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Investigation of the mechanism in the formation of power-law spectrum of internal waves YULIN PAN, BRIAN ARBIC, ARIN NELSON, University of Michigan, Ann Arbor, DIMITRIS MENEMENLIS, California Institute of Technology, RICHARD PELTIER, University of Toronto — We consider the formation of power-law spectrum of internal waves in a stratified ocean. The collection of field measurements have shown considerable variability of the spectral slopes compared to the high-wavenumber high-frequency part of the Garrett-Munk spectrum. Theoretical explanations on the spectral slopes have been developed in the context of the stationary solution of the kinetic equation. Depending on the properties of the collision integral (divergence or convergence at two ends), different power-law solutions can be found, resulting from different mechanisms of nonlinear interactions. In this work, we study the mechanism in the formation of power-law spectrum of internal waves in a realistic ocean, utilizing the numerical data from high-resolution ocean modeling. We show that the model captures the power-law spectrum in a broad range of scales (e.g., almost two decades in frequency). The nonlinear interaction is studied using a bi-coherence analysis and a new approach for a direct evaluation of the collision integral. The results show that the integral is dominated by the non-local interactions involving the low-frequency modes, implying the importance of induced diffusion mechanism. This is consistent with the spectral slopes observed in the model.

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