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Ocean Science
Discussions

Interactive comment on "The nodal dependence of long-period ocean tides in the Drake Passage" *by* Philip L. Woodworth and Angela Hibbert

X. Feng (Referee)

xiangbo.feng@reading.ac.uk

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This paper is to confirm the capability of the equilibrium tide theory in predicting the nodal (18.61 years) variations of long-period tides at high latitudes, using ∼31 years of bottom pressure recorder (BPR) data. Due to the fact that the long-period tides are usually very small tidal signals compared to the dominant diurnal and semi-diurnal constituents such as O1 and M2, detecting their long-term variations (i.e.nodal cycle) is always a challenge for oceanographers. It's good to see Woodworth and Hibbert making progress on this topic thanks to their very careful analysis work. It is more interesting to see this paper tackling the nodal cycle of long-period tides in the ACC region where ocean current is energetic and is supposed to have strong influence on these tidal signals. In addition, the diagnostic approach in this paper can be easily

extended to other regions, which will help to complete the world map of such tidal analysis. This is an interesting paper and is pleasant to read. I only have some suggestions as below.

1. P1 31: 't=0,' =>'t=0. Eq[1] is further modified to;'?

2. P6 6-8: Are the daily mean values suitable for resolving Mt (9.13 days)? Using daily means might be one of reasons for large error bars in Fig7. Though there are some discussions on the complications of this analysis approach, it will be better if authors can further discuss(/investigate) the dependence of long-period tides, especially Mt, on data temporal resolution.

3. P7 4-7, Fig4 and other places in text: why is non-tidal variability larger in the south side as however there are more eddies in the north as authors mentioned in P12 5? MJO (intraseasonal) is taken as one potential contributor but it seems to me that there are still some significant features at longer timescales (e.g. in Fig4b between 350day and 450day, between 510day and 610 day). A bit more explanations/speculations are suggested to add here.

4. Subsection 3.2: It compares the long-period tides derived from BPR and also the tide gauge record. How the power spectral distributions differ between those two kinds of records? If BPR has advantages of resolving long-period tides over tide gauge data, due to less non-tidal variability, one may expect there are more noises close to the 3 constituents' frequencies (Fig3). Is this true? It's good to show this merit.

5. P8 1-3 and Fig5b: It's worth proposing some explanations why such north-south differences are observed here, when this is not expected from the theory.

6. Fig 6&7: small amplitudes and large error bars make it difficult to detect the nodal cycle. It seems to me that error bars are slightly larger in the 1st decade. Is this related to BPR data density used? It'll be good if the data availability (after QC) of such 45 BPR records is provided.

7. Author used FES2014 model to discuss the spatial variation of long-period tide parameters. FES models are assimilated by satellite altimeter data, which to me however have some limitations at high latitudes. Is this a noticeable concern here?

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