# Numerical modeling the development of field-scale internal boluses via barotropic tidal forcings

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Two-dimensional, nonlinear, nonhydrostatic numerical SUNTANS simulations are carried out to investigate the evolution of field-scale internal boluses and bottom surges across a shelf break. The goal is to better understand the generation, propagation, and dissipation of these field-scale boluses. The model experiments are motivated by results from April, 2005 in the South China Sea which show the formation of detached bottom-trapped boluses which propagate shoreward over the continental shelf. Associated with the boluses are a highly nonlinear internal tide as well as strong near-bottom stratification. The characteristics of these boluses / surges will depend on several factors, including the incoming tide which may have barotropic and baroclinic components. This study explores the effect of semidiurnal (M2) and diurnal (K1) barotropic tidal boundary conditions on the resulting boluses/surges structure and propagation. High-resolution (50 m horizontal, 1 m vertical) numerical simulations are executed using realistic stratifcation collected from data in the South China Sea. Preliminary results show a nonlinear steepening face of the isopycnals landward of the shelfbreak. As the propagation continues, instabilities appear on the back side of the wave lead to wave breaking. Quantitative comparison of the model runs with observations from the South China Sea are underway. Algebraic multigrid solver is presently being incorporated into SUNTANS to expedite the nonhydrostatic pressure Poission equation solution.

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