

**Description of IMERG precipitation feature and tracks
V1.0**

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<http://atmos.tamucc.edu/trmm/data/imerg/>

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1. IMERG Precipitation Features (IPFs)

This database is created with V06B IMERG data from 2001 to near current to identify precipitation systems. Precipitation features are identified by grouping contiguous pixels with precipitation rate greater or equal to 0.1 mm/hr. The output data are combined into monthly files and distributed online. The properties of each precipitation feature are summarized and listed below:

| | | | |
|----------------|-------|-----------------|---|
| YEAR | INT | Array[6636540] | |
| MONTH | INT | Array[6636540] | |
| DAY | INT | Array[6636540] | |
| HOUR | FLOAT | Array[6636540] | |
| LON | FLOAT | Array[6636540] | geo-center longitude in degrees |
| LAT | FLOAT | Array[6636540] | geo-center latitude in degrees |
| RAINGRID | FLOAT | Array[6636540] | number of 0.1x0.1 grids with precip > 0.1 mm/hr |
| VOLRAINGRID | FLOAT | Array[6636540] | sum of precip rate from grids > 0.1 mm/hr |
| RAINAREA | FLOAT | Array[6636540] | area in km ² with precip > 0.1 mm/hr |
| VOLRAIN | FLOAT | Array[6636540] | volumetric rain in mm/hr*km ² |
| MEANRAINRATE | FLOAT | Array[6636540] | mean precipitation rate within feature in mm/hr |
| MEDIANRAINRATE | FLOAT | Array[6636540] | median precipitation rate in mm/hr |
| R_LON | FLOAT | Array[6636540] | Fit ellipse longitude in degree |
| R_LAT | FLOAT | Array[6636540] | Fit ellipse latitude in degree |
| R_MAJOR | FLOAT | Array[6636540] | Fit ellipse major axis in km |
| R_MINOR | FLOAT | Array[6636540] | Fit ellipse minor axis in km |
| R_ORIENTATION | FLOAT | Array[6636540] | Fit ellipse orientation angle, 0 is east. |
| R_SOLID | FLOAT | Array[6636540] | feature area / fit ellipse area |
| RAINGRID_5 | FLOAT | Array[6636540] | number of grids with precip rate > 5 mm/hr |
| VOLRAINGRID_5 | FLOAT | Array[6636540] | sum of precip rate from grid > 5mm/hr |
| RAINAREA_5 | FLOAT | Array[6636540]. | Area of precip > 5 mm/hr |
| VOLRAIN_5 | FLOAT | Array[6636540] | volrain in mm/hr*km ² from grid > 5mm/hr |

The morphology of the feature can be represented by major, minor axes, orientation angle of fitted ellipse. Here R_XXX are the parameters fitted for whole feature

2. Collocation of WWLLN Lightning dataset

Using the ellipse parameters, the WWLLN lightning data between 2014 to 2019 are collocated to the IMERG. The parameters include:

| | | |
|--------|-------|---|
| FLS15A | FLOAT | Number of lightning within 15 minutes after the IPF |
| FLS15B | FLOAT | Number of lightning within 15 minutes after the IPF |
| FLS30A | FLOAT | Number of lightning within 30 minutes after the IPF |

FLS30B FLOAT Number of lightning within 30 minutes after the IPF

3. Tracking of IPFs

Tracking of IPFs is completed only for data between 2015-2019 for system with size greater than 1000 km². The parameters calculated for each track include:

| | | | |
|------------------------|-------|----------------|----------------------------------|
| T | FLOAT | Array[3055518] | Julday time of each feature |
| T_IND | FLOAT | Array[1488] | Unique Time index |
| TRACKS | LONG | Array[3055518] | Track index of each IPF |
| TRACK_ID | LONG | Array[840942] | Track Index |
| TRACK_START_TIME | FLOAT | Array[840942] | Track start time |
| TRACK_START_LON | FLOAT | Array[840942] | Track start longitude |
| TRACK_START_LAT | FLOAT | Array[840942] | Track start latitude |
| TRACK_END_TIME | FLOAT | Array[840942] | Track end time |
| TRACK_END_LON | FLOAT | Array[840942] | Track end longitude |
| TRACK_END_LAT | FLOAT | Array[840942] | Track end latitude |
| TRACK_NTIMES | LONG | Array[840942] | Number of time stamps |
| TRACK_MAXRAINAREA | FLOAT | Array[840942] | Max rain area (km ²) |
| TRACK_MAXRAINAREA_TIME | FLOAT | Array[840942] | Time with maxrainarea |
| TRACK_MAXRAINAREA_5 | FLOAT | Array[840942] | Max rain area > 5 mm/hr |
| TRACK_MAXVOLRAIN | FLOAT | Array[840942] | Max Volumetric rain |
| TRACK_MAXVOLRAIN_TIME | FLOAT | Array[840942] | Time with max Volrain |
| TRACK_MAXVOLRAIN_5 | FLOAT | Array[840942] | Max Volrain from > 5 mm/hr |
| TRACK_MEANELONG | FLOAT | Array[840942] | Mean r_minor/r_major |
| TRACK_MAXELONG | FLOAT | Array[840942] | Max r_minor/r_major |
| TRACK_TOTFLASH | FLOAT | Array[840942] | Total lightning counts |
| TRACK_MAXFLASH | FLOAT | Array[840942] | Maximum lightning counts |
| TRACK_MAXFLASH_TIME | FLOAT | Array[840942] | Time with maximum lightning |

All the calculated parameters for each one of PFs are saved in a Level-2 product file in “HDF format”. There is an IDL program “read_sds.pro” for accessing these level-2 files.

Read_sds.pro

This program reads all the science data from HDF-4 format file and save into a structure. This program can be used to access level-2 products with new definitions and all level-3 products.

Usage example:

```
IDL> read_sds,'example.HDF',f ; f is a structure variable with all the parameters
```

Read_sds_one.pro

This program reads in one variable from HDF-4 format file Usage:

```
IDL> read_sds_one,'example.HDF','var1',var
```

All these IDL programs can be downloaded at:

<http://atmos.tamucc.edu/trmm/software/>