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Modeling small scale mixing in stably stratified turbulence DEREK STRETCH, School of Civil Engineering, University of KwaZulu-Natal, Durban, South Africa, SUBHAS KARAN VENAYAGAMOORTHY, Environmental Fluid Mechanics Laboratory, Stanford University, CA, USA — We use direct numerical simulations (DNS) to study mixing and dispersion in decaying stably stratified turbulence from a Lagrangian perspective. We track the changes in the density of fluid particles due to small scale mixing to provide insight into the mixing process. These changes are driven by spatially and temporally intermittent events that are strongly suppressed as the stratification increases and overturning motions disappear. The density changes of fluid particles are linked fundamentally to diapycnal mixing. We provide a (simple) general scaling prediction for the diapycnal diffusivity based on a model for these density changes. The scaling highlights the fundamental role of the Ellison overturning scale as an indicator of diapycnal mixing in these flows. We demonstrate the validity of the scaling by comparison with data from other DNS experiments for stratified turbulence, both with and without the presence of shear. The results reported here have implications for the development of improved models for dispersion and mixing in stably stratified turbulence.

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