



Surface Soil Moisture Estimates Across China Based on Multi-satellite Observations and A Soil Moisture Model

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Soil moisture is a key variable that regulates exchanges of water and energy between land surface and atmosphere. Soil moisture retrievals based on microwave satellite remote sensing have made it possible to estimate global surface (up to about 10 cm in depth) soil moisture routinely. Although there are many satellites operating, including NASA's Soil Moisture Active Passive mission (SMAP), ESA's Soil Moisture and Ocean Salinity mission (SMOS), JAXA's Advanced Microwave Scanning Radiometer 2 mission (AMSR2), and China's Fengyun (FY) missions, key differences exist between different satellite-based soil moisture products. In this study, we applied a single-channel soil moisture retrieval model forced by multiple sources of satellite brightness temperature observations to estimate consistent daily surface soil moisture across China at a spatial resolution of 25 km. By utilizing observations from multiple satellites, we are able to estimate daily soil moisture across the whole domain of China. We further developed a daily soil moisture accounting model and applied it to downscale the 25-km satellite-based soil moisture to 5 km. By comparing our estimated soil moisture with observations from a dense observation network implemented in Anhui Province, China, our estimated soil moisture results show a reasonably good agreement with the observations ($RMSE < 0.1$ and $r > 0.8$).