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A Simple Modeling of a Bare Soil Emission at L- Band and Soil Moisture Retrieval on the SMOSREX site

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In the framework of the Soil Moisture and Ocean Salinity (SMOS) Mission preparation, a long term field experiment is taking place in the south of France. A very accurate and sensitive radiometer with spectral characteristics similar to those of the SMOS instrument is installed on the field and makes continuous measurements over a natural fallow and a bare soil under different observation angles.

One of the experiment objectives is to test, validate and better understand radiative transfer models at L-band. To study complex targets like soil frost, dew, snow or vegetation emission, it is necessary to calibrate accurately a rough bare soil emission model. A commonly used semi-empirical approach is the Wang model. Previous studies based on this model have not developed the potentialities of the SMOS instrument, mainly the diversity of incidence angles. Moreover some authors have pointed out that roughness effects were different at horizontal and vertical polarization which is not taken into account in the Wang model.

In this context the objectives of this study are: (1) to study the influence of roughness at different angles and polarizations (2) to model rough bare soil emission using very few input parameters (3) to evaluate the model by retrieving surface soil moisture from L-band measurements.

It is found that (1) roughness effects are different at vertical and horizontal polarization and (2) the calibrated roughness parameters are sensitive to soil moisture. Based on a simple model calibration surface soil moisture is retrieved from radiometric measurements with a very high accuracy.