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Surface salinity error growth in an OGCM

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With the launch of the Soil Moisture and Ocean Salinity (SMOS) mission, a new stream of ocean data will be available to constrain ocean models and to infer inaccuracies in estimates of precipitation and evaporation. The ability of the new set of observations to constrain a multivariate model using sequential algorithms, as for example an ensemble Kalman filter, depends on the correlations between the variables being observed and the rest of the system. In a sequential data assimilation cycle, these correlations are adjusted after each analysis time, and they are dynamically rebuilt until the next analysis time.

The NEMO-OPA ocean model is used here to investigate the dynamical evolution of the covariances between surface salinity and other prognostic variables of the model (such as temperature and horizontal velocities) using an ensemble approach. The simulation used in this study is a regional configuration of the eastern North Atlantic Ocean, around the Macaronesian region. The model has a horizontal resolution of 1/3º and 31 vertical layers as in Mourre et al. (2008). The model starts from rest, initialized with a climatologic distribution of temperature and salinity. After a fifteen-year climatological spin-up simulation, the model is forced by NCEP fields for the 2000-2007 period. The ensemble covariances have been estimated from the last five years of the simulation. We present the dynamical spread of the model solutions, and their three-dimensional ensemble covariances. Different time windows (weekly, monthly, and seasonal) are used in order to illustrate the impact of SSS observations in initializing systems aiming to different time-scale phenomena.