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Simulation of the Western Mediterranean Deep Water formation: sensibility studies for the strong 1986-87 winter convection event

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The 1986-87 winter convection event is one of the deepest and best observed over the last decades (Leaman and Schott, 1991; Mertens and Schott, 1998). High resolution 3D realistic numerical modelling is needed to better understand the physical processes leading to the WMDW formation and spreading.

For this purpose, we use a Mediterranean version of the OGCM OPA8.1 with a 10 km horizontal resolution (OPAMED8). This ocean model is forced daily by air-sea fluxes (heat, water, momentum) coming from the ERA40 reanalysis. River runoff fluxes are also explicitly included.

Over the Gulf of Lions, the chronology of the different Mistral period is well reproduced by ERA40. Moreover, a simple heat flux correction allows a good representation of the intensity of the air-sea forcing. This correction is applied in agreement with observed data described in Mertens and Schott, 1998.

The simulation shows a convection down to the bottom in February as observed and also as simulated with a mixed layer model (Mertens and Schott, 1998). The phases of preconditionning, strong mixing and restratification as well as the characteristics of the newly formed WMDW are studied.

Other simulations are performed in order to understand the sensibility of the deep convection to changes in the surface forcings (wind stress, water flux, heat flux) and in the initial conditions.