Geophysical Research Abstracts,
Vol. 11, EGU2009-5437, 2009
EGU General Assembly 2009

Model salinity error covariances due to forcing inaccuracies

B. Mourre, J. Ballabrera, A. Aretxabaleta, and J. Gourrion
Institut de Ciències del Mar, CSIC, Barcelona, Spain (mourre@icm.csic.es)

The Soil Moisture and Ocean Salinity mission (SMOS) from the European Space Agency, scheduled for launch in 2009, will initiate the era of satellite salinity observations. In an ocean analysis and data assimilation context, one of the main challenges will consist in properly integrating these new satellite observations into ocean models. This not only requires models to be able to faithfully represent the main processes affecting salinity, but also a proper estimation of the associated model error. This paper investigates ensemble-generated model surface salinity error covariances induced by atmospheric forcing uncertainties in the eastern North-Atlantic Ocean.

Ensemble simulations are carried out using a 1/3º regional configuration of the NEMO-OPA ocean model over the period 2000-2007. Perturbations of the wind stress and the precipitations are obtained by randomly combining the leading EOFs of the fields under consideration. It was shown in Mourre et al. (Ocean Modelling, 2008) that uncertainties in wind stress and precipitations were the major sources of surface salinity error in this region (together with the open boundary data in the case of regional modelling).

In the current study, the resulting surface salinity ensemble spread is characterized by a significant spatial and temporal variability according to ocean dynamics. It has an averaged value of 0.1 psu over the modelling domain. The time scale for the error growth is of the order of 3-4 months, while the time persistence of error structures ranges between 3 and 7 months. In addition, horizontal surface salinity error correlation distances are inhomogeneous and anisotropic. They are larger than 100 km almost everywhere in the domain, and extend up to more than 400 km along the path of the main surface currents. Vertical salinity error correlation distances from the surface are found to be larger than the annual maximum mixed layer depth. In areas where subduction occurs, the vertical correlation radii exceed 500 meters.

This work is part of the effort conducted at the SMOS Barcelona Expert Center (http://www.smos-bec.icm.csic.es) aiming at contributing to the ground segment of the SMOS mission.