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Classical Turbulence Scaling and Intermittency in Strongly Stratified Turbulence[1] STEVE DE BRUYN KOPS, University of Massachusetts Amherst — A -5/3 slope in the velocity and scalar spectra of stratified turbulence has long been taken as a sign that turbulence in this regime may scale as hypothesized by Kolmogorov, Oboukhov, and Corrsin (KOC). It has also been observed, however, that if the flow is in the strongly stratified regime then the buoyancy force is not insignificant and so some of the assumptions that underlie the KOC scaling hypotheses do not hold. The KOC hypotheses imply more than just -5/3 slope in spectra, though. We consider scaling of the second- and third-order velocity structure functions, the second-order scalar structure function, and the third-order mixed velocity-scalar structure functions. In addition, we examine the scaling of the dissipation rate in light of Kolmogorov's hypotheses on internal intermittency. Direct numerical simulations in the strongly stratified regime with buoyancy Reynolds numbers between 13 and 220 are examined, along with isotropic homogeneous turbulence with similar dynamic range. The simulations are resolved on up to $8192 \times 8192 \times 4096$ grid points. For unstratified turbulence, the dynamic range that these large grids enable is sufficient for KOC scaling to be evident, and for the intermittency exponent to be close to its textbook value.

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Steve de Bruyn Kops
University of Massachusetts Amherst

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