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*Causes and diagnostics of internal tide scattering by balanced vortices*

Internal tides are oceanic internal waves that oscillate approximately at tidal frequencies. However, their scattering by the turbulent oceanic eddy field leads to a modulation in amplitude and frequency. Satellite altimeters, which are our most reliable measurements to track internal tides globally, suffer from a sampling that is too coarse in time to capture the tidal oscillations when these modulations are important. This talk will describe our attempts to shed light on these processes from two complementary approaches: one idealized and one data-driven. I will first present numerical experiments of tidal wave scattering by isolated barotropic balanced vortices and propose a scaling law for how much scattering happens for a given wave/vortex pair. In a second part, I will describe how our group trained and tested a deep-learning algorithm to produce snapshots of the tidal wave's signature based on raw snapshots of synthetic sea surface heights containing both eddies and waves.