Ocean Sci. Discuss.,
https://doi.org/10.5194/os-2018-104-AC2, 2019

Ocean Science
Discussions

Interactive comment on "The impact of sea-level rise on tidal characteristics around Australasia" *by* Alexander Harker et al.

Alexander Harker et al.

harker@igg.uni-bonn.de

Received and published: 15 January 2019

We thank the editor for their constructive commentary about our work. Comments received about the implementation of the boundary conditions of the domain prompted a review and recalculation of our simulations, resulting in significantly different results. We moved from using elevations as prescribed by TPXO8 to those from a global forward model. For computational cost and time reasons this model was run using the M2 and K1 constituents only, making it necessary to limit the manuscript results to these constituents. Unfortunately this means our discussion of S2 no longer appears in the manuscript, and any suggestions pertaining to this section cannot be addressed.

A first is the word Australasia in the title. Australasia means Australia, New Zealand and

the west Pacific islands and (maybe) Papua New Guinea. But there is no discussion of New Zealand tides in the text, so at first I thought Australasia should be replaced by Australia. But then many of the figures even cut off the southern part of Australia. Why was that? So I think the title might be revisited.

The title has been revised in line with your comment. The previous focus on the north of Australia was because that was where most of the notable changes to amplitude within the domain occurred. As of the new simulations undertaken, a new figure showing the south has been included.

page 1, line 5 and 8 - there are mentions in the abstract and text of places that can be unfamiliar and so need qualifying e.g. on line 5 this should be Arafura Sea (between Australia and Papua New Guinea). On line 8 Papua should be Papua New Guinea I guess (Papua is a province of Indonesia which I think is not is what is meant). Some of these places are later pointed out in Figure 1 but the reader will not know them at this point.

The abstract has been rewritten with, hopefully, more immediately recognisable descriptions of locations.

22 - I don't understand why Woodworth (2017) is given here. It is not relevant to the sentence.

This was a mistaken placement of the reference, now removed

page 2, line 1 - the main peaks in extremes in most parts of the ocean, where there is a semidiurnal tide, are every 4.4 years or so from the perigean cycles in the moon's orbit. You get peaks in extremes every 18.6 years where there are diurnal tides. You could references Haigh (JGR, 2011) for example or Pugh and Woodworth (2014) or Merrifield et al. (JGR, 2013).

10 - again I don't see why the Mawdsley reference is relevant to this sentence.

13-15 - you could reference the AR5 somewhere here.

23 - phenomena –> phenomenon

The above spelling and reference suggestions have been implemented

24 - again, who knows where the Sahul shelf is?

Potentially confusing place names have been removed, and the locations discussed in the paper are now all found in Figure 1.

26 - dissipation on a par with the Yellow Sea ..

Changed to "...dissipation comparable to that of the Yellow Sea..."

page 5, eqs. 6 and 7 - these need reformatting

23 ' 'Additional runs'. I think a few extra words are needed to clarify that these additional runs were not used.

The Section 2.3 has been reformulated to describe the new simulations performed.

page 6, Figure 2 - ok for amplitude. Is phase lag agreement worth showing?

Median phase differences have been calculated and describe in the text [page 8, line 15]

20 - reword 'A comparison of the amplitudes of the constituents calculated ...'

Reworded to "A regression of the constituent amplitudes calculated"

page 7, line 18 - I can see from the figure that the signs are often in agreement, I can't see the 'reproduces much of the in situ variability'. Needs explaining better.

page 8, line 3 - surely standard deviations should be standard errors?

.... annual tidal estimates of M2. Stations with insignificant measured phase . . .

Section rewritten to account for above comments

section 3 - this seems to me to need a couple of introduction sentences to say that you

will here in this section be testing SLR of 1,3,7 m for the modelling.

page 9, 13 - I don't see how the reader can relate to 10m change which is not shown, so add (not shown) to make it clear.

Section has been rewritten to discuss the updated simulation.

page 10, in Fig 5 caption and the y-annotation 'phase' should be 'phase lag' and it is Greenwich phase lag presumably.

Caption and Figure altered

line 2 - I think this should read: .. movement of a virtual amphidromic point (an amphidrome over land) (see Fig. 5) .. to become real (i.e. amphidrome over the ocean) . . .

Modified as suggested by comment

page 11, line 1 of Figure 6 caption - .. model domain in the control run. You should make clear which way the difference works.

The way the difference works is now explicitly stated in the figure caption "(FL - Control)"

Figure 7 - does the 200m refer to the control run bathymetry?

Yes, this has now been made explicit in the figure caption.

second sentence caption - I don't think is necessary.

Second sentence in caption has been removed

line 5 - why south coast chopped off?

This was to highlight some of the more complex structure in the dissipation changes. The figure now shows the full domain.

page 12, 1 and 2 - have JBG and VDG acronyms been defined?

The acronyms have been deemed unnecessary and removed.

13 - Eighty-Mile Beach

Sentence has been removed

page 13, Figure 9 - you have FL-cntl and FL-NFL so it might help to have a third column of maps for NFL-cntl so the reader did not have to do mental arithmetic.

The figures originally showed FL-Ctrl beside NFL-Ctrl, however the differences were very difficult to tell by eye – hence why we show NFL-FL instead, which more easily presents the difference. The trade-off is the mental arithmetic, hopefully aiding by the text. I believe a third column would limit the ability of the figures to show some of the smaller details.

line 13 - docile is an odd word. Just say K1 has a small amplitude (< ?? cm)

page 14, 4 - Figure 9c must be 9d

23 - reduce

page 15, 11 - in the amplitude

14-16 - I don't understand this sentence but anyway 'changes to changes' needs re-wording.

Modified the above as suggested

Interactive comment on Ocean Sci. Discuss., https://doi.org/10.5194/os-2018-104, 2018.