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Preliminary results of SMOS data analysis over the ocean during commissioning phase

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The SMOS (Soil Moisture and Ocean Salinity) satellite was successfully launched on 2nd November 2009. The first 6 months after launch is dedicated to the commissioning phase during which the ground segment processing chains are validated.
SMOS is the first interferometric radiometer in orbit. In the first ground processing (Level 1) an image reconstruction algorithm is applied which yields measured brightness temperatures (TB). Preliminary studies have shown that this processing is critical and likely to introduce biases that affect subsequent processing. Therefore, a comparison of modeled to reconstructed TB is essential. Homogenous ocean surfaces far from land masses are ideal for this task as the TB variation with the satellite geometry (incidence angle) is relatively well known.

In this presentation we will focus on the following analysis:
1. Extensive comparisons between SMOS Level 1c TB and forward model simulated TB using ECMWF (European Centre for Medium-Range Weather Forecast) forcings. Comparisons will be performed with one of the forward models implemented in the L2 ocean salinity processor (2-scale model, Dinnat et al. 2003).
Statistics of the TB differences will be presented. They may be related to flaws in the level 1c Tb related to image reconstruction or to instrumental imperfections, in the ECMWF forcings, or in the forward model. In order to discriminate between these various sources of uncertainties, the statistics of the Tb differences will be analysed in various reference frame:
- the antenna reference frame (director cosines)
- the earth reference frame
and the correlation of the differences with the geometry of the measurement (incidence angle, distance to the center of the swath, ascending or descending orbit…) and with respect to the auxiliary geophysical parameters (wind speed, sea surface temperature…) will be looked at.

2. The pseudo-dielectric parameter Acard (Waldteufel et al., 2004) is used to synthesize information contained in both the real and the imaginary parts of dielectric constant of medium, such as sea water. The principle for retrieving sea surface salinity (SSS) from radiometric measurements is that the dielectric constant of sea water depends on several physical parameters, including SSS and sea surface temperature (SST). Given the relation between dielectric constant and Acard, retrieving Acard with the whole direct model is in a way equivalent to retrieve dielectric constant, which represents the property of sea water more directly than SSS and SST. The consistency between Acard_retrieved and Acard_modeled will be another tool for testing and assessing the validity of SMOS measurements and retrieved parameters.
The consistency between retrieved Acard (Acard_retrieved) and Acard from known values of dielectric constants (Acard_modeled) will be investigated using similar methods as the ones described in 1.

Perspectives about the accuracy on sea surface salinity retrieved from SMOS measurements will be given based on the above comparisons and analysis.