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Internal Wave Scattering in Idealized and Realistic Continental Slope Canyons[1] ROBERT NAZARIAN, SONYA LEGG, Princeton Univ — When internal waves interact with topography, such as continental slopes, they can deposit their energy to local dissipation and mixing. Submarine canyons comprise about ten percent of global continental slopes, and can enhance the local dissipation of internal wave energy, yet parameterizations of canyon mixing processes are currently missing from ocean models. As a first step in developing such parameterizations, a parameter space study of M2 tidal-frequency, low-mode internal waves interacting with idealized canyon topographies was conducted. A two-pronged approach was employed in which a suite of MITgcm simulations was compared with a novel, analytical ray tracing scheme. The most noticeable result was that, as the ratio of the canyon mouth width to canyon length decreased, there was a marked increase in the relative energy loss. This energy loss also increased as the canyon sidewall steepness increased. Processes leading to this increased energy loss include increased energy focusing, increasing vertical wavenumber via multiple reflections for non-vertical sidewalls and the presence of arrested lee waves for vertical sidewalls. To test the robustness of these results, we model the energy lost from remotely-generated M2 internal tides in three realistic canyons with very different geometries: Veatch, La Jolla and Eel Canyons, comparing results with both idealized simulations and microstructure data taken from these locations. We also discuss how current parameterizations of tidally-driven diapycnal mixing can be extended to include the effects of continental slope canyons.

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Robert Nazarian
Princeton Univ

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