PRECIPITATION PROCESSING SYSTEM

GLOBAL PRECIPITATION MEASUREMENT

Metadata for GPM Products

Version 6.01

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Contents

1 Introduction

This document describes metadata, organized by group. There are two types of metadata groups: a group with elements and a "Long Metadata Group" which is not divided into elements.

The first type of group has elements, which are shown in a table. If the name of the metadata element is wider than the table column, it will be hyphenated in the table. There is no dash or hyphen in the element name. For example,

SolarBetaAngleAtMiddleOfGranule

would appear in the table as

SolarBetaAngleAt-
MiddleOfGranule

The second type of group, a "Long Metadata Group", has no elements and therefore no table is shown. Since the calls to TKIO to get or set metadata require an element name, the name NULL (in C) or "NULL" (in Fortran) are used as the element name in the TKIO calls.

2 FileHeader

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

Table 1 through 2 show each metadata element in this group.

3 InputRecord

InputRecord contains a record of input files for this granule. This group appears in Level 1, Level 2, and Level 3 orbital data products. Level 3 time averaged products have the same information separated into 3 groups since they have many inputs.

Table 3 shows each metadata element in this group.

4 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.

5 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 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.

7 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.

8 NavigationRecord

NavigationRecord contains navigation metadata for this granule. This group appears in Level 1, Level 2, and Level 3 orbital data products.

Table 4 shows each metadata element in this group.

9 FileInfo

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

Table 5 shows each metadata element in this group.

10 JAXAInfo

JAXAInfo contains metadata requested by JAXA. Used by DPR algorithms and GSMaP.

Table 6 shows each metadata element in this group.

11   DPRKuInfo

Contains DPR information. This group appears in 1BKu and 1BPR.

Table 7 shows each metadata element in this group.

12   DPRKaInfo

Contains DPR information. This group appears in 1BKa.

Table 8 shows each metadata element in this group.

13   GSMaPInfo

GSMaPinfo contains metadata required by GSMaP. This group appears in GSMaP products only.

Table 9 shows each metadata element in this group.

14   GprofInfo

GprofInfo contains metadata required by Gprof. This group appears in Gprof products.

Table 10 shows each metadata element in this group.

15   PRPSinfo

PRPSinfo contains metadata required by PRPS. This group appears in 2APRPS products.

Table 11 shows each metadata element in this group.

16   XCALinfo

XCALinfo contains metadata required by 1C intercalibrated files. This group appears in 1C intercalibrated products.

Table 12 shows each metadata element in this group.

17 SwathHeader

SwathHeader contains metadata for swaths. This group appears in Level 1 and Level 2 data products.

Table 13 shows each metadata element in this group.

18 GridHeader

GridHeader contains metadata defining the grids in the grid structure. This group appears in Level 3 products.

Table 14 shows each metadata element in this group.

Table 1: FileHeader Group

Metadata Element	Estimated Size (bytes)	Description
DOI	256	Digital Object Identifier
DOIauthority	256	Digital Object Identifier Authority
DOIshortName	256	Digital Object Identifier Short Name
AlgorithmID	50	The algorithm that generated this product, e.g., 2A12.
AlgorithmVersion	50	The version of the algorithm that generated this product.
FileName	50	The file name of this granule.
SatelliteName	10	Values are: TRMM GPM MULTI F10 ... F19 AQUA GCOMW1 CORIOLIS MT1 NOAA15 ... NOAA19 METOPA NPP. More values will be added as they are known.
InstrumentName	10	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.
GenerationDateTime	50	The date and time this granule was 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
StartGranuleDateTime	50	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
StopGranuleDateTime	50	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

Table 2: FileHeader Group

Metadata Element	Estimated Size (bytes)	Description
GranuleNumber	50	The number of this granule, which starts as defined 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. If there is no granule number (NRT or time-averaged products) then GranuleNumber is empty.
NumberOfSwaths	50	The number of swaths in this granule.
NumberOfGrids	50	The number of grid structures in this granule.
GranuleStart	50	The starting place in the orbit of this granule. Currently defined values are ”SOUTHERNMOST_LATITUDE” and ”NORTHBOUND_EQUATOR_CROSSING”.
TimeInterval	50	The time interval covered by this granule. Values are ”ORBIT”, ”HALF_ORBIT”, ”HALF_HOUR”, ”HOUR”, ”3_HOUR”, ”DAY”, ”DAY_ASC”, DAY_DES”, ”MONTH”, ”CONTACT”. Note: NRT will have the value ”ORBIT” but the orbit will be partial.
ProcessingSystem	50	The name of the processing system, e.g., ”PPS”, ”JAXA”.
ProductVersion	50	The data version assigned by the processing system.
EmptyGranule	50	Whether a granule is empty. Values are ”EMPTY” or ”NOT_EMPTY”.
MissingData	50	The number of missing scans.

Table 3: InputRecord Group

Metadata Element	Estimated Size (bytes)	Description
InputFileNames	1000	A list of input file names for this granule.
InputAlgorithmVersions	1000	A list of algorithm versions of the input files for this granule.
InputGenerationDateTimes	1000	A list of generation date times of the input files for this granule. The format is the same as GenerationDateTime.

Table 4: NavigationRecord Group

Metadata Element	Estimated Size (bytes)	Description
LongitudeOnEquator	50	The longitude where the satellite crosses the equator going from south to north.
UTCDateTimeOn-Equator	50	The UTC time when the satellite crosses the equator going from south to north. The format is the same as GenerationDate Time.
MeanSolarBetaAngle	50	The average solar beta angle in this granule.
EphemerisFileName	50	Name of the ephemeris file input for processing.
AttitudeFileName	50	Name of the attitude file input for processing.
GeoControlFileName	50	Name of the GeoTK Control Parameters File input for processing.
EphemerisSource	50	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"
AttitudeSource	50	Values are "0_CONSTANT_INPUTS_FOR_TESTING", "1_ON_BOARD_CALCULATED_PITCH_ROLL_YAW"
GeoToolkitVersion	50	Version of the GeoToolkit
SensorAlignmentFirstRotationAngle	50	Alignment angle, first rotation, in degrees. Rotation adjustment from sensor coordinates to the Attitude Control System Flight Coordinates.
SensorAlignmentSecondRotationAngle	50	Alignment angle, second rotation, in degrees.
SensorAlignmentThirdRotationAngle	50	Alignment angle, third rotation, in degrees.
SensorAlignmentFirstRotationAxis	50	Euler rotation sequence, first rotation axis. Values are "1", "2", "3" (representing X, Y, Z).
SensorAlignmentSecondRotationAxis	50	Euler rotation sequence, second rotation axis. Values are "1", "2", "3" (representing X, Y, Z).
SensorAlignmentThirdRotationAxis	50	Euler rotation sequence, third rotation axis. Values are "1", "2", "3" (representing X, Y, Z).

Table 5: FileInfo Group

Metadata Element	Estimated Size (bytes)	Description
DataFormatVersion	50	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" ...
TKCodeBuildVersion	50	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.
MetadataVersion	50	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" ...
FormatPackage	50	The underlying format of this granule. Values are "HDF4", "HDF5", "NETCDF", "TKBINARY"
BlueprintFilename	50	The filename of the primary blueprint file that defined the format used to write this file.
BlueprintVersion	50	The BlueprintVersion of the format definition
TKIOVersion	50	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.
MetadataStyle	50	The style in which the metadata was written, e.g., "PVL". "PVL" means $< parameter >=< value >$;
EndianType	50	The endian type of the system that wrote this file. Values are "BIG_ENDIAN" and "LITTLE_ENDIAN".

Table 6: JAXAInfo Group

Metadata Element	Estimated Size (bytes)	Description
GranuleFirstSca-nUTCDateTime	50	Granule First Scan UTC Date after crossing granule boundary. 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.
GranuleLastSca-nUTCDateTime	50	Granule Last Scan UTC Date before crossing granule boundary. 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.
TotalQualityCode	50	Total quality of the GPM product, e.g., "Good", "Fair" or "EG".
FirstScanLat	50	Latitude of orbit first scan.
FirstScanLon	50	Longitude of orbit first scan.
LastScanLat	50	Latitude of orbit last scan.
LastScanLon	50	Longitude of orbit last scan.
NumberOfRainPi-xelsNS	50	Number of rain pixels in the NS swath, judged at DPR L2 algorithm. At DPR L1, value is "-9999".
NumberOfRainPi-xelsMS	50	Number of rain pixels in the MS swath, judged at DPR L2 algorithm. At DPR L1, value is "-9999".
NumberOfRainPi-xelsHS	50	Number of rain pixels in the HS swath, judged at DPR L2 algorithm. At DPR L1, value is "-9999".
ProcessingSubSystem	50	The name of the processing sub-system, e.g., "ALGO-RITHM","PCS".
ProcessingMode	50	The name of the processing mode, e.g., "STD","NRT".
LightSpeed	50	A constant value of light speed in m/s.
DielectricConstantKa	50	A parameter of dielectric for Ka.
DielectricConstantKu	50	A parameter of dielectric for Ku.

Table 7: DPRKuInfo Group

Metadata Element	Estimated Size (bytes)	Description
scanAngleObsVersion	100	The version of scan angle table which is used for non-external calibration mode.
scanAngleExtVersion	100	The version of scan angle table which is used for external calibration mode.
transReceiptCoefVersion	100	The version of trans/receipt gain correction value table.
fcifIoTableVersion	100	The version of FCIF I/O table.
eqvWavelength	100	Equivalent wavelength (m).
logAveOffset	100	The offset value (dB) between logarithmic average and normal average.
alignmentAngleBasicEtoA	100	Rotation angle (degrees) from electrical axis to antenna axis.
alignmentAngleOffsetAtoM	100	Offset angle (degrees) from antenna axis to mechanical axis.

Table 8: DPRKaInfo Group

Metadata Element	Estimated Size (bytes)	Description
scanAngleObsVersion	100	The version of scan angle table which is used for non-external calibration mode.
scanAngleExtVersion	100	The version of scan angle table which is used for external calibration mode.
transReceiptCoefVersion	100	The version of trans/receipt gain correction value table.
fcifIoTableVersion	100	The version of FCIF I/O table.
eqvWavelength	100	Equivalent wavelength (m).
logAveOffset	100	The offset value (dB) between logarithmic average and normal average.
alignmentAngleBasicEtoA	100	Rotation angle (degrees) from electrical axis to antenna axis.
alignmentAngleOffsetAtoM	100	Offset angle (degrees) from antenna axis to mechanical axis.

Table 9: GSMaPInfo Group

Metadata Element	Estimated Size (bytes)	Description
AlgorithmName	100	Algorithm name of GSMaP module.
CoverageRatio	100	Ratio of effective (non-missing) pixel number within rainfall retrieval area (60S-60N at present) in percentage.
InputMWSFile-Number	100	Number of satellites with passive microwave instruments used in the file.
InputIRFileNumber	100	Number of IR files used in the file.
InputAncillaryFile-Number	100	Existence of rain gauge correction. For products except monthly products, if number is "1", rain gauge correction is applied, and if "0", rain gauge correction is not applied. For monthly products, total number of days with rain gauge correction is denoted, and date of without gauge correction is also shown as (NoGauge=D1,D2,D3), where D1,D2,D3 are day without gauge correction.

Table 10: GprofInfo Group

Metadata Element	Estimated Size (bytes)	Description
Satellite	12	Name of satellite.
Sensor	12	Name of sensor.
PreProcessorVersion	12	Version of preprocessor.
PostProcessorVersion	12	Version of postprocessor.
ProfileDatabaseFi-lename	128	Filename of profile database.
OriginalRadiomet-erFilename	128	Original filename of the radiometer.
ProfileStructureFlag	1	Flag as to whether cluster was computed. If cluster was computed, StructureFlag = 1. If cluster was not computed, StructureFlag = 0 and clusterNumber and clusterScale are set to missing.
spares	51	spares.

Table 11: PRPSinfo Group

Metadata Element	Estimated Size (bytes)	Description
PreProcessorVersion	12	Version of preprocessor.
PostProcessorVersion	12	Version of postprocessor.
spares	51	spares.

Table 12: XCALinfo Group

Metadata Element	Estimated Size (bytes)	Description
CalibrationStandard	50	The brightness temperature reference standard, e.g., "cc_1.1".
CalibrationTable	50	The name of a file containing the calibration table used to make this product, e.g., "1C.AQUA.ASMRE.XCAL2013-P.tbl".

CalibrationLevel	50	The level development of the intercalibration for a given sensor. When this level increases for a given sensor the Level 1C files are reprocessed and the version number will also increment. The intercalibration level is defined as follows:
		
		`N (None):        No intercalibration has been applied.  Tbs are unchanged from Level 1B source files.`
		`P (Preliminary): A preliminary or beta intercalibration has been applied to match the Tb to the reference.`
		`V (Verified):    The intercalibration has been verified by at least one independent effort.`
		`C (Consensus):   The XCAL intercalibration has been finalized and accepted by the Science Team.`

Table 13: SwathHeader Group

Metadata Element	Estimated Size (bytes)	Description
NumberScansInSet	50	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.
MaximumNumbe-rScansTotal	50	The maximum allowed number of total scans in this swath for non-NRT data. Total scans = overlap scans before granule + scans in granule + overlap scans after granule. Note that NRT data can be longer than one orbit and have many more scans than MaximumNumbe-rScansTotal.
NumberScansBe-foreGranule	50	The number of overlap scans before the first scan of the granule in this swath.
NumberScansGr-anule	50	The number of scans in the granule in this swath.
NumberScansAf-terGranule	50	The number of overlap scans after the last scan of the granule in this swath.
NumberPixels	50	The number of IFOV in each scan in this swath.
ScanType	50	The type of scan in this swath. Values are: "CROSSTRACK" and "CONICAL"

Table 14: GridHeader Group

Metadata Element	Estimated Size (bytes)	Description
BinMethod	50	Method used to obtain the value in each grid box. The only defined value is "ARITHMEAN".
Registration	50	Representative location within the grid box. The only defined value is "CENTER".
LatitudeResolution	50	North-south size of a bin (degrees latitude).
LongitudeResolution	50	East-west size of a bin (degrees longitude).
NorthBoundingCo-ordinate	50	Northern-most latitude (degrees) covered by the grid.
SouthBoundingCo-ordinate	50	Southern-most latitude (degrees) covered by the grid.
EastBoundingCo-ordinate	50	Eastern-most longitude (degrees) covered by the grid.
WestBoundingCo-ordinate	50	Western-most longitude (degrees) covered by the grid.
Origin	50	Origin of the grid indices, e.g., "SOUTHWEST".