

HYDRODYNAMICS AND ECOSYSTEM DYNAMICS IN THE BAY OF CALVI

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The RACE (Rapid Assessment of the marine Coastal Environment) project aims at developing diagnostic tools to detect and predict changes in the coastal ecosystems threatened by human activities.

1-D simulations of the hydrodynamics were realized with, on one hand, local (Aanderaa Weather Station located nearby the bay) and high-frequency ($\sim 8.3 \cdot 10^{-4}\text{Hz}$) atmospheric forcings, and on the other hand, with climate re-analysis from the European Centre for Medium-range Weather Forecasts (ECMWF), characterized by a regular spatial grid (2.5°) and a lower frequency ($\sim 4.6 \cdot 10^{-5}\text{Hz}$). These General Ocean Turbulence Model (GOTM) runs were performed in order to represent, respectively, as well as possible the physical properties of the water column and their inter-annual variability. 1-D simulations of the ecosystem dynamics were realized by coupling offline the results of the hydrodynamics. Three different models, calibrated for the Ligurian Sea, were implemented within the Flexible Environment for Mathematically Modelling the Environment (FEMME) in order to test the complexity requirement, before implementing it in a 3-D framework. 3-D test-case simulations of the hydrodynamics were performed with the GeoHydrodynamics and Environmental Research (GHER) group model, in its nested version.

References

- Raick C., E.J.M. Delhez, K. Soetaert and M. Grégoire. 2005. Study of the seasonal cycle of the biogeochemical processes in the Ligurian Sea using a 1D interdisciplinary model. *J. Mar. Sys.* 55:177-203.
- Soetaert K., V. DeClijpele and P. Herman 2002. Femme, a flexible environment for mathematically modelling the environment. *Ecol. Modell.* 151:177-193.
- Beckers J.M. 1991. Application of the GHER 3D general circulation model to the Western Mediterranean. *J. Mar. Sys.* 1:315-332.
- Umlauf L. and H. Burchard 2005. Second-order turbulence closure models for geophysical boundary layers: a review of recent work. *Cont. Shelf. Res.* 25:795-827.
- Uppala S.M. *et al.* 2005. The ERA-40 re-analysis. *Quart. J. Roy. Meteor. Soc.* 131:2961-3012.