



Microwave radiometry of forest defoliation

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Microwave radiometry at 1.4 GHz is one of the options to monitor areal near-surface soil moisture, with the advantages of being weather independent and using a protected frequency band. It is possible to interpret the time series of radiometric measured emissivity of the soil as an expression of the areal water regime.

One of the current research fields is the investigation of the vegetation effect. Theoretical models (Ferrazzoli, 2002) show that at L-band (1.4 GHz) the main contribution of a forest to emission and attenuation is due to the forest branches; while trunks and leaves have smaller effects.

In order to verify this hypothesis we performed an experiment in a deciduous forest during the defoliation phase of autumn 2004. An L-band and an X-band (11.4 GHz) radiometer were installed on the forest soil oriented upwards through the vegetation.

The measured brightness temperature as well as the optical depth, calculated from a simple radiation transfer model, decrease with the time. The total diminution of the optical depth is approximately 15% at the L-band and 50% at the X-band.

The cause of the observed decrease is investigated on the base of these measurements.

However, the reduction at X-band seems to be clearly correlated to the defoliation.