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Uncertainties of Satellite-Based Daily Precipitation Products over the Tibetan Plateau

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Satellite-based precipitation estimates is a major way to obtain the rainfall information especially in the sparse gauged areas of the Tibetan Plateau. Based on the gauge-based precipitation analysis in summer (JJA) for the period of 2005-2007, the performance of five satellite products are examined over the Tibetan Plateau in this research including 1) the CPC MORPHing products (CMORPH) of Joyce et al. (2004); 2) MW-adjusted IR products using Artificial Neural Network (PERSIANN, Hsu et al. 1997); 3) PDF matching MW-IR products NRL (Turk et al. 2004); 4) the gauge-adjusted MW-IR merged analysis of TRMM 3B42 (Huffman et al. 2007); and 5) its real-time version TRMM 3B42RT which is a MW-IR merged product without gauge adjustments (Huffman, et al. 2004). It shows that bias does exist in all the products with the smallest bias (relative bias) of -0.252 mm/d (-8.7%) observed by TRMM/3B42. Furthermore, following the research of Tian and Peters-Lidard (2010), three data ensemble methods of algorithm mean, one-outlier-removed algorithm mean and inverse-error-square weight, respectively, are used to generate the ensemble satellite-based precipitation estimates over the Tibetan Plateau. The ensemble data produced by the inverse-error-square weight has the best performance with bias (relative bias) of -0.06mm/d (-1.9%) in summer. The uncertainty of the satellite-based precipitation products is defined as the error square between each satellite estimate and the inverse-square-error-weight ensemble data. It indicates that the uncertainty is highly dependent on the rainfall rate and increased with the rainfall rate as an exponential function. Moreover, the uncertainty is seasonal dependency with the smallest in summer and largest in winter.