



A Simple method for Spatial Disaggregation of Radiometer Derived Soil Moisture Using Higher Resolution Radar Observations

Venkat Lakshmi and Ujjwal Narayan

Department of Geological Sciences, University of South Carolina, Columbia SC 29208,
vlakshmi@geol.sc.edu; Phone (803)-777-3552; Fax (803)-777-6684

This paper presents a technique for estimation of soil moisture by combining radiometric brightness temperatures in the LH band with horizontally co polarized L band radar backscattering coefficients. The approach is to use radiometric estimates of soil moisture at a lower resolution to compute the sensitivity of radar to soil moisture at the lower resolution. This estimate of sensitivity is then disaggregated using vegetation water content, vegetation type and soil texture information, which are the parameters on which radar sensitivity to soil moisture depends and are generally available at a scale of radar observation. The method discussed in this paper has potential applicability in soil moisture retrieval from proposed passive/active L band satellite instruments. The HYDROS instrument is proposed to have an L band radiometer and L band radar onboard. The passive instrument will have spatial resolution of the order of tens of kilometers and will operate along with the active instrument that will take observations at a resolution of tens of meters. The present study applies the methods presented to a limited data set obtained from the SMEX02 campaign held in June – July 02 in Iowa during which an airborne L band radiometer (PALS) and an L band synthetic aperture radar (AIRSAR) were used to coincidentally acquire data over the same region on 3 days and 400 m and 30 m resolutions respectively. In situ sampling of soil and vegetation parameters was also done. To demonstrate the applicability and limitation of the technique over a period of weeks, a simulated experiment was performed, the results of which have been presented and discussed in this study.