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Soil moisture and precipitation relationships inferred from satellite remote sensing data

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Quantitative estimation of the global water cycle and its budget is challenging due to the complex hydrologic mechanisms and interactions in the earth's three sub-systems: land, ocean and atmosphere. Over land, soil moisture plays a central role in the surface water balance and the partitioning of precipitation into evapotranspiration and runoff. The sparse distribution of *in situ* measurements of soil moisture considerably limits their use for initialization of land surface hydrologic models. Global-scale estimates of soil moisture on the other hand, using satellite remote sensing, can provide valuable new information for global water cycle research and forecasting.

In this study, we investigated the connection between soil moisture and precipitation in time and space using TMI (TRMM Microwave Imager) and AMSR-E (Advanced Microwave Scanning Radiometer-EOS) data. Retrieved soil moistures from both data sets over same observation periods were compared to investigate the consistency between TMI and AMSR-E data. The extended TMI data, including overlapped observations with AMSR-E data, were used to estimate the variability of soil moisture over a longer time period. We focused mainly on the inter-annual and inter-seasonal variability of the soil moisture and its relationship with the rainfall. To study this, principle component (PC) time series analyses were conducted over selected climatic regimes (e.g. arid and humid regions). Relationships between soil moisture and precipitation over the U.S. captured from the satellite-based retrieved data were evaluated with respect to the NARR (North American Regional Reanalysis) data which are based on the Noah land surface model.