

## Abstract

“A competition between turbulence and baroclinic instability in the upper ocean“

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The upper ocean is a highly energetic and dynamic environment that plays an important role in the climate system by mediating fluxes between the atmosphere and deep ocean. Here, two dynamical processes play competing roles. Baroclinic instabilities arise due to ubiquitous horizontal density gradients across the ocean surface. These instabilities release available potential energy and increase the vertical stability of the water column. Small-scale turbulence is driven by forcing from the atmosphere and larger ocean eddies, and acts to mix away any vertical stratification. The competition between turbulence and baroclinic instabilities ultimately controls the stratification of the upper ocean and influences vertical fluxes of important tracers. In this talk, I will describe results from large-eddy simulations which are able to explicitly resolve baroclinic instabilities and turbulence, and will discuss recent efforts to unravel some of the fundamental fluid dynamical processes in the upper ocean.