

## ***Interactive comment on “Continuous seiche in bays and harbors” by J. Park et al.***

### **Anonymous Referee #1**

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Comments on 'Continuous seiche in bays and harbors' by Park et al. (OSD)

This paper looks at the spectra of sea level variability in the range of frequencies that are likely to correspond to seiches at six bay locations in the US and New Zealand. The focus is on whether seiches occur near-continuously rather than being due to the abrupt forcings from tsunamis, strong winds etc.

It is an interesting study and clearly undertaken well technically. However, there are some things to do with the way it is written that could be better and I suggest that the text has a major revision.

General comments are that looking at data from only two countries does not help in coming to 'global' conclusions. The authors do not seem to have made much effort to

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find any other data but I am sure they could if they asked; they might start with data on the IOC Sea Level Monitoring Facility at VLIZ. There is also confusion in the text on whether 'continuous' or 'continuous-tidally forced' seiches are being discussed.

The authors also make the claim that continuous seiching is a new observation (p. 2364) but that is not really true and I found the literature review inadequate and rather US-centric. For example, they could look as far back as Cartwright and Young (Proc Royal Society 1974) which shows continuous seiches in the Shetland Islands that are more energetic when the wind blows; Woodworth et al. (JGR 2005) which shows seiching occurs all the time due to the ever present winds, mostly westerly; Lowry et al. (WIOJMS 2008) which shows occur in Mauritius and Rodrigues most of the time without tidal modulation etc.

The paper by Wijeratne et al. (p.2363) is misrepresented. The main points in that paper are that the seiches on the east coast of Sri Lanka vary over a fortnight but are strongest at neaps due to it taking a week for the internal tides to travel from the Andaman Sea. Those on the west coast have no fortnightly modulation but rather a diurnal one.

I am sure there are many other papers to do with continuous seiches either in the Rabinovich review, or reading the Pugh and Woodworth text book, or by making a literature search. The Mediterranean and places like Norway and Chile must be full of them.

The first sentence of section 1 could maybe refer to Airy's study of the seiche at Malta which I think is often said to be the first seiche to be identified in the ocean rather than a lake.

2363, 19 - Colombo

2364, 18-22 - this is an amusing sentence. Have the authors never looked at tide gauge charts? If they had they would have seen that most of them have high frequency signals

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superimposed on the tide, that are most easily spotted at the turning points, through which a pencil line had to be drawn in the old days prior to being digitised for tidal analysis. In some ways electronic data loggers have been a backward step.

2365, 6 - as mentioned, I find 6 examples in only 2 countries a bit limited for making global conclusions.

And line 7, it is a bit odd to learn of a paper published only this year that is now being questioned by its own authors.

17 - it would be good to say in the text here where (which countries) these bays are. Also in the figure 1 caption or the reader has to struggle with the lats and lons and his geographical memory.

2366, 14 - at Monterey and five other

18 - I can see what is claimed at Kahului. But I can't for Honolulu - that is just green (zero) around 0.2 min through the plot. Maybe you mean about 0.8 min?

22 - 'A close examination'. Is the reader supposed to take this on trust? It is fundamental to a main claim of the paper. Are you referring to what comes much later in Figure 5? If so I would say so.

In Figure 2 the 'vertical bands associated with increased energy'. I think I would say that does not mean more percentage of energy above and below the main band but rather a stronger band overall and then it is an artefact of the colouring.

Also in Kahului, middle right of Figure 2 - the blue band at 0.2 min seems to have streaks that point to the bottom left. What are they?

p2366 - it would good to know what the tidal range is at these 6 places and the tidal form factors.

2367, 12 - I would add 'identified in Figure 3' after 'spectra'

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23-26 - there are many statements like this associating a peak in the spectra with some feature of the bay which you can't possibly know for sure, without at least the use of a local model. Also p2369, 1 and many other places. And 2371, 6. 2372, 6.

2368, 13 'power spectra in Figure 3'

20 - aspect ratio = ?

22 - affine? define?

2371, 6. What is a pier mode? Again these are plausible statements but you can't know for sure.

2372, 24-26 - so far you have considered just the 1-d dependence of a shelf mode and so its frequency. To write this sentence you must have an idea of its long-shelf dependence. What is it, in general terms?

2373, 1-4 ditto.

2373, 10 - I don't understand 'shelf mode amplitudes'. There are several modes per site, there is not a unique frequency as I understand it (as you mention later for combining the metamodes), so presumably this is the amplitude of several modes combined or a band?

I think Figure 5 is very nice and I would stop there. There are clearly fortnightly dependencies which are the object of the paper.

I have a problem with the metamode text and onwards with the energetics. I get the general ideas but it is a bit vague what you are doing and for someone unfamiliar with EMD, for example, it won't mean much. Anyway you say later you don't understand the metamodes properly yourself. I would drop the later tables and figures in the paper and the energetics discussion of Section 6, and maybe use them for writing a more theoretical report in the future.

Section 7 - I think you will find many places where there is near-continuous seiching

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due to the ambient wind (the findings might not be published but that's a different issue). I would rewrite this to make it clearer you are looking at the tidal associations which are quite nice. Are any of the bays shallow enough to look at the change in frequency of the seiches with the tide? - Table 2 suggests not I guess.

Table 2. Monterey depths - why are 3 listed (harbour, bay and shelf?). Please make it clearer. Others also.

Table 3 caption last line - I would add the estimates are from the nearest peaks in Figure 3. Should the frequency from Merian's formula be the same as for a shelf wave equation solution for a flat shelf?

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