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Accuracy of SMOS Level 3 SSS products related to observational errors

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The Soil Moisture and Ocean Salinity (SMOS) mission is the second European Space Agency's (ESA) Earth Explorer Oportunity mission with an expected launch during 2009. The satellite will be equipped with a new type of sensor: the MIRAS (Microwave Imaging Radiometer using Aperture Synthesis, Kerr 1998). This new instrument acquires brightness temperature (Tb) which can be transformed into soil moisture data over land and sea surface salinity (SSS) data over the ocean. SMOS Tb images will have a mean pixel size of about 40 km and a revisiting time of about 3 days, which ensure a large SSS dataset. On the other hand, due to observational limitations on the measured Tb, the observational RMS error for a single SSS measurement is expected to be large. Different studies predict an SSS observational rms error of 1 to 4 psu (Philipps et al., 2007; Sabia et al, 2008). However those are theoretical estimates and it is possible that real errors could be even larger.

The goal of this contribution is to quantify the impact of the observational error on the accuracy of L3 gridded products and to establish how a scale selection can increase that accuracy. The L3 mapping algorithm is based in the Optimal Interpolation method (OI, Gandin, 1963). Following Pedder (2003), this formalism have been extended to the convolution of OI with a normal error filter, so that when selecting the smallest scale to be resolved by the analysis the formalism yields an estimation of the resulting analysis error. Therefore, we have an appropiate theoretical framework to explore the reduction of the analysis error induced by the scale selection in the particular case of SMOS data. Some examples of the expected accuracy of SMOS L3 products as a function of observational error and the selected spatial scales will be presented.