Abstract

“Baroclinic Equilibration with Topography”

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Large-scale ocean and atmospheric flows exhibit baroclinic instability, leading to energetic eddy motion. When the eddy fluxes themselves contribute strongly to determining the background state, the resulting problem is called "baroclinic equilibration." This talk will focus on the Southern Ocean, where baroclinic equilibration of the Antarctic Circumpolar Current (ACC) plays an important role in setting the global deep ocean stratification. The ACC stratification is determined by the competition between Ekman-induced upwelling and eddy-driven restratification. The specific question addressed here is how the presence of large-scale topography (i.e. large ridges such as the Kerguelen Plateau) affects the efficiency of eddies at restratifying the thermocline. The problem is studied in an idealized domain, using high-resolution primitive-equation numerical simulations and a highly simplified quasigeostrophic model. The results show that topography significantly enhances eddy efficiency and qualitatively alters the character of the baroclinic instability throughout the domain.