

**GLOBAL PRECIPITATION MEASUREMENT
PRECIPITATION PROCESSING SYSTEM**

**File Specification
3GPROF**

Preliminary Version

March 1, 2017

0.1 3GPROF - GPROF Profiling

3GPROF, "GPROF Profiling", produces global $0.25^\circ \times 0.25^\circ$ gridded means using Level 2 Gprof data. Vertical hydrometeor profiles and surface rainfall means are computed. Various pixel counts are also reported. The PI is Joyce Chou. The product can be monthly or daily. The following sections describe the structure and contents of the format.

Dimension definitions:

nlat	720	Number of 0.25° grid intervals of latitude from 90°N to 90°S .
nlon	1440	Number of 0.25° 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. The layer tops are heights above the earth's surface.

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 GPM Products for details.

InputFileNames (Metadata):

InputFileNames contains a list of input file names for this granule. See Metadata for GPM Products for details.

InputAlgorithmVersions (Metadata):

InputAlgorithmVersions contains a list of input algorithm versions for this granule. See Metadata for GPM Products for details.

InputGenerationDateTimes (Metadata):

InputGenerationDateTimes contains a list of input generation datetimes. See Metadata for GPM 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 GPM Products for details.

Grid (Grid)

GridHeader (Metadata):

GridHeader contains metadata defining the grids in the grid structure. See Metadata for GPM Products for details.

surfacePrecipitation (4-byte float, array size: nlat x nlon):

The monthly mean of the instantaneous precipitation rate at the surface for each grid.

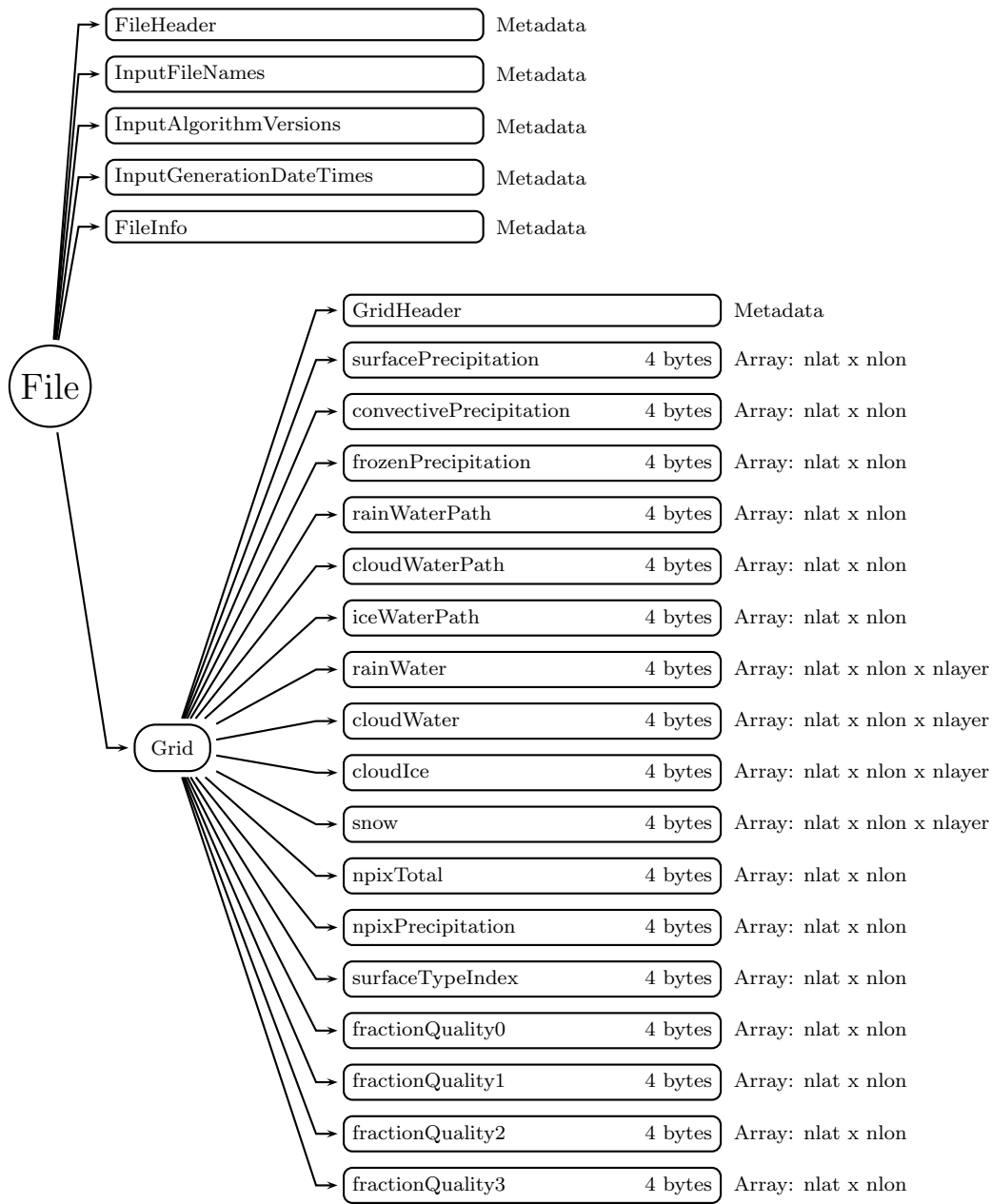


Figure 1: Data Format Structure for 3GPROF, GPROF Profiling

Values range from 0 to 3000 mm/hr. Special values are defined as:

-9999.9 Missing value

convectivePrecipitation (4-byte float, array size: nlat x nlon):

The monthly mean of the instantaneous convective precipitation rate at the surface for each grid. Values range from 0 to 3000 mm/hr. Special values are defined as:

-9999.9 Missing value

frozenPrecipitation (4-byte float, array size: nlat x nlon):

The monthly mean of the instantaneous frozen precipitation rate at the surface for each grid. Values range from 0 to 3000 mm/hr. Special values are defined as:

-9999.9 Missing value

rainWaterPath (4-byte float, array size: nlat x nlon):

The monthly mean of the total integrated rain water in the vertical atmospheric column. Values range from 0 to 3000 kg/m^2 . Special values are defined as:

-9999.9 Missing value

cloudWaterPath (4-byte float, array size: nlat x nlon):

The monthly mean of the total integrated cloud water in the vertical atmospheric column. Values range from 0 to 3000 kg/m^2 . Special values are defined as:

-9999.9 Missing value

iceWaterPath (4-byte float, array size: nlat x nlon):

The monthly mean of the total integrated ice water in the vertical atmospheric column. Values range from 0 to 3000 kg/m^2 . Special values are defined as:

-9999.9 Missing value

rainWater (4-byte float, array size: nlat x nlon x nlayer):

The monthly mean of the rain water content for each grid at each vertical layer. Values range from 0 to 10 g/m^3 . Special values are defined as:

-9999.9 Missing value

cloudWater (4-byte float, array size: nlat x nlon x nlayer):

The monthly mean of the cloud liquid water content for each grid at each vertical layer. Values range from 0 to 10 g/m^3 . Special values are defined as:

-9999.9 Missing value

cloudIce (4-byte float, array size: nlat x nlon x nlayer):

The monthly mean of the cloud ice liquid water content for each grid at each vertical layer. Values range from 0 to 10 g/m^3 . Special values are defined as:

-9999.9 Missing value

snow (4-byte float, array size: nlat x nlon x nlayer):

The monthly mean of the snow liquid water content for each grid at each vertical layer. Values range from 0 to 10 g/m^3 . Special values are defined as:

-9999.9 Missing value

npixTotal (4-byte integer, array size: nlat x nlon):

The monthly number of pixels with pixelStatus equal to zero for each grid. pixelStatus

equal to zero means the pixel is valid and has a retrieval. npixTotal is used to compute the monthly means described above. Values range from 0 to 10000. Special values are defined as:

-9999 Missing value

npixPrecipitation (4-byte integer, array size: nlat x nlon):

The monthly number of pixels with surfacePrecipitation greater than 0 for each grid. Values range from 0 to 10000. Special values are defined as:

-9999 Missing value

surfaceTypeIndex (4-byte integer, array size: nlat x nlon):

Indicates the type of surface (Range 0 - 99).

Codes include

1 : Ocean

2 : Sea-Ice

(3-12 are 'land classification')

3 : Maximum Vegetation

4 : High Vegetation

5 : Moderate Vegetation

6 : Low Vegetation

7 : Minimal Vegetation

8 : Maximum Snow

9 : Moderate Snow

10 : Low Snow

11 : Minimal Snow

12 : Standing Water and Rivers

13 : Water/Land Coast Boundary

14 : Water/Ice Boundary

15 : Land/Ice Boundary

60 : Multiple surface types

-99 : Missing value

fractionQuality0 (4-byte float, array size: nlat x nlon):

The fraction of the retrieved pixels in a given grid box identified as good retrievals. For regions where there are no retrieval issues this will be 1.0. Areas with surface screening or contamination issues with questionable retrievals during the accumulation period will have values less than one and should thus be used with caution for any quantitative analysis. Values range from 0 to 1. Special values are defined as:

-9999.9 Missing value

fractionQuality1 (4-byte float, array size: nlat x nlon):

The fraction of total pixels with qualityFlag equal to 1 (use with caution) for each grid. Values range from 0 to 1. Special values are defined as:

-9999.9 Missing value

fractionQuality2 (4-byte float, array size: nlat x nlon):

The fraction of total pixels with qualityFlag equal to 2 (use with extreme care over snow covered surface) for each grid. Values range from 0 to 1. Special values are defined as:

-9999.9 Missing value

fractionQuality3 (4-byte float, array size: nlat x nlon):

The fraction of total pixels with qualityFlag equal to 3 (use with extreme caution) for each grid. Values range from 0 to 1. Special values are defined as:

-9999.9 Missing value

C Structure Header file:

```
#ifndef _TK_3GPROF_H_
#define _TK_3GPROF_H_

#ifndef _L3GPROF_GRID_
#define _L3GPROF_GRID_

typedef struct {
    float surfacePrecipitation[1440][720];
    float convectivePrecipitation[1440][720];
    float frozenPrecipitation[1440][720];
    float rainWaterPath[1440][720];
    float cloudWaterPath[1440][720];
    float iceWaterPath[1440][720];
    float rainWater[28][1440][720];
    float cloudWater[28][1440][720];
    float cloudIce[28][1440][720];
    float snow[28][1440][720];
    int npixTotal[1440][720];
    int npixPrecipitation[1440][720];
    int surfaceTypeIndex[1440][720];
    float fractionQuality0[1440][720];
    float fractionQuality1[1440][720];
    float fractionQuality2[1440][720];
    float fractionQuality3[1440][720];
} L3GPROF_GRID;

#endif

#endif
```

Fortran Structure Header file:

```
STRUCTURE /L3GPROF_GRID/  
  REAL*4 surfacePrecipitation(720,1440)  
  REAL*4 convectivePrecipitation(720,1440)  
  REAL*4 frozenPrecipitation(720,1440)  
  REAL*4 rainWaterPath(720,1440)  
  REAL*4 cloudWaterPath(720,1440)  
  REAL*4 iceWaterPath(720,1440)  
  REAL*4 rainWater(720,1440,28)  
  REAL*4 cloudWater(720,1440,28)  
  REAL*4 cloudIce(720,1440,28)  
  REAL*4 snow(720,1440,28)  
  INTEGER*4 npixTotal(720,1440)  
  INTEGER*4 npixPrecipitation(720,1440)  
  INTEGER*4 surfaceTypeIndex(720,1440)  
  REAL*4 fractionQuality0(720,1440)  
  REAL*4 fractionQuality1(720,1440)  
  REAL*4 fractionQuality2(720,1440)  
  REAL*4 fractionQuality3(720,1440)  
END STRUCTURE
```