CNES and ESA CAROLS airborne campaigns at the Valencia Anchor Station and Los Monegros site in the framework of SMOS Validation

Ernesto Lopez-Baeza, M.C. Antolin, C. Bouzinac, E. Carbo, C. Castaneda, M. Davidson, M. Drusch, J. Herrero, Silvia Enache Juglea, Yann H. Kerr, et al.

CNES and ESA CAROLS Airborne Campaigns at the Valencia Anchor Station and Los Monegros Site in the Framework of SMOS Validation

E. Lopez-Baeza[1], M. C. Antolin[2], C. Bouzinac[3], E. Carbo[2], C. Castaneda[4], M. Davidson[3], M. Drusch[3], J. Herrero[5], S. Juglea[6], Y. H. Kerr[6], S. Mecklenburg[7], C. Millan-Scheiding[2], N. Novello[8], M. Parde[9], K. Saleh[1, 10], J.-P. Wigneron[8], and M. Zribi[6, 9]

[1]Department of Earth Physics and Thermodynamics, University of Valencia, Burjassot, Valencia, Spain
[2]Center for Desertification Research, Territorial Planning, Albal, Spain
[3]ESA-ESTEC, Earth Observation Programmes, Noordwijk, The Netherlands
[4]Agrifood Research and Technology Centre of Aragon, Zaragoza, Spain
[5]Estacion Experimental de Aula Dei (EEAD), CSIC, Zaragoza, Spain
[6]Centre d'Etudes Spatiales de la BIOsphere (CESBIO), Toulouse, France
[7]Directorate of Earth Observation Programmes, ESA-ESRIN, Frascati, Italy
[8]Institut National de la Recherche Agronomique, Villenave d'Ornon, France
[9]LATMOS-IPSL, Vélizy, France
[10]Centre for the Development of Industrial Technology (CDTI), Ministry for Science and Innovation Madrid, Spain

Abstract— This communication will present the main results of a series of airborne campaigns conducted at the *Valencia Anchor Station* (VAS) and *Los Monegros* site using the CAROLS (*Combined Airborne Radio-instruments for Ocean and Land Studies*) radiometer on board the ATR 42 aircraft from Météo-France. The main objective was to contribute to the implementation of the SMOS emission model L-MEB (*L-band Microwave Emission model of the Biosphere*) in the framework of the validation of SMOS land data and products. Specifically, the objectives of the CAROLS campaigns were the following:

Soil Moisture Validation Studies: Previous flights at the VAS area took place in 2008 in the context of the ESA *SMOS Validation Rehearsal Campaign* 2008 (EMIRAD radiometer, L-band) over a control area of 10 km × 10 km where intensive soil moisture data was acquired concurrently to airborne L-band measurements. One of the objectives of that campaign was to establish homogeneous units to characterize the average soil moisture of that area, and to investigate the possibility of extending the methodology to the whole SMOS validation pixel at the VAS site. The 'homogeneous units' characterisation was studied and extended further in the context of CAROLS 2009, and validated during the CAROLS 2010 campaign.

Radiometric Characterisation & SMOS Data Validation: The 10km × 10 km mentioned above is part of a larger area of ∼ 50 km × 50 km within the VAS SMOS validation pixel. For CAROLS 2009, flights were performed over a 30 km × 50 km area in order to examine the radiometric signature of other surfaces that are present in the VAS SMOS pixel but not in the 10 km × 10 km control area examined in 2008 (mostly dense forests, matorral, and non-flat surfaces). Main results of CAROLS 2009 will be presented in this communication, and the emphasis will be on comparing local to regional scale results given that CAROLS flights were performed at 4000 m above the surface. For 2010, lower altitude flights (∼ 2200 m a.s.l.) over an area of 20 km × 20 km containing a large number of homogeneous units ('environmental units'), were used for validation of SMOS microwave model L-MEB. The preliminary results of this campaign will be presented in this communication, and the emphasis will be on the validation of the L-MEB model.

In addition to the activities at the VAS site, flights over *Los Monegros*' salt pans near Zaragoza were performed in the 2010 CAROLS Campaign to study their emissivity at L-band. Three playa-lakes (Guallar, La Playa, and Salineta) were sampled to measure gravimetric soil moisture and electrical conductivity.[1]

[1]This paper is also with the collaboration of B. Abalos, M. Alcantara, C. Andres, S. Asensi, A. Buil, M. A. Coll, C. Narbon, F. Requena (University of Valencia, Spain) and E. Torre (Center for Desertification Research, Territorial Planning, Albal, Spain).