Nonlinear Processes in Geophysics Discussions

Nonlin. Processes Geophys. Discuss., author comment AC4
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Reply on RC2

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-AC4, 2022

Reviewer #2 (Peter Diamessis)

- Overlooked references: Thanks for pointing these out. As noted in a previous communication, this paper sat around for a while before submission. Sorry about that. I have added references to these and in fact several other recent publications to update the manuscript. With regard to Chang et al., [2021] on marginal instability, there is another paper on the same data set, here referenced as Chang et al., [2021b] that is more useful to reference. Since these sand dunes waves aren't breaking, marginal instability isn't so interesting as other aspects. Since NPG will graciously allow references to papers in revision, I have also added references to Ramp et al., [2022] which is the same data set as Chang et al., [2021b] (co-authors on both papers). I can provide a preprint of this if you like. The R-R [2020] is an excellent paper, but again, it is more concerned with breaking and trapped cores, which are of no concern in the sand dunes data set. I nevertheless found a few useful ways to reference it. Chang et al., [2021] (long term-observations) again has a lot on breaking but also some nice material on the basics, fortnightly cycles, seasonal cycles, etc. which has now been referenced.

- The a- vs. b-waves. I have tried to shorten and clean this up a bit, specifically as it applies to shoaling and transformation, rather than generation, which isn't so much the point of this paper. Seven years and two more field programs later, we no longer believe (or at least I don't) in the a-wave on ebb, b-wave on flood generation scenario, so this has been expunged from the manuscript! The various possible generation mechanisms do not need to be discussed in the paper.

- The primary reason the waves are not breaking is that they are 50% smaller than the waves shoaling to the southwest. This is now more obvious in the new Figure 3, which can be directly compared to a similar figure in Ramp et al., [2022] from off Dongsha Atoll.

- Breaking criteria: As I re-read R-R 2020 and V&H 2002 I realized that their criteria, which includes the bottom slope, is only applicable for steeper slopes than the mean slope in the sand dunes area (which is very slight). I have fallen back to earlier, simpler expressions which produce much more reasonable numbers for the breaking wave criteria. The result is unchanged: the observed amplitudes were too small to break.

- We did not get into background shear/density since I think it is secondary to the bottom depth, thermocline depth, and wave amplitude. And the waves weren't breaking anyway.