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Transformation and disintegration of internal waves near lake boundaries

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The baroclinic response of stratified lake to external wind forcing is studied. The degenerations of basin-scale internal waves into packets of solitary waves, their successive interaction with lake boundaries, as well as overturning and breaking with generation of spots of mixed water are important mechanisms for the transfer of energy within stratified lakes. Manifestations of such a cascading of energy from large to small scales and ultimately to turbulence was observed during the summer campaigns in Lake Onega in 1987 and 2004.

A fully non-linear non-hydrostatic numerical model was applied to reproduce the conditions of the field experiments. Particular attention was paid to the processes of transformation and disintegration of internal waves during their shoaling near the lake boundaries. Results of numerical modelling were compared with in-situ data. It was demonstrated both experimentally and theoretically that strong nonlinear wave-topography interaction can affect the background stratification.