The Nature of Eddy Kinetic Energy in the Labrador Sea: Different Types of Mesoscale Eddies, their Temporal Variability and Impact on Deep Convection

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Abstract

This study investigates the different sources and impacts of Eddy Kinetic Energy (EKE) and its temporal variability in the Labrador Sea (LS) with the help of two hindcast simulations of an ocean model with 1/20° resolution in the North Atlantic (VIKING20X). Results from a simulation forced with the well-established CORE.v2 (Large and Yeager, 2009) atmospheric forcing are supported by results from a simulation with the new JRA55-do (Tsujino et al., 2018) product. The realistic forcing and geometry together with the high resolution of VIKING20X are crucial to the correct simulation of the three types of eddies in the LS. The anticyclonic Irminger Rings from the West Greenland Current affect the preconditioning of the northern central LS and their temporal variability is linked to the large scale circulation of the subpolar gyre. The main source of EKE and restratification in the central LS are Convective Eddies (CE) generated by baroclinic instabilities near the bottom of the mixed layer during and after convection. The temporal variations of CE are associated with local air-sea heat fluxes. The Boundary Current Eddies shed from the Labrador Current appear to exert only minor influence on preconditioning and restratification.