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Ocean Science
Discussions

Interactive comment on "Sea Level Variability in the Swedish Exclusive Economic Zone and adjacent seawaters: Influence on a Point Absorbing Wave Energy Converter" *by* Valeria Castellucci and Erland Strömstedt

Anonymous Referee #1

Received and published: 28 May 2019

The article "Sea Level Variability in the Swedish Exclusive Economic Zone and adjacent seawaters: Influence on a Point Absorbing Wave Energy Converter" investigates sea level variability in the Baltic Sea to be used for the identification of a location to deploy wave energy converter (WEC) systems. This study if of great interest for WEC developers, however, before I can recommend publication, I recommend a major revision.

Major comments:

The main result of this study is shown in Figure 10b, defining the optimal sites for the deployment of WECs when only considering MSL variability. However, as written by the authors on page 15, line 5-6, this might change when considering for example the full sea states at each side. As the motivation of this paper is to provide a tool for WEC developers for choosing deployment sides, who need to take not only the MSL variability into account, I would like to suggest to extend Figure 10, showing also a figure on how the regions of optimal deployment side would change when not only MSL variability is considered.

Regarding sea-ice, on page 14, line 1-2 it is stated that the ice-concentrations have to be considered, but in this study it is only computed for ice-free conditions as all ice-variables are assumed to be zero (page 5, line 1). In addition, on page 13, line 2-6 (result section) was written an overview about ice-concentration and wave power summarized from other studies. May one could move this paragraph to the introduction and than include an argumentation why ice can be neglected in this study in the method section near page 5, line 1. And what happens with the WEC when sea-ice exists?

Page 14, line 28-32 and page 15 line 17-18: How are the other WECs systems, mentioned in the introduction, are influenced by MSL variations compared to the Uppsala WEC?

Please include equations to the manuscript for the calculations performed in this study. Although the calculations are not too complex, it would be much easier to grasp what has been calculated (and from which data) from the additional equations than only from text.

In addition, a time period from 2007-2016 was chosen, which includes a strong barotropic salt water inflow event in December 2014 (driven by a strong sea level gradient between the Baltic Sea and the Kattegat). What influence has this event on the MSL variability and the WEC systems? What about other short term variability? Please also discuss this or why it is neglected. The chosen time period from 2007-2016 rep-

resents the current situation. How are possible future changes included in this tool, as this is also needed for the decision making process of the WEC developers?

Minor comments

Figure 1: This figure is very similar to the figure in Castellucci et al. (2016). Therefore, please include something like “adapted from ... ” in the figure caption as reference.

Page 2, line 22: “to give an example, let us consider...” → The Uppsala WEC system is considered as example.

Page 4, line 13 - page 5, line 12: Unfortunately, the paragraph is not clear to me. Are the simulations done within this study or are they performed by SMHI in another study? Is the MSL extracted from NAMOD with a 44 km grid resolution or is it the one available at marine.copernicus.eu? Or is the second one used for validation? Is the 44 km grid resolution not a bit coarse for studies in the Baltic Sea? Is the validation of the model results part of this or a different study? etc. Please rewrite this section to clarify what simulations performed and what data has been used within this study. Please also acknowledge all work or data provided from others (if this is the case) with references and mention them in the acknowledgment section.

Page 5, line 2: Please include the reference for the atmospheric forcing (HIRLAM data set)

Page 5, line 3: Modeled MSL is normally strongly affected by data assimilation. Therefore it would be very beneficial to have a short overview on which variables are assimilated and which are affected and how, before referring to the studies describing the assimilation process in detail.

Page 5, line 12: Why are extreme events are neglected in this study. What impacts have extreme events on WECs?

Page 5, line 26: Is the MSL range computed from the hourly data?

Page 6, line 15: semester → time period

Page 8, line 9: When you computed the pooled standard deviation, did you include a weighting. If yes, please specify it.

Figure 3 and 4: Please use the same color scale to be able to compare the figures.

Figure 5 and 6: Please use the same color scale to be able to compare the figures.

Page 10, line 8-11 and Figure 7: please clarify if this is from Castellucci et al. (2016) or results of this study. Please include light gray grid lines for easier identification of the $\pm$0.8m MSL.

Page 12, line 8: “It is interesting to filter out areas with low enough MSL ...”, Did you mean that you wanted to “filter out” regions with higher MSL variations and keep the areas with low enough MSL variations, here? Or did I misunderstood something?

Page 16, line 4: “are available on-line”, please add where to find them

Please discuss the possibility of using this study to find deployment location in other regions as the Baltic Sea in the discussion section

References: please include the DOIs for all the references

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