Abstract Submitted
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The effect of stable stratification on initially homogeneous, isotripic turbulence[1] JAMES J. RILEY, University of Washington, STEPHEN M. DE BRUYN KOPS, University of Massachusetts — We report on very high resolution direct numerical simulations of the decay of initially isotropic turbulence in a stably-stratified environment. Simulations were carried out at a fixed, low Froude number, but for a range of Reynolds numbers such that, for the high Reynolds number cases, the flows had buoyancy Reynolds numbers in the hundreds, similar to typical oceanic values. A number of aspects of the flows have been studied, including their energetics, the behavior of various length scales describing the flows, their mixing characteristics, and their spectral behavior. It is found, for example, that, as the flows decay, stratification modifies them such that, compared to non-stratified cases, the energy decay rates decreased, the growth rate of the horizontal scales increased, while the growth rates of the vertical scales became negative. These results are consistent with the analysis of Davidson (*J. Fluid Mech.*, 2010), based upon the behavior of the effects of density stratification on the large-scale motions. It is also found, for example, that the behavior of the spectra of the velocity gradient tensor is consistent with the heuristic arguments of Lilly (*J. Atmos. Sci.*, 1983) and the scaling arguments of Billant & Chomaz (*Phys. Fluids*, 2001).

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