Geophysical Research Abstracts
Vol. 18, EGU2016-4199, 2016
EGU General Assembly 2016

Spatial pattern of convection activity in the subpolar North Atlantic in the winter of 2013/14

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Argo float data from the winter of 2013/14 (December–April, about 1000 profiles) were used for an analysis of spatial characteristics of convectively formed mixed layer (ML) in a region enclosing the Labrador and Irminger seas in the subpolar North Atlantic. The method consisted of mapping the potential density (σ_0) vertical stratification in the water column sampled by Argo and subsequent determination of the ML properties in the sites where the water column is least stratified. Several distinct domains of intense convective mixing were identified (maximum ML depths in parentheses): a domain over the western slope of the Reykjanes Ridge (500 m), a domain immediately south of the Denmark Strait (550 m), the southern interior of the Irminger Sea (650 m), a domain south of Cape Farewell, Greenland, (1050 m) and the interior of the Labrador Sea (1750 m). The ML potential density spatially increased (from 27.37 to 27.73) in the direction of the subpolar gyre cyclonic circulation: the lowest densities of the ML were observed over the Reykjanes Ridge in the Irminger Sea, and the densest ML was found in the central Labrador Sea. The ML thermohaline properties observed over the Reykjanes Ridge and in the vicinity of the Denmark Strait ($\sigma_0 < 27.55$, $\theta > 6.5^{\circ}$C, S > 35.0) are typical of the Subpolar Mode Water, while the ML properties in the southern Irminger Sea, to the south of Cape Farewell and in the Labrador Sea ($\sigma_0 > 27.70$, $3.3 < \theta < 4.0^{\circ}$C, $34.82 <$ S < 34.90) correspond to the Labrador Sea Water. The results are discussed in the context of preceding deep convection events that occurred in the subpolar North Atlantic since the mid-1990s.