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Retrieval of surface soil moisture over natural grass: rain interception effects

K. Saleh (1), J.-P. Wigneron (1), P. de Rosnay (2), J.-C. Calvet (3), Y.H. Kerr (2), M.-J. Escorihuela (2), J. Muñoz (3), P. Waldteufel (4)

(1) INRA-EPHYSE, France (ksalemco@bordeaux.inra.fr), (2) CESBIO, France, (3) CNRM-Météo France, (4) Service d'Aéronomie, France

The Surface Monitoring Of the Soil REservoir EXperiment (SMOSREX) has generated three years of L-band (1.4 GHz) multi-angular measurements over natural grass. One of the objectives of the experiment is to assess the capability of surface soil moisture retrievals over natural prairies through the implementation of retrieval algorithms. Such algorithms are needed in view of the close launch of the Soil Moisture and Ocean Salinity mission (SMOS). The development of an emission model for grass requires knowledge on the contribution of wet leaves and wet mulch to the overall emission. After rainfall, the grass and mulch system becomes a thick medium for the propagation of electromagnetic radiation at L-band. Thus the soil emission is significantly masked by the vegetation, and the overall emission increases because of the high emission of vegetation and mulch. The study presented in this communication suggests using a microwave index (modified polarisation ratio) at L-band to detect the presence/absence of interception by standing grass. Such an approach could be used to determine quality flags for the SMOS soil moisture products once SMOS data are available. In addition, the vegetation parameters used in the LMEB (L-band Microwave emission of the Biosphere) zero-th order radiative transfer model were obtained for natural grass. LMEB is the core of the SMOS products retrieval algorithm. Finally, a comparison between surface soil moisture retrievals based on the inversion of the zero-th order transfer model and based on statistical relationships is shown. The statistical approach highlights the potential of multi-angular and dual-polarisation measurements for the estimation of soil moisture from L-band satellite measurements. In particular, the multi-configuration approach reduces the effects of soil roughness and vegetation on the surface soil moisture estimates.