Geophysical Research Abstracts, Vol. 7, 02897, 2005
SRef-ID: 1607-7962/gra/EGU05-A-02897

Using high-resolution numerical models with idealized configurations to compare mixing properties in the Denmark Strait and the Faroe Bank Channel overflow regions

T. Ezer
Princeton University (ezer@splash.princeton.edu)

The Denmark Strait (DS) and the Faroe Bank Channel (FBC) overflows provide the two main sources for the North Atlantic Deep Water (NADW); thus mixing and entrainment in those overflow regions may affect Atlantic Ocean water properties and possibly climate variations. The Dynamics of Overflow Mixing and Entrainment (DOME) project established an idealized model configuration that resembles the DS overflow properties. This setup was used to compare mixing properties in various models (z-level, isopycnal, terrain-following, hydrostatic and non-hydrostatic- see recent papers in Ocean Modelling by Ezer and by Legg et al.). As a follow up on the DOME project, an idealized configuration resembling the FBC region and water properties has been set up. Simulations with a high-resolution terrain-following ocean model point to considerable differences in transport, mixing and entrainment properties between the DS and FBC regions. While the DS overflow bottom plume is subject to intense mixing and entrainment within about 100 km from the sill, the FBC bottom plume is constrained by the topography of the channel with very little entrainment and mixing in the sill area; thus the FBC plume can penetrate farther downstream from the sill (200-400 km in the model) before dilution by eddy mixing starts to take place. Despite the simplicity of the model topography, the simulations are in a good agreement with mixing and bottom plume properties obtained by recent observations in these two overflow regions. This study is part of a collaborative effort to improve overflow parameterizations in climate models- the Climate Process Team for Gravity Current Entrainment (CPT-GCE, http://cpt-gce.org), which includes climate modeling, process studies and observations.