

Abstract Submitted
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Characteristics of turbulent/non-turbulent interfaces in wakes in stably-stratified fluids¹ TOMOAKI WATANABE, JAMES RILEY, University of Washington, STEPHEN DE BRUYN KOPS, University of Massachusetts, PETER DIAMESSIS, QI ZHOU, Cornell University — The evolution of turbulent patches generated by the wake of a sphere in stably-stratified fluids is studied using direct numerical simulations. The DNS data analysis focuses on the investigation of the characteristics of turbulent/non-turbulence interfaces forming at the wake edge. Unlike the case for non-stratified fluids, because of the non-negligible enstrophy level in internal waves outside the stratified wake, enstrophy cannot be used as a marker for turbulent regions. We show that potential enstrophy is appropriate as a marker for turbulent regions in flows where both turbulence and internal waves exist. Therefore the interface is detected as an isosurface of constant potential enstrophy, and statistics can be calculated conditioned on the distance from the interface. Various quantities are examined from the wake interior to the region outside the wake, and show how the flow properties are adjusted between turbulent and non-turbulent regions near the interface. Based on the conditional analysis, we also report evidence for the strong influence of internal waves on turbulence inside the wake.

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