Mapping Soil Moisture with MODIS Land Products and Ground Measurements in Eastern China

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Soil moisture is one of key parameters in controlling the exchange of water and heat energy between land surface and atmosphere. It plays an important role in the development of weather patterns and the production of precipitation, and thus has fundamental importance to many hydrological, biological and biogeochemical processes. Recent technological advances in remote sensing have shown that soil moisture can be measured by microwave remote sensing under a variety of topographic and vegetation cover conditions. However, current satellite microwave remote sensing technology limits the spatial resolution of soil moisture data. It has been confirmed that the daily data product of Normalized Difference Vegetation Index (NDVI) and Land Surface Temperature (LST) are all related to surface soil moisture, therefore, a relationship between ground measurements of soil moisture and land surface NDVI and LST products can be developed. Two years of 1 km NDVI and LST data products of Moderate Resolution Imaging Spectroradiometer (MODIS) have been combined with soil moisture measurements in 137 ground stations over Shandong Province, China, to determine regression relationships at 1 km scale. Our preliminary results show that MODIS NDVI and LST are strongly correlated with the ground soil moisture measurements, and also regression relationships are soil type and vegetation type dependent. These regression relations based on different soil and vegetation types, in conjunction with MODIS NDVI and LST, are then used to generate soil moisture in the non-ground station areas with the same soil and vegetation types. The daily moderate resolution soil moisture maps have been generated combining retrieval products with accurate ground measurements.