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Spatio-temporal intermittency in stratified shear flow: effects of Prandtl number[1] ADRIEN LEFAUVE, PAUL LINDEN, DAMTP, University of Cambridge — We present laboratory experiments of a stratified shear flow in an inclined square duct, connecting two reservoirs of water at different densities. The exchange flow in which a layer of dense salt-water flows beneath a layer of lighter fresh-water moving in the opposite direction is known to host a rich zoo of behaviors. As the driving density difference or inclination angle is increased, the initially sharp and flat density interface can support Holmboe waves, and then transition to a statistically steady turbulent intermediate mixed layer. Here we report on the significantly different dynamics observed when stratification is achieved by heat instead of salt. Even moderate values of density difference or inclination angle now allow the dramatic growth of interfacial waves causing the flow to transition to a fully-turbulent state, before it relaxes back to a laminar state and so forth. These novel laminar-turbulent cycles exhibit a remarkable periodicity and suggest that the Prandtl number ($Pr = 700$ for salt vs $Pr = 7$ for heat) affects the intermittency and mixing properties of stratified turbulence.

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