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Nonlinear Processes in Geophysics
Discussions
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Interactive comment on "Shoaling of internal solitary waves at the ASIAEX site in the South China Sea" *by* K. G. Lamb and A. Warn-Varnas

Anonymous Referee #2

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Review of Lamb and Warn-Varnas

Shoaling Internal Solitary Waves

General Comments:

I like this paper by a very accomplished pair of theoreticians. The numerics have been very carefully done with several cases dedicated to demonstrating their veracity. Nonlinear waves are produced which resemble the waves actually observed in the South China Sea.

My primary criticism is they didn't really do enough when it comes to comparing the results to observations. The authors went to great lengths to accurately reproduce the bottom slope, topographic bumps, etc. of the SCS ASIAEX region, but then they

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never really got round to going back and comparing the model output with the actual field observations. There are many examples for instance in the IEEE ASIAEX special volume that show several of these features really well. Examples include the squared-off waves, the broadening of the waves with decreasing water depth, the shape of the broad wave with the shallower slope on the leading edge and the extremely steep back side, even some examples of split waves whose spacing and timing looks similar to the simulated waves. The paper could be strengthened by referring to/comparing more specifically to some of those results. When it looks good, you might as well show it!

On a similar but not quite the same note, I think it's not quite clear what, if anything, the shoaling has to do with a-waves vs. b-waves. These waves are described in the introduction, and then one might be led to believe that it is the described shoaling mechanism that creates the a-wave packets. Actually, it's not, because the a-waves already exist as very clear packets in the deep basin (2500 m water depth) and do not require a shoaling mechanism to create them, they are already there. That's not to say the work is not relevant: Both large b-waves (which are generally solitary) and the leading wave in a type a-packet (usually the biggest ones) are observed to split and form additional waves as the waves shoal. This only happens for the largest waves generated near the spring tide, but it does happen.

Finally, can the authors comment any more on the wave energetics? Is energy conserved, i.e., the energy in the original specified wave equals the sum of the energy in the split-out waves? If not, where is the energy coming from?

Smaller stuff:

The title should include something to suggest that these are simulations and not observations

Bottom page 2 and top of page 3: Even Zhou and Alford now admit this is wrong! Subsequent work including their own shows it's the eastward flow in the strait that pops off the big ones.

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Figure 18: (b,c) should be (b,d)

Interactive comment on Nonlin. Processes Geophys. Discuss., 1, 1163, 2014.