

Intermittent Mixing by Multiscale Breaking of Wind Waves: Implications for Oil Dispersion

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We simulated the intermittent mixing by breaking waves with the use of non-stationary 1D two-equation turbulence model. The wave-breaking layer with thickness of half significant wave height was included into consideration. An injection of turbulence by penetrating breakers in this layer was parameterized by source term in the turbulent kinetic energy and dissipation equations. The Monte-Carlo simulations of intermittent mixing were carried out. They support assumption that observed log normal distribution of dissipation rate is associated with breaking of waves in many scales. An intermittent mixing effects on the scales of breakup and dispersion in water of oil droplets in the wave breaking layer. The detailed results of simulations of turbulence and droplet spectre and concentration in the wave enhanced layer for stormy conditions by linked model of surface turbulent layer and 3D Lagrangian model of oil spill are presented.

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