SOIL MOISTURE MONITORING OVER AUSTRALIAN FORESTS USING AIRBORNE DATA

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The capability of L band wavelengths to register the soil emission over sparse to moderately dense forests makes attractive the comparative study of the soil moisture content and vegetation biophysical parameter.
Soil and vegetation conditions contribute to the microwave measurements through complex interactions, basically resulting from vegetation structure and from moisture content and roughness of the soil. With the availability of the ESA Soil Moisture and Ocean Salinity (SMOS) radiometer and the planning of the NASA Soil Moisture Active Passive (SMAP) an increased interest has grown on the retrieval of soil moisture content in presence of vegetation. The concurrent analysis of passive and active radiometric features at 1-2 GHz is of particular interest in order to prove the effectiveness of already developed models exploiting ground truth and simultaneous remote sensing data acquired during a measurement campaign.
We have considered the SMAPEx airborne facility consisting of the Polarimetric L-band Multibeam Radiometer (PLMR; 1.41 GHz) and the Polarimetric L-band Imaging Synthetic aperture radar (PLIS; 1.26 GHz) which are used to acquire simultaneous data with footprints of 1km and about 10m, for the passive and active case respectively, when the flight altitude is 3 km [1].
The study sites are the Australian Gillenbah and Boona State Forests, located in the Yanco Region (NSW, Australia), an area showing semiarid characteristics. During the third SPMAPEx campaign (September 2011), an extensive sampling of the tree structures, as well as of moisture content and surface temperature of the soil has been collected over the two forest areas dominated by Murray Pine (Calitris Glucophylla) and Eucalyptus.
A sensitivity analysis to soil moisture content and tree biophysical parameters was performed considered passive and active measurements showing promising results. The data was interpreted using the theoretical model developed at Tor Vergata University, and are being used to test and verify earlier theoretical findings [2]. The model is based on a discrete approach and is able to simulate both active and passive microwave signature of forests [3].

References

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