

NEW COMBINED L-BAND ACTIVE/PASSIVE SOIL MOISTURE RETRIEVAL ALGORITHM OPTIMIZED FOR ARGENTINE PLAINS

C.A. Bruscantini, F.M. Grings, M. Salvia, Paolo Ferrazzoli*, H. Karszenbaum

Instituto de Astronomía y Física del Espacio (IAFE-CONICET-UBA), Buenos Aires,
Argentina.

*Tor Vergata University, Department of Computer Science, Roma, Italy.

The ability of L-band passive microwave satellite observations to provide soil moisture (mv) measurements is well known. Despite its high sensitivity to near-surface mv, radiometric technology suffers from having a relatively low spatial resolution. Conversely active microwave observations, although their finer resolution, are difficult to be interpreted for mv content due to the confounding effects of vegetation and roughness.

There have been and there are strong motivations for the realization of satellite missions that carry passive and active microwave instruments on board. This has also led to important contributions in algorithm development. In this line of work, NASA-CONAE SAC-D/Aquarius mission had on board an L band radiometer and scatterometer. This was followed by the launch of NASA SMAP mission (Soil Moisture Active Passive), as well as several airborne campaigns that provide active and passive measurements.

Within this frame, a new combined active/passive mv retrieval algorithm is proposed by deriving an analytical expression of brightness temperature and radar backscattering relation using explicit semi-empirical models. Simple models (i.e. that can be easily inverted and have relatively low amount of ancillary parameters) were selected: ω - τ model (Jackson et al., 1982) and radar-only model (Narvekar et al., 2015). A major challenge involves coupling the active and passive models to be consistent with observations. Coupling equations can be derived using theoretical active/passive high-order radiative transfer models, such as 3D Numerical Method of Maxwell equations (Zhou et al., 2004) and Tor Vergata (Ferrazzoli et al., 1995) models. In this context, different coupling equations can be optimized for different land covers using theoretical forward models with specific parametrization for each land cover type. The quality of the coupling equations derived is discussed in relation with different land surface conditions using Aquarius/SAC-D observations. This is done in preparation for SMAP and future SAOCOM data.