Minute (UTC)
10	Separator	
13	A/D flag	X “A” or “D” (A=Ascending D=Descending)
14	Line break	0x0A

8. Level 3 (3GSLH, 3GSLHT) Data Format Structure

8.1. Dimension definition

Dimension definition:

- nlat
 - 268 number of high resolution 0.5° grid intervals of latitude from 67°S to 67°N .
- nlon
 - 720 number of high resolution 0.5° grid intervals of longitude from 180°W to 180°E .
- nlayer
 - 80 number of layers at the fixed heights of 0.00–0.25 km, 0.25–0.50 km, ..., 19.50–19.75 km, and 19.75–20.00 km.

8.2. Data Format Structure for 3GSLH, 3GSLHT

The "Gridded Orbital Spectral Latent Heating", 3GSLH and 3GSLHT, produces 0.5°x 0.5° latent heating, Q1-QR, and Q2 profiles from DPR rain and PR rain.

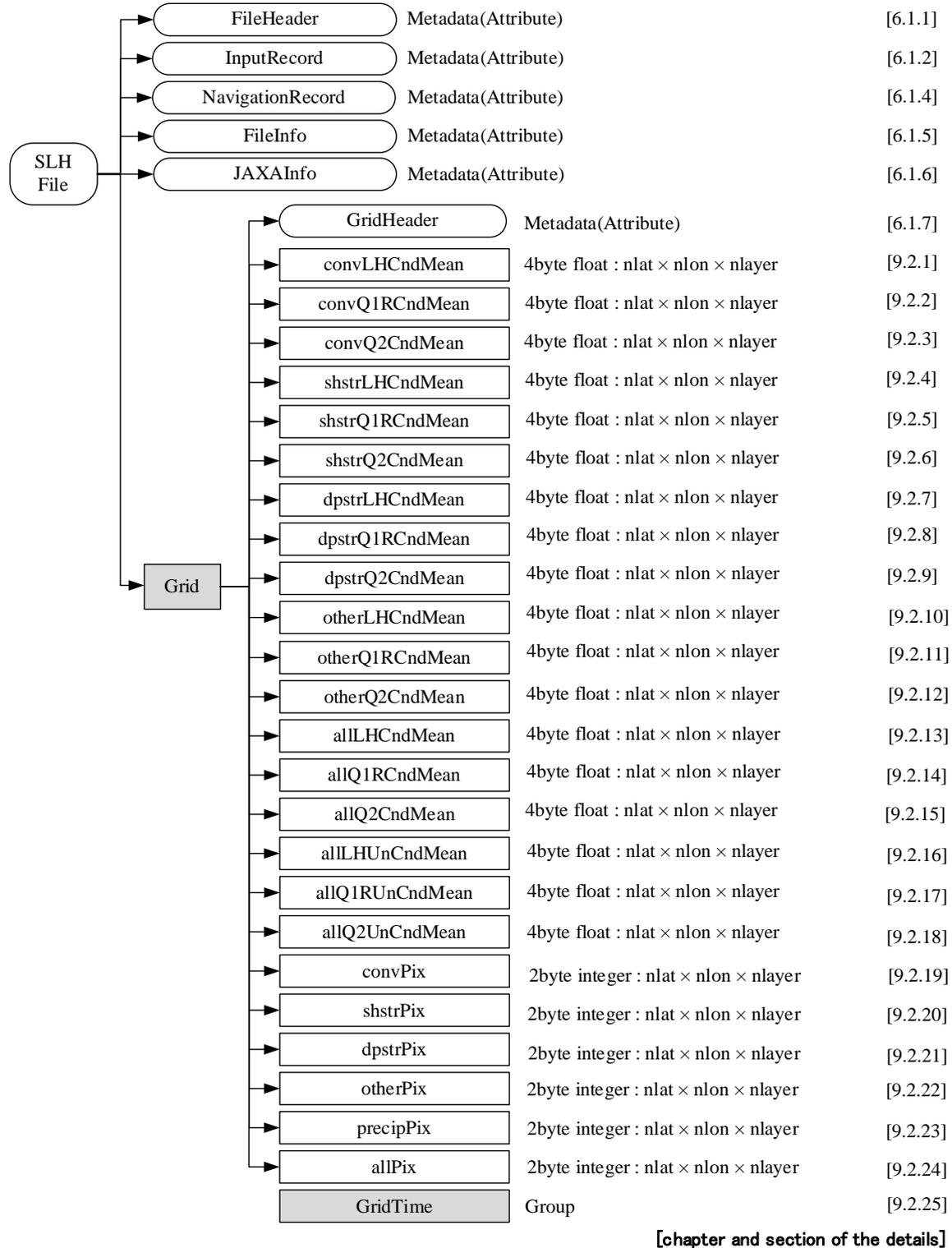


Figure 8.2-1 Data Format Structure for 3GSLH and 3GSLHT

8.3. Data Format Structure for GridTime

GridTime group's structure is shown in this section.

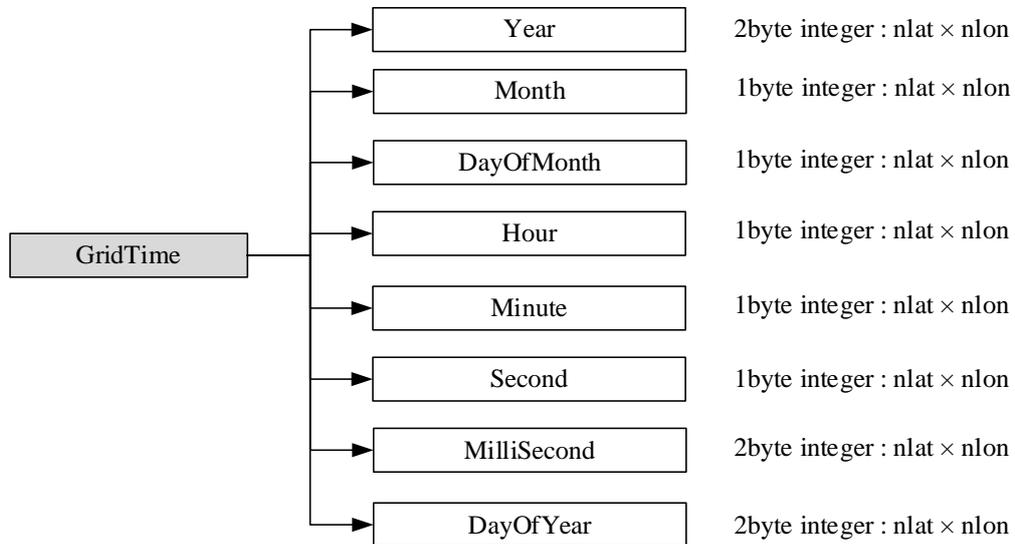


Figure 8.3-1 Data Format Structure for GridTime (3GSLH and 3GSLHT)

9. Level 3(3GSLH, 3GSLHT) Contents of Objects in each Group

9.1. Metadata

Metadata has six elements. Figure 9.1-1 shows metadata structure. About the 4 elements, FileHeader, FileInfo, JAXAInfo and GridHeader, see the section 6.1. And about other 2 elements, InputRecord and NavigationRecord, see the section 2.1.

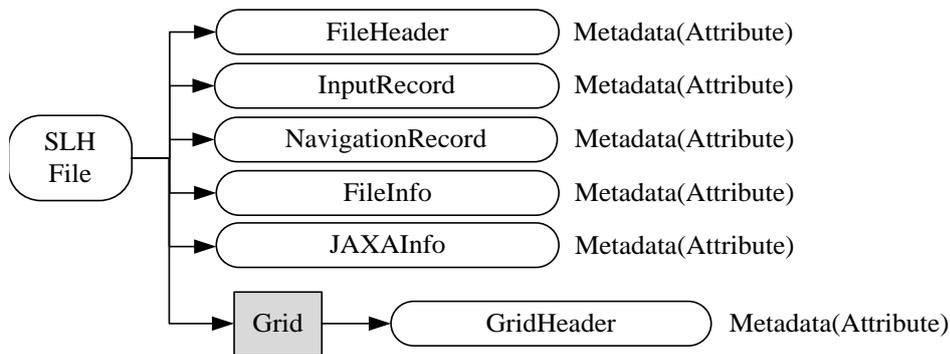


Figure 9.1-1 3GSLH and 3GSLHT Metadata

9.2. Data Group

9.2.1. convLHCndMean

(1) convLHCndMean

Type	Array	Unit
4-byte float	nlat * nlon * nlayer	K/hr

Latent Heating: convective conditional mean value.

Value range from - 400 to 400 [K/hr].

Missing Value:

-9999.9

9.2.2. convQ1RCndMean

(1) convQ1RCndMean

Type	Array	Unit
4-byte float	nlat * nlon * nlayer	K/h

Q1-QR: convective conditional mean value.

Value range from - 400 to 400 [K/h].

Missing Value:

-9999.9

9.2.3. convQ2CndMean

(1) convQ2CndMean

Type	Array	Unit
4-byte float	nlat * nlon * nlayer	K/hr

Q2: convective conditional mean value.

Value range from - 400 to 400 [K/hr].

Missing Value:

-9999.9

9.2.4. shstrLHCndMean

(1) shstrLHCndMean

Type	Array	Unit
4-byte float	nlat * nlon * nlayer	K/hr

Latent Heating: shallow stratiform conditional mean value.

Value range from - 400 to 400 [K/hr].

Missing Value:

-9999.9

9.2.5. shstrQ1RCndMean

(1) shstrQ1RCndMean

Type	Array	Unit
4-byte float	nlat * nlon * nlayer	K/hr

Q1-QR: shallow stratiform conditional mean value.

Value range from - 400 to 400 [K/hr].

Missing Value:

-9999.9

9.2.6. shstrQ2CndMean

(1) shstrQ2CndMean

Type	Array	Unit
4-byte float	nlat * nlon * nlayer	K/hr

Q2: shallow stratiform conditional mean value.

Value range from - 400 to 400 [K/hr].

Missing Value:

-9999.9

9.2.7. dpstrLHCndMean

(1) dpstrLHCndMean

Type	Array	Unit
4-byte float	nlat * nlon * nlayer	K/hr

Latent Heating: Deep stratiform conditional mean value

Value range from – 400 to 400 [K/hr].

Missing Value:

-9999.9

9.2.8. dpstrQ1RCndMean

(1) dpstrQ1RCndMean

Type	Array	Unit
4-byte float	nlat * nlon * nlayer	K/hr

Q1-QR: Deep stratiform conditional mean value.

Value range from – 400 to 400 [K/hr].

Missing Value:

-9999.9

9.2.9. dpstrQ2CndMean

(1) dpstrQ2CndMean

Type	Array	Unit
4-byte float	nlat * nlon * nlayer	K/hr

Q2: Deep stratiform conditional mean value.

Value range from – 400 to 400 [K/hr].

Missing Value:

-9999.9

9.2.10. otherLHCndMean

(1) otherLHCndMean

Type	Array	Unit
4-byte float	nlat * nlon * nlayer	K/hr

Latent Heating: other conditional mean value.

Value range from - 400 to 400 [K/hr].

Missing Value:

-9999.9

9.2.11. otherQ1RCndMean

(1) otherQ1RCndMean

Type	Array	Unit
4-byte float	nlat * nlon * nlayer	K/hr

Q1-QR: other conditional mean value.

Value range from - 400 to 400 [K/hr].

Missing Value:

-9999.9

9.2.12. otherQ2CndMean

(1) otherQ2CndMean

Type	Array	Unit
4-byte float	nlat * nlon * nlayer	K/hr

Q2: other conditional mean value.

Value range from - 400 to 400 [K/hr].

Missing Value:

-9999.9

9.2.13. allLHCndMean**(1) allLHCndMean**

Type	Array	Unit
4-byte float	nlat * nlon * nlayer	K/hr

Latent heating: all pixel average

Value range from - 400 to 400 [K/hr].

Missing Value:

-9999.9

9.2.14. allQ1RCndMean**(1) allQ1RCndMean**

Type	Array	Unit
4-byte float	nlat * nlon * nlayer	K/hr

Q1-QR: all pixel average.

Value range from - 400 to 400 [K/hr].

Missing Value:

-9999.9

9.2.15. allQ2CndMean**(1) allQ2CndMean**

Type	Array	Unit
4-byte float	nlat * nlon * nlayer	K/hr

Q2: all pixel average

Value range from - 400 to 400 [K/hr]

Missing Value:

-9999.9

9.2.16. allLHUnCndMean**(1) allLHUnCndMean**

Type	Array	Unit
4-byte float	nlat * nlon * nlayer	K/hr

Latent heating: all pixel unconditional average

Value range from - 400 to 400 [K/hr].

Missing Value:

-9999.9

9.2.17. allQ1RUnCndMean**(1) allQ1RUnCndMean**

Type	Array	Unit
4-byte float	nlat * nlon * nlayer	K/hr

Q1-QR: all pixel unconditional average

Value range from - 400 to 400 [K/hr].

Missing Value:

-9999.9

9.2.18. allQ2UnCndMean**(1) allQ2UnCndMean**

Type	Array	Unit
4-byte float	nlat * nlon * nlayer	K/hr

Q2: all pixel unconditional average

Value range from - 400 to 400 [K/hr].

Missing Value:

-9999.9

9.2.19. convPix**(1) convPix**

Type	Array	Unit
2-byte integer	nlat * nlon * nlayer	-

The number of convective pixels in 0.5-degree grid.

Missing Value:

-9999

9.2.20. shstrPix**(1) shstrPix**

Type	Array	Unit
2-byte integer	nlat * nlon * nlayer	-

The number of shallow stratiform pixels in 0.5-degree grid.

Missing Value:

-9999

9.2.21. dpstrPix**(1) dpstrPix**

Type	Array	Unit
2-byte integer	nlat * nlon * nlayer	-

The number of deep stratiform pixels in 0.5-degree grid.

Missing Value:

-9999

9.2.22. otherPix

(1) otherPix

Type	Array	Unit
2-byte integer	nlat * nlon * nlayer	-

The number of other pixels in 0.5-degree grid.

Missing Value:

-9999

9.2.23. precipPix

(1) precipPix

Type	Array	Unit
2-byte integer	nlat * nlon * nlayer	-

The number of precipitating pixels in 0.5-degree grid (=convPix+dpstrPix+shstrPix+otherPix)

Missing Value:

-9999

9.2.24. allPix

(1) allPix

Type	Array	Unit
2-byte integer	nlat * nlon * nlayer	-

The number of all pixels in 0.5-degree grid.

Missing Value:

-9999

9.2.25. GridTime (Group)**(1) Year**

Type	Array	Unit
2-byte integer	nlat * nlon	year

4-digit year, e.g., 1998. Value range from 1950 to 2100 years.

Missing Value:

-9999

(2) Month

Type	Array	Unit
1-byte integer	nlat * nlon	month

Month of the year. Value range from 1 to 12 months.

Missing Value:

-99

(3) DayOfMonth

Type	Array	Unit
1-byte integer	nlat * nlon	day

Day of the month. Values range from 1 to 31 days.

Missing Value:

-99

(4) Hour

Type	Array	Unit
1-byte integer	nlat * nlon	hour

UTC hour of the day. Values range from 0 to 23 hours.

Missing Value:

-99

(5) Minute

Type	Array	Unit
1-byte integer	nlat * nlon	minute

Minute of the hour. Values range from 0 to 59 minutes.

Missing Value:

-99

(6) Second

Type	Array	Unit
1-byte integer	nlat * nlon	s

Second of the minute. Values range from 0 to 60 minutes.

Missing Value:

-99

(7) MilliSecond

Type	Array	Unit
2-byte integer	nlat * nlon	ms

Thousandths of the second. Value range from 0 to 999 ms.

Missing Value:

-9999

(8) DayOfYear

Type	Array	Unit
2-byte integer	nlat * nlon	day

Day of the year. Values range from 1 to 366 days.

Missing Value:

-9999

10. Level 3 (3HSLH, 3HSLHT) Data Format Structure

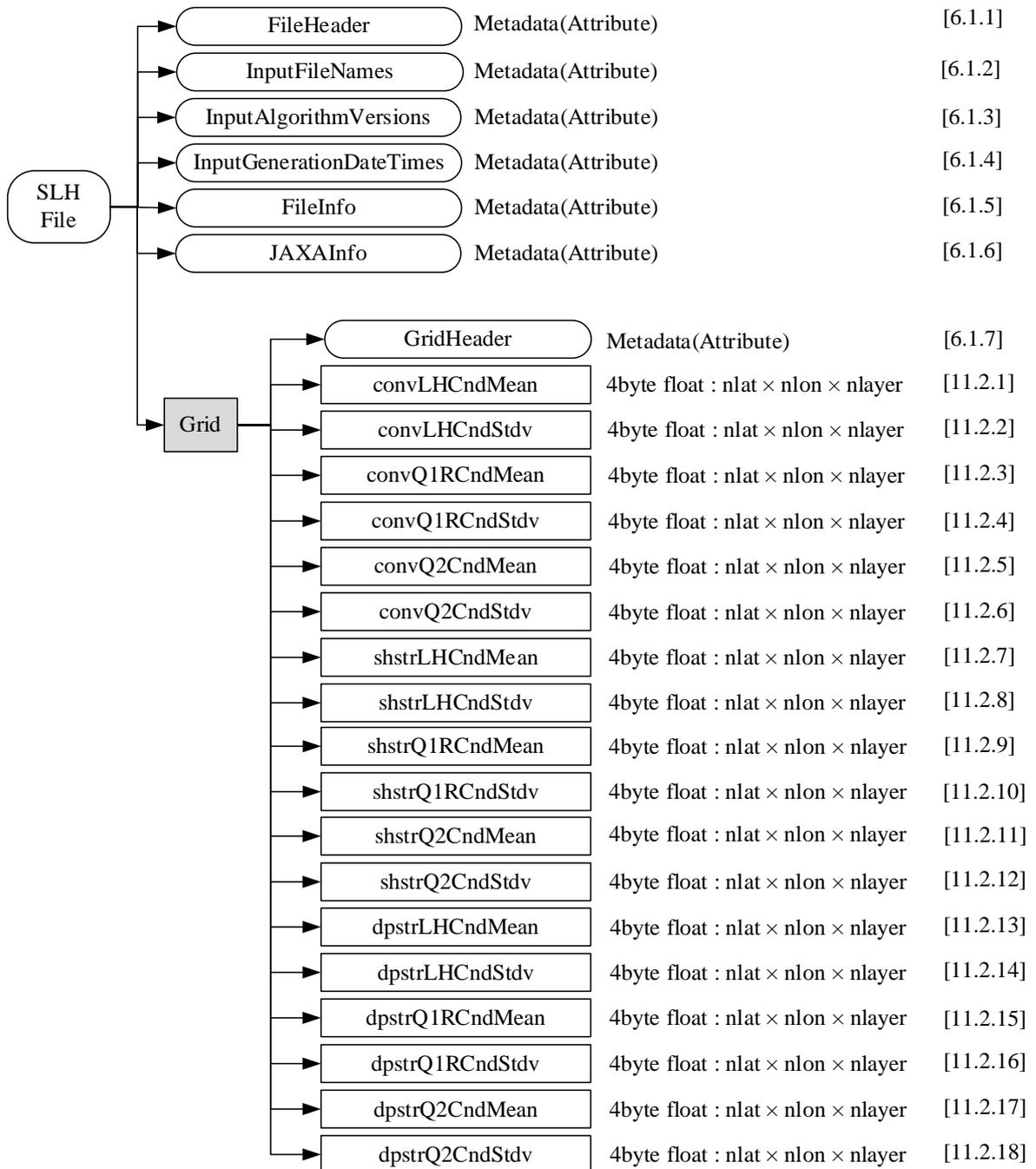
10.1. Dimension definition

Dimension definitions

- nlat
 - 268 number of high resolution 0.5° grid intervals of latitude from 67°S to 67°N .
- nlon
 - 720 number of high resolution 0.5° grid intervals of longitude from 180°W to 180°E .
- nlayer
 - 80 number of layers at the fixed heights of 0.00–0.25 km, 0.25–0.50 km, ..., 19.50–19.75 km, and 19.75–20.00 km.

10.2. Data Format Structure for 3HSLH and 3HSLHT

The "Monthly Spectral Latent Heating", 3HSLH and 3HSLHT, produces $0.5^\circ \times 0.5^\circ$ latent heating, Q1-QR, and Q2 profiles from DPR rain and PR rain.



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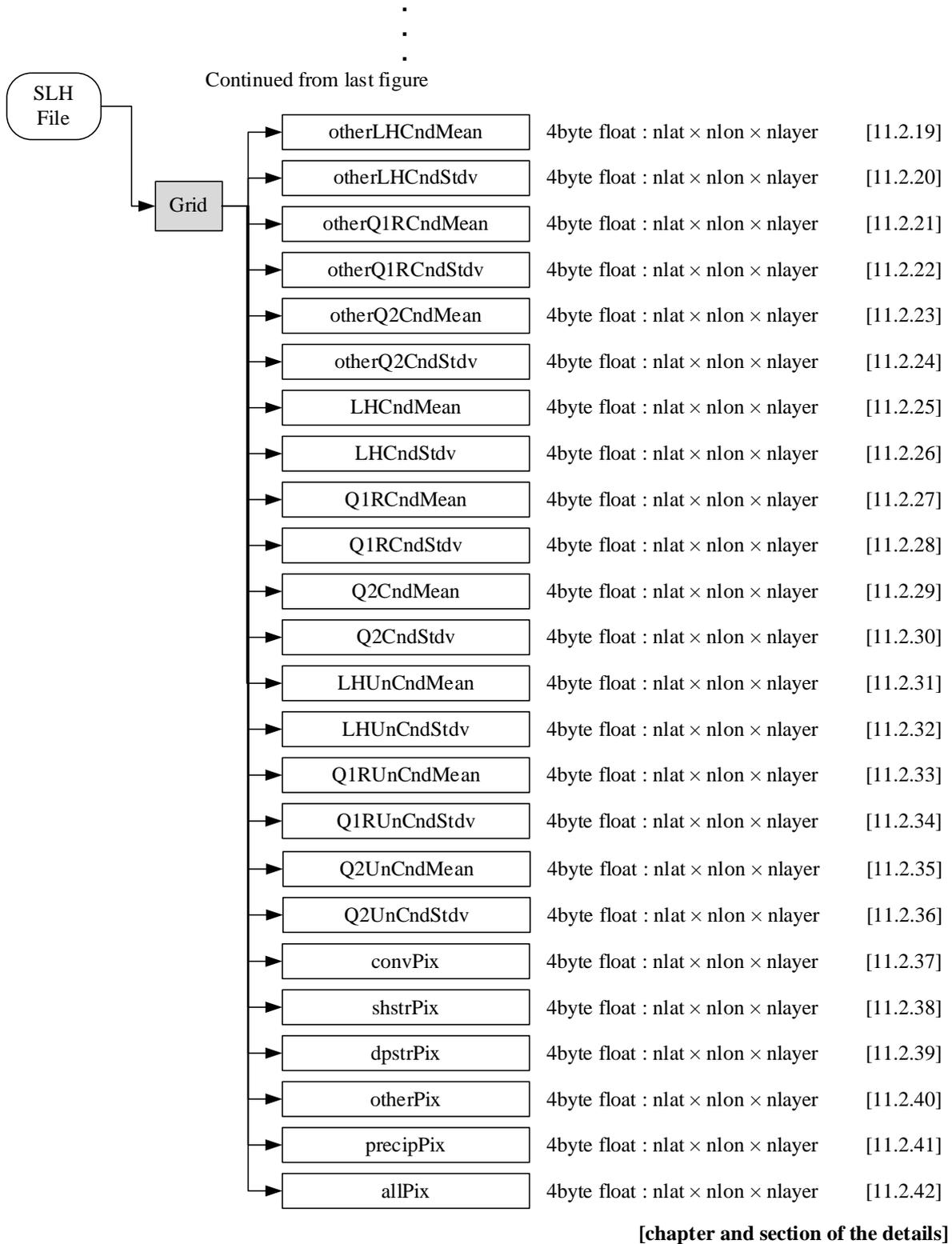


Figure 10.2-1 Data Format Structure for 3HSLH and 3HSLHT

11. Level 3(3HSLH, 3HSLHT) Contents of Objects in each Group

11.1. Metadata

Metadata has six elements. Figure 11.1-1 shows metadata structure. See Section 6.1 for detail.

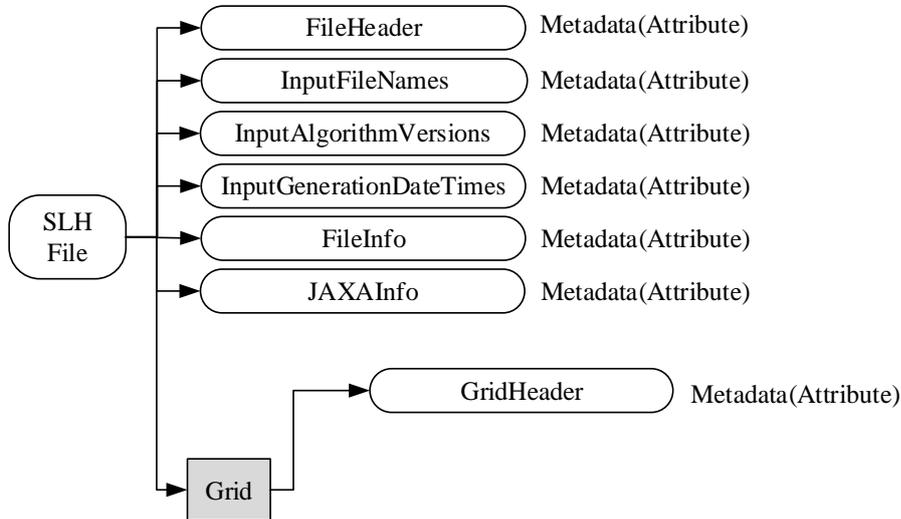


Figure 11.1-1 L3 Metadata

11.2. Data Group

11.2.1. convLHCndMean

(1) convLHCndMean

Type	Array	Unit
4-byte float	nlat * nlon * nlayer	K/hr

Conditional Mean value of convective latent heating

Value range from -400 to 400 [K/hr].

Missing Value:

-9999.9

11.2.2. convLHCndStdv

(1) convLHCndStdv

Type	Array	Unit
4-byte float	nlat * nlon * nlayer	K/hr

Conditional Standard Deviation of convective latent heating

Value range from -400 to 400 [K/hr].

Missing Value:

-9999.9

11.2.3. convQ1RCndMean

(1) convQ1RCndMean

Type	Array	Unit
4-byte float	nlat * nlon * nlayer	K/hr

Conditional Mean value of convective Q1-QR

Value range from -400 to 400 [K/hr].

Missing Value:

-9999.9

11.2.4. convQ1RCndStdv

(1) convQ1RCndStdv

Type	Array	Unit
4-byte float	nlat * nlon * nlayer	K/hr

Conditional Standard Deviation of convective Q1-QR

Value range from -400 to 400 [K/hr].

Missing Value:

-9999.9

11.2.5. convQ2CndMean

(1) convQ2CndMean

Type	Array	Unit
4-byte float	nlat * nlon * nlayer	K/hr

Conditional Mean value of convective Q2

Value range from -400 to 400 [K/hr].

Missing Value:

-9999.9

11.2.6. convQ2CndStdv

(1) convQ2CndStdv

Type	Array	Unit
4-byte float	nlat * nlon * nlayer	K/hr

Conditional Standard Deviation of convective Q2

Value range from -400 to 400 [K/hr].

Missing Value:

-9999.9

11.2.7. shstrLHCndMean

(1) shstrLHCndMean

Type	Array	Unit
4-byte float	nlat * nlon * nlayer	K/hr

Conditional Mean value of shallow stratiform latent heating.

Value range from -400 to 400 [K/hr].

Missing Value:

-9999.9

11.2.8. shstrLHCndStdv

(1) shstrLHCndStdv

Type	Array	Unit
4-byte float	nlat * nlon * nlayer	K/hr

Conditional Standard Deviation of shallow stratiform latent heating

Value range from -400 to 400 [K/hr].

Missing Value:

-9999.9

11.2.9. shstrQ1RCndMean

(1) shstrQ1RCndMean

Type	Array	Unit
4-byte float	nlat * nlon * nlayer	K/hr

Conditional Mean value of shallow stratiform Q1-QR

Value range from -400 to 400 [K/hr].

Missing Value:

-9999.9

11.2.10. shstrQ1RCndStdv**(1) shstrQ1RCndStdv**

Type	Array	Unit
4-byte float	nlat * nlon * nlayer	K/hr

Conditional Standard Deviation of shallow stratiform Q1-QR

Value range from -400 to 400 [K/hr].

Missing Value:

-9999.9

11.2.11. shstrQ2CndMean**(1) shstrQ2CndMean**

Type	Array	Unit
4-byte float	nlat * nlon * nlayer	K/hr

Conditional Mean Value of shallow stratiform Q2

Value range from -400 to 400 [K/hr].

Missing Value:

-9999.9

11.2.12. shstrQ2CndStdv**(1) shstrQ2CndStdv**

Type	Array	Unit
4-byte float	nlat * nlon * nlayer	K/hr

Conditional Standard Deviation of shallow stratiform Q2

Value range from -400 to 400 [K/hr].

Missing Value:

-9999.9

11.2.13. dpstrLHCndMean

(1) dpstrLHCndMean

Type	Array	Unit
4-byte float	nlat * nlon * nlayer	K/hr

Conditional Mean Value of deep stratiform latent heating.

Value range from -400 to 400 [K/hr].

Missing Value:

-9999.9

11.2.14. dpstrLHCndStdv

(1) dpstrLHCndStdv

Type	Array	Unit
4-byte float	nlat * nlon * nlayer	K/hr

Conditional Standard Deviation of deep stratiform latent heating.

Value range from -400 to 400 [K/hr].

Missing Value:

-9999.9

11.2.15. dpstrQ1RCndMean

(1) dpstrQ1RCndMean

Type	Array	Unit
4-byte float	nlat * nlon * nlayer	K/hr

Conditional Mean value of deep stratiform Q1-QR

Value range from -400 to 400 [K/hr].

Missing Value:

-9999.9

11.2.16. dpstrQ1RCndStdv**(1) dpstrQ1RCndStdv**

Type	Array	Unit
4-byte float	nlat * nlon * nlayer	K/hr

Conditional Standard Deviation of deep stratiform Q1-QR

Value range from -400 to 400 [K/hr].

Missing Value:

-9999.9

11.2.17. dpstrQ2CndMean**(1) dpstrQ2CndMean**

Type	Array	Unit
4-byte float	nlat * nlon * nlayer	K/hr

Conditional Mean value of deep stratiform Q2

Value range from -400 to 400 [K/hr].

Missing Value:

-9999.9

11.2.18. dpstrQ2CndStdv**(1) dpstrQ2CndStdv**

Type	Array	Unit
4-byte float	nlat * nlon * nlayer	K/hr

Conditional Standard Deviation of deep stratiform Q2

Value range from -400 to 400 [K/hr].

Missing Value:

-9999.9

11.2.19. otherLHCndMean**(1) otherLHCndMean**

Type	Array	Unit
4-byte float	nlat * nlon * nlayer	K/hr

Latent heating other conditional mean.

Value range from -400 to 400 [K/hr].

Missing Value:

-9999.9

11.2.20. otherLHCndStdv**(1) otherLHCndStdv**

Type	Array	Unit
4-byte float	nlat * nlon * nlayer	K/hr

Latent heating other conditional standard deviation.

Value range from -400 to 400 [K/hr].

Missing Value:

-9999.9

11.2.21. otherQ1RCndMean**(1) otherQ1RCndMean**

Type	Array	Unit
4-byte float	nlat * nlon * nlayer	K/hr

Q1 - QR other conditional mean.

Value range from -400 to 400 [K/hr].

Missing Value:

-9999.9

11.2.22. otherQ1RCndStdv**(1) otherQ1RCndStdv**

Type	Array	Unit
4-byte float	nlat * nlon * nlayer	K/hr

Q1 - QR other conditional standard deviation.

Value range from -400 to 400 [K/hr].

Missing Value:

-9999.9

11.2.23. otherQ2CndMean**(1) otherQ2CndMean**

Type	Array	Unit
4-byte float	nlat * nlon * nlayer	K/hr

Q2 other conditional mean.

Value range from -400 to 400 [K/hr].

Missing Value:

-9999.9

11.2.24. otherQ2CndStdv**(1) otherQ2CndStdv**

Type	Array	Unit
4-byte float	nlat * nlon * nlayer	K/hr

Q2 other conditional standard deviation.

Value range from -400 to 400 [K/hr].

Missing Value:

-9999.9

11.2.25. LHCndMean**(1) LHCndMean**

Type	Array	Unit
4-byte float	nlat * nlon * nlayer	K/hr

Conditional mean value of latent heating

Value range from -400 to 400 [K/hr]

Missing Value:

-9999.9

11.2.26. LHCndStdv**(1) LHCndStdv**

Type	Array	Unit
4-byte float	nlat * nlon * nlayer	K/hr

Conditional Standard Deviation of latent heating.

Value range from -400 to 400 [K/hr].

Missing Value:

-9999.9

11.2.27. Q1RCndMean**(1) Q1RCndMean**

Type	Array	Unit
4-byte float	nlat * nlon * nlayer	K/hr

Conditional Mean value of Q1-QR.

Value range from -400 to 400 [K/hr].

Missing Value:

-9999.9

11.2.28. Q1RCndStdv**(1) Q1RCndStdv**

Type	Array	Unit
4-byte float	nlat * nlon * nlayer	K/hr

Conditional Standard Deviation of Q1-QR

Value range from -400 to 400 [K/hr].

Missing Value:

-9999.9

11.2.29. Q2CndMean**(1) Q2CndMean**

Type	Array	Unit
4-byte float	nlat * nlon * nlayer	K/hr

Conditional Mean value of Q2

Value range from -400 to 400 [K/hr].

Missing Value:

-9999.9

11.2.30. Q2CndStdv**(1) Q2CndStdv**

Type	Array	Unit
4-byte float	nlat * nlon * nlayer	K/hr

Conditional Standard Deviation of Q2

Value range from -400 to 400 [K/hr].

Missing Value:

-9999.9

11.2.31. LHUnCndMean

(1) LHUnCndMean

Type	Array	Unit
4-byte float	nlat * nlon * nlayer	K/hr

Unconditional mean value of latent heating.

Value range from -400 to 400 [K/hr].

Missing Value:

-9999.9

11.2.32. LHUnCndStdv

(1) LHUnCndStdv

Type	Array	Unit
4-byte float	nlat * nlon * nlayer	K/hr

Unconditional Standard Deviation of latent heating.

Value range from -400 to 400 [K/hr].

Missing Value:

-9999.9

11.2.33. Q1RUnCndMean

(1) Q1RUnCndMean

Type	Array	Unit
4-byte float	nlat * nlon * nlayer	K/hr

Unconditional Mean value of Q1-QR.

Value range from -400 to 400 [K/hr].

Missing Value:

-9999.9

11.2.34. Q1RUnCndStdv**(1) Q1RUnCndStdv**

Type	Array	Unit
4-byte float	nlat * nlon * nlayer	K/hr

Unconditional Standard Deviation of Q1-QR.

Value range from -400 to 400 [K/hr].

Missing Value:

-9999.9

11.2.35. Q2UnCndMean**(1) Q2UnCndMean**

Type	Array	Unit
4-byte float	nlat * nlon * nlayer	K/hr

Unconditional Mean value of Q2.

Value range from -400 to 400 [K/hr].

Missing Value:

-9999.9

11.2.36. Q2UnCndStdv**(1) Q2UnCndStdv**

Type	Array	Unit
4-byte float	nlat * nlon * nlayer	K/hr

Unconditional Standard Deviation of Q2.

Value range from -400 to 400 [K/hr].

Missing Value:

-9999.9

11.2.37. convPix**(1) convPix**

Type	Array	Unit
4-byte float	nlat * nlon * nlayer	-

The number of convective pixels.

Missing Value:

-9999.9

11.2.38. shstrPix**(1) shstrPix**

Type	Array	Unit
4-byte float	nlat * nlon * nlayer	-

The number of shallow stratiform pixel.

Missing Value:

-9999.9

11.2.39. dpstrPix**(1) dpstrPix**

Type	Array	Unit
4-byte float	nlat * nlon * nlayer	-

The number of deep Stratiform pixel.

Missing Value:

-9999.9

11.2.40. otherPix**(1) otherPix**

Type	Array	Unit
4-byte float	nlat * nlon * nlayer	-

The number of other condition pixel.

Missing Value:

-9999.9

11.2.41. precipPix**(1) precipPix**

Type	Array	Unit
4-byte float	nlat * nlon * nlayer	-

The number of precipitating pixel (=convPix+dpstrPix+shstrPix+otherPix).

Missing Value:

-9999.9

11.2.42. allPix**(1) allPix**

Type	Array	Unit
4-byte float	nlat * nlon * nlayer	-

The number of All pixel.

Missing Value:

-9999.9

12. The List of Data Group Element

12.1. Data Group Element (2AKu, 2APR)

Table 12.1-1 2AKu, 2APR Data Group Element

Group	Element [Array]	Missing Value (_fillValue)	Min	Max	Unit	Type
ScanTime	Year [nscan]	-9999	1950	2100	[years]	2-byte integer
	Month [nscan]	-99	1	12	[months]	1-byte integer
	DayOfMonth [nscan]	-99	1	31	[days]	1-byte integer
	Hour [nscan]	-99	0	23	[hours]	1-byte integer
	Minute [nscan]	-99	0	59	[minutes]	1-byte integer
	Second [nscan]	-99	0	60	[s]	1-byte integer
	MilliSecond [nscan]	-9999	0	999	[ms]	2-byte integer
	DayOfYear [nscan]	-9999	1	366	[days]	2-byte integer
	SecondOfDay [nscan]	-9999.9	0	86400	[s]	8-byte float
(N/A)	Latitude [nray][nscan]	-9999.9	-90	90	[degrees]	4-byte float
(N/A)	Longitude [nray][nscan]	-9999.9	-180	180	[degrees]	4-byte float
(N/A)	sunLocalTime [nray][nscan]	-9999.9	0	24	[hours]	4-byte float
scanStatus	dataQuality [nscan]	-99	0x00	0xff		1-byte integer
	dataWarning [nscan]	-99	0x00	0xff		1-byte integer

12.1 The List of Data Group Element

Group	Element [Array]	Missing Value (_fillValue)	Min	Max	Unit	Type
	missing [nscan]	-99	0x00	0xff		1-byte integer
	modeStatus [nscan]	-99	0x00	0xff		1-byte integer
	geoError [nscan]	-9999	0x0000	0xffff		2-byte integer
	geoWarning [nscan]	-9999	0x0000	0xffff		2-byte integer
	SCorientation [nscan]	-9999			[degrees]	2-byte integer
	pointingStatus [nscan]	-9999				2-byte integer
	acsModeMidScan [nscan]	-99				1-byte integer
	targetSelectionMidScan [nscan]	-99	0	5		1-byte integer
	operationalMode [nscan]	-99	1	20		1-byte integer
	limitErrorFlag [nscan]	-99	0x00	0xff		1-byte integer
	FractionalGranuleNumber [nscan]	-9999.9	0	100000		8-byte float
navigation	scPos [XYZ][nscan]	-9999.9	- 100000 00	100000 00	[m]	4-byte float
	scVel [XYZ][nscan]	-9999.9	- 100000 00	100000 00	[m/s]	4-byte float
	scLat [nscan]	-9999.9	-70	70	[degrees]	4-byte float

12.1 The List of Data Group Element

Group	Element [Array]	Missing Value (_fillValue)	Min	Max	Unit	Type
	scLon [nscan]	-9999.9	-180	180	[degrees]	4-byte float
	scAlt [nscan]	-9999.9	350000	500000	[m]	4-byte float
	dprAlt [nscan]	-9999.9	350000	500000	[m]	4-byte float
	scAttRollGeoc [nscan]	-9999.9	-180	180	[degrees]	4-byte float
	scAttPitchGeoc [nscan]	-9999.9	-180	180	[degrees]	4-byte float
	scAttYawGeoc [nscan]	-9999.9	-135	225	[degrees]	4-byte float
	scAttRollGeod [nscan]	-9999.9	-180	180	[degrees]	4-byte float
	scAttPitchGeod [nscan]	-9999.9	-180	180	[degrees]	4-byte float
	scAttYawGeod [nscan]	-9999.9	-135	225	[degrees]	4-byte float
	scHeadingGround [nscan]	-9999.9	-180	180	[degrees]	4-byte float
	scHeadingOrbital [nscan]	-9999.9	-180	180	[degrees]	4-byte float
	greenHourAng [nscan]	-9999.9	0	390	[degrees]	4-byte float
	timeMidScan [nscan]	-9999.9	0	100000 00000	[s]	8-byte float
	timeMidScanOffset [nscan]	-9999.9	0	100	[s]	8-byte float
PRE	elevation [nray][nscan]	-9999.9			[m]	4-byte float
	landSurfaceType [nray][nscan]	-9999	0	399		4-byte integer

12.1 The List of Data Group Element

Group	Element [Array]	Missing Value (_fillValue)	Min	Max	Unit	Type
	localZenithAngle [nray][nscan]	-9999.9			[degree]	4-byte float
	flagPrecip [nray][nscan]	-9999				4-byte integer
	binRealSurface [nray][nscan]	-9999				2-byte integer
	binStormTop [nray][nscan]	-9999				2-byte integer
	binMirrorImageL2 [nray][nscan]	-9999				2-byte integer
	height [nbin][nray][nscan]	-9999.9			[m]	4-byte float
	heightStormTop [nray][nscan]	-9999.9			[m]	4-byte float
	binClutterFreeBottom [nray][nscan]	-9999				2-byte integer
	sigmaZeroMeasured [nray][nscan]	-9999.9			[dB]	4-byte float
	zFactorMeasured [nbin][nray][nscan]	-9999.9			[dBZ]	4-byte float
	ellipsoidBinOffset [nray][nscan]	-9999.9			[m]	4-byte float
	echoCountRealSurface [nray][nscan]	0				1-byte unsigned integer
	snRatioAtRealSurface [nray][nscan]	-9999				4-byte float
	adjustFactor [nray][nscan]	-9999.9			[dB]	4-byte float

12.1 The List of Data Group Element

Group	Element [Array]	Missing Value (_fillValue)	Min	Max	Unit	Type
	snowIceCover [nray][nscan]	-99				1-byte integer
	flagSigmaZeroSaturation [nray][nscan]	99			[dB]	1-byte unsigned integer
VER	binZeroDeg [nray][nscan]	-9999				2-byte integer
	binZeroDegSecondary [nray][nscan]	-9999				2-byte integer
	airTemperature [nbin][nray][nscan]	-9999.9			[K]	4-byte float
	attenuationNP [nbin][nray][nscan]	-9999.9			[dB/km]	4-byte float
	piaNP [nNP][nray][nscan]	-9999.9			[dB]	4-byte float
	piaNPrainFree [nNP][nray][nscan]	-9999.9			[dB]	4-byte float
	sigmaZeroNPCorrected [nray][nscan]	-9999.9			[dB]	4-byte float
	heightZeroDeg [nray][nscan]	-9999.9			[m]	4-byte float
	flagInversion [nray][nscan]	-9999				2-byte integer
CSF	flagBB [nray][nscan]	-9999				4-byte integer
	binBBPeak [nray][nscan]	-9999				2-byte integer
	binBBTop	-9999				

12.1 The List of Data Group Element

Group	Element [Array]	Missing Value (_fillValue)	Min	Max	Unit	Type
	[nray][nscan]					2-byte integer
	binBBBottom [nray][nscan]	-9999				2-byte integer
	heightBB [nray][nscan]	-9999.9			[m]	4-byte float
	widthBB [nray][nscan]	-9999.9			[m]	4-byte float
	qualityBB [nray][nscan]	-9999				4-byte integer
	typePrecip [nray][nscan]	-9999				4-byte integer
	qualityTypePrecip [nray][nscan]	-9999				4-byte integer
	flagShallowRain [nray][nscan]	-9999				4-byte integer
	binHeavyIcePrecipT op [nray][nscan]	-9999				2-byte integer
	binHeavyIcePrecipB ottom [nray][nscan]	-9999				2-byte integer
	nHeavyIcePrecip [nray][nscan]	0				1-byte unsign ed integer
	flagHeavyIcePrecip [nray][nscan]	0				1-byte integer
	flagAnvil [nray][nscan]	-99				1-byte integer
SRT	PIAalt	-9999.9			[dB]	

12.1 The List of Data Group Element

Group	Element [Array]	Missing Value (_fillValue)	Min	Max	Unit	Type
	[method][nray][nscan]					4-byte float
	PIAhb [nray][nscan]	-9999.9			[dB]	4-byte float
	PIAhybrid [nray][nscan]	-9999.9			[dB]	4-byte float
	RFactorAlt [method][nray][nscan]	-9999.9				4-byte float
	PIAweight [method][nray][nscan]	-9999.9				4-byte float
	PIAweightHY [two][nray][nscan]	-9999.9				4-byte float
	pathAtten [nray][nscan]	-9999.9			[dB]	4-byte float
	reliabFactor [nray][nscan]	-9999.9				4-byte float
	reliabFactorHY [nray][nscan]	-9999.9				4-byte float
	reliabFlag [nray][nscan]	-9999				2-byte integer
	reliabFlagHY [nray][nscan]	-9999				2-byte integer
	refScanID [nearFar][foreBack] [nray][nscan]	-9999				2-byte integer
	stddevEff [nsdew][nray][nscan]]	-9999.9				4-byte float
	stddevHY [nray][nscan]	-9999.9				4-byte float

12.1 The List of Data Group Element

Group	Element [Array]	Missing Value (_fillValue)	Min	Max	Unit	Type
	zeta [nray][nscan]	-9999.9				4-byte float
DSD	phase [nbin][nray][nscan]	255				1-byte unsigned integer
	binNode [nNode][nray][nscan]	-9999				2-byte integer
	paramRDm [nNode][nray][nscan]	-9999.9				4-byte float
Experimental	precipRateESurface2 [nray][nscan]	-9999.9			[mm/hr]	4-byte float
	precipRateESurface2 Status [nray][nscan]	255				1-byte unsigned integer
	sigmaZeroProfile [nbinSZP][nray][nscan]	-9999.9			[dB]	4-byte float
	seaIceConcentration [nray][nscan]	-9999.9			[%]	4-byte float
SLV	flagSLV [nbin][nray][nscan]	-99				1-byte integer
	qualitySLV [nray][nscan]	-9999				4-byte integer
	binEchoBottom [nray][nscan]	-9999				2-byte integer
	piaFinal [nray][nscan]	-9999.9			[dB]	4-byte float
	piaOffset	-9999.9			[dB]	

12.1 The List of Data Group Element

Group	Element [Array]	Missing Value (_fillValue)	Min	Max	Unit	Type
	[nray][nscan]					4-byte float
	sigmaZeroCorrected [nray][nscan]	-9999.9			[dB]	4-byte float
	zFactorFinal [nbin][nray][nscan]	-9999.9			[dBZ]	4-byte float
	zFactorFinalESurface [nray][nscan]	-9999.9			[dBZ]	4-byte float
	zFactorFinalNearSurface [nray][nscan]	-9999.9			[dBZ]	4-byte float
	paramDSD [nDSD][nbin][nray][nscan]	-9999.9			[10 log ₁₀ (Nw) mm]	4-byte float
	precipRate [nbin][nray][nscan]	-9999.9			[mm/hr]	4-byte float
	precipWater [nbin][nray][nscan]	-9999.9			[g/m ³]	4-byte float
	precipWaterIntegrated [LS][nray][nscan]	-9999.9			[g/m ²]	4-byte float
	precipRateNearSurface [nray][nscan]	-9999.9			[mm/hr]	4-byte float
	precipRateESurface [nray][nscan]	-9999.9			[mm/hr]	4-byte float
	precipRateAve24 [nray][nscan]	-9999.9			[mm/hr]	4-byte float
	phaseNearSurface [nray][nscan]	255				1-byte unsigned

12.1 The List of Data Group Element

Group	Element [Array]	Missing Value (_fillValue)	Min	Max	Unit	Type
						ed integer
	epsilon [nbin][nray][nscan]	-9999.9				4-byte float
	paramNUBF [nNUBF][nray][nscan]	-9999.9				4-byte float
FLG	flagEcho [nbin][nray][nscan]	-99	0x00	0xff		1-byte integer
	qualityData [nray][nscan]	-9999				4-byte integer
	flagSensor [nscan]	-99				1-byte integer
	qualityFlag [nray][nscan]	-99				1-byte integer
	flagScanPattern [nscan]	-99				2-byte integer

12.2. Data Group Element (2AKa, FS)

Table 12.2-1 2AKa Data Group Element (FS)

Group	Element [Array]	Missing Value (_fillValue)	Min	Max	Unit	Type
ScanTime	Year [nscan]	-9999	1950	2100	[years]	2-byte integer
	Month [nscan]	-99	1	12	[months]	1-byte integer
	DayOfMonth [nscan]	-99	1	31	[days]	1-byte integer
	Hour [nscan]	-99	0	23	[hours]	1-byte integer
	Minute [nscan]	-99	0	59	[minutes]	1-byte integer
	Second [nscan]	-99	0	60	[s]	1-byte integer
	MilliSecond [nscan]	-9999	0	999	[ms]	2-byte integer
	DayOfYear [nscan]	-9999	1	366	[days]	2-byte integer
	SecondOfDay [nscan]	-9999.9	0	86400	[s]	8-byte float
(N/A)	Latitude [nray][nscan]	-9999.9	-90	90	[degrees]	4-byte float
(N/A)	Longitude [nray][nscan]	-9999.9	-180	180	[degrees]	4-byte float
(N/A)	sunLocalTime [nray][nscan]	-9999.9	0	24	[hours]	4-byte float
scanStatus	dataQuality [nscan]	-99	0x00	0xff		1-byte integer
	dataWarning [nscan]	-99	0x00	0xff		1-byte integer

12.2 The List of Data Group Element

Group	Element [Array]	Missing Value (_fillValue)	Min	Max	Unit	Type
	missing [nscan]	-99	0x00	0xff		1-byte integer
	modeStatus [nscan]	-99	0x00	0xff		1-byte integer
	geoError [nscan]	-9999	0x0000	0xffff		2-byte integer
	geoWarning [nscan]	-9999	0x0000	0xffff		2-byte integer
	SCorientation [nscan]	-9999			[degrees]	2-byte integer
	pointingStatus [nscan]	-9999				2-byte integer
	acsModeMidScan [nscan]	-99				1-byte integer
	targetSelectionMidScan [nscan]	-99	0	5		1-byte integer
	operationalMode [nscan]	-99	1	20		1-byte integer
	limitErrorFlag [nscan]	-99	0x00	0xff		1-byte integer
	FractionalGranuleNumber [nscan]	-9999.9	0	100000		8-byte float
navigation	scPos [XYZ][nscan]	-9999.9	-100000 00	100000 00	[m]	4-byte float
	scVel [XYZ][nscan]	-9999.9	-100000 00	100000 00	[m/s]	4-byte float
	scLat [nscan]	-9999.9	-70	70	[degrees]	4-byte float

12.2 The List of Data Group Element

Group	Element [Array]	Missing Value (_fillValue)	Min	Max	Unit	Type
	scLon [nscan]	-9999.9	-180	180	[degrees]	4-byte float
	scAlt [nscan]	-9999.9	350000	500000	[m]	4-byte float
	dprAlt [nscan]	-9999.9	350000	500000	[m]	4-byte float
	scAttRollGeoc [nscan]	-9999.9	-180	180	[degrees]	4-byte float
	scAttPitchGeoc [nscan]	-9999.9	-180	180	[degrees]	4-byte float
	scAttYawGeoc [nscan]	-9999.9	-135	225	[degrees]	4-byte float
	scAttRollGeod [nscan]	-9999.9	-180	180	[degrees]	4-byte float
	scAttPitchGeod [nscan]	-9999.9	-180	180	[degrees]	4-byte float
	scAttYawGeod [nscan]	-9999.9	-135	225	[degrees]	4-byte float
	scHeadingGround [nscan]	-9999.9	-180	180	[degrees]	4-byte float
	scHeadingOrbital [nscan]	-9999.9	-180	180	[degrees]	4-byte float
	greenHourAng [nscan]	-9999.9	0	390	[degrees]	4-byte float
	timeMidScan [nscan]	-9999.9	0	100000 00000	[s]	8-byte float
	timeMidScanOffset [nscan]	-9999.9	0	100	[s]	8-byte float
PRE	elevation [nray][nscan]	-9999.9			[m]	4-byte float
	landSurfaceType [nray][nscan]	-9999	0	399		4-byte integer

12.2 The List of Data Group Element

Group	Element [Array]	Missing Value (_fillValue)	Min	Max	Unit	Type
	localZenithAngle [nray][nscan]	-9999.9			[degree]	4-byte float
	flagPrecip [nray][nscan]	-9999				4-byte integer
	binRealSurface [nray][nscan]	-9999				2-byte integer
	binStormTop [nray][nscan]	-9999				2-byte integer
	binMirrorImageL2 [nray][nscan]	-9999				2-byte integer
	height [nbin][nray][nscan]	-9999.9			[m]	4-byte float
	heightStormTop [nray][nscan]	-9999.9			[m]	4-byte float
	binClutterFreeBottom [nray][nscan]	-9999				2-byte integer
	sigmaZeroMeasured [nray][nscan]	-9999.9			[dB]	4-byte float
	zFactorMeasured [nbin][nray][nscan]	-9999.9			[dBZ]	4-byte float
	ellipsoidBinOffset [nray][nscan]	-9999.9			[m]	4-byte float
	echoCountRealSurface [nray][nscan]	0				1-byte unsigned integer
	snRatioAtRealSurface [nray][nscan]	-9999.9				4-byte float
	adjustFactor [nray][nscan]	-9999.9			[dB]	4-byte float

12.2 The List of Data Group Element

Group	Element [Array]	Missing Value (_fillValue)	Min	Max	Unit	Type
	snowIceCover [nray][nscan]	-99				1-byte integer
	flagSigmaZeroSaturation [nray][nscan]	99				1-byte unsigned integer
VER	binZeroDeg [nray][nscan]	-9999				2-byte integer
	binZeroDegSecondary [nray][nscan]	-9999				2-byte integer
	airTemperature [nbin][nray][nscan]	-9999.9			[K]	4-byte float
	attenuationNP [nbin][nray][nscan]	-9999.9			[dB/km]	4-byte float
	piaNP [nNP][nray][nscan]	-9999.9			[dB]	4-byte float
	piaNPrainFree [nNP][nray][nscan]	-9999.9			[dB]	4-byte float
	sigmaZeroNPCorrected [nray][nscan]	-9999.9			[dB]	4-byte float
	heightZeroDeg [nray][nscan]	-9999.9			[m]	4-byte float
	flagInversion [nray][nscan]	-9999				2-byte integer
CSF	flagBB [nray][nscan]	-9999				4-byte integer
	binBBPeak [nray][nscan]	-9999				2-byte integer
	binBBTop	-9999				

12.2 The List of Data Group Element

Group	Element [Array]	Missing Value (_fillValue)	Min	Max	Unit	Type
	[nray][nscan]					2-byte integer
	binBBBottom [nray][nscan]	-9999				2-byte integer
	heightBB [nray][nscan]	-9999.9			[m]	4-byte float
	widthBB [nray][nscan]	-9999.9			[m]	4-byte float
	qualityBB [nray][nscan]	-9999				4-byte integer
	typePrecip [nray][nscan]	-9999				4-byte integer
	qualityTypePrecip [nray][nscan]	-9999				4-byte integer
	flagShallowRain [nray][nscan]	-9999				4-byte integer
	binHeavyIcePrecipT op [nray][nscan]	-9999				2-byte integer
	binHeavyIcePrecipB ottom [nray][nscan]	-9999				2-byte integer
	nHeavyIcePrecip [nray][nscan]	0				1-byte unsign ed integer
	flagHeavyIcePrecip [nray][nscan]	0				1-byte integer
SRT	PIAalt [method][nray][nscan]	-9999.9			[dB]	4-byte float
	PIAhb	-9999.9			[dB]	

12.2 The List of Data Group Element

Group	Element [Array]	Missing Value (_fillValue)	Min	Max	Unit	Type
	[nray][nscan]					4-byte float
	PIAhybrid [nray][nscan]	-9999.9			[dB]	4-byte float
	RFactorAlt [method][nray][nscan]	-9999.9				4-byte float
	PIAweight [method][nray][nscan]	-9999.9			[dB]	4-byte float
	PIAweightHY [two][nray][nscan]	-9999.9			[dB]	4-byte float
	pathAtten [nray][nscan]	-9999.9			[dB]	4-byte float
	reliabFactor [nray][nscan]	-9999.9				4-byte float
	reliabFactorHY [nray][nscan]	-9999.9				4-byte float
	reliabFlag [nray][nscan]	-9999				2-byte integer
	reliabFlagHY [nray][nscan]	-9999				2-byte integer
	refScanID [nearFar][foreBack] [nray][nscan]	-9999				2-byte integer
	stddevEff [nsdew][nray][nscan]	-9999.9				4-byte float
	stddevHY [nray][nscan]	-9999.9				4-byte float
	zeta [nray][nscan]	-9999.9				4-byte float

12.2 The List of Data Group Element

Group	Element [Array]	Missing Value (_fillValue)	Min	Max	Unit	Type
DSD	phase [nbin][nray][nscan]	255				1-byte unsigned integer
	binNode [nNode][nray][nscan]	-9999				2-byte integer
	paramRDm [nNode][nray][nscan]	-9999.9				4-byte float
Experimental	precipRateESurface2 [nray][nscan]	-9999.9			[mm/hr]	4-byte float
	precipRateESurface2 Status [nray][nscan]	255				1-byte unsigned integer
	sigmaZeroProfile [nbinSZP][nray][nscan]	-9999.9			[dB]	4-byte float
	seaIceConcentration [nray][nscan]	-9999.9			[%]	4-byte float
SLV	flagSLV [nbin][nray][nscan]	-99				1-byte integer
	qualitySLV [nray][nscan]	-9999				4-byte integer
	binEchoBottom [nray][nscan]	-9999				2-byte integer
	piaFinal [nray][nscan]	-9999.9			[dB]	4-byte float
	piaOffset [nray][nscan]	-9999.9			[dB]	4-byte float
	sigmaZeroCorrected	-9999.9			[dB]	

12.2 The List of Data Group Element

Group	Element [Array]	Missing Value (_fillValue)	Min	Max	Unit	Type
	[nray][nscan]					4-byte float
	zFactorFinal [nbin][nray][nscan]	-9999.9			[dBZ]	4-byte float
	zFactorFinalESurface [nray][nscan]	-9999.9			[dBZ]	4-byte float
	zFactorFinalNearSurface [nray][nscan]	-9999.9			[dBZ]	4-byte float
	paramDSD [nDSD][nbin][nray][nscan]	-9999.9			[10 log ₁₀ (Nw) mm]	4-byte float
	precipRate [nbin][nray][nscan]	-9999.9			[mm/hr]	4-byte float
	precipWater [nbin][nray][nscan]	-9999.9			[g/m ³]	4- byteflo at
	precipWaterIntegrated [LS][nray][nscan]	-9999.9			[g/m ²]	4- byteflo at
	precipRateNearSurface [nray][nscan]	-9999.9			[mm/hr]	4-byte float
	precipRateESurface [nray][nscan]	-9999.9			[mm/hr]	4-byte float
	precipRateAve24 [nray][nscan]	-9999.9			[mm/hr]	4-byte float
	phaseNearSurface [nray][nscan]	255				1-byte unsign ed integer
	epsilon	-9999.9				

12.2 The List of Data Group Element

Group	Element [Array]	Missing Value (_fillValue)	Min	Max	Unit	Type
	[nbin][nray][nscan]					4-byte float
	paramNUBF [nNUBF][nray][nscan]	-9999.9				4-byte float
FLG	flagEcho [nbin][nray][nscan]	-99	0x00	0xff		1-byte integer
	qualityData [nray][nscan]	-9999				4-byte integer
	flagSensor [nscan]	-99				1-byte integer
	qualityFlag [nray][nscan]	-99				1-byte integer
	flagScanPattern [nscan]	-99				2-byte integer

12.3. Data Group Element (2AKa, HS)

Table 12.3-1 Data Group Element (2AKa, HS)

Group	Element [Array]	Missing Value (_fillValue)	Min	Max	Unit	Type
ScanTime	Year [nscan]	-9999	1950	2100	[years]	2-byte integer
	Month [nscan]	-99	1	12	[months]	1-byte integer
	DayOfMonth [nscan]	-99	1	31	[days]	1-byte integer
	Hour [nscan]	-99	0	23	[hours]	1-byte integer
	Minute [nscan]	-99	0	59	[minutes]	1-byte integer
	Second [nscan]	-99	0	60	[s]	1-byte integer
	MilliSecond [nscan]	-9999	0	999	[ms]	2-byte integer
	DayOfYear [nscan]	-9999	1	366	[days]	2-byte integer
	SecondOfDay [nscan]	-9999.9	0	86400	[s]	8-byte float
(N/A)	Latitude [nray][nscan]	-9999.9	-90	90	[degrees]	4-byte float
(N/A)	Longitude [nray][nscan]	-9999.9	-180	180	[degrees]	4-byte float
(N/A)	sunLocalTime [nray][nscan]	-9999.9	0	24	[hours]	4-byte float
scanStatus	dataQuality [nscan]	-99	0x00	0xff		1-byte integer
	dataWarning [nscan]	-99	0x00	0xff		1-byte integer

12.3 The List of Data Group Element

Group	Element [Array]	Missing Value (_fillValue)	Min	Max	Unit	Type
	missing [nscan]	-99	0x00	0xff		1-byte integer
	modeStatus [nscan]	-99	0x00	0xff		1-byte integer
	geoError [nscan]	-9999	0x0000	0xffff		2-byte integer
	geoWarning [nscan]	-9999	0x0000	0xffff		2-byte integer
	SCorientation [nscan]	-9999			[degrees]	2-byte integer
	pointingStatus [nscan]	-9999				2-byte integer
	acsModeMidScan [nscan]	-99				1-byte integer
	targetSelectionMidScan [nscan]	-99	0	5		1-byte integer
	operationalMode [nscan]	-99	1	20		1-byte integer
	limitErrorFlag [nscan]	-99	0x00	0xff		1-byte integer
	FractionalGranuleNumber [nscan]	-9999.9	0	100000		8-byte float
navigation	scPos [XYZ][nscan]	-9999.9	- 100000 00	100000 00	[m]	4-byte float
	scVel [XYZ][nscan]	-9999.9	- 100000 00	100000 00	[m/s]	4-byte float
	scLat [nscan]	-9999.9	-70	70	[degrees]	4-byte float

12.3 The List of Data Group Element

Group	Element [Array]	Missing Value (_fillValue)	Min	Max	Unit	Type
	scLon [nscan]	-9999.9	-180	180	[degrees]	4-byte float
	scAlt [nscan]	-9999.9	350000	500000	[m]	4-byte float
	dprAlt [nscan]	-9999.9	350000	500000	[m]	4-byte float
	scAttRollGeoc [nscan]	-9999.9	-180	180	[degrees]	4-byte float
	scAttPitchGeoc [nscan]	-9999.9	-180	180	[degrees]	4-byte float
	scAttYawGeoc [nscan]	-9999.9	-135	225	[degrees]	4-byte float
	scAttRollGeod [nscan]	-9999.9	-180	180	[degrees]	4-byte float
	scAttPitchGeod [nscan]	-9999.9	-180	180	[degrees]	4-byte float
	scAttYawGeod [nscan]	-9999.9	-135	225	[degrees]	4-byte float
	scHeadingGround [nscan]	-9999.9	-180	180	[degrees]	4-byte float
	scHeadingOrbital [nscan]	-9999.9	-180	180	[degrees]	4-byte float
	greenHourAng [nscan]	-9999.9	0	390	[degrees]	4-byte float
	timeMidScan [nscan]	-9999.9	0	100000 00000	[s]	8-byte float
	timeMidScanOffset [nscan]	-9999.9	0	100	[s]	8-byte float
PRE	elevation [nray][nscan]	-9999.9			[m]	4-byte float
	landSurfaceType [nray][nscan]	-9999	0	399		4-byte integer

12.3 The List of Data Group Element

Group	Element [Array]	Missing Value (_fillValue)	Min	Max	Unit	Type
	localZenithAngle [nray][nscan]	-9999.9			[degree]	4-byte float
	flagPrecip [nray][nscan]	-9999				4-byte integer
	binRealSurface [nray][nscan]	-9999				2-byte integer
	binStormTop [nray][nscan]	-9999				2-byte integer
	binMirrorImageL2 [nray][nscan]	-9999				2-byte integer
	height [nbin][nray][nscan]	-9999.9			[m]	4-byte float
	heightStormTop [nray][nscan]	-9999.9			[m]	4-byte float
	binClutterFreeBottom [nray][nscan]	-9999				2-byte integer
	sigmaZeroMeasured [nray][nscan]	-9999.9			[dB]	4-byte float
	zFactorMeasured [nbin][nray][nscan]	-9999.9			[dBZ]	4-byte float
	ellipsoidBinOffset [nray][nscan]	-9999.9			[m]	4-byte float
	echoCountRealSurface [nray][nscan]	0				1-byte unsigned integer
	snRatioAtRealSurface [nray][nscan]	-9999.9				4-byte float
	adjustFactor [nray][nscan]	-9999.9			[dB]	4-byte float

12.3 The List of Data Group Element

Group	Element [Array]	Missing Value (_fillValue)	Min	Max	Unit	Type
	snowIceCover [nray][nscan]	-99				1-byte integer
	flagSigmaZeroSaturation [nray][nscan]	99			[dB]	1-byte unsigned integer
VER	binZeroDeg [nray][nscan]	-9999				2-byte integer
	binZeroDegSecondary [nray][nscan]	-9999				2-byte integer
	airTemperature [nbin][nray][nscan]	-9999.9			[K]	4-byte float
	attenuationNP [nbin][nray][nscan]	-9999.9			[dB/km]	4-byte float
	piaNP [nNP][nray][nscan]	-9999.9			[dB]	4-byte float
	piaNPrainFree [nNP][nray][nscan]	-9999.9			[dB]	4-byte float
	sigmaZeroNPCorrected [nray][nscan]	-9999.9			[dB]	4-byte float
	heightZeroDeg [nray][nscan]	-9999.9			[m]	4-byte float
	flagInversion [nray][nscan]	-9999				2-byte integer
CSF	flagBB [nray][nscan]	-9999				4-byte integer
	binBBPeak [nray][nscan]	-9999				2-byte integer
	binBBTop	-9999				

12.3 The List of Data Group Element

Group	Element [Array]	Missing Value (_fillValue)	Min	Max	Unit	Type
	[nray][nscan]					2-byte integer
	binBBBottom [nray][nscan]	-9999				2-byte integer
	heightBB [nray][nscan]	-9999.9			[m]	4-byte float
	widthBB [nray][nscan]	-9999.9			[m]	4-byte float
	qualityBB [nray][nscan]	-9999				4-byte integer
	typePrecip [nray][nscan]	-9999				4-byte integer
	qualityTypePrecip [nray][nscan]	-9999				4-byte integer
	flagShallowRain [nray][nscan]	-9999				4-byte integer
	binHeavyIcePrecipT op [nray][nscan]	-9999				2-byte integer
	binHeavyIcePrecipB ottom [nray][nscan]	-9999				2-byte integer
	nHeavyIcePrecip [nray][nscan]	0				1-byte unsign ed integer
	flagHeavyIcePrecip [nray][nscan]	0				1-byte integer
SRT	PIAalt [method][nray][nscan]	-9999.9			[dB]	4-byte float
	PIAhb	-9999.9			[dB]	

12.3 The List of Data Group Element

Group	Element [Array]	Missing Value (_fillValue)	Min	Max	Unit	Type
	[nray][nscan]					4-byte float
	PIAhybrid [nray][nscan]	-9999.9			[dB]	4-byte float
	RFactorAlt [method][nray][nscan]	-9999.9				4-byte float
	PIAweight [method][nray][nscan]	-9999.9			[dB]	4-byte float
	PIAweightHY [two][nray][nscan]	-9999.9			[dB]	4-byte float
	pathAtten [nray][nscan]	-9999.9			[dB]	4-byte float
	reliabFactor [nray][nscan]	-9999.9				4-byte float
	reliabFactorHY [nray][nscan]	-9999.9				4-byte float
	reliabFlag [nray][nscan]	-9999				2-byte integer
	reliabFlagHY [nray][nscan]	-9999				2-byte integer
	refScanID [nearFar][foreBack] [nray][nscan]	-9999				2-byte integer
	stddevEff [nsdew][nray][nscan]	-9999.9				4-byte float
	stddevHY [nray][nscan]	-9999.9				4-byte float
	zeta [nray][nscan]	-9999.9				4-byte float

12.3 The List of Data Group Element

Group	Element [Array]	Missing Value (_fillValue)	Min	Max	Unit	Type
DSD	phase [nbin][nray][nscan]	255				1-byte unsigned integer
	binNode [nNode][nray][nscan]	-9999				2-byte integer
	paramRDm [nNode][nray][nscan]	-9999.9				4-byte float
Experimental	precipRateESurface2 [nray][nscan]	-9999.9			[mm/hr]	4-byte float
	precipRateESurface2 Status [nray][nscan]	255				1-byte integer
	sigmaZeroProfile [nbinSZP][nray][nscan]	-9999.9			[dB]	4-byte float
	seaIceConcentration [nray][nscan]	-9999.9			[%]	4-byte float
SLV	flagSLV [nbin][nray][nscan]	-99				1-byte integer
	qualitySLV [nray][nscan]	-9999				4-byte integer
	binEchoBottom [nray][nscan]	-9999				2-byte integer
	piaFinal [nray][nscan]	-9999.9			[dB]	4-byte float
	piaOffset [nray][nscan]	-9999.9			[dB]	4-byte float
	sigmaZeroCorrected [nray][nscan]	-9999.9			[dB]	4-byte float

12.3 The List of Data Group Element

Group	Element [Array]	Missing Value (_fillValue)	Min	Max	Unit	Type
	zFactorFinal [nbin][nray][nscan]	-9999.9			[dBZ]	4-byte float
	zFactorFinalESurface [nray][nscan]	-9999.9			[dBZ]	4-byte float
	zFactorFinalNearSurface [nray][nscan]	-9999.9			[dBZ]	4-byte float
	paramDSD [nDSD][nbin] [nray][nscan]	-9999.9			[10 log ₁₀ (Nw) mm]	4-byte float
	precipRate [nbin][nray][nscan]	-9999.9			[mm/hr]	4-byte float
	precipWater [nbin][nray][nscan]	-9999.9			[g/m ³]	4-byte float
	precipWaterIntegrated [LS][nray][nscan]	-9999.9			[g/m ²]	4-byte float
	precipRateNearSurface [nray][nscan]	-9999.9			[mm/hr]	4-byte float
	precipRateESurface [nray][nscan]	-9999.9			[mm/hr]	4-byte float
	precipRateAve24 [nray][nscan]	-9999.9			[mm/hr]	4-byte float
	phaseNearSurface [nray][nscan]	255				1-byte unsigned integer
	epsilon [nbin][nray][nscan]	-9999.9				4-byte float
	paramNUBF	-9999.9				

12.3 The List of Data Group Element

Group	Element [Array]	Missing Value (_fillValue)	Min	Max	Unit	Type
	[nNUBF][nray][nscan]					4-byte float
FLG	flagEcho [nbin][nray][nscan]	-99	0x00	0xff		1-byte integer
	qualityData [nray][nscan]	-9999				4-byte integer
	flagSensor [nscan]	-99				1-byte integer
	qualityFlag [nray][nscan]	-99				1-byte integer
	flagScanPattern [nscan]	-99				2-byte integer

12.4. Data Group Element (2ADPR, FS)

Table 12.4-1 Data Group Element (2ADPR, FS)

Group	Element [Array]	Missing Value (_fillValue)	Min	Max	Unit	Type
ScanTime	Year [nscan]	-9999	1950	2100	[years]	2-byte integer
	Month [nscan]	-99	1	12	[months]	1-byte integer
	DayOfMonth [nscan]	-99	1	31	[days]	1-byte integer
	Hour [nscan]	-99	0	23	[hours]	1-byte integer
	Minute [nscan]	-99	0	59	[minutes]	1-byte integer
	Second [nscan]	-99	0	60	[s]	1-byte integer
	MilliSecond [nscan]	-9999	0	999	[ms]	2-byte integer
	DayOfYear [nscan]	-9999	1	366	[days]	2-byte integer
	SecondOfDay [nscan]	-9999.9	0	86400	[s]	8-byte float
(N/A)	Latitude [nray][nscan]	-9999.9	-90	90	[degrees]	4-byte float
(N/A)	Longitude [nray][nscan]	-9999.9	-180	180	[degrees]	4-byte float
(N/A)	sunLocalTime [nray][nscan]	-9999.9	0	24	[hours]	4-byte float
scanStatus	dataQuality [nfreq][nscan]	-99	0x00	0xff		1-byte integer
	dataWarning [nfreq][nscan]	-99	0x00	0xff		1-byte integer

12.4 The List of Data Group Element

Group	Element [Array]	Missing Value (_fillValue)	Min	Max	Unit	Type
	missing [nfreq][nscan]	-99	0x00	0xff		1-byte integer
	modeStatus [nfreq][nscan]	-99	0x00	0xff		1-byte integer
	geoError [nfreq][nscan]	-9999	0x0000	0xffff		2-byte integer
	geoWarning [nfreq][nscan]	-9999	0x0000	0xffff		2-byte integer
	SCorientation [nscan]	-9999			[degrees]	2-byte integer
	pointingStatus [nfreq][nscan]	-9999				2-byte integer
	acsModeMidScan [nscan]	-99				1-byte integer
	targetSelectionMidScan [nscan]	-99	0	5		1-byte integer
	operationalMode [nfreq][nscan]	-99	1	20		1-byte integer
	limitErrorFlag [nfreq][nscan]	-99	0x00	0xff		1-byte integer
	FractionalGranuleNumber [nscan]	-9999.9	0	100000		8-byte float
navigation	scPos [XYZ][nscan]	-9999.9	-100000 00	100000 00	[m]	4-byte float
	scVel [XYZ][nscan]	-9999.9	-100000 00	100000 00	[m/s]	4-byte float
	scLat [nscan]	-9999.9	-70	70	[degrees]	4-byte float

12.4 The List of Data Group Element

Group	Element [Array]	Missing Value (_fillValue)	Min	Max	Unit	Type
	scLon [nscan]	-9999.9	-180	180	[degrees]	4-byte float
	scAlt [nscan]	-9999.9	350000	500000	[m]	4-byte float
	dprAlt [nscan]	-9999.9	350000	500000	[m]	4-byte float
	scAttRollGeoc [nscan]	-9999.9	-180	180	[degrees]	4-byte float
	scAttPitchGeoc [nscan]	-9999.9	-180	180	[degrees]	4-byte float
	scAttYawGeoc [nscan]	-9999.9	-135	225	[degrees]	4-byte float
	scAttRollGeod [nscan]	-9999.9	-180	180	[degrees]	4-byte float
	scAttPitchGeod [nscan]	-9999.9	-180	180	[degrees]	4-byte float
	scAttYawGeod [nscan]	-9999.9	-135	225	[degrees]	4-byte float
	scHeadingGround [nscan]	-9999.9	-180	180	[degrees]	4-byte float
	scHeadingOrbital [nscan]	-9999.9	-180	180	[degrees]	4-byte float
	greenHourAng [nscan]	-9999.9	0	390	[degrees]	4-byte float
	timeMidScan [nscan]	-9999.9	0	100000 00000	[s]	8-byte float
	timeMidScanOffset [nscan]	-9999.9	0	100	[s]	8-byte float
PRE	elevation [nray][nscan]	-9999.9			[m]	4-byte float
	landSurfaceType	-9999	0	399		

12.4 The List of Data Group Element

Group	Element [Array]	Missing Value (_fillValue)	Min	Max	Unit	Type
	[nray][nscan]					4-byte integer
	localZenithAngle [nfreq][nray][nscan]	-9999.9			[degree]	4-byte float
	flagPrecip [nray][nscan]	-9999				4-byte integer
	binRealSurface [nfreq][nray][nscan]	-9999			s	2-byte integer
	binStormTop [nray][nscan]	-9999				2-byte integer
	binMirrorImageL2 [nray][nscan]	-9999				2-byte integer
	height [nbin][nray][nscan]	-9999.9			[m]	4-byte float
	heightStormTop [nray][nscan]	-9999.9			[m]	4-byte float
	binClutterFreeBottom [nray][nscan]	-9999				2-byte integer
	sigmaZeroMeasured [nfreq][nray][nscan]	-9999.9			[dB]	4-byte float
	zFactorMeasured [nfreq] [nbin][nray][nscan]	-9999.9			[dBZ]	4-byte float
	ellipsoidBinOffset [nray][nscan]	-9999.9			[m]	4-byte float
	echoCountRealSurface [nfreq][nray][nscan]	0				1-byte unsigned integer
	snRatioAtRealSurface	-9999.9				4-byte float

12.4 The List of Data Group Element

Group	Element [Array]	Missing Value (_fillValue)	Min	Max	Unit	Type
	[nfreq][nray][nscan]					
	adjustFactor [nfreq][nray][nscan]	-9999.9			[dB]	4-byte float
	snowIceCover [nray][nscan]	-99				1-byte integer
	flagSigmaZeroSaturation [nfreq][nray][nscan]	99			[dB]	1-byte unsigned integer
VER	binZeroDeg [nray][nscan]	-9999				2-byte integer
	binZeroDegSecondary [nray][nscan]	-9999				2-byte integer
	airTemperature [nbin][nray][nscan]	-9999.9			[K]	4-byte float
	attenuationNP [nfreq][nbin][nray][nscan]	-9999.9			[dB/km]	4-byte float
	piNP [nfreq][nNP][nray][nscan]	-9999.9			[dB]	4-byte float
	piNPPrainFree [nfreq][nNP][nray][nscan]	-9999.9			[dB]	4-byte float
	sigmaZeroNPCorrected [nfreq][nray][nscan]	-9999.9			[dB]	4-byte float
	heightZeroDeg [nray][nscan]	-9999.9			[m]	4-byte float
	flagInversion [nray][nscan]	-9999				2-byte integer

12.4 The List of Data Group Element

Group	Element [Array]	Missing Value (_fillValue)	Min	Max	Unit	Type
CSF	flagBB [nray][nscan]	-9999				4-byte integer
	binBBPeak [nray][nscan]	-9999				2-byte integer
	binBBTop [nray][nscan]	-9999				2-byte integer
	binBBBottom [nray][nscan]	-9999				2-byte integer
	heightBB [nray][nscan]	-9999.9			[m]	4-byte float
	widthBB [nray][nscan]	-9999.9			[m]	4-byte float
	qualityBB [nray][nscan]	-9999				4-byte integer
	typePrecip [nray][nscan]	-9999				4-byte integer
	qualityTypePrecip [nray][nscan]	-9999				4-byte integer
	flagShallowRain [nray][nscan]	-9999				4-byte integer
	binDFRmMLBottom [nray][nscan]	-9999				2-byte integer
	binDFRmMLTop [nray][nscan]	-9999				2-byte integer
	binHeavyIcePrecipTop [nfreqHI][nray][nscan]	-9999				2-byte integer
binHeavyIcePrecipBottom	-9999				2-byte integer	

12.4 The List of Data Group Element

Group	Element [Array]	Missing Value (_fillValue)	Min	Max	Unit	Type
	[nfreqHI][nray][nscan]					
	nHeavyIcePrecip [nfreqHI][nray][nscan]	0				1-byte unsigned integer
	flagHeavyIcePrecip [nray][nscan]	0				1-byte integer
	flagAnvil [nray][nscan]	-99				1-byte integer
	flagHail [nray][nscan]	-99				1-byte integer
	flagMLQuality [nray][nscan]	255				1-byte unsigned integer
SRT	PIAalt [nfreq][method] [nray][nscan]	-9999.9			[dB]	4-byte float
	PIAdw [nfreq][nray][nscan]	-9999.9			[dB]	4-byte float
	PIAhb [nfreq][nray][nscan]	-9999.9			[dB]	4-byte float
	PIAhybrid [nfreq][nray][nscan]	-9999.9			[dB]	4-byte float
	RFactorAlt [method][nray][nscan]	-9999.9				4-byte float
	PIAweight [method][nray][nscan]	-9999.9			[dB]	4-byte float
	PIAweightHY	-9999.9			[dB]	

12.4 The List of Data Group Element

Group	Element [Array]	Missing Value (_fillValue)	Min	Max	Unit	Type
	[three][nray][nscan]					4-byte float
	pathAtten [nfreq][nray][nscan]	-9999.9			[dB]	4-byte float
	reliabFactor [nray][nscan]	-9999.9				4-byte float
	reliabFactorHY [nray][nscan]	-9999.9				4-byte float
	reliabFlag [nray][nscan]	-9999				2-byte integer
	reliabFlagHY [nray][nscan]	-9999				2-byte integer
	refScanID [nearFar][foreBack] [nray][nscan]	-9999				2-byte integer
	stddevEff [nfreq][nsdew] [nray][nscan]	-9999.9				4-byte float
	stddevHY [nfreq][nray][nscan]	-9999.9				4-byte float
	zeta [nfreq][nray][nscan]	-9999.9				4-byte float
DSD	phase [nbin][nray][nscan]	255				1-byte unsign ed integer
	binNode [nNode][nray][nscan]	-9999				2-byte integer
	paramRDm [nNode][nray][nscan]	-9999.9				4-byte float

12.4 The List of Data Group Element

Group	Element [Array]	Missing Value (_fillValue)	Min	Max	Unit	Type
Experimental	precipRateESurface2 [nray][nscan]	-9999.9			[mm/hr]	4-byte float
	precipRateESurface2 Status [nray][nscan]	255				1-byte unsigned integer
	sigmaZeroProfile [nfreq][nbinSZP] [nray][nscan]	-9999.9			[dB]	4-byte float
	seaIceConcentration [nray][nscan]	-9999.9			[%]	4-byte float
	binMixedPhaseTop [nray][nscan]	-9999				2-byte integer
	flagGraupeHail [nray][nscan]	255				1-byte unsigned integer
	flagSurfaceSnowfall [nray][nscan]	255				1-byte unsigned integer
	surfaceSnowfallIndex [nray][nscan]	-9999.9				4-byte float
SLV	flagSLV [nbin][nray][nscan]	-99				1-byte integer
	qualitySLV [nray][nscan]	-9999				4-byte integer
	binEchoBottom [nray][nscan]	-9999				2-byte integer
	piaFinal [nfreq][nray][nscan]	-9999.9			[dB]	4-byte float

12.4 The List of Data Group Element

Group	Element [Array]	Missing Value (_fillValue)	Min	Max	Unit	Type
	pieOffset [nfreq][nray][nscan]	-9999.9			[dB]	4-byte float
	sigmaZeroCorrected [nfreq][nray][nscan]	-9999.9			[dB]	4-byte float
	zFactorFinal [nfreq][nbin][nray][nscan]	-9999.9			[dBZ]	4-byte float
	zFactorFinalESurface [nfreq][nray][nscan]	-9999.9			[dBZ]	4-byte float
	zFactorFinalNearSurface [nfreq][nray][nscan]	-9999.9			[dBZ]	4-byte float
	paramDSD [nDSD][nbin] [nray][nscan]	-9999.9			[10log ₁₀ (Nw) mm]	4-byte float
	precipRate [nbin][nray][nscan]	-9999.9			[mm/hr]	4-byte float
	precipWater [nbin][nray][nscan]	-9999.9			[g/m ³]	4-byte float
	precipWaterIntegrated [LS][nray][nscan]	-9999.9			[g/m ²]	4-byte float
	precipRateNearSurface [nray][nscan]	-9999.9			[mm/hr]	4-byte float
	precipRateESurface [nray][nscan]	-9999.9			[mm/hr]	4-byte float
	precipRateAve24 [nray][nscan]	-9999.9			[mm/hr]	4-byte float
	phaseNearSurface [nray][nscan]	255				1-byte unsign

12.4 The List of Data Group Element

Group	Element [Array]	Missing Value (_fillValue)	Min	Max	Unit	Type
						ed integer
	epsilon [nbin][nray][nscan]	-9999.9				4-byte float
	paramNUBF [nNUBF][nray][nscan]	-9999.9				4-byte float
	DPRforward1 [nbin][nray][nscan]	-9999.9				4-byte float
FLG	flagEcho [nbin][nray][nscan]	-99	0x00	0xff		1-byte integer
	qualityData [nray][nscan]	-9999				4-byte integer
	flagSensor [nfreq][nscan]	-99				1-byte integer
	qualityFlag [nfreq][nray][nscan]	-99				1-byte integer
	flagScanPattern [nfreq][nscan]	-99				2-byte integer
TRG	NUBFindex [nray][nscan]	-9999.9				4-byte float
	MSindex [nray][nscan]	-9999				4-byte integer
	MSindexKu [nray][nscan]	-9999				4-byte integer
	MSindexKa [nray][nscan]	-9999				4-byte integer
	MSsurfPeakIndexKu [nray][nscan]	-9999				4-byte integer
	MSsurfPeakIndexKa [nray][nscan]	-9999				4-byte integer
	MSkneeDFRindex	-9999				

12.4 The List of Data Group Element

Group	Element [Array]	Missing Value (_fillValue)	Min	Max	Unit	Type
	[nray][nscan]					4-byte integer
	MSslopesKu [four][nray][nscan]	-9999.9				4-byte float
	MSslopesKa [four][nray][nscan]	-9999.9				4-byte float

12.5. Data Group Element (2ADPR, HS)

Table 12.5-1 Data Group Element (2ADPR, HS)

Group	Element [Array]	Missing Value (_fillValue)	Min	Max	Unit	Type
ScanTime	Year [nscan]	-9999	1950	2100	[years]	2-byte integer
	Month [nscan]	-99	1	12	[months]	1-byte integer
	DayOfMonth [nscan]	-99	1	31	[days]	1-byte integer
	Hour [nscan]	-99	0	23	[hours]	1-byte integer
	Minute [nscan]	-99	0	59	[minutes]	1-byte integer
	Second [nscan]	-99	0	60	[s]	1-byte integer
	MilliSecond [nscan]	-9999	0	999	[ms]	2-byte integer
	DayOfYear [nscan]	-9999	1	366	[days]	2-byte integer
	SecondOfDay [nscan]	-9999.9	0	86400	[s]	8-byte float
(N/A)	Latitude [nray][nscan]	-9999.9	-90	90	[degrees]	4-byte float
(N/A)	Longitude [nray][nscan]	-9999.9	-180	180	[degrees]	4-byte float
(N/A)	sunLocalTime [nray][nscan]	-9999.9	0	24	[hours]	4-byte float
scanStatus	dataQuality [nscan]	-99	0x00	0xff		1-byte integer
	dataWarning [nscan]	-99	0x00	0xff		1-byte integer

12.5 The List of Data Group Element

Group	Element [Array]	Missing Value (_fillValue)	Min	Max	Unit	Type
	missing [nscan]	-99	0x00	0xff		1-byte integer
	modeStatus [nscan]	-99	0x00	0xff		1-byte integer
	geoError [nscan]	-9999	0x0000	0xffff		2-byte integer
	geoWarning [nscan]	-9999	0x0000	0xffff		2-byte integer
	SCorientation [nscan]	-9999			[degrees]	2-byte integer
	pointingStatus [nscan]	-9999				2-byte integer
	acsModeMidScan [nscan]	-99				1-byte integer
	targetSelectionMidScan [nscan]	-99	0	5		1-byte integer
	operationalMode [nscan]	-99	1	20		1-byte integer
	limitErrorFlag [nscan]	-99	0x00	0xff		1-byte integer
	FractionalGranuleNumber [nscan]	-9999.9	0	100000		8-byte float
navigation	scPos [XYZ][nscan]	-9999.9	- 100000 00	100000 00	[m]	4-byte float
	scVel [XYZ][nscan]	-9999.9	- 100000 00	100000 00	[m/s]	4-byte float
	scLat [nscan]	-9999.9	-70	70	[degrees]	4-byte float

12.5 The List of Data Group Element

Group	Element [Array]	Missing Value (_fillValue)	Min	Max	Unit	Type
	scLon [nscan]	-9999.9	-180	180	[degrees]	4-byte float
	scAlt [nscan]	-9999.9	350000	500000	[m]	4-byte float
	dprAlt [nscan]	-9999.9	350000	500000	[m]	4-byte float
	scAttRollGeoc [nscan]	-9999.9	-180	180	[degrees]	4-byte float
	scAttPitchGeoc [nscan]	-9999.9	-180	180	[degrees]	4-byte float
	scAttYawGeoc [nscan]	-9999.9	-135	225	[degrees]	4-byte float
	scAttRollGeod [nscan]	-9999.9	-180	180	[degrees]	4-byte float
	scAttPitchGeod [nscan]	-9999.9	-180	180	[degrees]	4-byte float
	scAttYawGeod [nscan]	-9999.9	-135	225	[degrees]	4-byte float
	scHeadingGround [nscan]	-9999.9	-180	180	[degrees]	4-byte float
	scHeadingOrbital [nscan]	-9999.9	-180	180	[degrees]	4-byte float
	greenHourAng [nscan]	-9999.9	0	390	[degrees]	4-byte float
	timeMidScan [nscan]	-9999.9	0	100000 00000	[s]	8-byte float
	timeMidScanOffset [nscan]	-9999.9	0	100	[s]	8-byte float
PRE	elevation [nray][nscan]	-9999.9			[m]	4-byte float
	landSurfaceType [nray][nscan]	-9999	0	399		4-byte integer

12.5 The List of Data Group Element

Group	Element [Array]	Missing Value (_fillValue)	Min	Max	Unit	Type
	localZenithAngle [nray][nscan]	-9999.9			[degree]	4-byte float
	flagPrecip [nray][nscan]	-9999				4-byte integer
	binRealSurface [nray][nscan]	-9999				2-byte integer
	binStormTop [nray][nscan]	-9999				2-byte integer
	binMirrorImageL2 [nray][nscan]	-9999				2-byte integer
	height [nbin][nray][nscan]	-9999.9			[m]	4-byte float
	heightStormTop [nray][nscan]	-9999.9			[m]	4-byte float
	binClutterFreeBottom [nray][nscan]	-9999				2-byte integer
	sigmaZeroMeasured [nray][nscan]	-9999.9			[dB]	4-byte float
	zFactorMeasured [nbin][nray][nscan]	-9999.9			[dBZ]	4-byte float
	ellipsoidBinOffset [nray][nscan]	-9999.9			[m]	4-byte float
	echoCountRealSurface [nray][nscan]	0				1-byte unsigned integer
	snRatioAtRealSurface [nray][nscan]	-9999				4-byte float
	adjustFactor [nray][nscan]	-9999.9			[dB]	4-byte float

12.5 The List of Data Group Element

Group	Element [Array]	Missing Value (_fillValue)	Min	Max	Unit	Type
	snowIceCover [nray][nscan]	-99				1-byte integer
	flagSigmaZeroSaturation [nray][nscan]	99			[dB]	1-byte unsigned integer
VER	binZeroDeg [nray][nscan]	-9999				2-byte integer
	binZeroDegSecondary [nray][nscan]	-9999				2-byte integer
	airTemperature [nbin][nray][nscan]	-9999.9			[K]	4-byte float
	attenuationNP [nbin][nray][nscan]	-9999.9			[dB/km]	4-byte float
	piaNP [nNP][nray][nscan]	-9999.9			[dB]	4-byte float
	piaNPrainFree [nNP][nray][nscan]	-9999.9			[dB]	4-byte float
	sigmaZeroNPCorrected [nray][nscan]	-9999.9			[dB]	4-byte float
	heightZeroDeg [nray][nscan]	-9999.9			[m]	4-byte float
flagInversion [nray][nscan]	-9999				2-byte integer	
CSF	flagBB [nray][nscan]	-9999				4-byte integer
	binBBPeak [nray][nscan]	-9999				2-byte integer
	binBBTop	-9999				

12.5 The List of Data Group Element

Group	Element [Array]	Missing Value (_fillValue)	Min	Max	Unit	Type
	[nray][nscan]					2-byte integer
	binBBBottom [nray][nscan]	-9999				2-byte integer
	heightBB [nray][nscan]	-9999.9			[m]	4-byte float
	widthBB [nray][nscan]	-9999.9			[m]	4-byte float
	qualityBB [nray][nscan]	-9999				4-byte integer
	typePrecip [nray][nscan]	-9999				4-byte integer
	qualityTypePrecip [nray][nscan]	-9999				4-byte integer
	flagShallowRain [nray][nscan]	-9999				4-byte integer
	binDFRmMLBottom [nray][nscan]	-9999				2-byte integer
	binDFRmMLTop [nray][nscan]	-9999				2-byte integer
	flagHeavyIcePrecip [nray][nscan]	0				1-byte integer
	flagMLquality [nray][nscan]	255				1-byte unsign ed integer
SRT	PIAalt [method][nray][nscan]	-9999.9			[dB]	4-byte float
	PIAdw [nray][nscan]	-9999.9			[dB]	4-byte float
	PIAhb	-9999.9			[dB]	

12.5 The List of Data Group Element

Group	Element [Array]	Missing Value (_fillValue)	Min	Max	Unit	Type
	[nray][nscan]					4-byte float
	PIAhybrid [nray][nscan]	-9999.9			[dB]	4-byte float
	RFactorAlt [method][nray][nscan]	-9999.9				4-byte float
	PIAweight [method][nray][nscan]	-9999.9			[dB]	4-byte float
	PIAweightHY [two][nray][nscan]	-9999.9			[dB]	4-byte float
	pathAtten [nray][nscan]	-9999.9			[dB]	4-byte float
	reliabFactor [nray][nscan]	-9999.9				4-byte float
	reliabFactorHY [nray][nscan]	-9999.9				4-byte float
	reliabFlag [nray][nscan]	-9999				2-byte integer
	reliabFlagHY [nray][nscan]	-9999				2-byte integer
	refScanID [nearFar][foreBack] [nray][nscan]	-9999				2-byte integer
	stddevEff [nsdew][nray][nscan]	-9999.9				4-byte float
	stddevHY [nray][nscan]	-9999.9				4-byte float
	zeta [nray][nscan]	-9999.9				4-byte float

12.5 The List of Data Group Element

Group	Element [Array]	Missing Value (_fillValue)	Min	Max	Unit	Type
DSD	phase [nbin][nray][nscan]	255				1-byte unsigned integer
	binNode [nNode][nray][nscan]	-9999				2-byte integer
	paramRDm [nNode][nray][nscan]	-9999.9				4-byte float
Experimental	precipRateESurface2 [nray][nscan]	-9999.9			[mm/hr]	4-byte float
	precipRateESurface2 Status [nray][nscan]	255				1-byte unsigned integer
	sigmaZeroProfile [nbinSZP][nray][nscan]	-9999.9			[dB]	4-byte float
	seaIceConcentration [nray][nscan]	-9999.9			[%]	4-byte float
SLV	flagSLV [nbin][nray][nscan]	-99				1-byte integer
	qualitySLV [nray][nscan]	-9999				4-byte integer
	binEchoBottom [nray][nscan]	-9999				2-byte integer
	piaFinal [nray][nscan]	-9999.9			[dB]	4-byte float
	piaOffset [nray][nscan]	-9999.9			[dB]	4-byte float
	sigmaZeroCorrected	-9999.9			[dB]	

12.5 The List of Data Group Element

Group	Element [Array]	Missing Value (_fillValue)	Min	Max	Unit	Type
	[nray][nscan]					4-byte float
	zFactorFinal [nbin][nray][nscan]	-9999.9			[dBZ]	4-byte float
	zFactorFinalESurface [nray][nscan]	-9999.9			[dBZ]	4-byte float
	zFactorFinalNearSurface [nray][nscan]	-9999.9			[dBZ]	4-byte float
	paramDSD [nDSD][nbin] [nray][nscan]	-9999.9			[10log ₁₀ (Nw) mm]	4-byte float
	precipRate [nbin][nray][nscan]	-9999.9			[mm/hr]	4-byte float
	precipWater [nbin][nray][nscan]	-9999.9			[g/m ³]	4-byte float
	precipWaterIntegrated [LS][nray][nscan]	-9999.9			[g/m ²]	4-byte float
	precipRateNearSurface [nray][nscan]	-9999.9			[mm/hr]	4-byte float
	precipRateESurface [nray][nscan]	-9999.9			[mm/hr]	4-byte float
	precipRateAve24 [nray][nscan]	-9999.9			[mm/hr]	4-byte float
	phaseNearSurface [nray][nscan]	255				1-byte unsigned integer
	epsilon	-9999.9				

12.5 The List of Data Group Element

Group	Element [Array]	Missing Value (_fillValue)	Min	Max	Unit	Type
	[nbin][nray][nscan]					4-byte float
	paramNUBF [nNUBF][nray][nscan]	-9999.9				4-byte float
FLG	flagEcho [nbin][nray][nscan]	-99	0x00	0xff		1-byte integer
	qualityData [nray][nscan]	-9999				4-byte integer
	flagSensor [nscan]	-99				1-byte integer
	qualityFlag [nray][nscan]	-99				1-byte integer
	flagScanPattern	-99				2-byte integer

12.6. Data Group Element (3DPR, 3PR)

Table 12.6-1 Data Group Element (3DPR, 3PR)

Group		Element [Array]	Missing Value (_fillValue)	Min	Max	Unit	Type
1	2						
G1	precipRate	count [ltL][lnL][chn3][hgt][rt][st]	-9999				4-byte integer
		mean [ltL][lnL][chn3][hgt][rt][st]	-9999.9				4-byte float
		stdev [ltL][lnL][chn3][hgt][rt][st]	-9999.9				4-byte float
		hist [ltL][lnL][chn3][hgt][rt][st][bin]	-9999				4-byte integer
	rainRate	count [ltL][lnL][chn3][hgt][rt][st]	-9999				4-byte integer
		mean [ltL][lnL][chn3][hgt][rt][st]	-9999.9				4-byte float
		stdev [ltL][lnL][chn3][hgt][rt][st]	-9999.9				4-byte float
		hist [ltL][lnL][chn3][hgt][rt][st][bin]	-9999				4-byte integer
	snowRate	count [ltL][lnL][chn3][hgt][rt][st]	-9999				4-byte integer
		mean [ltL][lnL][chn3][hgt][rt][st]	-9999.9				4-byte float
		stdev [ltL][lnL][chn3][hgt][rt][st]	-9999.9				4-byte float
		hist [ltL][lnL][chn3][hgt][rt][st][bin]	-9999				4-byte integer
	mixedPhRate	count [ltL][lnL][chn3][hgt][rt][st]	-9999				4-byte integer
		mean [ltL][lnL][chn3][hgt][rt][st]	-9999.9				4-byte float
		stdev [ltL][lnL][chn3][hgt][rt][st]	-9999.9				4-byte

12.6 The List of Data Group Element

Group		Element [Array]	Missing Value (_fillValue)	Min	Max	Unit	Type
1	2						
							float
		hist [ltL][lnL][chn3][hgt][rt][st][bin]	-9999				4-byte integer
	precipRate ESurface	count [ltL][lnL][chn3][rt][st]	-9999				4-byte integer
		mean [ltL][lnL][chn3][rt][st]	-9999.9				4-byte float
		stdev [ltL][lnL][chn3][rt][st]	-9999.9				4-byte float
		hist [ltL][lnL][chn3][rt][st][bin]	-9999				4-byte integer
	precipRate ESurface2	count [ltL][lnL][chn3][rt][st]	-9999				4-byte integer
		mean [ltL][lnL][chn3][rt][st]	-9999.9				4-byte float
		stdev [ltL][lnL][chn3][rt][st]	-9999.9				4-byte float
		hist [ltL][lnL][chn3][rt][st][bin]	-9999				4-byte integer
	precipRate NearSurface	count [ltL][lnL][chn3][rt][st]	-9999				4-byte integer
		mean [ltL][lnL][chn3][rt][st]	-9999.9				4-byte float
		stdev [ltL][lnL][chn3][rt][st]	-9999.9				4-byte float
		hist [ltL][lnL][chn3][rt][st][bin]	-9999				4-byte integer
	rainRateNe arSurface	count [ltL][lnL][chn3][rt][st]	-9999				4-byte integer
		mean [ltL][lnL][chn3][rt][st]	-9999.9				4-byte float
		stdev [ltL][lnL][chn3][rt][st]	-9999.9				4-byte

12.6 The List of Data Group Element

Group		Element [Array]	Missing Value (_fillValue)	Min	Max	Unit	Type
1	2						
							float
		hist [ltL][lnL][chn3][rt][st][bin]	-9999				4-byte integer
	snowRate NearSurface	count [ltL][lnL][chn3][rt][st]	-9999				4-byte integer
		mean [ltL][lnL][chn3][rt][st]	-9999.9				4-byte float
		stdev [ltL][lnL][chn3][rt][st]	-9999.9				4-byte float
		hist [ltL][lnL][chn3][rt][st][bin]	-9999				4-byte integer
	mixedPhRateNearSurface	count [ltL][lnL][chn3][rt][st]	-9999				4-byte integer
		mean [ltL][lnL][chn3][rt][st]	-9999.9				4-byte float
		stdev [ltL][lnL][chn3][rt][st]	-9999.9				4-byte float
		hist [ltL][lnL][chn3][rt][st][bin]	-9999				4-byte integer
	precipWaterIntegrated	count [ltL][lnL][chn3][rt][st]	-9999				4-byte integer
		mean [ltL][lnL][chn3][rt][st]	-9999.9				4-byte float
		stdev [ltL][lnL][chn3][rt][st]	-9999.9				4-byte float
		hist [ltL][lnL][chn3][rt][st][bin]	-9999				4-byte integer
	precipIceIntegrated	count [ltL][lnL][chn3][rt][st]	-9999				4-byte integer
		mean [ltL][lnL][chn3][rt][st]	-9999.9				4-byte float
		stdev [ltL][lnL][chn3][rt][st]	-9999.9				4-byte

12.6 The List of Data Group Element

Group		Element [Array]	Missing Value (_fillValue)	Min	Max	Unit	Type
1	2						
							float
		hist [ltL][lnL][chn3][rt][st][bin]	-9999				4-byte integer
	precipRate Ave24	count [ltL][lnL][chn3][rt][st]	-9999				4-byte integer
		mean [ltL][lnL][chn3][rt][st]	-9999.9				4-byte float
		stdev [ltL][lnL][chn3][rt][st]	-9999.9				4-byte float
		hist [ltL][lnL][chn3][rt][st][bin]	-9999				4-byte integer
	zFactorMeasured	count [ltL][lnL][chn4][hgt][rt][st]	-9999				4-byte integer
		mean [ltL][lnL][chn4][hgt][rt][st]	-9999.9				4-byte float
		stdev [ltL][lnL][chn4][hgt][rt][st]	-9999.9				4-byte float
		hist [ltL][lnL][chn4][hgt][rt][st][bin]	-9999				4-byte integer
	zFactorMeasuredNear Surface	count [ltL][lnL][chn4][rt][st]	-9999				4-byte integer
		mean [ltL][lnL][chn4][rt][st]	-9999.9				4-byte float
		stdev [ltL][lnL][chn4][rt][st]	-9999.9				4-byte float
		hist [ltL][lnL][chn4][rt][st][bin]	-9999				4-byte integer
	dm	count [ltL][lnL][chn3][hgt][rt][st]	-9999				4-byte integer
		mean [ltL][lnL][chn3][hgt][rt][st]	-9999.9				4-byte float
		stdev [ltL][lnL][chn3][hgt][rt][st]	-9999.9				4-byte

12.6 The List of Data Group Element

Group		Element [Array]	Missing Value (_fillValue)	Min	Max	Unit	Type
1	2						
							float
		hist [ltL][lnL][chn3][hgt][rt][st][bin]	-9999				4-byte integer
	dBNw	count [ltL][lnL][chn3][hgt][rt][st]	-9999				4-byte integer
		mean [ltL][lnL][chn3][hgt][rt][st]	-9999.9				4-byte float
		stdev [ltL][lnL][chn3][hgt][rt][st]	-9999.9				4-byte float
		hist [ltL][lnL][chn3][hgt][rt][st][bin]	-9999				4-byte integer
	epsilon	count [ltL][lnL][chn4][rt][st]	-9999				4-byte integer
		mean [ltL][lnL][chn4][rt][st]	-9999.9				4-byte float
		stdev [ltL][lnL][chn4][rt][st]	-9999.9				4-byte float
		hist [ltL][lnL][chn4][rt][st][bin]	-9999				4-byte integer
	piaSRT	count [ltL][lnL][chn4][ang7 (ang4)][rt][st]	-9999				4-byte integer
		mean [ltL][lnL][chn4][ang7 (ang4)][rt][st][bin]	-9999.9				4-byte float
		stdev [ltL][lnL][chn4][ang7 (ang4)][rt][st]	-9999.9				4-byte float
		hist [ltL][lnL][chn4][ang7 (ang4)][rt][st]	-9999				4-byte integer
	piaFinal	count [ltL][lnL][chn4][ang7 (ang4)][rt][st]	-9999				4-byte integer
		mean [ltL][lnL][chn4][ang7 (ang4)][rt][st][bin]	-9999.9				4-byte float
		stdev [ltL][lnL][chn4][ang7	-9999.9				4-byte

12.6 The List of Data Group Element

Group		Element [Array]	Missing Value (_fillValue)	Min	Max	Unit	Type
1	2						
		(ang4)][rt][st]					float
		hist [ltL][lnL][chn4][ang7 (ang4)][rt][st]	-9999				4-byte integer
	piaFinalSu bset	count [ltL][lnL][chn4][ang7 (ang4)][rt][st]	-9999				4-byte integer
		mean [ltL][lnL][chn4][ang7 (ang4)][rt][st][bin]	-9999.9				4-byte float
		stdev [ltL][lnL][chn4][ang7 (ang4)][rt][st]	-9999.9				4-byte float
		hist [ltL][lnL][chn4][ang7 (ang4)][rt][st]	-9999				4-byte integer
	piaHybrid	count [ltL][lnL][chn4][ang7 (ang4)][rt][st]	-9999				4-byte integer
		mean [ltL][lnL][chn4][ang7 (ang4)][rt][st][bin]	-9999.9				4-byte float
		stdev [ltL][lnL][chn4][ang7 (ang4)][rt][st]	-9999.9				4-byte float
		hist [ltL][lnL][chn4][ang7 (ang4)][rt][st]	-9999				4-byte integer
	piaHB	count [ltL][lnL][chn4][ang7 (ang4)][rt][st]	-9999				4-byte integer
		mean [ltL][lnL][chn4][ang7 (ang4)][rt][st][bin]	-9999.9				4-byte float
		stdev [ltL][lnL][chn4][ang7 (ang4)][rt][st]	-9999.9				4-byte float
		hist [ltL][lnL][chn4][ang7 (ang4)][rt][st]	-9999				4-byte integer
	heightBB	count [ltL][lnL][chn3][rt][st]	-9999				4-byte integer
		mean [ltL][lnL][chn3][rt][st]	-9999.9				4-byte float
		stdev [ltL][lnL][chn3][rt][st]	-9999.9				4-byte

12.6 The List of Data Group Element

Group		Element [Array]	Missing Value (_fillValue)	Min	Max	Unit	Type
1	2						
							float
		hist [ltL][lnL][chn3][rt][st][bin]	-9999				4-byte integer
	heightBBn adir	count [ltL][lnL][chn3][rt][st]	-9999				4-byte integer
		mean [ltL][lnL][chn3][rt][st]	-9999.9				4-byte float
		stdev [ltL][lnL][chn3][rt][st]	-9999.9				4-byte float
		hist [ltL][lnL][chn3][rt][st][bin]	-9999				4-byte integer
	heightStor mTop	count [ltL][lnL][chn3][rt][st]	-9999				4-byte integer
		mean [ltL][lnL][chn3][rt][st]	-9999.9				4-byte float
		stdev [ltL][lnL][chn3][rt][st]	-9999.9				4-byte float
		hist [ltL][lnL][chn3][rt][st][bin]	-9999				4-byte integer
	BBwidth	count [ltL][lnL][chn3][rt][st]	-9999				4-byte integer
		mean [ltL][lnL][chn3][rt][st]	-9999.9				4-byte float
		stdev [ltL][lnL][chn3][rt][st]	-9999.9				4-byte float
		hist [ltL][lnL][chn3][rt][st][bin]	-9999				4-byte integer
	BBwidthN adir	count [ltL][lnL][chn3][rt][st]	-9999				4-byte integer
		mean [ltL][lnL][chn3][rt][st]	-9999.9				4-byte float
		stdev [ltL][lnL][chn3][rt][st]	-9999.9				4-byte

12.6 The List of Data Group Element

Group		Element [Array]	Missing Value (_fillValue)	Min	Max	Unit	Type
1	2						
							float
		hist [ltL][lnL][chn3][rt][st][bin]	-9999				4-byte integer
	DFRNearSurface	count [ltL][lnL][rt][st]	-9999				4-byte integer
		mean [ltL][lnL][rt][st]	-9999.9				4-byte float
		stdev [ltL][lnL][rt][st]	-9999.9				4-byte float
		hist [ltL][lnL][rt][st][bin]	-9999				4-byte integer
	DFRmNearSurface	count [ltL][lnL][rt][st]	-9999				4-byte integer
		mean [ltL][lnL][rt][st]	-9999.9				4-byte float
		stdev [ltL][lnL][rt][st]	-9999.9				4-byte float
		hist [ltL][lnL][rt][st][bin]	-9999				4-byte integer
	zeta	count [ltL][lnL][chn4][ang7(ang4)][rt][st]	-9999				4-byte integer
		mean [ltL][lnL][chn4][ang7(ang4)][rt][st]	-9999.9				4-byte float
		stdev [ltL][lnL][chn4][ang7(ang4)][rt][st]	-9999.9				4-byte float
		hist [ltL][lnL][chn4][ang7(ang4)][rt][st][bin]	-9999				4-byte integer
	flagHeavyIcePrecip	count [ltL][lnL][chn3][rt][st]	-9999				4-byte integer
		mean [ltL][lnL][chn3][rt][st]	-9999.9				4-byte float
		stdev [ltL][lnL][chn3][rt][st]	-9999.9				4-byte

12.6 The List of Data Group Element

Group		Element [Array]	Missing Value (_fillValue)	Min	Max	Unit	Type
1	2						
							float
		hist [ltL][lnL][chn3][rt][st][bin]	-9999				4-byte integer
	observatio nCounts	total [ltL][lnL][chn3][st]	-9999				4-byte integer
		localTime [ltL][lnL][chn3][tim][st]	-9999				4-byte integer
		pia [ltL][lnL][chn3][ang7 (ang4)][st]	-9999				4-byte integer
		shallowRain [ltL][lnL][chn3][st]	-9999				4-byte integer
	precipRate LocalTime	count [ltL][lnL][chn3][tim][st]	-9999				4-byte integer
		mean [ltL][lnL][chn3][tim][st]	-9999.9				4-byte float
		stdev [ltL][lnL][chn3][tim][st]	-9999.9				4-byte float
	precipRate NearSurfac eUnconditi onal	[ltL][lnL][chn3]	-9999.9				4-byte float
	precipProb abilityNear Surface	[ltL][lnL][chn3]	-9999.9				4-byte float
	zFactorFin al	count [ltL][lnL][chn4][hgt][rt][st]	-9999				4-byte integer
		mean [ltL][lnL][chn4][hgt][rt][st]	-9999.9				4-byte float
		stdev [ltL][lnL][chn4][hgt][rt][st]	-9999.9				4-byte float
		hist [ltL][lnL][chn4][hgt][rt][st][bin]	-9999				4-byte integer
	zFactorFin	count [ltL][lnL][chn4][rt][st]	-9999				4-byte

12.6 The List of Data Group Element

Group		Element [Array]	Missing Value (_fillValue)	Min	Max	Unit	Type
1	2						
	alNearSurface						integer
		mean [ltL][lnL][chn4][rt][st]	-9999.9				4-byte float
		stdev [ltL][lnL][chn4][rt][st]	-9999.9				4-byte float
		hist [ltL][lnL][chn4][rt][st][bin]	-9999				4-byte integer
	zFactorFinalESurface	count [ltL][lnL][chn4][rt][st]	-9999				4-byte integer
		mean [ltL][lnL][chn4][rt][st]	-9999.9				4-byte float
		stdev [ltL][lnL][chn4][rt][st]	-9999.9				4-byte float
		hist [ltL][lnL][chn4][rt][st][bin]	-9999				4-byte integer
G2	precipRate	count [ltH][lnH][chn3][hgt][rt]	-9999				4-byte integer
		mean [ltH][lnH][chn3][hgt][rt]	-9999.9				4-byte float
		stdev [ltH][lnH][chn3][hgt][rt]	-9999.9				4-byte float
	rainRate	count [ltH][lnH][chn3][hgt][rt]	-9999				4-byte integer
		mean [ltH][lnH][chn3][hgt][rt]	-9999.9				4-byte float
		stdev [ltH][lnH][chn3][hgt][rt]	-9999.9				4-byte float
	snowRate	count [ltH][lnH][chn3][hgt][rt]	-9999				4-byte integer
		mean [ltH][lnH][chn3][hgt][rt]	-9999.9				4-byte float
		stdev [ltH][lnH][chn3][hgt][rt]	-9999.9				4-byte

12.6 The List of Data Group Element

Group		Element [Array]	Missing Value (_fillValue)	Min	Max	Unit	Type
1	2						
							float
	mixedPhRate	count [ltH][lnH][chn3][hgt][rt]	-9999				4-byte integer
		mean [ltH][lnH][chn3][hgt][rt]	-9999.9				4-byte float
		stdev [ltH][lnH][chn3][hgt][rt]	-9999.9				4-byte float
	precipRateESurface	count [ltH][lnH][chn3][rt]	-9999				4-byte integer
		mean [ltH][lnH][chn3][rt]	-9999.9				4-byte float
		stdev [ltH][lnH][chn3][rt]	-9999.9				4-byte float
	precipRateESurface2	count [ltH][lnH][chn3][rt]	-9999				4-byte integer
		mean [ltH][lnH][chn3][rt]	-9999.9				4-byte float
		stdev [ltH][lnH][chn3][rt]	-9999.9				4-byte float
	precipRateNearSurface	count [ltH][lnH][chn3][rt]	-9999				4-byte integer
		mean [ltH][lnH][chn3][rt]	-9999.9				4-byte float
		stdev [ltH][lnH][chn3][rt]	-9999.9				4-byte float
	rainRateNearSurface	count [ltH][lnH][chn3][rt]	-9999				4-byte integer
		mean [ltH][lnH][chn3][rt]	-9999.9				4-byte float
		stdev [ltH][lnH][chn3][rt]	-9999.9				4-byte float
	snowRate	count [ltH][lnH][chn3][rt]	-9999				4-byte

12.6 The List of Data Group Element

Group		Element [Array]	Missing Value (_fillValue)	Min	Max	Unit	Type
1	2						
	NearSurface						integer
		mean [ltH][lnH][chn3][rt]	-9999.9				4-byte float
		stdev [ltH][lnH][chn3][rt]	-9999.9				4-byte float
	mixedPhRateNearSurface	count [ltH][lnH][chn3][rt]	-9999				4-byte integer
		mean [ltH][lnH][chn3][rt]	-9999.9				4-byte float
		stdev [ltH][lnH][chn3][rt]	-9999.9				4-byte float
	precipWaterIntegrated	count [ltH][lnH][chn3][rt]	-9999				4-byte integer
		mean [ltH][lnH][chn3][rt]	-9999.9				4-byte float
		stdev [ltH][lnH][chn3][rt]	-9999.9				4-byte float
	precipIceIntegrated	count [ltH][lnH][chn3][rt]	-9999				4-byte integer
		mean [ltH][lnH][chn3][rt]	-9999.9				4-byte float
		stdev [ltH][lnH][chn3][rt]	-9999.9				4-byte float
	precipRateAve24	count [ltH][lnH][chn3][rt]	-9999				4-byte integer
		mean [ltH][lnH][chn3][rt]	-9999.9				4-byte float
		stdev [ltH][lnH][chn3][rt]	-9999.9				4-byte float
	zFactorMeasured	count [ltH][lnH][chn4][hgt][rt]	-9999				4-byte integer
		mean [ltH][lnH][chn4][hgt][rt]	-9999.9				4-byte

12.6 The List of Data Group Element

Group		Element [Array]	Missing Value (_fillValue)	Min	Max	Unit	Type
1	2						
							float
		stdev [ltH][lnH][chn4][hgt][rt]	-9999.9				4-byte float
	zFactorMe asuredNear Surface	count [ltH][lnH][chn4][rt]	-9999				4-byte integer
		mean [ltH][lnH][chn4][rt]	-9999.9				4-byte float
		stdev [ltH][lnH][chn4][rt]	-9999.9				4-byte float
	dm	count [ltH][lnH][chn3][hgt][rt]	-9999				4-byte integer
		mean [ltH][lnH][chn3][hgt][rt]	-9999.9				4-byte float
		stdev [ltH][lnH][chn3][hgt][rt]	-9999.9				4-byte float
	dBNw	count [ltH][lnH][chn3][hgt][rt]	-9999				4-byte integer
		mean [ltH][lnH][chn3][hgt][rt]	-9999.9				4-byte float
		stdev [ltH][lnH][chn3][hgt][rt]	-9999.9				4-byte float
	epsilon	count [ltH][lnH][chn4][hgt][rt]	-9999				4-byte integer
		mean [ltH][lnH][chn4][hgt][rt]	-9999.9				4-byte float
		stdev [ltH][lnH][chn4][hgt][rt]	-9999.9				4-byte float
	piaSRT	count [ltH][lnH][chn4][ang7 (ang4)][rt]	-9999				4-byte integer
		mean [ltH][lnH][chn4][ang7 (ang4)][rt]	-9999.9				4-byte float
		stdev [ltH][lnH][chn4][ang7 (ang4)][rt]	-9999.9				4-byte float

12.6 The List of Data Group Element

Group		Element [Array]	Missing Value (_fillValue)	Min	Max	Unit	Type
1	2						
		(ang4)][rt]					float
	piaFinal	count [ltH][lnH][chn4][ang7 (ang4)][rt]	-9999				4-byte integer
		mean [ltH][lnH][chn4][ang7 (ang4)][rt]	-9999.9				4-byte float
		stdev [ltH][lnH][chn4][ang7 (ang4)][rt]	-9999.9				4-byte float
	piaFinalSu bset	count [ltH][lnH][chn4][ang7 (ang4)][rt]	-9999				4-byte integer
		mean [ltH][lnH][chn4][ang7 (ang4)][rt]	-9999.9				4-byte float
		stdev [ltH][lnH][chn4][ang7 (ang4)][rt]	-9999.9				4-byte float
	piaHybrid	count [ltH][lnH][chn4][ang7 (ang4)][rt]	-9999				4-byte integer
		mean [ltH][lnH][chn4][ang7 (ang4)][rt]	-9999.9				4-byte float
		stdev [ltH][lnH][chn4][ang7 (ang4)][rt]	-9999.9				4-byte float
	piaHB	count [ltH][lnH][chn4][ang7 (ang4)][rt]	-9999				4-byte integer
		mean [ltH][lnH][chn4][ang7 (ang4)][rt]	-9999.9				4-byte float
		stdev [ltH][lnH][chn4][ang7 (ang4)][rt]	-9999.9				4-byte float
	heightBB	count [ltH][lnH][chn3][rt]	-9999				4-byte integer
		mean [ltH][lnH][chn3][rt]	-9999.9				4-byte float
		stdev [ltH][lnH][chn3][rt]	-9999.9				4-byte float
	heightBBn	count [ltH][lnH][chn3][rt]	-9999				4-byte

12.6 The List of Data Group Element

Group		Element [Array]	Missing Value (_fillValue)	Min	Max	Unit	Type
1	2						
	adir						integer
		mean [ltH][lnH][chn3][rt]	-9999.9				4-byte float
		stdev [ltH][lnH][chn3][rt]	-9999.9				4-byte float
	heightStor mTop	count [ltH][lnH][chn3][rt]	-9999				4-byte integer
		mean [ltH][lnH][chn3][rt]	-9999.9				4-byte float
		stdev [ltH][lnH][chn3][rt]	-9999.9				4-byte float
	BBwidth	count [ltH][lnH][chn3][rt]	-9999				4-byte integer
		mean [ltH][lnH][chn3][rt]	-9999.9				4-byte float
		stdev [ltH][lnH][chn3][rt]	-9999.9				4-byte float
	BBwidthN adir	count [ltH][lnH][chn3][rt]	-9999				4-byte integer
		mean [ltH][lnH][chn3][rt]	-9999.9				4-byte float
		stdev [ltH][lnH][chn3][rt]	-9999.9				4-byte float
	DFRNearS urface (This element does not exist in HS)	count [ltH][lnH][rt]	-9999				4-byte integer
		mean [ltH][lnH][rt]	-9999.9				4-byte float
		stdev [ltH][lnH][rt]	-9999.9				4-byte float
	DFRmNea rSurface (This	count [ltH][lnH][rt]	-9999				4-byte integer
		mean [ltH][lnH][rt]	-9999.9				4-byte

12.6 The List of Data Group Element

Group		Element [Array]	Missing Value (_fillValue)	Min	Max	Unit	Type
1	2						
	element does not exist in HS)						float
		stdev [ltH][lnH][rt]	-9999.9				4-byte float
	zeta	count [ltH][lnH][chn4][ang7 (ang4)][rt]	-9999				4-byte integer
		mean [ltH][lnH][chn4][ang7 (ang4)][rt]	-9999.9				4-byte float
		stdev [ltH][lnH][chn4][ang7 (ang4)][rt]	-9999.9				4-byte float
	flagHeavyIcePrecip	count [ltH][lnH][chn3][rt]	-9999				4-byte integer
		mean [ltH][lnH][chn3][rt]	-9999.9				4-byte float
		stdev [ltH][lnH][chn3][rt]	-9999.9				4-byte float
	observationCounts	total [ltH][lnH][chn3]	-9999				4-byte integer
		localTime [ltH][lnH][chn3][tim]	-9999				4-byte integer
		pia [ltH][lnH][chn3][ang7 (ang4)]	-9999				4-byte integer
		shallowRain [ltH][lnH][chn3]	-9999				4-byte integer
	precipRateLocalTime	count [ltH][lnH][chn3][tim]	-9999				4-byte integer
		mean [ltH][lnH][chn3][tim]	-9999.9				4-byte float
		stdev [ltH][lnH][chn3][tim]	-9999.9				4-byte float
precipRateNearSurfaceUnconditi	[ltH][lnH][chn3]	-9999.9				4-byte float	

12.6 The List of Data Group Element

Group		Element [Array]	Missing Value (_fillValue)	Min	Max	Unit	Type
1	2						
	onal						
	precipProbabilityNearSurface	[ltH][lnH][chn3]	-9999.9				4-byte float
	zFactorFinal	count [ltH][lnH][chn][hgt][rt]	-9999				4-byte integer
		mean [ltH][lnH][chn][hgt][rt]	-9999.9				4-byte float
		stdev [ltH][lnH][chn][hgt][rt]	-9999.9				4-byte float
	zFactorFinalNearSurface	count [ltH][lnH][chn][rt]	-9999				4-byte integer
		mean [ltH][lnH][chn][rt]	-9999.9				4-byte float
		stdev [ltH][lnH][chn][rt]	-9999.9				4-byte float
	zFactorFinalESurface	count [ltH][lnH][chn][rt]	-9999				4-byte integer
		mean [ltH][lnH][chn][rt]	-9999.9				4-byte float
		stdev [ltH][lnH][chn][rt]	-9999.9				4-byte float

12.7. Data Group Element (3DPRD, 3PRD)

Table 12.7-1 Data Group Element (3DPRD, 3PRD)

Group		Element [Array]	Missing Value (_fillValue)	Min	Max	Unit	Type
1	2						
Grid	(N/A)	precipRateMean [nlat][nlon][nalt][chd][AD]	-9999.9			mm/hr	4-byte float
		rainRateMean [nlat][nlon][nalt][chd][AD]	-9999.9			mm/hr	4-byte float
		mixedRateMean [nlat][nlon][nalt][chd][AD]	-9999.9			mm/hr	4-byte float
		snowRateMean [nlat][nlon][nalt][chd][AD]	-9999.9			mm/hr	4-byte float
		precipRateNearSurfaceMean [nlat][nlon][chd][AD]	-9999.9			mm/hr	4-byte float
		rainRateNearSurfaceMean [nlat][nlon][chd][AD]	-9999.9			mm/hr	4-byte float
		mixedRateNearSurfaceMean [nlat][nlon][chd][AD]	-9999.9			mm/hr	4-byte float
		snowRateNearSurfaceMean [nlat][nlon][chd][AD]	-9999.9			mm/hr	4-byte float
		precipRateESurfaceMean [nlat][nlon][chd][AD]	-9999.9			mm/hr	4-byte float
		precipRateESurface2Mean [nlat][nlon][chd][AD]	-9999.9			mm/hr	4-byte float
		totalPixel [nlat][nlon][chd][AD]	-9999				2-byte integer
		precipPixel [nlat][nlon][nalt][chd][AD]	-9999				2-byte integer
		precipPixelNearSurface [nlat][nlon][chd][AD]	-9999				2-byte integer
		precipPixelESurface [nlat][nlon][chd][AD]	-9999				2-byte integer
convPrecipRateMean	-9999.9				mm/hr	4-byte	

12.7 The List of Data Group Element

Group		Element [Array]	Missing Value (_fillValue)	Min	Max	Unit	Type
1	2						
		[nlat][nlon][nalt][chd][AD]					float
		convPrecipRateNearSurfaceMean [nlat][nlon][chd][AD]	-9999.9			mm/hr	4-byte float
		convPrecipRateESurfaceMean [nlat][nlon][chd][AD]	-9999.9			mm/hr	4-byte float
		convPrecipPixNearSurface [nlat][nlon][chd][AD]	-9999				2-byte integer
		stratPrecipRateMean [nlat][nlon][nalt][chd][AD]	-9999.9			mm/hr	4-byte float
		stratPrecipRateNearSurfaceMean [nlat][nlon][chd][AD]	-9999.9			mm/hr	4-byte float
		stratPrecipRateESurfaceMean [nlat][nlon][chd][AD]	-9999.9			mm/hr	4-byte float
		stratPrecipPixelNearSurface [nlat][nlon][chd][AD]	-9999				2-byte integer
		heightBBMean [nlat][nlon][chd][AD]	-9999.9			m	4-byte float
		heightStormTopMean [nlat][nlon][chd][AD]	-9999.9			m	4-byte float
		phase [nlat][nlon][nalt][nvar][chd][AD]	-9999				2-byte integer
		phaseNearSurface [nlat][nlon][nvar][chd][AD]	-9999				2-byte integer
	GridT imeA sc	Year [nlat][nlon]	-9999	1950	2100		2-byte integer
		Month [nlat][nlon]	-99	1	12		1-byte integer
		DayOfMonth [nlat][nlon]	-99	1	31		1-byte integer
		Hour [nlat][nlon]	-99	0	23		1-byte integer
		Minute [nlat][nlon]	-99	0	59		1-byte

12.7 The List of Data Group Element

Group		Element [Array]	Missing Value (_fillValue)	Min	Max	Unit	Type
1	2						
							integer
		Second [nlat][nlon]	-99	0	60		1-byte integer
		MilliSecond [nlat][nlon]	-9999	0	999		2-byte integer
		DayOfYear [nlat][nlon]	-9999	1	366		2-byte integer
	GridTimeDes	Year [nlat][nlon]	-9999	1950	2100		2-byte integer
		Month [nlat][nlon]	-99	1	12		1-byte integer
		DayOfMonth [nlat][nlon]	-99	1	31		1-byte integer
		Hour [nlat][nlon]	-99	0	23		1-byte integer
		Minute [nlat][nlon]	-99	0	59		1-byte integer
		Second [nlat][nlon]	-99	0	60		1-byte integer
		MilliSecond [nlat][nlon]	-9999	0	999		2-byte integer
		DayOfYear [nlat][nlon]	-9999	1	366		2-byte integer

12.8. Data Group Element (2HSLH, 2HSLHT)

Table 12.8-1 Data Group Element (2HSLH, 2HSLHT)

Group	Element [Array]	Missing Value (_fillValue)	Min	Max	Unit	Type
ScanTime	Year [nscan]	-9999	1950	2100	[year]	2-byte integer
	Month [nscan]	-99	1	12	[month]	1-byte integer
	DayOfMonth [nscan]	-99	1	31	[day]	1-byte integer
	Hour [nscan]	-99	0	23	[hour]	1-byte integer
	Minute [nscan]	-99	0	59	[minute]	1-byte integer
	Second [nscan]	-99	0	60	[s]	1-byte integer
	MilliSecond [nscan]	-9999	0	999	[ms]	2-byte integer
	DayOfYear [nscan]	-9999	1	366	[day]	2-byte integer
	SecondOfDay [nscan]	-9999.9	0	8640 0	[s]	8-byte float
(N/A)	Latitude [nray][nscan]	-9999.9	-90	90	[degree]	4-byte float
	Longitude [nray][nscan]	-9999.9	-180	180	[degree]	4-byte float
	sunLocalTime [nray][nscan]	-9999.9	0	24	[hour]	4-byte float
	latentHeating [nlayer][nray][nscan]	-9999.9	-400	400	[K/hr]	4-byte float

12.8 The List of Data Group Element

Group	Element [Array]	Missing Value (_fillValue)	Min	Max	Unit	Type
(N/A)	Q1minusQR [nlayer][nray][nscan]	-9999.9	-400	400	[K/hr]	4-byte float
	Q2 [nlayer][nray][nscan]	-9999.9	-400	400	[K/hr]	4-byte float
	rainTypesSLH [nray][nscan]	-9999				2-byte integer
	stormTopHeight [nray][nscan]	-9999	0	3200 0	[m]	2-byte integer
	meltLevel [nray][nscan]	-9999	0	3200 0	[m]	2-byte integer
	nearMeltLevel [nray][nscan]	-9999	0	3200 0	[m]	2-byte integer
	nearSurfLevel [nray][nscan]	-9999	0	3200 0	[m]	2-byte integer
	topoLevel [nray][nscan]	-9999	0	3200 0	[m]	2-byte integer
	levelConvUpper [nray][nscan]	-9999	0	3200 0	[m]	2-byte integer
	nearSurfacePrecipRate [nray][nscan]	-9999.9	0	500	[mm/hr]	4-byte float
	precipRateNearMelt [nray][nscan]	-9999.9	0	500	[mm/hr]	4-byte float
	precipRateConvUpper [nray][nscan]	-9999.9	0	500	[mm/hr]	4-byte float
	rainType2ADPR(PR) [nray][nscan]	-9999				2-byte integer
	surfaceType [nray][nscan]	-9999				2-byte integer

12.9. Data Group Element (3GSLH, 3GSLHT)

Table 12.9-1 Data Group Element (3GSLH, 3GSLHT)

Group 1	Group 2	Element [Array]	Missing Value (_fillValue)	Min	Max	Unit	Type
Grid	(N/A)	convLHCndMean [nlat][nlon][nlayer]	-9999.9	-400	400	[K/hr]	4-byte float
		convQ1RCndMean [nlat][nlon][nlayer]	-9999.9	-400	400	[K/hr]	4-byte float
		convQ2CndMean [nlat][nlon][nlayer]	-9999.9	-400	400	[K/hr]	4-byte float
		shstrLHCndMean [nlat][nlon][nlayer]	-9999.9	-400	400	[K/hr]	4-byte float
		shstrQ1RCndMean [nlat][nlon][nlayer]	-9999.9	-400	400	[K/hr]	4-byte float
		shstrQ2CndMean [nlat][nlon][nlayer]	-9999.9	-400	400	[K/hr]	4-byte float
		dpstrLHCndMean [nlat][nlon][nlayer]	-9999.9	-400	400	[K/hr]	4-byte float
		dpstrQ1RCndMean [nlat][nlon][nlayer]	-9999.9	-400	400	[K/hr]	4-byte float
		dpstrQ2CndMean [nlat][nlon][nlayer]	-9999.9	-400	400	[K/hr]	4-byte float
		otherLHCndMean [nlat][nlon][nlayer]	-9999.9	-400	400	[K/hr]	4-byte float
		otherQ1RCndMean [nlat][nlon][nlayer]	-9999.9	-400	400	[K/hr]	4-byte float
		otherQ2CndMean [nlat][nlon][nlayer]	-9999.9	-400	400	[K/hr]	4-byte float
		allLHCndMean [nlat][nlon][nlayer]	-9999.9	-400	400	[K/hr]	4-byte float
		allQ1RCndMean	-9999.9	-400	400	[K/hr]	

Group 1	Group 2	Element [Array]	Missing Value (_fillValue)	Min	Max	Unit	Type
		[nlat][nlon][nlayer]					4-byte float
		allQ2CndMean [nlat][nlon][nlayer]	-9999.9	-400	400	[K/hr]	4-byte float
		allLHUnCndMean [nlat][nlon][nlayer]	-9999.9	-400	400	[K/hr]	4-byte float
		allQ1RUnCndMean [nlat][nlon][nlayer]	-9999.9	-400	400	[K/hr]	4-byte float
		allQ2UnCndMean [nlat][nlon][nlayer]	-9999.9	-400	400	[K/hr]	4-byte float
		convPix [nlat][nlon][nlayer]	-9999				2-byte integer
		shstrPix [nlat][nlon][nlayer]	-9999				2-byte integer
		dpstrPix [nlat][nlon][nlayer]	-9999				2-byte integer
		otherPix [nlat][nlon][nlayer]	-9999				2-byte integer
		precipPix [nlat][nlon][nlayer]	-9999				2-byte integer
		allPix [nlat][nlon][nlayer]	-9999				2-byte integer
	GridTime	Year [nlat][nlon]	-9999	1950	2100	[year]	2-byte integer
		Month [nlat][nlon]	-99	1	12	[month]	1-byte integer
		DayOfMonth [nlat][nlon]	-99	1	31	[day]	1-byte integer
		Hour [nlat][nlon]	-99	0	23	[hour]	1-byte integer
		Minute	-99	0	59	[minute]	

12.9 The List of Data Group Element

Group 1	Group 2	Element [Array]	Missing Value (_fillValue)	Min	Max	Unit	Type
		[nlat][nlon]					1-byte integer
		Second [nlat][nlon]	-99	0	60	[s]	1-byte integer
		MilliSecond [nlat][nlon]	-9999	0	999	[ms]	2-byte integer
		DayOfYear [nlat][nlon]	-9999	1	366	[day]	2-byte integer

12.10. Data Group Element (3HSLH, 3HSLHT)

Table 12.10-1 Data Group Element (3HSLH, 3HSLHT)

Group 1	Group2	Element [Array]	Missing Value (_fillValue)	Min	Max	Unit	Type
Grid	(N/A)	convLHCndMean [nlat][nlon][nlayer]	-9999.9	-400	400	[K/hr]	4-byte float
		convLHCndStdv [nlat][nlon][nlayer]	-9999.9	-400	400	[K/hr]	4-byte float
		convQ1RCndMean [nlat][nlon][nlayer]	-9999.9	-400	400	[K/hr]	4-byte float
		convQ1RCndStdv [nlat][nlon][nlayer]	-9999.9	-400	400	[K/hr]	4-byte float
		convQ2CndMean [nlat][nlon][nlayer]	-9999.9	-400	400	[K/hr]	4-byte float
		convQ2CndStdv [nlat][nlon][nlayer]	-9999.9	-400	400	[K/hr]	4-byte float
		shstrLHCndMean [nlat][nlon][nlayer]	-9999.9	-400	400	[K/hr]	4-byte float
		shstrLHCndStdv [nlat][nlon][nlayer]	-9999.9	-400	400	[K/hr]	4-byte float
		shstrQ1RCndMean [nlat][nlon][nlayer]	-9999.9	-400	400	[K/hr]	4-byte float
		shstrQ1RCndStdv [nlat][nlon][nlayer]	-9999.9	-400	400	[K/hr]	4-byte float
		shstrQ2CndMean [nlat][nlon][nlayer]	-9999.9	-400	400	[K/hr]	4-byte float
		shstrQ2CndStdv [nlat][nlon][nlayer]	-9999.9	-400	400	[K/hr]	4-byte float
		dpstrLHCndMean [nlat][nlon][nlayer]	-9999.9	-400	400	[K/hr]	4-byte float
		dpstrLHCndStdv [nlat][nlon][nlayer]	-9999.9	-400	400	[K/hr]	4-byte float

12.10 The List of Data Group Element

Group 1	Group2	Element [Array]	Missing Value (_fillValue)	Min	Max	Unit	Type
		[nlat][nlon][nlayer]					
		dpstrQ1RCndMean [nlat][nlon][nlayer]	-9999.9	-400	400	[K/hr]	4-byte float
		dpstrQ1RCndStdv [nlat][nlon][nlayer]	-9999.9	-400	400	[K/hr]	4-byte float
		dpstrQ2CndMean [nlat][nlon][nlayer]	-9999.9	-400	400	[K/hr]	4-byte float
		dpstrQ2CndStdv [nlat][nlon][nlayer]	-9999.9	-400	400	[K/hr]	4-byte float
		otherLHCndMean [nlat][nlon][nlayer]	-9999.9	-400	400	[K/hr]	4-byte float
		otherLHCndStdv [nlat][nlon][nlayer]	-9999.9	-400	400	[K/hr]	4-byte float
		otherQ1RCndMean [nlat][nlon][nlayer]	-9999.9	-400	400	[K/hr]	4-byte float
		otherQ1RCndStdv [nlat][nlon][nlayer]	-9999.9	-400	400	[K/hr]	4-byte float
		otherQ2CndMean [nlat][nlon][nlayer]	-9999.9	-400	400	[K/hr]	4-byte float
		otherQ2CndStdv [nlat][nlon][nlayer]	-9999.9	-400	400	[K/hr]	4-byte float
		LHCndMean [nlat][nlon][nlayer]	-9999.9	-400	400	[K/hr]	4-byte float
		LHCndStdv [nlat][nlon][nlayer]	-9999.9	-400	400	[K/hr]	4-byte float
		Q1RCndMean [nlat][nlon][nlayer]	-9999.9	-400	400	[K/hr]	4-byte float
		Q1RCndStdv [nlat][nlon][nlayer]	-9999.9	-400	400	[K/hr]	4-byte float
		Q2CndMean	-9999.9	-400	400	[K/hr]	4-byte float

12.10 The List of Data Group Element

Group 1	Group2	Element [Array]	Missing Value (_fillValue)	Min	Max	Unit	Type
		[nlat][nlon][nlayer]					
		Q2CndStdv [nlat][nlon][nlayer]	-9999.9	-400	400	[K/hr]	4-byte float
		LHUnCndMean [nlat][nlon][nlayer]	-9999.9	-400	400	[K/hr]	4-byte float
		LHUnCndStdv [nlat][nlon][nlayer]	-9999.9	-400	400	[K/hr]	4-byte float
		Q1RUnCndMean [nlat][nlon][nlayer]	-9999.9	-400	400	[K/hr]	4-byte float
		Q1RUnCndStdv [nlat][nlon][nlayer]	-9999.9	-400	400	[K/hr]	4-byte float
		Q2UnCndMean [nlat][nlon][nlayer]	-9999.9	-400	400	[K/hr]	4-byte float
		Q2UnCndStdv [nlat][nlon][nlayer]	-9999.9	-400	400	[K/hr]	4-byte float
		convPix [nlat][nlon][nlayer]	-9999.9				4-byte float
		shstrPix [nlat][nlon][nlayer]	-9999.9				4-byte float
		dpstrPix [nlat][nlon][nlayer]	-9999.9				4-byte float
		otherPix [nlat][nlon][nlayer]	-9999.9				4-byte float
		precipPix [nlat][nlon][nlayer]	-9999.9				4-byte float
		allPix [nlat][nlon][nlayer]	-9999.9				4-byte float

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