Evaluation of satellite rainfall

Subash

(Hossain and Huffman 2008)

rain gauge is considered as the most accurate method for measuring rainfall because they provide a direct physical measurement of rain

(Prakash et al. 2014)

(Prakash et al. 2015)  performed a error characterization of TMPA-V7 (Research Product) and TMPA-RT  over India for a period of thirteen years (2001-2013) and found that TMPA-V7 and RT data sets represent the mean seasonal rainfall characteristics reasonably well, however both the satellite-based data sets show an overestimation of rainfall over most parts of the country except over the orographic regions. Between the two datasets the TMPA has less error.  They recommend that a suitable region specific and season dependent bias-correction is essential before its integration in hydrological applications.

The combined instrument rain calibration algorithm (3B42) uses an optimal combination of 2B31, 2A12, SSMI, AMSR and AMSU precipitation estimates (referred to as HQ), to adjust IR estimates from geostationary IR observations. Near-global estimates are made by calibrating the IR brightness temperatures to the HQ estimates. The 3B42 estimates are scaled to match the monthly rain gauge analyses used in 3B43. The output is rainfall for 0.25x0.25 degree grid boxes every 3 hours.

# Pre-processing of rainfall

## Re-sampling to match the grid centers

## Converting three-hourly to daily rainfall.

The 3B42 rain rate (rr) is a 3-hourly average centered at the middle of each 3-hour period (i.e., 0Z, 3Z, 6Z, 9Z, 12Z, 15Z, 18Z, and 21Z).  Further, for every data day, the first of the eight 3-hourly accumulated 3B42 files has starting time 22:30:00 (hh:mm:sec) UTC on the day before, and the last 3B42 file has the ending time 22:29:59 UTC on the data day. To convert these rainfall rates to total daily rainfall (mm/day), each 3-hourly rr are multiplied by 3 hours, to get the total rainfall for each 3-hour period. Then, for your desired 24-hour-day begin and end times, sum all the 3-hourly total rainfall in the defined 24-hour period, to get the total daily rainfall.

In India, the IMD reports daily rainfall as the total rainfall for the preceding 24 hours ending at 08.30 am (03UTC) of the recording date of the measurement. It is considered as the 24-hour rainfall recorded on *dd/mm/yyyy* at *08:30 AM*.  However, in order for TRMM to match the IMD  accumulation timings  the rainfall of  03, 06, 09, 12, 15, 18, 21, 00 UTC (\* (\* time steps) data of TMPA were subtracted with half of the previous day rainfall  difference between 03UTC  and 0 UTC rainfall  and current day rainfall  difference between 03UTC  and 0 UTC is added.

**Temporal Analysis of Error Components**

**The temporal analysis of bias based on climatic regions (Humid, Transition and Semi-arid)**

**Intensity Distribution of Error Components**

However, some parts of India receive considerable rainfall during the pre-monsoon (March to May) and postmonsoon seasons (October to December).

The TMPA products are available at three-hourly, daily and monthly timescales in near-real-time (since March 2000) and research-quality (since January 1998)

modes.

Such inaccuracy may be rooted in the inadequate number of gauges, provided by the Global Precipitation Climatology Centre and used for bias correction in satellite products.

# References

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