

**SMOS BRIGHTNESS TEMPERATURES VALIDATION: FIRST RESULTS
AFTER THE COMMISSIONING PHASE.**

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ESA's Soil Moisture and Ocean Salinity (SMOS) mission was launched on November, 2 2009, at 2.50 GMT from the Russian cosmodrome of Plesetsk.

The SMOS single payload consists of a 2-D synthetic-aperture radiometer, the so-called Microwave Imaging Radiometer for Aperture Synthesis (MIRAS) which provides unprecedented global coverage L-band brightness temperature (TB) measurements of the Earth's surface every 3 days.

Over the last 10 years, several groups within the scientific community have been preparing for the SMOS mission: New ad-hoc algorithms have been developed [e.g. 1 – 3], an accurate characterization of the instrument have been carried out on-ground [4], and several measurement campaigns have been performed [e.g. 5 – 6] to improve the L-band emissivity models.

During the first six months following the launch, the so-called “Commissioning Phase”, several tests will be re-run and new ones will be performed to 1) re-evaluate the instrument characterization; 2) test, and eventually, adapt the processing algorithms against external contaminations (e.g. sun or galaxy) and real scenes (presence of both land and ocean within the FOV) as well as to the real geophysical conditions of the

ocean surfaces; 3) choose the optimum among the various possible options regarding calibration strategy, operation mode, and processing configuration; 4) better characterize L-band emission of the Earth surface.

The purpose of the present study is to provide quantitative arguments to help the decision, primarily about data selection, correction, and processing options, and secondarily about the operation mode.

Results from analyses of SMOS brightness temperature acquired over oceanic areas are presented.

The first objective will be assessing the consistency of the TBs trying to detect instrumental biases or particular large-scale geophysical structures. For this initial set of tests, the pre-launch based (and therefore immature) forward models will not be used to ease the interpretation of the results. The tests will therefore be based on inter-comparisons between the SMOS TBs (accumulation of data subsets only derived from SMOS measurements). To reduce the degrees of freedom of the measurements, the comparison of TBs will be performed within specific classes, i.e., data will be sorted according to: the incidence angle, the wind speed, the across-track distance, the radiometric accuracy and the spatial resolution.

The results of these tests will provide the basis for the consolidation of the existing [7 – 8] brightness-temperature bias-mitigation techniques and for the development of new techniques. The first results will be presented at the symposium.

References

- [1] M. Brown, F. Torres, I. Corbella, and A. Colliander, “SMOS Calibration”, IEEE Trans. on Geosci. and Remote Sens., 46, 646 – 658. 2008.
- [2] E. Anterrieu and A. Camps, “Image reconstruction algorithms for 2D aperture synthesis radiometers”, Proceedings of the 10th IEEE MICRORAD, Firenze (Italy) 11-14 March 2008.

- [3] S. Zine, J. Boutin, J. Font, N. Reul, P. Waldteufel, C. Gabarró, J. Tenerelli, F. Petitcolin, J.-L. Vergely, M. Talone, S. Delwart, “Overview of the SMOS Sea Surface Salinity Prototype Processor”, *IEEE Trans. on Geosci. and Remote Sens.*, 46, 621 – 645. 2008.
- [4] K. D. McMullan, M. A. Brown, M. Martín-Neira, W. Rits, S. Eklom, J. Marti and J. Lemanczyk, “SMOS: The Payload”, *IEEE Trans. on Geosci. and Remote Sens.*, 46, 594 – 605. 2008.
- [5] A. Camps, J. Font, M. Vall-llossera, I. Corbella, N. Duffo, F. Torres, S. Blanch, A. Aguasca, R. Villarino, C. Gabarró, L. Enrique, J. Miranda, R. Sabia, M. Talone, “Determination of the Sea Surface Emissivity at L-band and its Applications to SMOS Salinity Retrieval Algorithms: Review of the Contributions of the UPC – ICM”, *Radio Science*, vol. 43, RS3008, doi: 10.1029/2007RS003728, 2008.
- [6] M. Martín-Neira, I. Cabeza, C. Pérez, M. A. Palacios, M. A. Guijarro, S. Ribó, I. Corbella, S. Blanch, F. Torres, N. Duffo, V. González, S. Beraza, A. Camps, M. Vall-llossera, S. Tauriainen, J. Pihlflyckt, J. Kettunen, and M. T. Hallikainen, “AMIRAS – An Airborne MIRAS Demonstrator”, *IEEE Trans. on Geosci. and Remote Sens.*, 46, 705 – 716. 2008.
- [7] A. Camps, M. Vall-llossera, L. Batres, F. Torres, N. Duffo, and I. Corbella, “Retrieving sea surface salinity with multiangular L-band brightness temperatures: Improvement by spatio-temporal averaging”, *Radio Sci.*, 40, doi: 10.1029/2004RS003040. 2005.
- [8] I. Meirold-Mautner, C. Mugerin, J.-L. Vergely, P. Spurgeon, F. Rouffi, and N. Meskini, “SMOS ocean salinity performance and TB bias correction”, *Proceedings of EGU General Assembly 2009*, Vienna, Austria, April 2009.