Operations Concept for Notifying Tier-1 Ground Radars of TRMM and GPM Overpass Events

The operations concept so far is to routinely make four (4) file types available for each Tier-1 radar (that is, each radar will have its own set of 4 of file types, 2 for GPM and 2 for TRMM). The file type contents are described below.

1) **A 60-day overpass event prediction file, generated once per month**. Separate files will be generated for TRMM and GPM events. The files will predict the time and date of TRMM and GPM overpass events where any part of the swath of the PR/DPR falls within a specified radius of your ground radar antenna. The default radius is 125 km, but any radius can be chosen, just let us know if you prefer a different "radius of exclusion." Of course the accuracy of this file will tend to degrade for events that take place progressively farther from the date the file was generated. These inaccuracies will be compounded following any spacecraft maneuvers, which may be frequent during the early part of the GPM mission.

The contents of the file will include records for each predicted overpass event, with one record per line of the file. Each record will include the time, latitude, longitude, and bearing of the nadir point of the TRMM or GPM spacecraft's nearest approach to the antenna of the ground radar.

2) **A 5-day overpass event prediction file, generated once per day**. Separate files will be generated for TRMM and GPM events. The files will provide more accurate time and date information than the 60-day file because they are generated more frequently and because they are generated from a higher time resolution source file.

The contents of the 5-day files will be the same as that for the 60-day files: a set of overpass event records, with one record for each predicted overpass event. The record will include the time, latitude, longitude, and bearing of the nadir point of the TRMM or GPM spacecraft's nearest approach to the antenna of the ground radar.

In addition, instrument geometry image files will be generated daily for each overpass event in the 5-day file. Each image will illustrate the PR/DPR swath as it intersects with a 125 km range ring of the ground radar. Both Ka and Ku swaths will be shown for DPR.

File naming conventions

Each nadir ground track (GT) overpass event prediction file will conform to the file naming convention described below.

GT_TRMM_5DAY_RRRRRRR_YYYYMMDD
GT_TRMM_60DAY_RRRRRRR_ YYYYMMDD
GT_GPM_5DAY_RRRRRRR_ YYYYMMDD
GT_GPM_60DAY_RRRRRRR_ YYYYMMDD

Where TRMM or GPM designates the corresponding satellite for each overpass event prediction file.

Where RRRRRRR is a ground radar ID code, with these possible values:

AUSCPOL = Australian BOM CPOL radar
AUSTCP2 = Australian BOM CP2 radar
FINKUMP = Finland FMI Kumpula radar
NETTARA = Netherlands NMI TARA radar
UNCHILB = UK Chilbolton radar
CANKING = Canadian EC King City radar
USANPOL = US NASA NPOL radar
USACHILL = US NSF/CSU radar
ITLP55C = Italy ISAC Polar 55C radar

And where YYYYMMDD is the GMT date when the file was created.

GT File format

Each file will be formatted as ASCII text with one record per line.

Each 5-day file will include records that contain five (5) comma-separated values: Date and Time, Latitude, Longitude, Azimuth, Distance, and Bearing.

Each 31-day file will include records that contain three (3) comma-separated values: Date and Time, Latitude, and Longitude (the predictions that the 31-day files are build on are too coarse to estimate azimuth, distance and bearing).

The format for each record value is described below.

Date and Time[1]:
YYYY-MM-DD hh:mm:ss
Where time is expressed in GMT and where
YYYY = year (starting with 2014)
MM = month (01-12)
DD = day (01-31)
hh = hour (0-24)
mm = minute (00-59)
ss = second (00-59)
with DD and hh separated by a single space.

Latitude:
DD.FFFF
Where positive latitude is North and negative is South, and where
DD = geographic latitude in degrees (00-90)
FFFF = decimal fraction of a degree (from 0000-9999)

[1] The date/time format was chosen to make it compatible with Microsoft Excel.

Longitude:
DDD.FFFF
Where positive longitude is East and negative is West, and where
DDD = geographic longitude in degrees (00-90)
FFFF = decimal fraction of a degree (from 0000-9999)

Azimuth:
DDD.FF
Where 000 is due North and degrees are expressed as bearing, clockwise from due North, from the ground radar to the orbit track's closest approach
DDD = degrees (000-359)
FF = decimal fraction of a degree (from 00-99)

Distance:
KKKK.ff
Where KKKK is the distance in km (a variable number of digits depending on the distance) and ff is the fraction of a km (always 2 digits) from the Tier-1 ground radar antenna to the closest approach of the satellite's nadir path.

Bearing:
DDD.FF
Where 000 is due North and degrees are expressed as bearing, clockwise from due North of the satellite's nadir track at its closest approach to the ground radar.
DDD = degrees (000-359)
FF = decimal fraction of a degree (from 00-99)

Overpass event image geometry image files

In addition to the ASCII files described above, we will also provide png formatted images that illustrate the location of the each Tier-1 radar, a 125km range ring around the radar, and the location of the PR/DPR swath in relation to the radar. A set of these files will be generated daily, with one image file for each TRMM and GPM overpass event occurring within the next 5 days. The file naming convention for these files is described below.

IMAGE_TRMM_5DAY_RRRRRRR_ YYYYMMDD _hhmmss.png
IMAGE_GPM_5DAY_RRRRRRR_ YYYYMMDD _hhmmss.png

Where TRMM or GPM designates the corresponding satellite for each overpass event prediction file and .png is the filename extension.

Where RRRRRRR is a ground radar ID code, with these possible values:
AUSCPOL = Australian BOM CPOL radar
AUSTCP2 = Australian BOM CP2 radar

FINKUMP = Finland FMI Kumpula radar
NETTARA = Netherlands NMI TARA radar
UNCHILB = UK Chilbolton radar
CANKING = Canadian EC King City radar
USANPOL = US NASA NPOL radar
USACHILL = US NSF/CSU radar
ITLP55C = Italy ISAC Polar 55C radar

Where YYYYMMDD is the GMT date of the overpass event, with these possible values:

YYYY = year (starting with 2014)
MM = month (01-12)
DD = day (01-31),

hhmmss is the GMT hour, minute, second for the closest approach of the overpass event to the ground radar, with these possible values:

hh = hour (0-24)
mm = minute (00-59)
ss = second (00-59)