



High resolution modelling of dense water formation in the Northwestern Mediterranean: benefits from an improved initial stratification in summer

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The period that extends from summer 2012 to summer 2013 was the subject of several field campaigns in the northwestern Mediterranean that allowed to characterize the stratification on a seasonal scale in this region of deep water formation. This period is therefore ideal for testing hydrodynamic models and assessing the accuracy required on initial conditions and meteorological forcing.

A 1 km resolution simulation of the vertical stratification evolution of the northwestern Mediterranean between summer 2012 and spring 2013 was conducted. The representation of winter convection was shown to be highly dependent on initial conditions in summer. A method was developed to correct the initial state of the model using the observations of the annual summer cruise of the MOOSE monitoring program and data from ARGO profilers. In addition, an adjustment of the wind helped to better approach winter observations, the criterion being the profile of residual buoyancy, simple index of the potential of the water column to convect more or less deeply and rapidly. The simulation obtained after correction of the initial conditions and wind forcing allowed to accurately represent the characteristics of the water masses formed during the convective period, the area concerned by convection and its timing.

We will first present the methodology used to correct the initial state of the simulation, and then the validation of the simulation based on the observations from the DEWEX cruise (MERMEX program) and from profilers deployed in the frame of the HyMeX program. Then the volume of dense water formed and its characteristics will be quantified as well as their sensitivity to initial conditions.