Release Notes for GPM SLH V4

February 24, 2016

GPM SLH V4 is the same as TRMM SLH V7A (see below) except for using GPM/KuPR information instead of TRMM/PR information as an input. Analysis showed consistency between GPM SLH V4 and TRMM SLH V7A estimates over the coverage of TRMM/PR during a GPM and TRMM overlapping observation period (April-June 2014). It should be noted:

1. Shallow non-isolated echo has been classified as stratiform by rain type classification algorithm for TRMM/PR, but as convective by that for GPM/KuPR, affecting SLH estimates. To give consistent SLH estimates from GPM/KuPR with those from TRMM/PR, shallow non-isolated echo is classified as stratiform in GPM SLH V4.
2. Differences of sampling between TRMM/PR and GPM/KuPR affect SLH estimates. The greater global coverage of the GPM Core Observatory (65°N/S) compared to the TRMM coverage (35°N/S) decreases sampling of GPM/DPR over the coverage of TRMM/PR, especially at around the satellite inclination latitudes of 35°N/S, affecting SLH estimates there.
3. Retrieval for high mountains/winter mid-latitudes pixels will be developed.

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Release Notes for TRMM SLH V7A

August 25, 2015

Revised November 29, 2016

Two additional masks are applied to Version 7A SLH.

The first (rainTypeSLH=90) is for high mountains/winter mid-latitudes pixels. This new mask assigns a missing value for most of pixels that were classified as rainTypeSLH=4 in the previous version-7 SLH. This type was used mainly for Tibet and winter mid-latitude with the melting level close to the ground level.

Another (rainTypeSLH=80) for extratropical frontal system regime also has been applied, because an artificial discontinuity in winter mid-latitude were found in the previous version-7 SLH.

In summary, for rain type decided by the SLH, special values are defined as:

1: Convective
2: Shallow strat
3: Deep strat
4: Deep strat with low melting level
5: Intermediary
6: Other
80: Mask for Extratropical frontal system regime
90: Mask for Tibet, winter mid-lat etc.

-9999: Missing value

Note that some of pixels classified as rainTypeSLH=4 still remain in the version-7A SLH, although the new masks were introduced.

In order to remove suspicious extreme rainfall profiles in PR 2A25 version-7 data, a filter developed by Hamada and Takayabu (2014) has been applied. However, it cannot remove all of them, so that some suspicious extreme profiles still remain in the version-7A SLH.

The previous version 7 SLH contained a misclassification that caused some stratiform pixels erroneously assigned to rainTypeSLH=4, and this resulted in unrealistic positive heating at altitudes lower than the freezing level [see median volumetric latent heating from stratiform precipitation over the US and Argentina shown in Fig. 6b of Liu et al. (2015)]. This misclassification has been fixed in the version-7A SLH.

Analysis showed some isolated abnormal reflectivity profiles, these may result in non-negligible abnormal values of SLH. We conjecture this is caused by some kind of radio wave interferences from the ground. No fixes were applied to deal with this abnormal profile. This remains as a future issue.

References:

Hamada, A. and Y. N. Takayabu, 2014: A removal filter for suspicious extreme rainfall profiles in TRMM PR 2A25 version-7 data. *J. Appl. Meteor. Climatol.*, **53**, 1252–1271.

Liu, C., S. Shige, Y. N. Takayabu, E. Zipser, 2015: Latent heating contribution from precipitation systems with different sizes, depths and intensities in the tropics. *J. Climate*, **28**, 186-203, DOI: 10.1175/JCLI-D-14-00370.1.