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Mixed layer evolution in the subpolar North Atlantic measured by Argo floats

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The mixed layer is the site of ocean-atmosphere interactions. Wind forcing and heat and moisture fluxes induce turbulent mixing and determine the mixed layer depth (MLD). The mixed layer is involved in many oceanic processes, the MLD for instance establishes the volume of water over which the surface heat flux is distributed, and it also determines the ventilation of the deep ocean. In areas where deep convection occurs, winter mixed layer conditions set the properties of the new formed deep and intermediate water masses.
Due to its contact with the atmosphere, atmospheric seasonal changes result in changes of the mixed layer. These changes were examined for the year 2007 by the analysis of 4293 quality controlled Argo float profiles from the subpolar North Atlantic (40 - 67°N).
The MLD in the study region was determined using an algorithm developed by Holte & Talley (2008) which combines physical profile features like profile maxima or minima as well as threshold and gradient criteria to detect the MLD. This algorithm was compared to other methods for identifying the MLD and turned out to be the most appropriate method for the study region. From the resulting MLD the temporal evolution as well as the regional evolution of the mixed layer was examined, and possible causes of these evolutions were explained by air-sea interaction processes. This was done by analyzing surface and momentum fluxes using atmospheric data from the NCEP/NCAR reanalysis. Finally, based on the available data, a mixed layer heat budget was calculated for the year 2007.