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Effect of slope criticality and tidal forcing on internal tide energetics at a model ridge NARSIMHA RAPAKA, BISHAKHDATTA GAYEN, SUTANU SARKAR, University of California San Diego — Direct and large eddy simulations are performed to study the internal waves generated by the oscillation of a barotropic tide over a model ridge of triangular shape. The criticality parameter, defined as the ratio of the topographic slope to the characteristic slope of the tidal rays, is varied from subcritical to supercritical values. The barotropic tidal forcing is also systematically increased. Higher baroclinic modes are generated with increasing criticality parameter, resulting in generation of intensified beams near the topography in critical and supercritical cases. The radiated internal wave energy flux increases from subcritical to supercritical cases in laminar flow regime. In critical and supercritical cases with higher forcing, there is turbulence and significant reduction (as much as 25%) of the radiated wave flux with respect to laminar flow results. Analysis of the baroclinic energy budget shows that the decrease in the radiated wave flux is associated with a decrease in energy conversion from the barotropic to baroclinic flow, caused by increased drag and mixing of momentum near the ridge, and additionally because of conversion to turbulence.

Narsimha Rapaka
University of California San Diego

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