



Upscaling

Luc Vandenbulcke (1) and Alexander Barth (2)

(1) seamod.ro, sc Jailoo srl, Salatrucu, Romania (luc@seamod.ro), (2) GHER, Universite de Liege, Belgium (a.barth@ulg.ac.be)

In the present European operational oceanography context, global and basin-scale models are run daily at different Monitoring and Forecasting Centers from the Copernicus Marine component (CMEMS). Regional forecasting centers, which run outside of CMEMS, then use these forecasts as initial conditions and/or boundary conditions for high-resolution or coastal forecasts. However, these improved simulations are lost to the basin-scale models (i.e. there is no feedback). Therefore, some potential improvements inside (and even outside) the areas covered by regional models are lost, and the risk for discrepancy between basin-scale and regional model remains high. The objective of this study is to simulate two-way nesting by extracting pseudo-observations from the regional models and assimilating them in the basin-scale models. The proposed method is called “upscaling”.

A ensemble of 100 one-way nested NEMO models of the Mediterranean Sea (Med) ($1/16^\circ$) and the North-Western Med ($1/80^\circ$) is implemented to simulate the period 2014-2015. Each member has perturbed initial conditions, atmospheric forcing fields and river discharge data. The Med model uses climatological Rhone river data, while the nested model uses measured daily discharges. The error of the pseudo-observations can be estimated by analyzing the ensemble of nested models. The pseudo-observations are then assimilated in the parent model by means of an Ensemble Kalman Filter.

The experiments show that the proposed method improves different processes in the Med model, such as the position of the Northern Current and its incursion (or not) on the Gulf of Lions, the cold water mass on the shelf, and the position of the Rhone river plume.

Regarding areas where no operational regional models exist, (some variables of) the parent model can still be improved by relating some resolved parameters to statistical properties of a higher-resolution simulation. This is the topic of a complementary study also presented at the EGU 2017 (Barth et al).