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Turbulence Identification in Stably Stratified Flows DAVID HEBERT, Naval Research Laboratory, STEPHEN DE BRUYN KOPS, University of Massachusetts Amherst — Flows subject to stable density stratification often occur in natural settings such as the ocean and atmosphere. Unlike turbulence in homogeneous flows, when turbulence occurs in density stratified flows it does so in localized, intermittent patches. It is in these turbulent patches that important features of the flow occur, e.g., mixing of species, dissipation of energy. As such, it would be beneficial to be able to identify where turbulent patches occur. Turbulence is a three dimensional phenomena associated with flow vorticity. In this talk, several published vortex identification methods are employed to identify turbulent patches from three dimensional high resolution direct numerical simulations (DNS) of density stratified flows. Vortex identification methods include those based on the second invariant as well as the eigenvalues of the velocity gradient tensor ∇v . The use of DNS allows the results of the identification methods to be compared with actual flow dynamics, such as areas of high energy dissipation rate and enstrophy. Results suggest that while each vortex identification method is able to efficiently extract areas of turbulent activity, they depend on a subjective threshold criterion for meaningful results.

David Hebert
Naval Research Laboratory

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