Release Notes For Use of GPM GMI and Partner L1 Data
March 2016

The GPM project science office is pleased to announce the release of V04 of the GPM Microwave Imager (GMI) L1 (L1B, L1Base, L1C) and GPM Partner Radiometer data to the General Public. This new release involves significant changes in the calibration of the GPM radiometer constellation from the previous release. As such, we would like for all Users to keep the following in mind while using the data.

1. The Level 1C brightness temperature (Tb) data for all of the constellation radiometers has been intercalibrated to be consistent with the Tb from GMI on board the GPM core satellite. Note that the GMI V04 calibration differs from V03 by up to 2-3 K for some channels due to updated spillover corrections derived from on-orbit calibration maneuvers. Comparisons with other well calibrated radiometers and with radiative transfer simulations indicate that GMI is extremely well calibrated and stable with an absolute calibration accuracy of well within 1K for all channels.

2. For the constellation radiometers V04 moves from the use of TRMM TMI and METOP-A MHS as the calibration reference for the window and sounder channels respectively to GPM GMI as the reference for all channels. This results in changes to the Level 1C Tb by up to 2.5K depending on channel, but with significantly improved consistency between channels and with radiative transfer models. In addition, a number of calibration biases and artifacts have been identified and removed from the Level 1C Tb for the constellation radiometers. These include, but are not limited to, issues such as emissive reflectors, solar and lunar intrusions, and biases across the scan.

3. RFI is currently being flagged at the 1B level for GPM GMI, with the quality flag in the Level 1C files set to a value of 2 for the potentially affected pixels. Note that the affected Tb are currently not set to missing, but left to the user to screen based on the data quality flag. RFI impacts on the observed Tb can easily exceed 10K, although impacts are currently only observed and flagged for the 10 and 18 GHz channels.

4. Users should be cautious when using the data to draw any climate inferences or conclusions. While the level 1 products appear very reasonable, corrections to constellation radiometers in particular are based on a limited data. These issues will be re-examined as the duration of the GMI data record is extended.

For questions regarding data access and availability please contact: helpdesk@pps-mail.nascom.nasa.gov

List of V4 GMI BASE update against V3 GMI BASE

1. Calibration

    a. Adjustment of spillover coefficients of all GMI channels. This adjustment is the major improvement from V3 to V4 in GMI antenna pattern correction (APC). The adjustment of spillover is based on the data from GMI inertial hold and refinements of the analysis performed by GMI manufacture. Table 1 (Table 2.12 in ATBD) shows comparisons of APC coefficients reflecting the changes due to spillover adjustments. Tb changes vary from channel to channel and are functions of brightness temperatures. Figure 1 (Figure 2.32 in ATBD) demonstrates the Tb changes for all channels in their normal temperature range. For channels 1-5, Tb reduced ~3 – 6 K at their maximums. For channels 10-13, Tb increased ~2 – 4 K at their maximums. For channels 6-9, Tb increased ~0.1 K at their maximums.
    b. Adjustment of Antenna-induced along-scan bias correction. This is a minor adjustment and may result Tb changes less than 0.1 K.
    c. Adjustment of magnetic correction coefficients. This is also a minor adjustment and may result Tb changes less than 0.1K.

    All these corrections are implemented in V4 as well as ITE043 and ITE057. No code adjustments for these updates.

2. Geolocation

    There are no pixel geolocation changes between Version 3 and 4, however there is a notable change affecting Sun angles. This change is due to the correction of a typographic error in the calculation of sun angle in the V3 geoTK code which causes maximum error of about 6 degrees in the vector directions, reported solar beta angles, and Sun glint angles. This significant change was implemented in December 4, 2014 for V03 processing. This implementation results a change of V3 GMI Base version from V03B to V03C. The fix is included in the GMI Base V03C and ITE043 data from December 4, 2014 and not included in V03B and ITE043 data before December 4, 2014.

    Another bug in computation of sun glint angles in V3 geoTK was found and fixed in V4 geoTK. This is due to a bug in the code that rejects computing sun glint angle when a scan time coincidence at noon UT. This error has a very remote chance of occurring with a scan time coincidence at noon UT within microseconds

    All these geoTK corrections are implemented in V4 GMIBase and in ITE057.

3. Others

    NEDT computation is added to the GMIBase code and the data format is revised to include the NEDT parameter.

Table 1. Coefficients Change for computing Tb from Ta: Cn, Dn, and En. Tb=Cn*Ta - Dn*Ta* - En

Channel Number	Frequency GHz	Cn		Dn		En	
		old	new	old	new	old	new
1	**10.65 V**	1.062802	1.052007	0.003875	0.003833	0.161459	0.131997
2	**10.65 H**	1.063577	1.052039	0.003904	0.003864	0.163503	0.131997
3	**18.7 V**	1.067189	1.048938	0.002993	0.002946	0.176538	0.126479
4	**18.7 H**	1.066024	1.049064	0.003125	0.003027	0.172972	0.126479
5	**23.8 V**	1.033860	1.028810	0.000000	0.000000	-0.282590	-0.295000
6	**36.64 V**	1.005063	1.005618	0.000946	0.000946	0.011610	0.013174
7	**36.64 H**	1.005063	1.005618	0.000946	0.000946	0.011610	0.013174
8	**89.0 V**	1.003099	1.003863	0.001195	0.001196	0.006225	0.008721
9	**89.0 H**	1.003099	1.003863	0.001195	0.001196	0.006225	0.008721
10	**166.0 V**	1.013758	1.025926	0.013758	0.013924	0.000000	0.053170
11	**166.0 H**	1.013758	1.025926	0.013758	0.013924	0.000000	0.053170
12	**183 ± 3**	1.000000	1.007940	0.000000	0.000000	0.000000	0.038000
13	**183 ± 7**	1.000000	1.007940	0.000000	0.000000	0.000000	0.038000

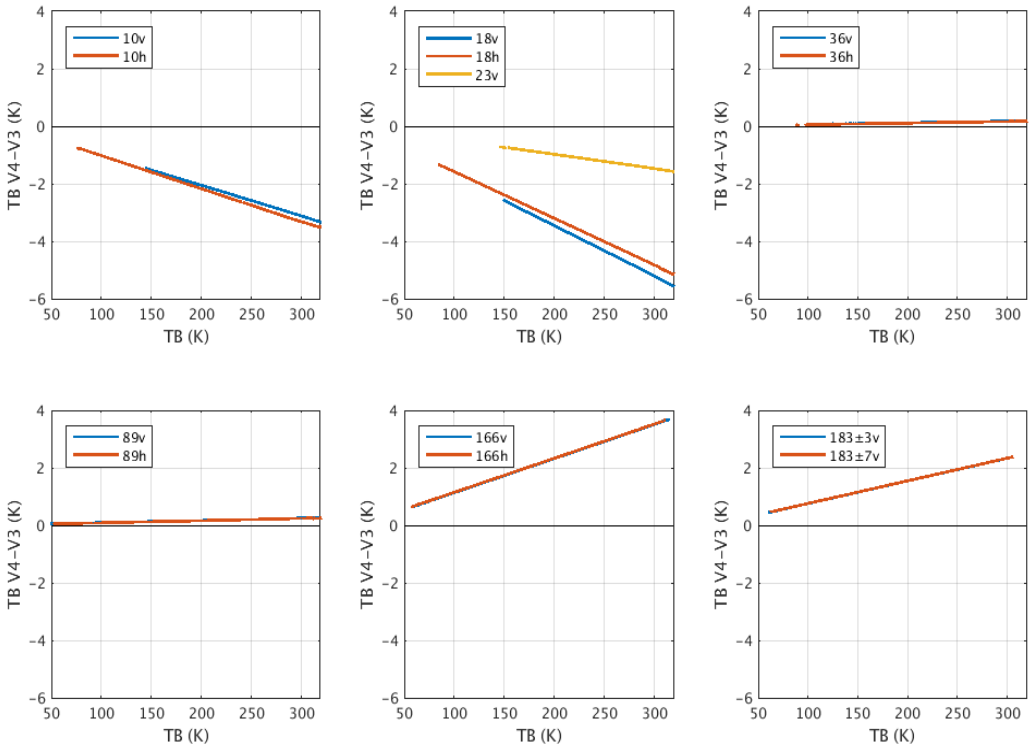

Figure 1: Tb changes from V3 to V4 (Tb(V4)-Tb(V3)) as functions of Tb.

GPROF2014 is being made available to the public but some caveats should be noted.

- Version 1 of GPROF constitutes the pre-launch version of the algorithm and it does NOT make use of the GPM core satellite as the source of its a-priori database. Instead, the a-priori database was put together from a variety of imperfect sources as described in the algorithm ATBD (http://rain.atmos.colostate.edu/ATBD).

- Research intended to examine climate aspects of precipitation should consider waiting forVersion 2 of the GMI algorithm that will be constructed using the GPM core satellite database and should be available one year after launch.

- While the ocean algorithm is reasonably mature, the land algorithm is quite new and some artifacts continue to appear - particularly at interfaces between surface types containing snow and ice. These are being addressed as they are discovered and users are encouraged to check for periodic updates during the early phases of GPM data release.

- For the cross-track scanning MHS GPROF there is a known issue with precipitation over the tropical oceans being too low. This is being worked on but it will require more study before an appropriate fix can be implemented. As a result, users are cautioned by basing any publication results on MHS GPROF retrievals over the tropical oceans.