Abstract Submitted
for the DFD16 Meeting of
The American Physical Society

Numerical modeling of convective instabilities in internal solitary waves of depression shoaling over gentle slopes GUSTAVO RIVERA, PETER DIAMESSIS, Cornell University — The shoaling of an internal solitary wave (ISW) of depression over gentle slopes is explored through fully nonlinear and non-hydrostatic simulations based on a high-accuracy deformed spectral multidomain penalty method. As recently observed in the South China Sea, in high-amplitude shoaling ISWs, the along-wave current can exceed the wave celerity resulting in convective instabilities. If the slope is less than 3%, the wave does not disintegrate as in the case of steeper slope shoaling but, instead, maintains its symmetric shape; the above convective instability may drive the formation of a turbulent recirculating core. The sensitivity of convective instabilities in an ISW is examined as a function of the bathymetric slope and wave steepness. ISWs are simulated propagating over both idealized and realistic bathymetry. Emphasis is placed on the structure of the above instabilities, the persistence of trapped cores and their potential for particle entrainment and transport. Additionally, the role of the baroclinic background current on the development of convective instabilities is explored. A preliminary understanding is obtained of the transition to turbulence within a high-amplitude ISW shoaling over progressively varying bathymetry.

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Date submitted: 31 Jul 2016 Electronic form version 1.4