

Validation of two gridded soil moisture products over India with in-situ observations

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Abstract: Surface level soil moisture from two gridded datasets over India are evaluated in this study. The first one is the UK Met Office (UKMO) soil moisture analysis produced by a land data assimilation system based on Extended Kalman Filter method (EKF), which make use of satellite observation of Advanced Scatterometer (ASCAT) soil wetness index as well as the screen level meteorological observations. Second dataset is a satellite soil moisture product, produced by National Remote Sensing Centre (NRSC) using passive microwave Advanced Microwave Scanning Radiometer 2 measurements. In-situ observations of soil moisture from India Meteorological Department (IMD) are used for the validation of the gridded soil moisture products. The difference between these datasets over India is minimum in the non-monsoon months and over agricultural regions. It is seen that the NRSC data is slightly drier (0.05%) and UKMO soil moisture analysis is relatively wet during southwest monsoon season. Standard AMSR-2 satellite soil moisture product is used to compare the NRSC and UKMO products. The standard AMSR-2 and UKMO values are closer in monsoon season and AMSR-2 soil moisture is higher than UKMO in all seasons. NRSC and AMSR-2 showed a correlation of 0.83 (significant at 0.01 level). The probability distribution of IMD soil moisture observation peaks at 0.25 m³/m³, AMSR-2 at 0.25 m³/m³ and UKMO at 0.35 m³/m³ during June-September period. Validation results show UKMO analysis has better correlation with in-situ observations compared to the NRSC and AMSR-2 datasets. The seasonal variation in soil moisture is better represented in UKMO analysis. Underestimation of soil moisture during monsoon season over India in NRSC data suggests the necessity of incorporating the actual vegetation for a better soil moisture retrieval using passive microwave sensors. Both products have good agreement over bare soil, shrubs and grassland compared to needle leaf tree, broad leaf tree and urban land cover types.

Keywords: Soil moisture validation satellite analysis