Aqua AMSR-E Observations of Land Surface Moisture Variability

E. Njoku[1], T. Chan[1], L. Li[1], S. Nghiem[1], T. Jackson[2], V. Lakshmi[3]
[1]Jet Propulsion Laboratory, California Institute of Technology, Pasadena, CA
(Tel: 818-354-3693; Fax: 818-354-9476; Email: eni.g.njoku@jpl.nasa.gov)
[2]USDA/ARS Hydrology and Remote Sensing Laboratory, Beltsville, MD.
[3]University of South Carolina, Columbia, SC.

The Advanced Microwave Scanning Radiometer (AMSR-E) was developed by the National Space Development Agency of Japan (NASDA) and launched in May, 2002 on the NASA/EOS Aqua satellite. The AMSR-E instrument observes at six frequencies in the range 6.9 to 89 GHz with spatial resolutions ranging from 60 km at 6.9 GHz to 5 km at 89 GHz. AMSR-E observations will provide potentially significant contributions to studies of the global hydrologic cycle by improved characterization of land surface moisture variability. The hydrologic cycle integrates water and energy budgets at the land surface that are controlled in part by soil moisture, hence AMSR-E measurements will provide new information of use to weather, climate, and flood forecasting. In this paper we present results of initial analyses of the AMSR-E estimation of surface soil moisture and the influence of vegetation cover. We have used the 6.9, 10.7, and 18.7 GHz, V and H channels to examine soil moisture variability by direct estimation and by statistical analyses of temporal trends and spatial patterns in the brightness temperature data. The AMSR-E low frequency channels are relatively unaffected by atmospheric moisture. Spatial variability patterns in the monthly means are related predominantly to variability in vegetation cover and topography, and effects of snow cover at high latitudes. Temporal analyses indicate dynamic changes in surface emissivity that are caused primarily by variability in soil moisture. Time-series comparisons of AMSR-E data with data from the TRMM Microwave Imager (TMI) at 10.7 GHz and 19.3 GHz, and *in situ* soil moisture data from USDA NRCS SCAN sites, indicate relative sensitivities of the microwave data to transient (days to weeks) surface wetness, modulated by the longer (seasonal) time-scale trends. The AMSR-E observed space-time surface moisture variability patterns will be characterized globally using the first few months of the mission data, and this will be extended to longer periods as subsequent data become available. The magnitude and extent of radio-frequency interference (RFI) observed in the 6.9 GHz channels has also been assessed and indicates the global contamination problem at C-band. The observed RFI is widespread and is particularly severe in the U. S. The impacts of the presence of RFI on the soil moisture estimation capability will be discussed.

Special Session: E. Lobl
A20 - Hydrology