



## **Monitoring the mesoscale circulation of the Western Mediterranean Sea using SSS derived from SMOS**

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The circulation in the Mediterranean Sea is characterized by the inflow of fresh waters from the Atlantic Ocean through the Strait of Gibraltar. These waters, characterized by their lower salinity, create baroclinic instabilities that spawn eddies with sizes of the order of 100 km. These eddies have been widely analyzed using Sea Surface Temperature (SST) observations. Recent improvements in the Sea Surface Salinity (SSS) retrieval and bias correction methodologies applied to the Soil Moisture and Ocean Salinity (SMOS) satellite data have led, for the first time, to the generation of SSS maps that capture the signature of these structures. This opens the door for the generation of high spatial and temporal density maps in the Mediterranean, which can be used in a wide variety of oceanographic applications. In particular, the signature of the Alboran gyre and the eddy propagation across the Algerian coast are well reproduced, allowing for the first time to characterize the baroclinicity of the flow.

The SMOS data are strongly affected by Radio Frequency Interference (RFI) and land-sea contamination in the Mediterranean Sea. Two important SSS retrieval algorithm improvements are proposed in this study. First, with more than six years of SMOS data acquisitions, there is enough data to empirically characterize and correct systematic biases. Second, the filtering criterion has been modified to account for the statistical distributions of SSS at each ocean grid point. This allows retrieving a value of SSS which is less affected by outliers originated from RFI and other effects.

In this study, high level (spatio-temporally consistent) SSS maps are obtained by averaging the SMOS SSS retrievals using a classical objective analysis scheme and then combining the resulting maps with Sea Surface Temperature (SST) maps by means of multifractal fusion. The SSS fused maps contain well-defined spatial structures, suitable for studying the mesoscale activity in the Western Mediterranean.