Release Notes for TRMM SLH V8A and GPM SLH V6

July 12, 2018

The LUT for mid and higher latitudes was newly developed in the GPM SLH V5. In the TRMM SLH V8A and GPM SLH V6, the same LUT for mid and higher latitudes is applied and LUT for tropics is the same as TRMM SLH V7A. Some recommendations to users of orbital data are listed below, for TRMM SLH V8A and GPM SLH V6 retrieved as tropical precipitation or those as mid latitude precipitation. The separation between the tropics and the mid latitudes should be done referring to the rainTypeSLH values stored in the orbital data, and described in Table 1.
Although the SLH algorithm and Tables are the same as GPM SLH V5 for mid-latitude and TRMM SLH V7A for tropics, respectively, because of the change in input PR/KuPR Level 2 data (2APR/2AKu), TRMM SLH V8A and GPM SLH V6 products differ from TRMM SLH V7A and GPM SLH V5 products, respectively.

Table 1. description for rainTypeSLH

(a) Tropics and subtropics	(b) Mid and higher latitudes
0: No precipitation 1: Convective 2: Shallow stratiform 3: Deep stratiform 4: Deep stratiform with low melting level 5: Intermediary 6: Other	0: No precipitation 110: Convective 121: Shallow stratiform 122: Deep stratiform, downward decreasing 123: Deep stratiform, downward increasing 124: Deep stratiform, subzero 160: Other
Mask	
900: Tibet, winter mid-lat etc. 910: Suspicious extreme	

(i) No precipitation or Masked out pixels (rainTypeSLH=0, 900, or 910)

SLH values are not estimated.

(ii) Release note for tropical algorithm (0< rainTypeSLH <10)

Analysis showed consistency among GPM SLH V4, V5 and TRMM SLH V7A estimates over the coverage of TRMM/PR during a GPM and TRMM overlapping

observation period (April-June 2014). Note that:

0. Vertical levels are changed from 19 levels to 80 levels.
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.
4. For tropical latent heating, due to the change of vertical levels from 19 levels to 80 levels, users are recommended to smooth the profile vertical for a few levels to avoid the spurious peak at around 0degC level.

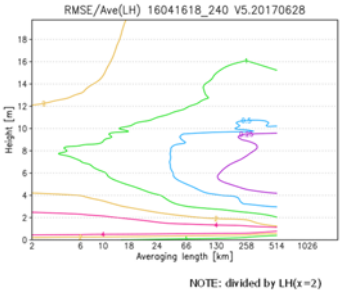
(iii) Release Note for Mid-latitude algorithm (rainTypeSLH>100)

A. In look up table ranges where sampling numbers did not satisfy the criteria, values are discarded or extrapolated from nearest neighbor bins, depending on the precipitation type. Sampling number criterion is basically 30, but 60 is chosen for deep stratiform LUT with precipitation maximum at the near surface level. Corresponding range for the convective LUT is PTH>10.5km.

B. Recommendation for horizontal averaging at the utilization of products SLP or SLG of GPM SLH V05.

B1. Eddy flux convergence in Q1R and Q2 are estimated assuming that the size of "large-scale grids" is 100kmx100km. Therefore, it is recommended to average horizontally in this spatial scale to utilize Q1R or Q2.

B2. Horizontal averaging of about 50km x 50km, or 100 pixels with GPM DPR sampling, is recommended, in order to limit root mean square errors (RMSE) calculated between estimated LH from LFM-simulated precipitation, less than a half of the mean value at the LH peak height of ~5.5km (for Case 1).



(iv) Release Note for L3 (gridded; SLG and Monthly; SLM) product

From the TRMM SLH V8A and GPM SLH V6 product, we added the unconditional variables (UnCnd) for each rain type, and modify the variable name including conditional variables (Cnd). Please refer to the ATBD.