SMOS and AMSR-E brightness temperature cross-validation over the Salar de Uyuni: first year data analysis

M.J. Escorihuela¹, Y. H. Kerr², P. Richaume², J.P. Wigneron³ and M. Roca¹
¹isardSAT, Barcelona ²CESBIO, Toulouse ³INRA, Bordeaux
SMOS Validation and Retrieval Team Workshop 29-30 November 2010 ESRIN, Frascati, Italy

OBJECTIVE

The Salar de Uyuni is the largest salt flat in the world. It is located in the Bolivian altiplano at a height of about 3700 m between latitudes 19°45'S and 20°40'S and between longitudes 68°17'W and 66°45'W. The Salar is covered with a solid salt crust with a thickness varying between tens of centimeters to a few meters. Underneath its surface is a lake of brine 2 to 20 meters deep. The Salar's surface is about 9600 km² (several tenths the SMOS footprint). It is located in a rather uninhabited area with no RFI (Radio Frequency Interferences).

Salar’s climate is cold and dry, being characterized by low temperatures, low relative humidity levels and low precipitation. The rainfall is very low and concentrated from December to March. During the austral summer (from December to March), the surface can be covered by a thin water layer. This water layer disappears in the dry season, from April to November, leaving the Salar surface extremely flat and smooth.

The large area, clear skies and exceptional surface flatness make the Salar an ideal object for calibrating Earth observation satellites. Consequently, the Salar has been used to calibrate radar and laser altimeters as well as spectral reflectances. The aim of this study is to use the Salar for SMOS brightness temperature vicarious calibration.

SMOS AND AMSR-E DATA

The radiometric temporal and spatial resolution of the Salar was used, therefore dedicated to the temporal signature. SMOS data at 42.5 incidence angle from 9th June 2010 (version 340 and later) is used.

SMOS brightness temperature shows more scattering than expected. This scattering is not due to diurnal oscillations. Pure and mixed brightness temperatures are lower. Dielectric constant measurements are currently underway to better understand this issue.

CONCLUSIONS AND PERSPECTIVES

The brightness temperature was shown to be uniform spatially uniform over the Salar both at V-pol and H-pol at AMSR-E lower frequencies (6.9 and 10.7 GHz) and SMOS frequency (1.4 GHz) in [1,2]. This study will be therefore dedicated to the temporal signature. SMOS data at 42.5 incidence angle from 9th June 2010 (version 340 and later) is used.

SMOS BT and AMSR-E follow the same tendency, slightly increasing at the end of the period, although SMOS brightness temperature is always lower than AMSR-E BT. Dielectric constant measurements are currently underway to understand better differences between frequencies. AMSR-E shows a diurnal variation. In the case of SMOS variations are not related to the diurnal cycle.

Both SMOS and AMSR-E BT show an increase of emissivity during the period indicating that the Salar is still drying. SMOS data shows a higher scatter in emissivity.

REFERENCES