

Effects of Strong, Stable Density Stratification on Motions at Large Horizontal Scales

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For larger horizontal scale motions, strong stratification inhibits vertical motions, in turn inhibiting some specific types of nonlinear interactions and vorticity dynamics which would occur without the strong stratification. This inhibition of nonlinear interactions, as well as nonlinear interactions which are still free to occur, are studied in numerical simulations of strongly stratified flow, and also of other flows where the vertical velocity is analogously inhibited. The latter includes flows near free surfaces and flows in thin layers. The simulation results, along with theoretical arguments, lead to some general insights into flows where one component of the velocity is inhibited.

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