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Energy transfer in the abyss.

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Interaction of tides with orography of the ocean produces mechanical energy input of the order of 1TW. But as a result of this monochromatic or biharmonic energy input we see a multi-scale and multi-frequency energy spectrum described by Garrett-Munk approximation. So the important question remains how energy is transfered from large scales to small scales and how mixing occurs in the depth of the ocean. Recent research showed that internal waves attractors may serve as the mechanisms of the increase of energy due to focusing and subsequent instabilities, and mixing due to overturning. We have made experiments and numerical simulations of large-amplitude wave attractors, which showed cascades of triadic resonances with discrete spectrum for moderate supercriticalities, and intensive mixing due to overturning of small-scale waves for larger amplitudes. We have also showed the existence of 3D waves attractors generated by localized sources of perturbations in 3D trapezoidal domains. The existence of almost 2D attracting structures support the hypothesis of importance of wave attractors in final wave dynamics of the deep ocean. In the present report we discuss the scale effect in wave attractors in linear and nonlinear regimes.