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Effective temperature for L-band radiometry

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Abstract: An accurate value of the effective temperature is critical for soil emissivity retrieval, and hence soil moisture content retrieval, from passive microwave observations. Computation of the effective temperature needs fine profile measurements of soil temperature and soil moisture.

The availability of a three-year long data set of these surface variables from SMOSREX (Surface Monitoring Of the Soil Reservoir Experiment) makes it possible to study the features of the effective temperature at L-band and the IR temperature of the surface at the seasonal to the inter annual scale. This paper reviews the main parameterizations of the effective temperature which have been proposed in the literature by Choudhury et al. (1982), Wigneron et al. (2001) and Holmes et al. (2006). An inter-comparison and validation of the effective temperature models at the inter-annual time scale is performed. Based on the SMOSREX data set, the paper investigates the effective temperature dependency to soil moisture and the effects on the retrieved soil emissivity. The 3-year long SMOSREX data set is used to investigate the features of the L-band emissivity at both vertical and horizontal polarizations, under various conditions of soil moisture soil temperature, and soil roughness.