

## ***Interactive comment on “Predictability of Non-Phase-Locked Baroclinic Tides in the Caribbean Sea” by Edward D. Zaron et al.***

### **Anonymous Referee #1**

Received and published: 29 May 2019

This manuscript describes the decomposition of low-frequency, tidally phase-locked and high frequency (assumed to be dominated by non-phase-locked) baroclinic sea surface height in an operational assimilated high-resolution ocean model of the Caribbean Sea (AMSEAS). The results are of regional interest, as there are few in-situ observations of internal tides in the Caribbean, but I feel that further analysis would give the paper wider appeal to the global internal wave/tide community. That said, I am not in the position to comment on the implications for the operational ocean model community. My suggestions for possible further work are to investigate interference between the multiple internal tide generation sites that are mentioned and/or the radial dispersion from Aves Escarpment.

Specific comments:

Page 1, Lines 20-22. Briefly explain how is is possible to separate the phase-locked baroclinic tide from the barotropic tide in satellite altimetry datasets.

Page 3, Line 12. ...sea surface heights data.

Figure 2. It is not clear to me that Figure 2 is necessary. You have already stated that the AMSEAS has been skill assessed and validated. I suggest Figure 2 and the related main text is cut or put in an appendix under a title of Further model validation (or similar).

Figure 3. This figure needs a colorbar.

Section 3. To confirm, both total (barotropic and baroclinic) sea level anomaly and baroclinic (steric, from temperature and salinity) sea level anomaly are output by the model? This needs to be clarified.

Section 3. How is it possible to separately resolve the M2 and S2 tides from a 96 hour timeseries? If I have missed something it need explaining more clearly.

Page 7, Lines 11-13. See also Guihou et al. (2017, JGR) and Aslam et al. (2018, Progress in Oceanography).

Section 4. The first two paragraphs of this section would be easier to understand if you referred to the example in Figure 6 earlier and used your standard notation (low frequency, phase-locked, and non-phase-locked) consistently. Non-phase-locked and high-frequency are used interchangeably despite stating on Page 9, Line 8 that the former will be used.

Figure 8. This figure would be improved if it had the same layout as Figure 6. RMS low frequency is stated as not shown, but it would be if the same figure layout was used.

Figure 9. Change forecast on the y-axis of panel a to fcst.

Figure 10. This figure would be improved if the line colours were used consistently, e.g., in panel a LF fcst is red so in panel b HF fcst should be red as well. Why is total

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SLA not shown in panel b?

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Interactive comment on Ocean Sci. Discuss., <https://doi.org/10.5194/os-2019-53>, 2019.

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