2004 Ocean Sciences Meeting
Search Results

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mitgcm

HR: 16:15h
AN: **OS42G-08**
TI: **Numerical Simulations of Entrainment in Overflows**
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AB: Dense overflows play an important role in transporting dense water formed in marginal seas into the large scale ocean circulation, yet are typically poorly represented in coarse resolution ocean general circulation models. Small scale mixing processes, including shear instability, result in the entrainment of ambient fluid into the overflow, modifying overflow tracers and transport, and ultimately the depth at which overflow water matches its surroundings. Entrainment must be parameterized in coarse resolution models, but there is currently little understanding of the fidelity of present parameterizations of entrainment. This study evaluates the entrainment diagnosed from coarse resolution simulations of idealized dense overflows, using both the z-coordinate MITgcm (in which entrainment occurs through a combination of numerical diffusion and convective adjustment) and the isopycnal HIM (in which entrainment is parameterized by using a Richardson number dependent scheme), and comparing with high-resolution nonhydrostatic simulations, using the nonhydrostatic version of MITgcm. A variety of scenarios with and without rotation and ambient stratification are considered. At horizontal resolutions of 10km (fine enough to resolve the gravity current, yet too coarse to resolve mixing) both z-coordinate and isopycnal formulations are found to underpredict entrainment and diapycnal mixing when compared with the high-resolution simulations. This underprediction of mixing suggests improvements could be made at this resolution by modifying mixing parameterizations.
DE: 4255 Numerical modeling
DE: 4568 Turbulence, diffusion, and mixing processes
SC: OS
MN: 2004 Ocean Sciences Meeting

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