Intercomparison of Indian Ground Radar and Space Radar using alignment methodology

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Abstract

In the present work, a methodology based on aligning the space and ground radar data onto common footprint geometry after accounting for different viewing angle, etc. is employed for calibration. Data from Dual Polarization Ground Radar (GR) for the month of June, July, August and September, 2013 is utilized. The space radar used for the comparison is TRMM PR aboard TRMM satellite. After alignment is achieved, the calibration is performed using curve fitting technique.

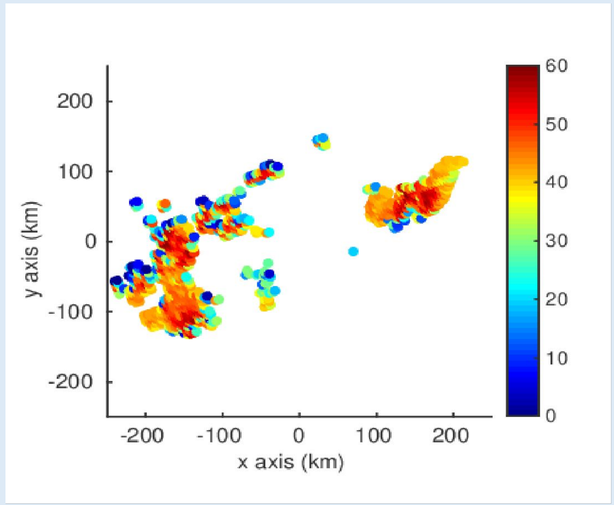
Data Extraction

- **TRMM PR :** TRMM version 7 products 2A23 and 2A25 (Ku Band) stored in HDF format. Extracted data contains precipitation radar reflectivity, geolocation data (latitude and longitude of scans), type of rain, intensity of rain, height of bright band, width of bright band etc.
- **Ground Radar Data (GR) :** Reflectivity data form Dual-Pol Radar at IMD Delhi. Beam Width is 1° with 831 range bins.
- PR orbits with 100 rain certain pixels within 100 km range of GR are considered for alignment.

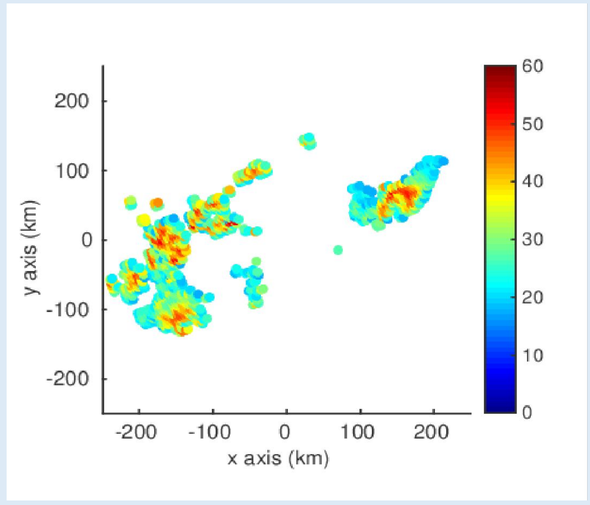
Points considered for match

Parallax Correction

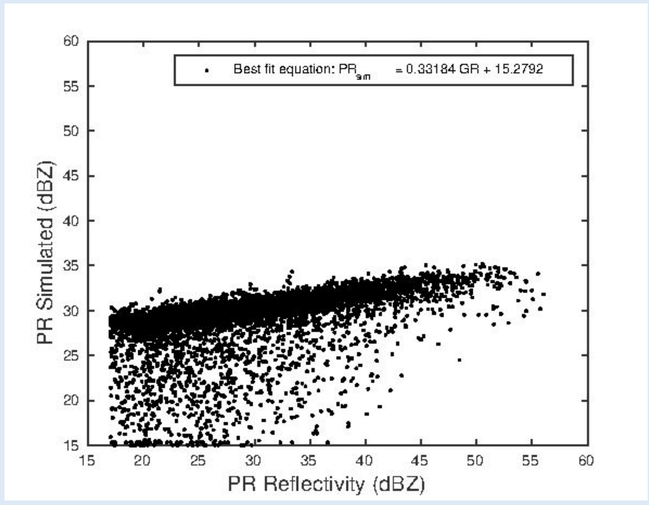
Intersection of rays of GR and PR



GR Reflectivity



SR Reflectivity



GR SR regression scatter plot

Conclusion:

- The correlation coefficient obtained between GR and SR by curve fitting technique is 0.49.

References

- Warren, Robert A., et al. "Calibrating ground-based radars against TRMM and GPM." Journal of Atmospheric and Oceanic Technology 35.2 (2018): 323-346.