

Dear Philip Woodworth,

Thank you very much for your careful reading and your valuable hints and suggestions!

We fully agree that some figures required correction. We are grateful for your remarks in this matter. We have integrated your suggestions and comments into our manuscript.

p1, line 8 (and other places) - is the German Bight really in the SE of the North Sea rather than the east.

In our comprehension the German Bight is located rather in the south-east of the North Sea than in the east. That is certainly a matter of opinion. Also other authors describe the location of the German Bight in the south-east (e.g. Wahl et al., 2011; Albrecht and Weisse, 2012).

figures 1 and 2. These have several errors. Fig 1 has degrees longitude and latitude swapped. But anyway they should read North Latitude (deg) and East Longitude (deg). In figure 1 deep water bathymetry, shown by dark blue, is a negative number whereas in Figure 2 it is a positive number. In Figure 2 it is hard to read the black names.

We corrected the figures and updated them in the manuscript.

Explain somewhere that NHN is the German datum which is a good approximation of MSL.

An explanation is now given on page 6.

Table 1. replace commas in the numbers with dots which is more normal internationally.

Changed in the manuscript.

Figure 3. define MEZ in terms of UT

It is not necessary to have 00:00 in the times.

Changed in the manuscript.

Figure 3. Why is there a slightly different set of 7 stations used for the 2 models (because of the grids presumably). explain better. It is not easy to spot the grouping of blue A,B etc. when printed - I had to blow up the pdf to see that. Anyway Target-Diagram would be better as 'Target Diagram' and things would be clearer if the maximum radius was 0.6.

The seven stations that we show in the diagram are the same spots in each model. The only difference is the order of the stations in the legend. I am afraid we could not change the order because it is hardcoded in the analysis and the plotting program.

We zoomed in so hopefully the locations can be better seen now.

p8, 5 and elsewhere - oscillation volume sounds odd to me although I am struggling to think of something else. perhaps have this sentence read: Therefore, the only difference between models concerns the volume of water exchanged through the tidal cycle, which we call the oscillation volume.

We agree with you that “oscillation volume” (page 8, line 5) may lead to misunderstandings. The removed estuaries shorten the length of the estuary and inhibit the tidal wave from propagating further. The wave is reflected much earlier and therefore the oscillation behaviour changes in the corresponding areas. In this context we don’t mean the tidal prism thus the water volume that is exchanged through every tidal cycle. We mean the varied volume of the tidal basin itself. To make this clear we changed the manuscript.

Figure 5. why does this have a different colour scale to Figure 2? It covers almost the same area.

In figure 2 and also in figure 1 we show the whole model domain and the used colours should give information about the present depths. In figure 5 we use a different colour scale which looks more realistically. This colour scale gives the viewer a better idea of the tidal flats, the channels and the complex structure of the Wadden Sea (right hand side). The simplifications resulting from the coarser topography (left hand side) can then be better estimated.

section 2.5 header. Please do not be so cryptic. Perhaps Analysis of Model Simulations. section 3 Model results

Changed in the manuscript.

p10, 26 - this is not surprising as the volume of water in the estuaries is small.

We agree, but we were not sure before we conducted this study.

Figure 6 and others. What is the second b/w scale for? Is that because of the wet/dry areas or what? Anyway it is not explained in the captions. It seems to me it could be just left off.

We removed the grey colour bar in the figures where it isn’t necessary. The grey colour which indicates dry areas is now explained in the caption.

The paper does not discuss changes in phase lags, only amplitudes. Nothing to say about them?

In our paper we focus on the amplitude of M2. For completeness, we added in the results section and in the supplement some information on the changes in the phase of M2. Based on figure 6, figure S2 shows the phase of M2 in both models in the reference case and the respective changes by a rise of mean sea level of 0.8 m and 10 m. In both models the celerity of the tidal wave increases due to mean sea level rise. In the simulations with mean sea level of 10 m this increase is stronger than in the simulations with mean sea level of 0.8 m. This seems plausible since water depth increases.

p15 current velocity should be current speed (velocity is a vector)

We agree with you that current speed is the correct term. We changed the manuscript at the according positions.

Figure 11 and 12 (a) remove the white arrow. You can't have a negative speed.

Changed in the manuscript.

Somewhere I noted R2 pointing to the recent Schindelegger et al. (2018) paper regarding model validation, and I was reminded of the Harker et al. (2019) paper in Ocean Science concerning the important aspect of whether model tides are allowed to change on an open boundary when MSL changes, and that should be made clear in the present paper.

Thank you for this hint.

Contrary to the considerations from Harker et al. (2019) we assume that the tides will not change at the open boundary of the DCSMv6FM due to mean sea level rise since we are performing a case study. But nevertheless changes in tides on the European shelf due to shallow water effects are taken into account in the study since the boundary values of the German Bight Model are derived from the DCSMv6FM.

We added this additional information in the manuscript to make this more explicit.

References

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- Harker, A., Green, J. A. M., Schindelegger, M., and Wilmes, S.-B.: The impact of sea-level rise on tidal characteristics around Australia, *Ocean Sci.*, 15, 147–159, <https://doi.org/10.5194/os-15-147-2019>, 2019.
- Wahl, T., Jensen, J., Frank, T., and Haigh, I. D.: Improved estimates of mean sea level changes in the German Bight over the last 166 years, *Ocean Dynamics*, 61, 701–715, <https://doi.org/10.1007/s10236-011-0383-x>, 2011.