STRUCTURE AND VARIABILITY OF INTERNAL TIDES IN MAMALA BAY, O'AHU, HAWAI'I

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Abstract

This thesis demonstrates, from current and temperature observations, that approximately 60% of the observed semidiurnal internal tide variance in Mamala Bay, located off the southern shore of O'ahu, Hawai'i, is phase-locked to the surface tide. It is further demonstrated, using a three-dimensional numerical model, that the observed internal tide is non-locally generated in contrast to the converging barotropic tidal flow hypothesis of *Hamilton [1995]*. The coherent semidiurnal internal tide is observed primarily at 240 m depth in the central regions of the Bay and is partially described by a standing wave. The observations and model results support the conclusion that coherent internal wave energy generated in the deep (500-1000 m) waters of the Kaua'i and Kaiwi Channels, as well as offshore, gets focused and amplified at the head of Mamala Bay. A westward net flux of baroclinic energy suggests the primary internal tide energy source emanates from the east side of the Bay in the Kaiwi Channel.