Preliminary Results of the Advanced L-BAnd Transmission and Reflection Observation of the Sea Surface (ALBATROSS) Campaign: preparing the SMOS Calibration and Validation activities

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Up to now several models have been developed to estimate the emission of the sea surface at L-band as a function of different key physical variables, such as the Sea Surface Temperature (SST), the Sea Surface Salinity (SSS) and the roughness as well as the presence or absence of sea foam.
Due to the very few measurements of SSS available, none of the models elaborated has demonstrated to be clearly better than the others, and the scientific community has not still completely agreed about which approximation is the best available at the moment.
Much work is still needed and surely an important contribution in that direction will be given by the Soil Moisture and Ocean Salinity (SMOS) mission in the next future, when global and frequent measurements of the ocean will be available to all the community and will permit further studies.
The SMOS mission is the second of the ESA's Living Planet Programme Earth Explorer Opportunity Missions and its launch is foreseen on 2009. Through its single payload, the Microwave Imaging Radiometer by Aperture Synthesis (MIRAS) sensor, SMOS will provide remote measurements of SSS with global coverage that will reach, at Level 3, the accuracy of 0.1 – 0.4 psu (practical salinity units) over 100 x 100 – 200 x 200 km^2 in 30 – 10 days [1], respectively.

During the first months following the launch date, the so-called Calibration/Validation (Cal/Val) phase will be held; in this period all the active ground sensor will be used and several ad-hoc measurement campaigns are foreseen to calibrate and validate the remote measurements provided by SMOS. One of the zones that will be used as reference during the Cal/Val phase is the *Subtropical Gyre* (in the North Atlantic Ocean, in front of the Canary Islands coast), a region of large gradients of SSS and SST and thus very interesting from the oceanographic and biological point of view. These particular features have motivated, during the last years, the deployment of several oceanographic buoys and the zone is currently very well covered and monitored.

During 40 days, between the months of May and June 2008, in the *Subtropical Gyre* zone, particularly at the Mirador de la Aldea (Aldea de San Nicolas, Gran Canaria Island, Spain) the Advanced L-BAnd Transmission and Reflection Observation of the Sea Surface (ALBATROSS) measurement campaign took place to rehearse a future SMOS Cal/Val activity and to contribute to the improvement of the present sea surface emissivity models at 1.4 GHz.
Joint measurements of brightness temperature (using the UPC L-band AUtomatic RAdiometer, LAURA [2]), reflected GPS signal over the sea surface ([3, 4]), and in-situ SSS, SST, wind speed, and wave spectrum (through four different buoys, two for SSS and SST, especially designed and realized at the Universidad de Las Palmas de Gran Canaria, ULPGC, and two TRYAXIS buoys for wind speed and wave spectrum) have been collected. The two SSS/SST and the wind spectrum buoys have been moored with a triangular configuration centered at (28.005 N, 15.790 W), the wind speed has been measured few kilometers North of the other buoys, whereas the remote radiometric and reflectometric measurements have been taken from the Mirador de la Aldea (28.019 N, 15.785 W), a cliff at 361 m on the sea level. In Fig. 1 the campaign location is shown, while in Fig. 2a, b, and c three snapshots taken during the campaign are presented. Several different sea conditions have been observed, with the wind speed taking values between 0 and 10 m/s, SST varying from 20 °C to 21.6 °C, with an average excursion of 1°C during day, and an approximately constant SSS of 36.83 psu.

In the paper the campaign set-up and the measurement procedure will be described more in details, and the preliminary results of the study will be presented.

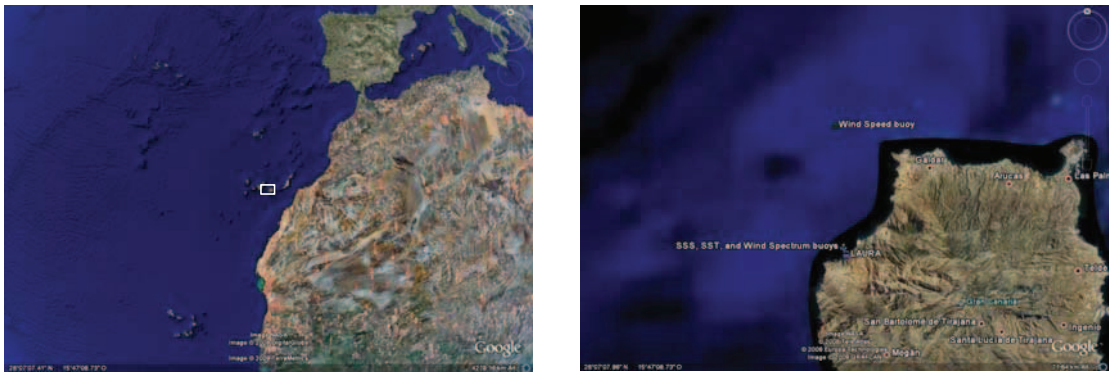
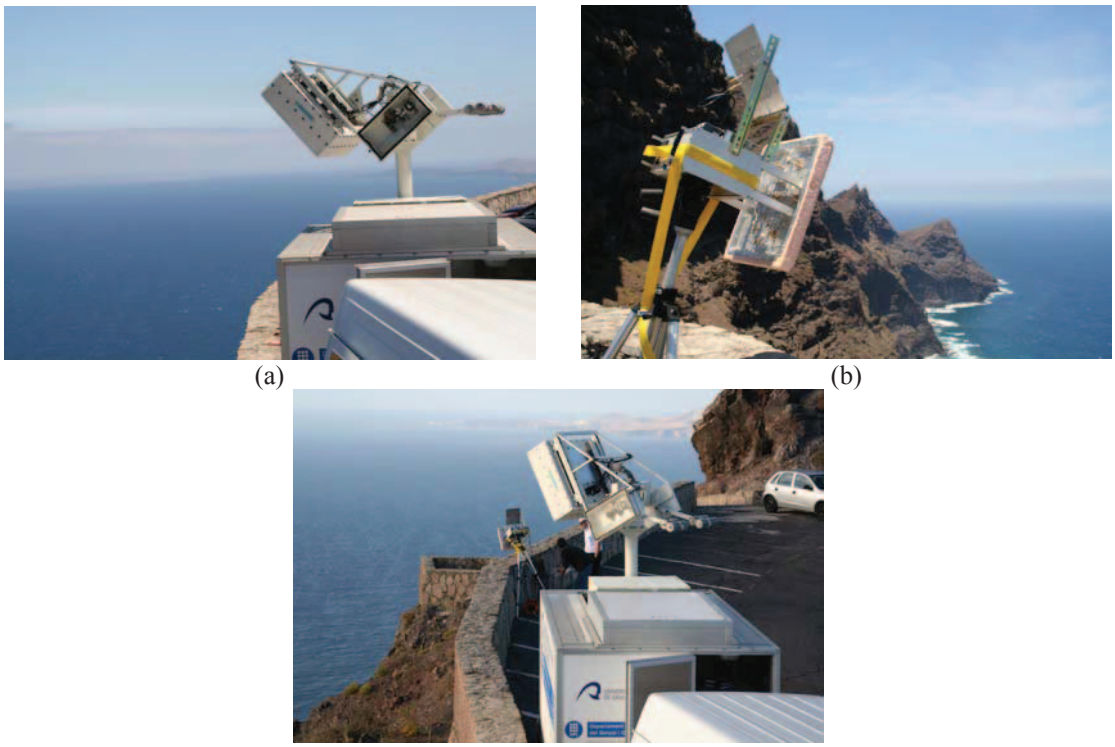


Figure 1. Google Earth view of the measurement campaign location



(a) (b)

(c)

Figure 2. Snapshot of the (a) LAURA radiometer, (b) GPS-Reflectometer, and (c) both of them during the measurement campaign.

References:

[1] Font, J., Lagerloef, G., LeVine, D., Camps, A. and Zanife, O. Z. – *The determination of surface salinity with the European SMOS space mission* – IEEE Transactions on Geoscience and Remote Sensing, vol. 42, no. 10, pp. 2196 – 2205, Oct. 2004.

[2] Villarino, R., Enrique, L., Camps, A., Corbella, I., Blanch, S. – *Design, implementation and test of the UPC L-band AUtomatic RAdiometer* – URSI 2002.

[3] Marchan-Hernandez, J.-F., Rodríguez-Álvarez, N., Camps, A., Bosch-Lluis, X., Ramos-Perez, I., Valencia, E. – *Correction of the Sea State Impact in the L-band Brightness Temperature by Means of Delay-Doppler Maps of Global Navigation Satellite Signals Reflected over the Sea Surface* – IEEE Transactions on Geoscience and Remote Sensing, vo. 46, issue 10, part 1, pp. 2914 – 2923.

[4] Marchan-Hernandez, J.F., Rodríguez-Álvarez, N. , Camps, A., Ramos-Perez, I., Valencia, E., Bosch-Lluis, X., Talone, M., Tarongi, J. M., and Piles, M. – *Ground-Based GNSS-R Measurements with the PAU Instrument and their Application to the Sea Surface Salinity Retrieval: First Results* – Proceedings of International Geoscience and Remote Sensing Symposium (IGARSS) '08, Boston 6-11/07/2008.