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Argo observations in support of SSS modeling efforts in the perspective of SMOS data exploitation

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Getting a proper description of sea surface salinity (SSS) in ocean circulation models is known to be a rather difficult task, in particular due to the inaccuracies of forcing terms (notably freshwater fluxes) and vertical mixing parametrizations of numerical models. In the case of regional configurations, the impact of open boundary conditions should be considered too. An approach widely used to control spurious SSS drifts consists in restoring model SSS towards climatological values. When the focus is on salinity by itself, this approach is not satisfactory as it adds an artificial forcing term in the fundamental equations. Moreover, the restoring term may introduce additional significant errors as it relies on climatological data. To be launched in 2008, the SMOS (Soil Moisture and Ocean Salinity) satellite mission, by providing for the first time global SSS observations, is expected to allow a much more convenient data assimilation approach. Preparing SMOS data exploitation, this study focuses on the sea surface salinity modeling in an ocean circulation model. Because of the lack of in-situ data of sea surface salinity or T-S profiles, Argo observations are shown to be very useful as a support to these modeling efforts.

In this work we use a 1/3-degree regional configuration of the OPA model implemented in the north eastern Atlantic Ocean (45W-5W, 15N-43N), covering a large part of the subtropical gyre. After studying the sensitivity of the model SSS to different forcing fields, vertical parametrizations and open boundary conditions, we use Argo observations to calibrate and validate our configuration. In particular, we show the usefulness of Argo data to guide our parameter and forcing choices. Finally, Argo profiles are also compared to model outputs to get first insights into the spatio-temporal scales of model error, especially in the mixed layer. These scales are compared to SMOS expected resolution.