

Center for Environmental & Applied Fluid Mechanics



**“In Search of
Stratified
Turbulence”**

**SPECIAL DATE &
SPECIAL LOCATION**

**Prof. Colm-cille Caulfield
University of Cambridge
Applied Mathematics &
Theoretical Physics**

Abstract: Statically stable density stratification is ubiquitous in geophysical flows, with the atmosphere, lakes and oceans all typically having an average density distribution that decreases upwards in a gravitational field. Due to the associated stabilising effect of the buoyancy force, it would seem intuitive that such statically stable density distributions should suppress vertical motions, relative to horizontal motions. Such inevitable anisotropy complicates even further developing an understanding of turbulence in density-stratified fluids. Stratified turbulence is not just a fascinating (and inherently complicated) research challenge in classical physics, but also a key component of the global climate system, as stratified turbulence has a leading order effect on the transport of heat and other scalars such as carbon dioxide, pollutants etc in the world’s oceans and atmosphere. Indeed, how stratified turbulence can actually be ‘born’ and then ‘survive’ for a significant period, hence irreversibly mixing significant scalar quantities, are open questions, associated with ongoing controversy in the global research community. In this talk, I will review some recent studies by my collaborators that have advanced our understanding of various key properties of stratified turbulence and mixing, while also demonstrating that there is still much more to learn about this fascinating and vitally important class of fluid flows.



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September 30, 2024 ✦ 3:00 PM ✦ Shaffer 2

