Geophysical Research Abstracts, Vol. 9, 05846, 2007
SRef-ID: 1607-7962/gra/EGU2007-A-05846

Multitemporal analysis and downscaling of TRMM-based satellite rainfall products for land data assimilation applications

C. Peters-Lidard (1), Y. Tian (1,2), M.Garcia (1,2), B. Choudhury (1)

(1) NASA-GSFC Hydrological Sciences Branch, Greenbelt, Maryland, USA, (2) Goddard Earth Sciences and Technology Center, UMBC, Greenbelt, Maryland, USA (christa.peters@nasa.gov / Fax: +01 301-6145808 / Phone: +01 301-6145811)

In this study, we extend the recent work of Gottschalck et al. (2005) by assessing the suitability of two Tropical Rainfall Measurement Mission (TRMM)-based rainfall products for hydrological land data assimilation applications. The two products are NASA's gauge-corrected TRMM 3B42 Version 6 (3B42), and the satellite-only NOAA Climate Prediction Center (CPC) Morphing technique (CMORPH). The two products were analyzed and evaluated against ground-based rain gauge-only and gauge-corrected Doppler radar measurements. The analyses were performed at multiple time scales, ranging from annual to diurnal for the period March 2003 through February 2006. The analyses show that at annual or seasonal time scales, TRMM 3B42 has much lower biases and RMS errors than CMORPH. CMORPH shows season-dependent biases, with overestimates in summer and underestimates in winter. This leads to 50% higher RMS errors in CMORPH's area-averaged daily rainfall than TRMM 3B42. At shorter time-scales (5-days or less), CMORPH has slightly less uncertainty, and about 10-20% higher probability of detection of rain events than TRMM 3B42. Summertime diurnal cycles in the Southeastern US are well captured by both products, although the 8km CMORPH seems to capture more diurnal features than the 0.25 degree CMORPH or 3B42 products. CMORPH tends to overestimate the amplitude of the diurnal cycles, particularly in the Central US. It is also found that errors at longer time-scales are dominated by estimation biases in certain individual rainfall events at short time-scales. Based on this analysis, the ideal product for hydrological land data assimilation applications would be a combined product that takes advantage of geostationary infrared data in the manner of CMORPH for improved event detec-

tion and temporal interpolation, coupled with the gauge-based correction method used in developing the TRMM 3B42 product for improved monthly to seasonal totals. We will show the impact of gauge-based bias correction and PRISM-based downscaling on CMORPH and TRMM 3B42 products for selected case studies.