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On spectral energy transfer in strongly stratified flows[1] JAMES RILEY, VISHAL VASAN, OSCAR FLORES, University of Washington, P.K. YEUNG, Georgia Institute of Technology — The fluid dynamics of many regions of the atmosphere and oceans are characterized by being strongly affected by stable density stratification, but weakly affected by the earth's rotation. This is typical of the open ocean, e.g., on horizontal scales from a few meters up to hundreds of meters. One approach to understanding and predicting such flows is by examining their nonlinear, spectral energy transfer. At horizontal scales strongly affected by stratification, vertical motion as well as the stretching of vertical vorticity is suppressed. In addition the stable stratification supports the propagation of internal waves. These features impose strong constraints on spectral energy transfer. We will present the results of direct numerical simulations of strongly stratified flows with Taylor-Green initialization. The simulations are performed using highly scalable codes run on massively parallel computers; the computational domains are highly anisotropic with up to 2048 X 2048 X 256 grid points. This allows sufficient resolution to examine both the downscale as well as the upscale transfer of energy, both which are found to be dynamically significant.

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