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Introduction of FY-3/MWRI soil moisture product and its applications

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Microwave Radiation Imager (MWRI) onboard the FengYun-3D(FY-3D) satellite of China Meteorological Administration was launched in November, 2017. MWRI is a highly sensitive microwave radiometer that woks at five different frequencies: 10.65, 18.7, 23.8, 36.5 and 89GHz with dual polarization. The current soil moisture production retrieval algorithm of FY-3D/MWRI uses the brightness temperature with both v and h polarizations of 10.65GHz to eliminate the effects of surface roughness and vegetation simultaneously. For the bare surface soil estimation part, the algorithm is developed on a parameterized surface emission model which uses a physically based soil moisture inversion technique for application with passive microwave measurements. For the vegetation correction part, the algorithm uses the empirical relationship between the NDVI and the vegetation water content to estimate the vegetation optical depth. In the validation with ground observations in western China, the average root mean square error of the soil moisture product is about 0.06cm3/cm3 in low to moderate vegetation cover area. This accuracy can meet the needs of applications in drought, flood and agriculture monitoring. Furthermore, in order to derive higher accuracy soil moisture with higher spatial resolution, the soil moisture products of SMAP which is working at L-band, and AMSR2 which has C-band are integrated with MWRI using a correlation analysis method. The fused soil moisture product provides global observations with similar accuracy as SMAP.