Development of A-SRVN – AERONET-based Surface Reflectance Validation Network

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Validation is a critical component of the Earth Observing System aimed at establishing the accuracy of satellite-derived products on the regional and global scales, under different atmospheric and surface conditions. Due to spatial heterogeneity of the land surface, validation of surface reflectance is a difficult and challenging task. Performing direct ground-based measurements with the scale of surface spatial variability is practically impossible at the moderate resolution (1 km) of global measurements. We are developing an alternative approach based on the accurate atmospheric correction of satellite measurements for small areas around AERONET sunphotometer sites, using AERONET aerosol and column water vapor information. Our goal is to develop an indirect validation method for MODIS, MISR, VIIRS, ETM+ etc. surface reflectance products over heterogeneous land. Our algorithm makes independent retrievals with both the Hybrid and the MRPV BRF models used in the MODIS and MISR land algorithms, respectively. In this study, we report the first results of processing MISR Collection 4 data for 2003-2004 for two sites, Mongu, Zambia, and Greenbelt, Maryland (USA). We found that MISR generally provides accurate retrievals of BRF and albedo in both clear and hazy atmospheric conditions, correctly reproducing the parameter time series and spatial distribution. We found that the MISR BRF on average is less anisotropic than actual BRF in the visible bands. The difference is greatest in the blue band, but decreases with increasing wavelength such that it is negligible in the near-IR band. This discrepancy originates in part in the MISR aerosol retrieval algorithm over heterogeneous land, which tends to select an aerosol model that favors spectrally invariant shapes of surface BRF. The other part of discrepancy comes from the MISR surface HDRF retrieval algorithm where the iteration loop that removes the diffuse atmospheric transmittance is currently turned off. Our initial results suggest that the MISR surface albedo is on average lower than the actual albedo by about 0.005 in the green and red bands. In the near-IR, it agreed with our retrievals with the MRPV model for the Mongu site, but was systematically lower over the Greenbelt site by about 0.016. When significant aerosol absorption is present (Mongu), the albedo discrepancy is additionally biased by the difference between the MISR and AERONET retrievals of aerosol absorption.