TROPICAL RAINFALL MEASURING MISSION PRECIPITATION PROCESSING SYSTEM

File Specification
3B31

Version 7

March 23, 2012

0.1 3B31 - Rainfall Combined

3B31, "Rainfall Combined", uses the high quality retrievals done for the narrow swath in 2B31 to calibrate the wide swath retrievals generated in 2A12. For each 0.5^o x 0.5^o latitude/longitude box and each vertical layer, an adjustment ratio will be calculated for the swath overlap region for one month. Only TMI pixels with 2A12 pixelStatus equal to zero are included in monthly averages. The major effect of the pixelStatus requirement is to remove sea ice.

Dimension definitions:

nlat	160	Number of 0.5^o grid intervals of latitude from 40° N to 40° S.
nlon	720	Number of 0.5^o grid intervals of longitude from 180° W to 180° E.
nlayer	28	Number of profiling layers. The top of each layer is 0.5, 1.0, 1.5, ..., 9.5, 10.0, 11.0, ..., 18.0 km. TMI layer tops are heights above the earth's surface; COMB layer tops are heights above the earth ellipsoid. These layers will have the same height over the ocean but different height over the land, the difference being the land elevation.

Figure 1 shows the structure of this product. The text below describes the contents of objects in the structure, the C Structure Header File and the Fortran Structure Header File.

FileHeader (Metadata):
FileHeader contains general metadata. This group appears in all data products. See Metadata for TRMM Products for details.

InputFileNames (Metadata):
InputFileNames contains a list of input file names for this granule. See Metadata for TRMM Products for details.

InputAlgorithmVersions (Metadata):
InputAlgorithmVersions contains a list of input algorithm versions for this granule. See Metadata for TRMM Products for details.

InputGenerationDateTimes (Metadata):
InputGenerationDateTimes contains a list of input generation datetimes. See Metadata for TRMM Products for details.

FileInfo (Metadata):
FileInfo contains metadata used by the PPS I/O Toolkit (TKIO). This group appears in all data products. See Metadata for TRMM Products for details.

Grid (Grid)

GridHeader (Metadata):
GridHeader contains metadata defining the grids in the grid structure. See Metadata for TRMM Products for details.

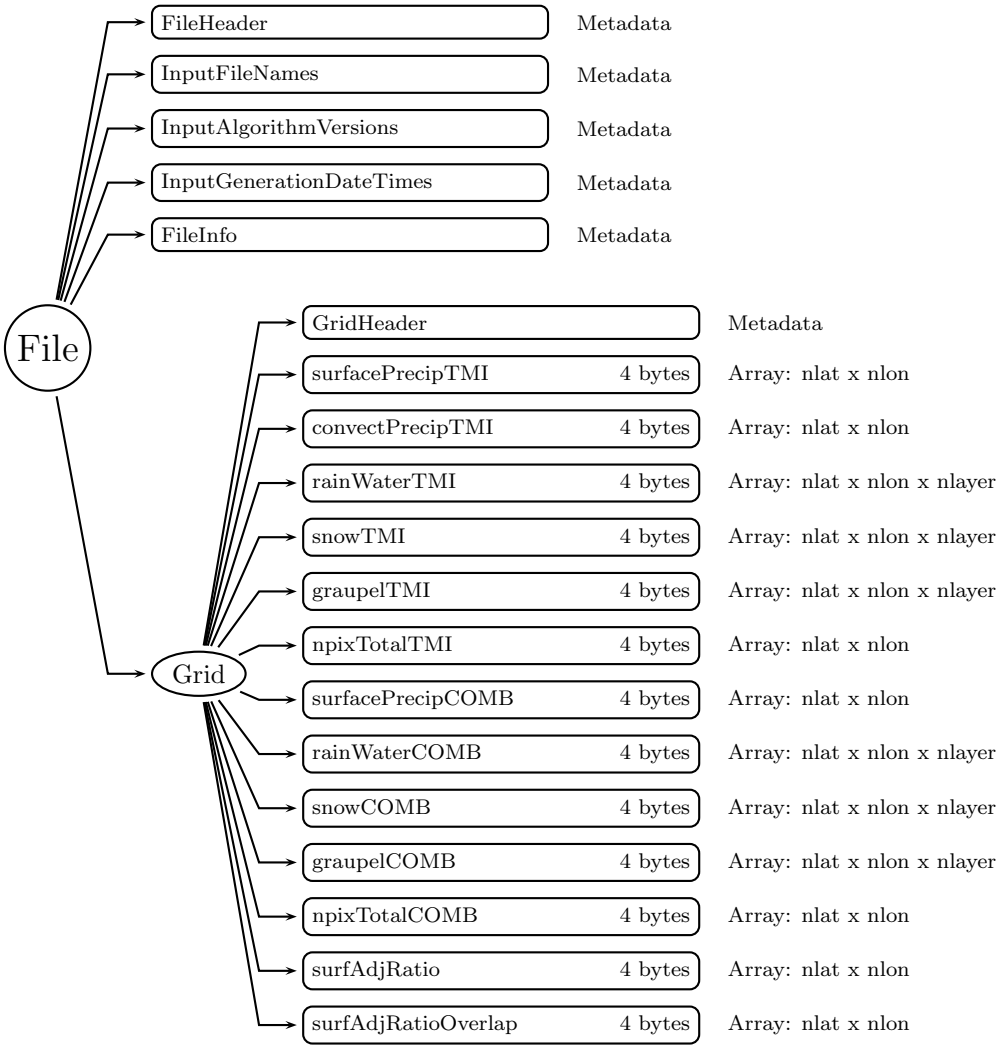

Figure 1: Data Format Structure for 3B31, Rainfall Combined

surfacePrecipTMI (4-byte float, array size: nlat x nlon):
Monthly mean surface precipitation from the wide swath of 2A12 accumulated in each 0.5^o x 0.5^o box. Values range from 0 to 3000 mm. Special values are defined as:
-9999.9 Missing value

convectPrecipTMI (4-byte float, array size: nlat x nlon):
Monthly mean sonvective surface precipitation from the wide swath of 2A12 accumulated in each 0.5^o x 0.5^o box. Values range from 0 to 3000 mm. Special values are defined as:
-9999.9 Missing value

rainWaterTMI (4-byte float, array size: nlat x nlon x nlayer):
Monthly mean rain water content from the wide swath of 2A12 at each vertical layer in each 0.5^o x 0.5^o box. Values range from 0 to 10 gm^-3. Special values are defined as:
-9999.9 Missing value

snowTMI (4-byte float, array size: nlat x nlon x nlayer):
Monthly mean snow liquid water content from the wide swath of 2A12 at each vertical layer in each 0.5^o x 0.5^o box. Values range from 0 to 10 gm^-3. Special values are defined as:
-9999.9 Missing value

graupelTMI (4-byte float, array size: nlat x nlon x nlayer):
Monthly mean graupel liquid water content from the wide swath of 2A12 at each vertical layer in each 0.5^o x 0.5^o box. Values range from 0 to 10 gm^-3. Special values are defined as:
-9999.9 Missing value

npixTotalTMI (4-byte integer, array size: nlat x nlon):
The monthly number of pixels with pixelStatus equal to zero for each grid. The major effect of the pixelStatus requirement is to remove sea ice. npixTotalTMI is used to compute the monthly means described above. Values range from 0 to 10000. Special values are defined as:
-9999 Missing value

surfacePrecipCOMB (4-byte float, array size: nlat x nlon):
Surface precipitation from the narrow swath of 2B31 accumulated in each 0.5^o x 0.5^o box. Values range from 0 to 3000 mm. Special values are defined as:
-9999.9 Missing value

rainWaterCOMB (4-byte float, array size: nlat x nlon x nlayer):
Monthly mean rain water content from the narrow swath of 2B31 accumulated in each at each vertical layer 0.5^o x 0.5^o box. Values range from 0 to 10 gm^-3. Special values are defined as:
-9999.9 Missing value

snowCOMB (4-byte float, array size: nlat x nlon x nlayer):
Monthly mean snow liquid water content from the narrow swath of 2B31 accumulated in each at each vertical layer 0.5^o x 0.5^o box. Values range from 0 to 10 gm^-3. Special

values are defined as:
-9999.9 Missing value

graupelCOMB (4-byte float, array size: nlat x nlon x nlayer):
Monthly mean graupel liquid water content from the narrow swath of 2B31 accumulated in each at each vertical layer 0.5^o x 0.5^o box. Values range from 0 to 10 gm^-3. Special values are defined as:
-9999.9 Missing value

npixTotalCOMB (4-byte integer, array size: nlat x nlon):
The monthly number of pixels npixTotalCOMB is used to compute the monthly means described above. Values range from 0 to 10000. Special values are defined as:
-9999 Missing value

surfAdjRatio (4-byte float, array size: nlat x nlon):
The ratio of 2B31 (narrow swath) to 2A12 (wide swath) surface precipitation, calculated for each 0.5^o x 0.5^o box. Special values are defined as:
-9999.9 Missing value

surfAdjRatioOverlap (4-byte float, array size: nlat x nlon):
The ratio of 2B31 to 2A12 surface precipitation, calculated from the overlap region (where both 2B31 and 2A12 have valid samples) for each 0.5^o x 0.5^o box. Special values are defined as:
-9999.9 Missing value

C Structure Header file:

```
#ifndef _TK_3B31_H_
#define _TK_3B31_H_

#ifndef _L3B31_GRID_
#define _L3B31_GRID_

typedef struct {
    float surfacePrecipTMI[720][160];
    float convectPrecipTMI[720][160];
    float rainWaterTMI[28][720][160];
    float snowTMI[28][720][160];
    float graupelTMI[28][720][160];
    int npixTotalTMI[720][160];
    float surfacePrecipCOMB[720][160];
    float rainWaterCOMB[28][720][160];
    float snowCOMB[28][720][160];
    float graupelCOMB[28][720][160];
    int npixTotalCOMB[720][160];
    float surfAdjRatio[720][160];
```

```
    float surfAdjRatioOverlap[720][160];
} L3B31_GRID;

#endif

#endif
```

Fortran Structure Header file:

```
STRUCTURE /L3B31_GRID/
    REAL*4 surfacePrecipTMI(160,720)
    REAL*4 convectPrecipTMI(160,720)
    REAL*4 rainWaterTMI(160,720,28)
    REAL*4 snowTMI(160,720,28)
    REAL*4 graupelTMI(160,720,28)
    INTEGER*4 npixTotalTMI(160,720)
    REAL*4 surfacePrecipCOMB(160,720)
    REAL*4 rainWaterCOMB(160,720,28)
    REAL*4 snowCOMB(160,720,28)
    REAL*4 graupelCOMB(160,720,28)
    INTEGER*4 npixTotalCOMB(160,720)
    REAL*4 surfAdjRatio(160,720)
    REAL*4 surfAdjRatioOverlap(160,720)
END STRUCTURE
```