

Nonlin. Processes Geophys. Discuss., author comment AC3
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Reply on RC1

Steven R. Ramp et al.

Author comment on "Observations of shoaling internal wave transformation over a gentle slope in the South China Sea" by Steven R. Ramp et al., Nonlin. Processes Geophys. Discuss., <https://doi.org/10.5194/npg-2021-29-AC3>, 2022

Reviewer #1 (anonymous)

- Focus: Our intent is definitely to focus more on transformation than generation. I agree the first part on arrival patterns was too long and laborious and have shortened it in the revision. I also explained how the waves labeled in Figure 3 were identified using additional information. I've added some words as to why a- vs. b-type waves matters. The all-new Figure 3 is much clearer. I deleted Figure 4a because one of these types of figures is sufficient.
- Energy budget: Theory is great, and very sophisticated these days, but there is still no substitute for field observations that confirm or conflict with published theoretical ideas. I think that the energy and energy flux changes as the waves progressed upslope agreed well with the theoretical expectation is both encouraging and useful.
- Near-bottom currents. Unfortunately, the reason there is not more about this is that the near-bottom currents were not well observed. Prior to this experiment, we didn't know whether the large dunes were moving or stationary. The instruments were intentionally arrayed such that they would not be buried and lost by migrating dunes. This precluded placing instruments in the bottom boundary layer. Now that we know the dunes are essentially stationary (migrating a few tens of centimeters per year) we could go back and put more instruments on the bottom. Funding for this exercise remains to be seen. We also attempted to measure the bottom currents with lowered instrumentation, but there was just no way to keep the package near the bottom. The drag on the wire due to wave-induced currents lifted the package about 150 m off the bottom when a wave went by, no matter how much weight we hung on it.

Changes to Figures

Table 1: I am fine with this being an appendix, if the editors concur.

Figure 1: This figure is all new, including the color bar. It's a big improvement over the original.

Figure 2: The pink line is just the base line used to compute wave propagation direction. This is now stated in the figure caption.

Figure 3: An all-new figure. Per the reviewer's suggestion it now shows displacement rather than temperature fluctuations. The new labeling technique makes the waves clearer.

Figure 4: We eliminated one of these to shorten the paper/discussion. We think one of these suffices. Maybe it is just experience, but I am certain beyond a shadow of a doubt that the waves are labeled correctly.

Figures 5-7: I'm sticking to my guns on this one. To me (and the sponsor) the temperature fluctuations/gradients are more interesting and instructive than the displacements. It also shows where the waves are in relation to the internal tides.

Figure 8: I like the bar graph! I changed the description in the text a bit though. Small waves (less than 50 m) advanced unchanged or continue to grow. Large waves max out at YPO1, then decrease slightly to CPO, then decrease a lot to RPO.

Figure 9: I adjusted the image brightness and contrast in photoshop and displaced the yellow lines a bit more so they do not mask the wave fronts. I think it's better.

Figure 10 and 11: I quite agree with the reviewer and the velocity color maps have been changed to red/blue to match Figures 12-14.

Figures 12-14: It's hard to choose which ones to show! Some of the packet structure is out of view to the right in Figures 12-13, at the expense of showing the details of the velocity structure. I'd call the wave packet in Figure 14 evenly spaced, rather than rank ordered. Clearly though, the b-wave behaved differently from the a-waves.

Figure 15. The figure is a little dense, but I've played around with it a bit and have not come up with anything better. With a little patience you can make it out. I also improved the words in the text describing the figure.

Figure 16. Is unchanged.