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Kinetic Energy Dynamics in Forced, Horizontally Homogeneous, Stably Stratified Turbulence STEVE DE BRUYN KOPS, KAUSTUBH RAO, SABA ALMALKIE, Univ. of Massachusetts Amherst — Recent numerical simulations and scaling arguments have established that in stratified turbulence there is net downscale transfer of kinetic energy. The nature of the transfer is less clear, particularly in how it compares to energy transfer in the inertial range of isotropic turbulence, and the literature suggests that the dynamics depend on the buoyancy Reynolds number, $\mathrm{Re_b}$. To gain further insight, three-dimensional direct numerical simulations with 170 billion grid points are considered. The flows are horizontally homogeneous and vertically stratified with Froude number between 0.125 and 1 and $\mathrm{Re_b}$ between 9 and 219. The complete balances of the horizontal and vertical contributions to kinetic energy are presented in terms of two-dimensional spectra. In this format, the extent in wave number space of the inertial range where the dissipation rate is small compared with other terms in the balance is clear. The spectra also show regions of wave space in which energy transfers downscale in the vertical and then upscale in the horizontal, particularly at low $\mathrm{Re_b}$. They also explain why some published results reporting one-dimensional spectra appear to show high dissipation rate at large length scales.

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