

# Observations of bispectra in the propagating internal tide

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## Abstract

We present evidence of wave-wave interaction between the low-mode, semidiurnal tide and high-mode, near-inertial motions. Data are examined from five central Pacific sites, each within an  $M_2$  tidal beam. In the Hawaii Ocean Mixing Experiment (HOME) Nearfield, conducted at a strong generation site for the internal tide, significant bicoherences are observed between frequency groups  $(M_2, f, M_2 - f)$  and  $(M_2, \frac{1}{2}M_2 + \varepsilon, \frac{1}{2}M_2 - \varepsilon)$ . At HOME Farfield, 400 km away from the generation site, the bicoherences are no longer observed. In Internal Waves Across the Pacific (IWAP), the internal wavefield was sampled at successive latitudes along a tidal beam propagating northward from French Frigate Shoals. We compare results from three widely-separated moorings along the line. Strong bicoherent signals are once again observed, but only at the critical latitude of  $28.8^\circ\text{N}$ , where the  $M_2$  tide and the local inertial frequency  $f$  are in perfect resonance. An estimate of the energy balance between the  $M_2$  internal tide and near-inertial daughter waves is computed from the frequency-wavenumber bispectrum. The results suggest that nonlinear interactions of the Parametric Subharmonic Instability (PSI) class contribute to the energy cascade from  $M_2$  energy toward low frequencies/high wavenumbers.