The main purpose of this research is to examine the error characteristics of satellite based precipitation estimation with the view to improve the reliability of wet season (June to September) rainfall dataset over the Blue Nile Basin (Ethiopia). The study utilized the historical rainfall datasets and six satellite derived precipitation datasets (3B42 V7, 3B42 RT, gauge adjusted and un-adjusted products of CMORPH, and PERSIANN) for the period of 2000 to 2013. The error analysis utilized statistical techniques of missed rainfall volume fraction (MRV), falsely detected rainfall volume fraction (FRV), mean relative error (MRE), bias ratio (Bias), coefficient of variation of error (CVE) and the trends of the error metrics with respect to elevation. The three error metrics, MRE, Bias and CVE are further examined for five rainfall thresholds associated with different percentile categories (2nd, 20th, 50th, 80th and 98th). Results show that CMORPH has relatively lower MRV (~1.5%) than the TRMM and PERSIANN products (10-13%). Non-gauge adjusted PERSIANN gave slightly higher percentage of FRV (13%) than the other satellite rainfall products (10 to 11%). Non-gauge adjusted PERSIANN gave slightly higher percentage of FRV (13%) than the other satellite rainfall products (10 to 11%). Among the six satellite rainfall products only adjusted PERSIANN overestimated gauge precipitation whereas, adjusted CMORPH exhibited relatively better bias estimation. Among the six satellite rainfall products the adjusted CMORPH has relatively better potential to improve rainfall estimation over the region. However, for higher rainfall amounts, particularly above the 50th percentile threshold non-adjusted PERSIANN performed better than the others.

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Among the six satellite rainfall products the adjusted CMORPH has relatively better potential to improve rainfall estimate over the region. For heavier rainfall amounts, particularly above the 50th percentile threshold non-adjusted PERSIANN performed better than the others. We have observed that there is no significant relationship between gauge rainfall elevation and the error metrics.