Geophysical Research Abstracts
Vol. 16, EGU2014-15217, 2014
EGU General Assembly 2014

Monitoring of Intense Events of Deep Water Formations in the Northwestern Mediterranean over the last five years

Loïc Houpert (1), Xavier Durrieu de Madron (2), Pierre Testor (1), Anthony Bosse (1), and Laurent Mortier (1)
(1) LOCEAN-IPSL, Université Pierre et Marie Curie, CNRS, IRD, MNHN, 75252 Paris, France, (2) CEFREM, CNRS, Université de Perpignan Via Domitia, 52 Avenue Paul Alduy, 66860 Perpignan Cedex, France

A multi-platforms and integrated monitoring system in the framework of the Mediterranean Ocean Observing System on Environment (MOOSE) enables to monitor the deep water formation processes. Since 2007, it provides high frequency in-situ temperature, salinity vertical profiles, derived from CTD measurements on moorings, ships, and gliders, as well as horizontal and vertical currents from moorings. The aim of this study is to investigate the temporal scales associated to the deep convection phases. We also studied the interannual variability of the deep convection and its implication in the evolution of deep water thermohaline characteristics.

Recent measurements from the mooring lines reveal the temporal evolution of the physical processes interfering in the phases of deep convection. Horizontal currents were strongly equivalent barotropic during each deployment and strong currents were also recorded during the different events of deep ocean convection: high frequencies vertical velocities exceeded 10 cm.s-1 during the violent vertical mixing phase and strong mesoscale horizontal currents reached 40cm.s-1 during the spreading/restratification phase. Using a eddy-detection method based on a kinematic model, more than 34 eddies crossing the mooring line were detected between November 2009 and July 2012, 19 cyclones and 15 anticyclones. The radii (resp. velocities) ranging from 1.9 km to 20.0 km (resp. 2.5 cm.s^{-1} to 25.1 cm.s^{-1}). The main mode of the distribution of eddies radii is centered at 4km for the cyclones and 5km for the anticyclones.

The apparition of newly-formed deep waters was detected in winter 2009, 2010, 2011 and 2012. In winter 2010, two newly-formed deep waters were detected after the deep convection event, both present a different potential temperature but a similar salinity, suggesting that both might be formed in the cyclonic gyre, but in different locations. In 2012, two new deep waters were detected at the mooring location, one was identified as a result of open-ocean deep convection, while the other seems to be the result of a dense shelf water cascading event that occurred in winter 2012.