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Building a Learning Database for the Neural Network Retrieval of Sea Surface Salinity from SMOS Brightness Temperatures

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Using neural networks to retrieve the sea surface salinity from the observed Soil Moisture and Ocean Salinity (SMOS) brightness temperatures (TBs) is an empirical approach that offers the possibility of being independent from any theoretical emissivity model, during the in-flight phase. A Previous study has proven that this approach is applicable to all pixels over ocean, by designing a set of neural networks with different inputs.

The present study exposes a strategy to build the learning database to be used for the retrieval, and demonstrates that a judicious distribution of the geophysical parameters allows to markedly reduce the systematic regional biases of the retrieved SSS, which are due to the high noise on the TBs.

An equalization of the distribution of the geophysical parameters, followed by a new technique for boosting the learning process, makes the regional biases almost disappear for latitudes between 40°S and 40°N, while the global standard deviation remains between 0.6 psu (at the center of the swath) and 1 psu (at the edges). Besides, we show that the size of the learning database is not as critical as the choice of the distribution of geophysical parameters.