Geophysical Research Abstracts,
Vol. 11, EGU2009-668, 2009
EGU General Assembly 2009

Assimilating SMOS data into land surface emissivity models

M. Mira, V. Caselles, E. Valor, and C. Coll
Universitat de Valencia, Department of Earth Physics and Thermodinamics, Burjassot, Spain

Surface emissivity is an important parameter for determining the long-wave surface energy balance, which is strongly affected by the difference between the land surface temperature (LST) and the sky brightness temperature. This difference is small outside the atmospheric window region (7-14 µm) and any changes in the emitted radiation by emissivity variability are mostly compensated for changes in the reflected sky brightness. However, the difference is the greatest in the atmospheric window, where it is possible to estimate the broadband land surface emissivity from multi-spectral thermal infrared (TIR) remote sensing. Furthermore, if the emissivity is known, the LST can be accurately estimated from TIR radiance measurements. For this reason, it is necessary to study the factors that influence emissivity, since it must be estimated with the highest possible accuracy. The soil type influence on emissivity is well known from experimental studies. However, the analysis of the variation of TIR emissivity with soil moisture (SM) is one of the pending issues in thermal remote sensing. The SM dependence should be taken into account in emissivity retrievals from satellite data observations, since the SM variation may cause a high systematic error in this parameter, e.g., about +0.1 in emissivity for an increase from 0.04 to 0.10 g/cm3 in SM for sandy soils. This is why a variety of emissivity-soil moisture quadratic relationships have been obtained from a laboratory experiment for a set of bare soils of different texture (see also Mira et al., 2007). The idea behind these relationships is to use them together with soil moisture estimates from remotely sense data in order to improve the TIR emissivity estimations an thus, the LST determination. Therefore, the next step in our analysis is to explore the feasibility of this approach using Soil Moisture and Ocean Salinity (SMOS) data. The main idea is to apply and validate the relationships, as well as to compare the retrieved emissivities with those coming from other sources, e.g., MODIS (Moderate resolution Imaging Spectroradiometer) and ASTER (Advanced Spaceborne Thermal Emission and Reflection) emissivities. Additionally, new relationships at satellite level can be obtained through the direct comparison of SMOS data and MODIS/ASTER emissivities.