

Kumar, P., R. M. Gairola, T. Kubota, and C. M. Kishtawal, 2021: Hybrid assimilation of satellite rainfall product with high density gauge network to improve daily estimation: a case of Karnataka, India. *J. Meteor. Soc. Japan*, **99**, 741 – 763.

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Plain Language Summary:

After initial verification of GSMaP rainfall product against dense rain gauge network over a southwestern state of India, a hybrid assimilation method is developed in this study to prepare merge rainfall product. The hybrid assimilation method, a combination of variational method and Kalman filter, demonstrated importance of advance data assimilation over objective analysis and optimal interpolation methods, widely used for generating merge rainfall product. Moreover, study suggested that both assimilation technique and density of rain gauges are crucial for preparing final rainfall product.

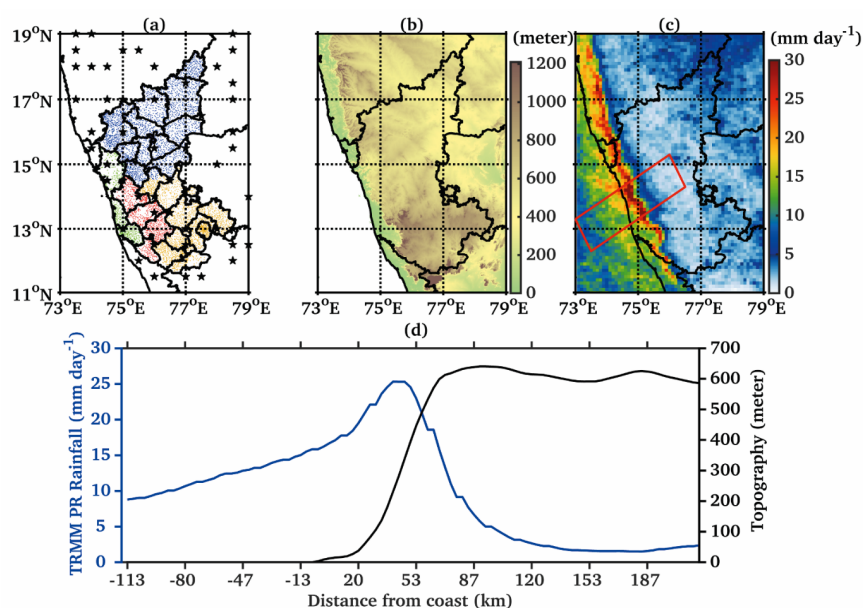


Fig. 1: Spatial distribution of (a) KSNDMC rain gauge network and NOAA/CPC rain gauge network over Karnataka, India. KSNDMC rain gauge stations over COASTAL (650), MALNAD (901), NIK (2737) and SIK (2214) regions are shown in green, red, blue and yellow dots, respectively. State boundaries of India and district boundaries of Karnataka state are shown as black lines. The black star shows location of NOAA/CPC gauges.(b) Spatial distribution of topography at 1 km spatial resolution, (c) mean JJAS rainfall at 0.1-degree spatial resolution from 13-years TRMM precipitation radar (PR) dataset and box covering the Western Ghats and oceanic regions, and (d) the cross-shore distribution of rainfall (blue line) and topography (black line) averaged across the red box (c) selected over the Western Ghats.

Highlights of the Paper:

- Verification of GSMaP rainfall product against dense rain gauge network over a southwestern state of India suggested large errors over the orographic heavy rainfall region of the Western Ghats. The hybrid assimilation method improved GSMaP rainfall product majorly over orographic heavy rainfall regions.
- This study recognized that both assimilation technique and density of rain gauges are crucial to generate final merge rainfall product.