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Eddy induced heat transport into and out of the Labrador Sea

Vasco Müller (1), Dagmar Kieke (1), and Paul Myers (2)

(1) University of Bremen, Institute of Environmental Physics (IUP), Department of Oceanography, Germany, (2) University of Alberta, Department of Earth & Atmospheric Science, Canada

The mains interest of our work is the distribution of water masses in the subpolar North Atlantic (SPNA). We ask where and how mixing takes place, if there are localized hotspots of mixing and how water masses are transported across horizontal fronts (e.g. the boundary between subpolar and subtropical gyre). To analyze this, a geometry based eddy detection and tracking algorithm is applied to over 20 years of geostrophic velocities from satellite altimetry. The velocity fields are resolved daily on a 1/4° horizontal grid. The largest numbers of eddies are found in the Irminger Sea, the eastern Labrador Sea and along the North American shelf.
To estimate the heat content of individual eddies and the respective heat transports, the eddy surface area and translation speed from the eddy detection and tracking algorithm are combined with a real-time global sea surface temperature (SST) analysis and a climatological mixed layer depth. We then calculate timeseries of eddy heat transport across transects at different longitudes and latitudes. For the zonal eddy heat transport, we focus mainly on the north-south transect at 44°W (eddies mostly moving westwards into the Labrador Sea). The meridional eddy heat transport is mainly analyzed at the east-west transect across 47°N (eddies mostly moving southward). This transect is located close to the gyre boundary and there are ship based measurements available for this location in order to further investigate the depth structure of individual eddies.