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Interactive comment on “Technical Note: Mean sea level variation in the Singapore Strait from long-term tide data” by P. Tkalich et al.

Anonymous Referee #2

Received and published: 24 July 2012

1/Suitability: The subject of the paper, i.e. mean sea level variation in the Singapore Strait falls within the field of the Ocean Sciences journal.

2/Summary: The paper investigates the mean sea level variations in the Singapore Strait, using mainly water level data from one tidal gauge. Analysing the residual water level (the original signal has been de-tided), the authors discuss the behaviour of annually averaged residual water level, as well as trend and seasonal variability. The authors explain the interannual variability by the El Nino events, and the seasonal variability by the monsoon.

3/General comments: The aim of the paper is quite interesting from a research and practical point of view. However, the methods are not sufficiently explained to guarantee that the results are valid and well interpreted. I identified at several points which

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make the paper questionable, and make some propositions of improvement (see the specific comments below).

4/Specific comments

Initial assumptions

Authors refer to Pavel et al (2011, 2012) to justify some choices like for instance that wind is the main driver of observed variability of sea-level anomaly in the Singapore Strait. However, this reference is not in the reference list. The only Pavel et al. reference I could find on internet is " Pavel Tkulich, Vethamony P., Babu M.T., Pokratath R., "Seasonal sea level variability and anomalies in the Singapore Strait", Third International Conference in Ocean Engineering (ICOE2009), 1-5 February 2009, Chennai India, pp. 874-880". I read the paper, but I did not understand why this work justify that wind is the main driver of observed variability, and moreover on season, year and decades time scale. This point has to be explained. Indeed, mean sea level variations can also be due to pressure, general 3D circulations.

Used Data

The authors explain they use several types of data (for instance NCEP wind). They describe it (table 1 and Figure 1a), but no analysis of these data is shown. It seems it is the same for the altimeter measurements. At the end, all the conclusions are based only on one dataset of water level in one location. This makes the conclusions questionable.

Data processing: de-tiding and trend significance

Authors explain they de-tided the signal. Some further explanations are needed. Which method or software has been used to do this? Furthermore, I do not think that the entire table 2 of all the constituents is necessary for the paper, regarding the aim of the paper which is mean sea level: we need to be sure that the entire tidal signal is removed, but we do not need to know perfectly what is the tide at this place. Regarding trend results,

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there is no statistical test of significance (like T-test ?). Such test would strengthen the credibility of the paper.

Analysis and interpretation: trend and subsidence

Regarding the observed trend and the way to check if there is subsidence or not, the authors compare the total water signal with other gauges, over one year. To me, it is not a proper way to check it. A proper way would be to use permanent GPS measures. It seems that such type of measure is available: <http://www.sbsm.gov.cn/pcgiap/95wg/wg3/geodinf.htm#Singapore>. If no measures are available, then a water level comparison could be done, but on several decades, and plotting the annual mean sea level rather than the total water level (which includes tide and make the figures not readable regarding the initial question of subsidence existence). Also, on Figure 2, it seems that at the studied gauge (Tangon Pagar), the behaviour between august 1998 and December 1998 is quite different from the other gauges, with a mean water level which seem to first increase and then decrease. Of course, it is difficult to see this behaviour on such plot. Also, on trend results, some important references and discussion are missing, like (Becker et al, 2012; Meyssignac et al, 2012a,b,c) which show results on sea-level variations the global scale and on tropical Pacific islands since 1950.

Analysis and interpretation: interannual variability

Regarding interannual variability, the paper would benefit of a more quantitative analyses, for instance, by using teleconnection patterns indices (<http://www.cpc.ncep.noaa.gov/data/teledoc/teleindcalc.shtml>) and compare it to the annual mean sea level.

Presentation

The paper is sometimes difficult to read in reason of a lack of supporting arguments and figures (for instance when the authors describe the dynamics of the site, or when they

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compare mean sea level variability with El Nino events). Also, I strongly recommend a reading and correction by an English native speaker.

5/Acceptability: Although the subject of the manuscript is interesting, the limits of the method used by the authors (as it is presented in the manuscript) seem to me too strong to be confident in the conclusions. That is why I do not recommend publication of the paper in this form. Lot of work is needed to improve the method and strengthen the results, but I strongly encourage the authors to do it.

6/Technical corrections

Since many points have to be improved (from a scientific point of view), I did not check the form/presentation of the entire manuscript. Thus, this list of technical corrections is not exhaustive. I recommend a careful check by the authors before a new submission.

- P 2257 – line 2 : a problem in the sentence (something is missing)

- P 2257 – line 13 to 19 : a figure would help a lot the reader to understand the dynamics of this study site

- P 2259 – line 6 to 9: I do not understand why gaps are filled by tidal signal. Indeed, looking at the end to mean sea-level, I do not see the necessity of this operation. It has to be better explained

-P 2263 – reference list: references cited in the text are not present in these list.

7/References

M. Becker, B. Meyssignac, C. Letetrel, W. Llovel, A. Cazenave, T. Delcroix, Sea level variations at tropical Pacific islands since 1950, Global and Planetary Change, Volumes 80–81, January 2012, Pages 85-98, ISSN 0921-8181, 10.1016/j.gloplacha.2011.09.004. (<http://www.sciencedirect.com/science/article/pii/S0921818111001445>)

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and recent-past changes and variability. *Journal of Geodynamics*, 58:96-109. doi:10.1016/j.jog.2012.03.005.

Meyssignac B., Llovel W., Cazenave A., Salas-Melia D., Becker M. (2012) Tropical Pacific spatial trend patterns in observed sea level: internal variability and/or anthropogenic signature? *Climate of the Past*. 8:787-802. doi:10.5194/cp-8-787-2012.

Meyssignac B., Becker M., Llovel W., Cazenave A. (2012) An assessment of two-dimensional past sea level reconstructions over 1950-2009 based on tide gauge data and different input sea level grids. *Survey in Geophysics*, online. doi:10.1007/s10712-011-9171-x.

Interactive comment on *Ocean Sci. Discuss.*, 9, 2255, 2012.

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