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Internal wave generation by tidal flow over topography in the deep ocean MATTHEW S. PAOLETTI, MATTHEW C. DRAKE, HARRY L. SWINNEY, University of Texas at Austin — We present experimental and numerical studies of internal wave generation by tidal flow of an exponentially stratified fluid over bottom topography in a model of the deep ocean. King et al. (J. Geophys. Res. 117, C04008 (2012)) recently found many locations in the deep ocean where the stratification becomes so weak that the buoyancy frequency (proportional to the square root of the density gradient) becomes less than the tidal frequency; below such turning depths internal waves decay exponentially. Prior studies predict that topography beneath a turning depth would be unable to extract power from tidal motions and convert it to internal waves. However, we find that tidal motions over topography beneath a turning depth radiate internal waves, although the power is greatly diminished compared to cases of stronger stratification. We recover prior predictions of the radiated power by averaging the nonuniform stratification over an effective height. In the absence of a turning depth, the effective height is given by the actual topographic height, but for weak stratification where there is a turning depth, the effective height monotonically increases with turning depth height until it encompasses the entire fluid depth for very weak stratification.

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