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Turbulence generation by tide-driven resonant internal waves on a continental slope HEPENG ZHANG, BEN KING, HARRY L. SWINNEY, University of Texas at Austin — Turbulent flow over a continental slope is spatially heterogeneous. Near so-called "critical regions", where the topographic slope coincides with the propagation slope of semidiurnal internal waves, turbulence can be orders of magnitude stronger than other places. Formation of these localized energetic regions is conventionally explained by critical reflection from the continental shelf of remotely generated internal waves. We have conducted laboratory experiments on tidal flow past a sloping bottom boundary in a tank of stratified fluid. The experiments reveal that at resonance, the tidal forcing generates a narrow and intense internal wave beam parallel to the slope. When the Richardson number ($\frac{N^2}{(dU/dz)^2}$), where N is the buoyancy frequency, is less than 1/4, the strong shear produced by the intense internal wave beam destabilizes the beam, and turbulence is generated through the formation and breaking of Kelvin-Helmholtz billows.

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