ERROR ANALYSIS OF A HIGH-RESOLUTION PHYSICAL MODEL OF THE MEDITERRANEAN SEA

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We analyze the errors that are inevitably associated to hydrodynamic models, in a realistic case. The error of the GHER model in the Mediterranean Sea has already been studied in e.g. Beckers et al. (2000) by comparing it with other primitive equation models, or in Alvera (2004) by comparing the model with observations and with the climatology, using usual statistical methods and also wavelet decompositions. In this study, we rather study the sensitivity of the model to various variables using an ensemble of models. We chose a relatively high resolution, 1/16°, corresponding to the resolution now used in operational OGCMs covering the Mediterranean, such as the MFS system (http://www.bo.ingv.it/mfs). We explain how we generated an ensemble of model simulations, where various more-or-less well known inputs are allowed to vary according to the uncertainty affecting them. Statistics calculated on this ensemble are, in fact, the response of the non-linear hydrodynamic system to errors on the forcing terms. When those statistics are calculated at a certain timestep, they allow us to provide a spatial analysis of the model error; statistics calculated over the time dimension will show whether errors are intensified by the system, or rather disappear. The model error is interesting as such. However, it can also be used for different purposes. For example, it allows using data assimilation techniques without needing the usual assumptions of reduced-rank Kalman Filters. It also allows studying the sensitivity of coupled models (biological, oil spill, search-and-rescue, ...) to physical forcings.

References

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