

An uncertainty framework to estimate dense water formation rates : case study in the Northwestern Mediterranean.

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The Northwestern Mediterranean (NWMed) sea is a key region for the Mediterranean thermohaline circulation as it includes the main deep water formation sites of the Western Mediterranean. The Mediterranean Ocean Observing System for the Environment (MOOSE) has been implemented since 2007 over that region to characterize the space and time variability of the main water masses up to interannual (yearly summer cruises) scale. However, despite a large covering of the NWMed region, the limited number of conductivity, temperature and depth (CTD) casts leads to subsampling errors and advocates for an uncertainty assessment of large-scale hydrology estimates.

This study aims at estimating the error related to subsampling in time and space. For that purpose, an Observing System Simulation Experiment (OSSE) is performed with an eddy-permitting Mediterranean sea model (NEMOMED12) and an eddy-resolving NWMed sea model (SYMPHONIE). A subsampling of the full model fields in time and space allows for an error estimate in terms of large-scale hydrology. The methodology is applied to dense water volume estimates for the period july 2012 - july 2013.

Secondly, an optimization framework is proposed to evaluate and improve MOOSE network's performances under a series of scientific constraints. The results will be discussed for an application in MOOSE observing network, as well as the main assumptions, the stakes and limitations of this framework.