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Internal wave bolus detection and analysis by a Lagrangian coherent structure method[1] MICHAEL R. ALLSHOUSE, G. SALVADOR-VIEIRA, HARRY L. SWINNEY, Center for Nonlinear Dynamics and Department of Physics, University of Texas at Austin — The shoaling of vertical mode internal waves on a continental shelf produces boluses, which are trapped regions of fluid that travel up the shelf with the wave. Unlike a propagating solitary wave, these boluses can transport material with the wave. Boluses have been observed to transport oxygen depleted water and induce rapid changes in temperature both of which have potential ramifications for marine biology. We extend a number of two-layer studies by investigating bolus generation and material transport in continuously stratified fluids. Laboratory experiments are conducted in a 4 m long tank and are complemented by 2-dimensional numerical simulations of the Navier-Stokes equations. The boundaries of a bolus are identified using a Lagrangian based coherent structure method relying on trajectory clustering. The time evolution of material transport by the bolus is investigated as a function of the stratification, wave properties, and the angle of the sloping topography.

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