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Direct Evaluation of the TRMM 2A25 Surface Rain Using Raingauge Network in the Northeastern India Subcontinent

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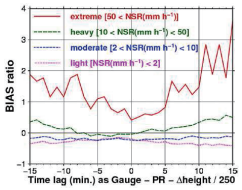
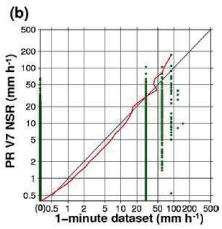
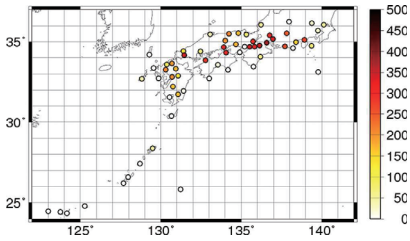
TRMM/RG direct comp.

- Seto et al. (2013)
  - JMA 1-minute, 10-minute
  - TRMM 2A25

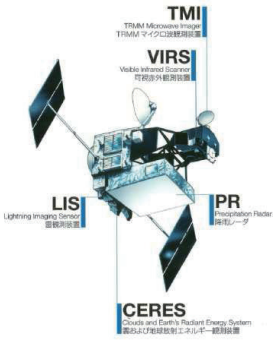






TRMM-2A25(V7) dataset

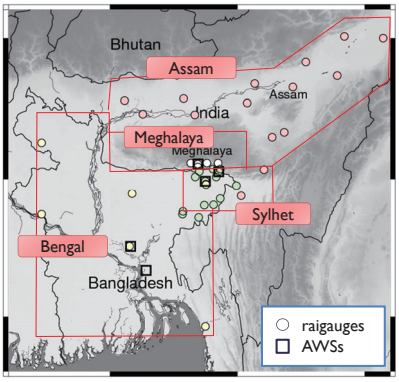
- TRMM
  - Sun async., 36N-36S, 402.5km
- TRMM-PR
  - Precipitation Radar
  - Swath: 247km
  - Resolution: 5km
  - vertical 250m(0-20km)
- TRMM 2A25(V7)
  - Renovation of algorithms for vertical rain profile (V6→V7)
  - rain, surface_rain were utilized.



Tipping Bucket RG-network, NE India

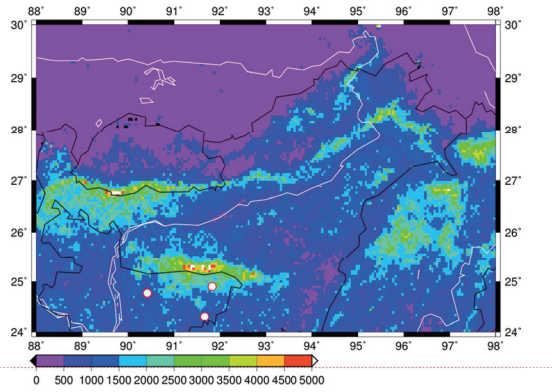
- RG-network by Kyoto University
- Samping freq.
  - Assam/Brahmaputra
    - 13pts. (638/9225)
  - Meghalaya
    - 6pts. (491/4232)
  - Sylhet+Barak
    - 13pts. (718/8104)
  - Bengal Plain
    - 7pts. (397/7611)

(with rain / all)

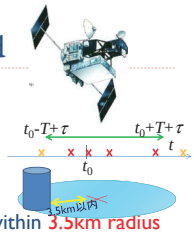


Monsoon TRMM-PR

1998-2011 Jun.-Sep.



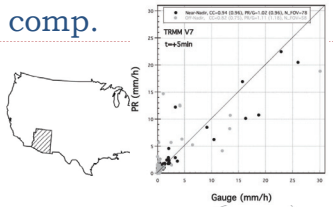
TRMM/RG validation method

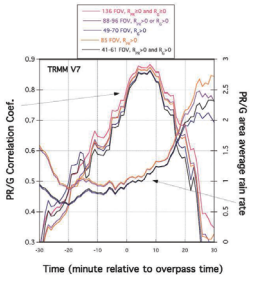


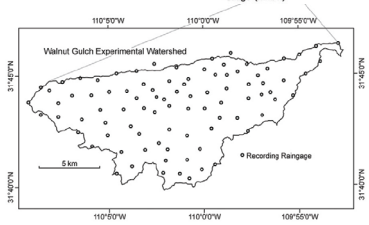
- TRMM data
  - TRMM-2A25(V7) 1998-2013
  - Swath passes over RG almost once a day.
- Rainfall amount estimation
  - Cases when the FOV passed over the area within 3.5km radius are analyzed.
  - RG tipping events within the $2T$ seconds (T=150s) centered by the scanning time t_0 are counted.
  - Considering the rain drop descending time, a lag τ was applied for the estimation (Amitai et al. 2012).
  - Rain intensity (mm/h) was estimated and compared.

TRMM/RG direct comp.

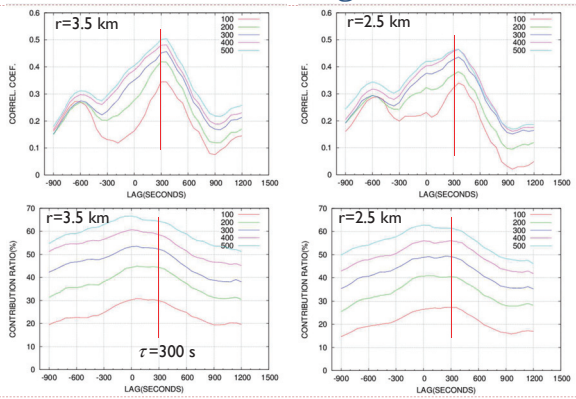
- Amitai et al. (2012/JH)
  - Arizona WGEW
  - TRMM 2A25



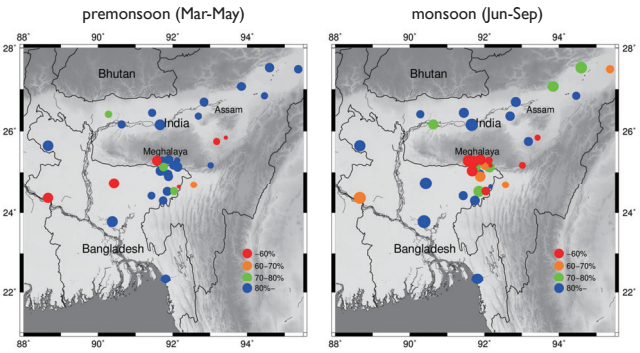




Detection of the best lag

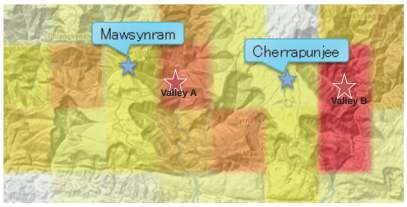


Locations of underestimate

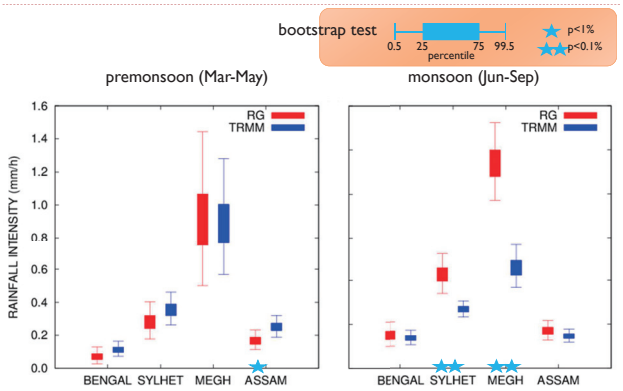


5km-mesh TRMM surface rain

- Rain rates are grater over valleys adjacent to the well known surface rainfall observatories over the crest.
- We may conduct field rainfall observation in the valleys A and B shown in figures, though these points are very tough areas to reach.



Significance of Underestimate

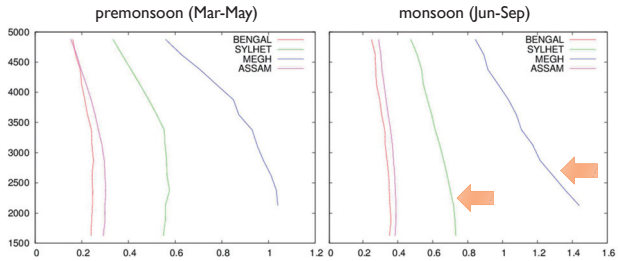


Summary

- Successfully directly validated the TRMM-2A25 surface rainfall using tipping bucket raingauge network.
- TRMM-2A25 surface rain underestimate rainfall over the Meghalaya Plateau areas and adjacent areas in monsoon season (June-September).
- Due to topographic shallow rainfall systems?

Vertical Structure/TRMM 2A25 rain

- Increases in lower layer near Meghalaya Region
  - Especially Sylhet and Meghalaya in Monsoon Season



GSMaP

Shige et al. (2013)

- Underestimate due to topographic shallow rainfall systems?