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Energy flux and shoaling internal solitary waves

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Internal solitary waves are common, highly energetic occurrences in the coastal ocean. The fate of shoaling internal solitary waves is important for a number of reasons, the most important being the location and distribution of the mixing associated with the break-down of the waves. Here high-resolution two-dimensional numerical simulations of shoaling internal solitary waves will be presented. We consider two situations: the first is waves propagating across a shelf slope. The time-evolution of the available potential energy and kinetic energy of the waves as the shoal will be considered. In addition, comparisons with the predictions of two weakly-nonlinear models are made. The second situation considered is waves propagating along a thermocline which intersects the boundary. Here breaking occurs and some energy is dissipated, some goes into irreversible mixing and some is reflected. Past laboratory and numerical estimates of the reflectance coefficient (ratio of reflected to incident wave energy) have been based on incorrect calculations of the available potential energy flux. Here we correct the problem and discuss the impact on reflectence coefficients.