High Resolution Soil Moisture Retrieval from Active Microwave Remote Sensing Data

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Abstract. The successful mapping of soil moisture under vegetation canopies from active microwave data would be an advantage to agriculture, global climate change studies, water resource management and other areas. The dynamic range of soil moisture is generally affected by the variation in soil surface characteristics such as: soil texture, land cover, and vegetation parameters. Soil texture affects the microwave sensing of soil moisture through changes in the soil dielectric constant (via the relative amount of sand, silt, and clay in the soil). The land cover effect on the total backscatter received by the sensor is mainly due to the macrostructure of vegetation canopy such as height of canopy and number of plants or trees per unit area; and the microstructure.

In this study, a neural network and fuzzy logic-based model is used to explore the effect of soil texture, land cover, vegetation parameters on soil moisture retrieval. RADARSAT-1 satellite data along with soil moisture, soil texture, land cover and vegetation data measured during the Southern Great Plains 97 (SGP97) campaign were used in the model development. The significance of different configurations of input parameters such as vegetation optical depth, NDVI, soil texture and land cover type on soil moisture retrieval have been tested using statistical tools. Quantitative assessments using employing the RADARSAT-1 data have been made from independent datasets selected randomly from the field area.

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