

# Improved rainfall estimation over the Indian monsoon region by synergistic use of Kalpana-1 and rain gauge data

R. M. Gairola, Satya Prakash, and P. K. Pal

Atmósfera, 2015, 28(1), 51-61.

**Abstract:** In this paper, an attempt has been made to estimate rainfall over the Indian monsoon region by the synergistic use of the geostationary Kalpana-1 satellite-derived INSAT Multispectral Rainfall Algorithm (IMSR) rainfall estimates and rain gauge data, using a successive correction method in order to further refine the operational IMSR rainfall estimates. The successive correction method benefits from high spatial and temporal resolutions of the Kalpana-1 satellite and accurate rainfall estimates from rain gauges. A preliminary analysis is done for the southwest monsoon season of 2010 at a daily scale. The successive correction method is applied at a  $1^\circ$  latitude  $\times$   $1^\circ$  longitude resolution determined by the spatial autocorrelation analysis. Results are compared with four independent global multisatellite rainfall products, namely the Global Satellite Mapping of Precipitation, the Tropical Rainfall Measuring Mission Multisatellite Precipitation Analysis near-real time and research version rainfall monitoring products, and the Global Precipitation Climatology Project rainfall product. The objectively analyzed rainfall estimates show noticeable improvement over the satellite-based rainfall estimates alone over southern India. Comparison with independent rain gauge observations shows a considerable improvement in terms of correlation, bias and root-mean-square error after objective analysis, especially over the regions where density of rain gauge is fairly good. Overall results reveal that the synergistic use of satellite and in situ observations has potential for more accurate rainfall estimations over the Indian monsoon region.