

# Evaluation of Satellite Based Precipitations and Their Applicability for Rainfall Runoff Modelling in Narayani Basin of Nepal

Sunil Ghaju<sup>1</sup> and Knut Alfredsen<sup>2</sup>

<sup>1</sup> ITECO-Nepal & TMS JV

<sup>2</sup> Depart of Hydraulic and Environmental Engineering, NTNU, Norway

## ABSTRACT

*High spatial variability of precipitation over Nepal demands dense network of rain-gauge stations. But to set-up a dense rain gauge network is almost impossible due to mountainous topography of Nepal. Also the dense rain gauge network will be very expensive and some time impossible for timely maintenance. Satellite precipitation products are an alternative way to collect precipitation data with high temporal and spatial resolution over Nepal. In this study, the satellite precipitation products TRMM and GSMaP were analyzed. Precipitation was compared with ground based gauge precipitation in the Narayani basin, while the applicability of these rainfall products for runoff simulation were tested using the LANDPINE model for Trishuli basin which is a sub-basin within Narayani catchment. The Nash-Sutcliffe efficiency calculated for TRMM and GSMaP from point to pixel comparison is negative for most of stations. Also the estimation bias for both the products is negative indicating under estimation of precipitation by satellite products, with least under estimation for the GSMaP precipitation product. After point to pixel comparison, satellite precipitation estimates were used for runoff simulation in the Trishuli catchment with and without bias correction for each product. Among the two products, TRMM shows good simulation result without any bias correction for calibration and validation period with scaling factor of 2.24 for precipitation which is higher than that for gauge precipitation. This suggests, it could be used for runoff simulation to the catchments where there is no precipitation station. But it is too early to conclude by just looking into one catchment. So extensive study need to be done to make such conclusion.*

**Keywords:** *TRMM, GSMaP, satellite rainfall, rainfall runoff model, LANDPINE*