# Assessment of Satellite Based Precipitation Products

S. Avina Patil[1*], Anand[2], Himanshu Raj[3], A. L. Irappa[4]
[1,2,3,4]*Department of Civil Engineering, Dayananda Sagar College of Engineering, Banglore, India*

***Abstract*: Precipitation event will impact on the economy of the countries in the world the environment and the society, mostly in the countries where rainfall is more. With the help of satellite precipitation data with high resolution and worldwide coverage of the data which gave us the new source of precipitation products, the data collected from satellite is not considered most of the times due to its uncertainty.**

**In the present study the goal was, evaluate performance of satellite products after gathering the data, this is used to know the difference between rainfall data and satellite products data using an extensive selections of validation metric. The results obtained are similar to the likelihood of knowing rainfall volume and amount of correctly recognized rainfall. In the few years, satellite datasets of rainfall believed to be a source for input in the hydrological models, which are used in areas where it is difficult to get the gauge.**

**The study goal is to assess satellite products of, CPC morphing technique, PERSIANN-CDR (precipitation estimation from remotely sensed information using artificial neural networks-climate data) against Ground based rainfall datasets and to know the effect on the hydrological process. The intention is to know data of two satellites such as RFE (rainfall estimate) and TRMM (tropical rainfall measuring) in the Western Ghats region. the discontinuity of the ground data due to difficulties such as inaccessibility of the ground, where gauges data is not so correct, so determining the amount of rain from satellite is more helpful to get the rainfall pattern to know the forecast about the floods and discharges, to examine the satellite datasets ME (mean error) and CC (correlation coefficient) are used.**

***Keywords*: Remote sensing, CPC technique, Persian-CDR, RFE, TRMM, Rainfall stations, Correlation Coefficient.**

## 1. Introduction

Spatial variability and Accurate temporal of worldwide rainfall data has possible for implementation in the forecasting of climatology, extreme weather conditions, hydrological simulation, water resource management, flood monitoring, drought monitoring, and ground rainfall datasets are the main source of rainfall data obtained through direct measurement. The distribution of rain gauges is uneven in remote areas is very difficult to overcome for the spatial cover. The radar, numerical model and Satellite based precipitation products are the secondary source of the rainfall datasets. However, data extracted from secondary sources must be calibrated and validated satellite products provide spatial and temporal coverage of rainfall measurements even in hilly terrain and Over Ocean. The development of Satellite based products were done through use of infrared and thermal satellites, and by the use of passive microwave (PMW) sensors technologies, it is the mainly used approach for determining satellite rainfall data. Different Satellite based datasets are accessible in various temporal resolution and spatial resolution (0.25°–0.04) these techniques are not correctly obtained results due to uncertainty may be there in errors such as device, calibration, algorithms. Such things affect the prediction of the satellite products and causes uncertainty. Correct authenticate of data is very much required for determine the performance of SPPEs to be used for different purposes.

## 2. Literature Review

*Manoj Kumar Thakur, T. V. Lakshmi Kumar:* The satellite has given the outcome during the days of MSS and TEJ above the climatology is due to the Low level circulation in the clouds which appears due to the liberation of latent heat in the Upper level circulation of TEJ This helps the satellite to detect the lower parts of cloud high temperature and so the estimation is better.

Tapas Ranjan Martha, Priyom Roy: The first spell of rainfall would have saturated the pore spaces of the soil with consequent landslides during the second spell of excess rainfall. Idukki district in Kerala witnessed maximum rainfall during this event, resulting in the highest occurrence of landslides among all neighbouring districts.

*Margaret Kimani (University of Twente):* The satellite datasets used in this study were able to give the rainfall patterns in time and space, also showed the error in the rainfall retrieval which decreased when there was an increase in the rainfall amount i.e around >100mm/month.

*JOE TURK (California Institute of Technology):* The process used in this study has observational constraints which causes difficulty in getting the correct vertically resolved temperature, pressure and structure of water vapor near and inside convective cloud with coverage of the data in land and oceans globally

*Akhilesh S. Nair (IIT Bombay):* The Multi source weighted-Ensemble Precipitation (MSWEP) overestimated the amount of rainfall in the study area contribution rates in the middle rainfall ranges (3 mm/day < rainfall < 20 mm/day) and the satellite underestimated it in the heavy rainfall class range (>50 mm/day). So the datasets used from this satellite is unpredictable and uncertain

Vivek gupta, Dr Vishal Singh:(National Institute of

*Corresponding author: avinasadashiva@gmail.com

Hydrology Water Resources System Division)*:* For the study of Larges scale rainfall data studies the SM2RAIN-ASCAT will be an good option, for small scale rainfall datasets study this satellite is unfit. From the results it can be concluded that there is uncertainty in this SM2RAIN-ASCAT satellite, mostly in the case of heavy rainfall precipitation. Still, the SM2RAIN-ASCAT satellite has the capability in capturing low to medium rainfall precipitation as shown in majority of regions in India and the Western Ghats region

*Alaa Alden Alazzy (College of Hohai University):* This study found that there is difficulty in accurately estimating rainstorms based on satellite precipitation datasets over the GRB Among all products, CMORPH-CRT and 3B42 are closer to gauge precipitation data when the precipitation class range is over 1 mm/day, but they cannot be considered fully reliable, which may be due to the lack of adequate precipitation observations.

*V Pandey (Banaras Hindu University), Prashant Srivastava (NASA GSFC/JPL and BHU):* Results showed that the high resolution (0.05') CHIRPS data is the most suitable for drought characterization according to statistical performance studied from 1998 to 2016 in comparison to (PERSIANN-CDR, CHIRPS, and TRMM). The monthly CHIRPS data was used to evaluate the drought condition for 36 years (1981-2016) at 3-month time scale (SPI3)

*Chian-Yi Liu (National Central University Taiwan):* Integrated multi satellite retrievals (IMERG) satellite datasets performed better on weekly, daily and monthly scale time scales when compared with CHIRPS data showed higher ability to determine rainfall occurrence at different altitudes but this satellite overestimated the rainfall events at high altitudes. Under estimated rainfall events at low altitudes was shown by the GSMAP.

## 3. Inference

The final obtained outcome from analysis is that, at yearly and monthly scales the TRMM (tropical rainfall measurement) and CHIRPS (climate hazards group infrared precipitation with station data) are more accomplished than PERSIANN-CDR. In this paper we have evaluated the satellite rainfall datasets with the ground based rainfall data in the study region due to the uncertainties in the hydrological modelling process.

## 4. Conclusion

This paper presented an overview on assessment of satellite based precipitation products.

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