Abstract Submitted
for the DFD19 Meeting of
The American Physical Society

Turbulence in Forced Stratified Exchange Flows KATHERINE M. SMITH, JOHN R. TAYLOR, JAMIE PARTRIDGE, ADRIEN LEFAUVE, PAUL LINDEN, Department of Applied Mathematics and Theoretical Physics (DAMTP), University of Cambridge, C. P. CAULFIELD, Department of Applied Mathematics and Theoretical Physics (DAMTP) and The BP Institute, University of Cambridge
— Continuously forced, stratified exchange flows occur in many geophysical systems, such as through channels between ocean basins, between coastal shelves and the deep ocean, and at the mouth of rivers and estuaries. These exchange flows can be susceptible to instabilities that promote the growth of turbulence and increase mixing between the two differing flows. While these mixing processes are assumed to be important to global ocean budgets, they are unresolved within Earth system models and therefore must be fully understood in order to include accurately through sub-grid scale parameterization. In this talk, we present results from three-dimensional direct numerical simulations of stratified exchange flows that are continuously forced by weakly relaxing the buoyancy and streamwise velocity back to their initial mean profiles. We explore a range of large and small values of the bulk Richardson number and, after an initial 'spin-up' period, a turbulent steady state is analyzed. Both turbulence and mixing are characterized in each case and comparisons to experimental results are discussed.

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Date submitted: 05 Aug 2019 Electronic form version 1.4