Interactive comment on "The long-term variability of extreme sea levels in the German Bight" *by* Andreas Lang and Uwe Mikolajewicz

Anonymous Referee #2

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General Comments: The manuscripts investigates the sea level variability in the German Bight on millennial time scales, using a downscaling technique from a global GCM. Several important and interesting questions are tackled regarding for example: trend detection, connections between atmospheric patterns and sea level extremes and the fidelity of extreme value statistics derived from the operational records.

The manuscript is most well written, and interesting. I believe it will make a nice contribution to the journal after some minor revisions.

Specific comments: 1: My biggest objection to the manuscript is the structuring, where I think the supplementary material is much to extensive. Parts of it like the comparison to observations would be better put in the text, and other parts, I think, could be dispensed of. Specifically I think figs. A2,A3,A7 would be fit better as part of the article.

Figs A1,A9 and A10 I believe did not add much and could likely be dispensed of. However, I think if would be nice to add quantile plots of model vs observations for different 100 year periods, too have a more direct comparison to observations

2:The 16 m minimum depth. This is discussed a bit, but not in relation to the representation of bottom topography. Being myself unfamiliar with the German Bight, I don't know if representation of complex bottom topography is a problem in the area. However, I think that it should be stated in the article if this is a potential problem or if the bottom is essentially flat.

3: Sect. 3 how mean high water is defined should be in the paper.

4: Sect. 3.1 row 25 comparison to observations. It is stated that ESL relative to MHW compares well to observations, but to me it seems that ESL is likely somewhat overestimated. I think the suggested quantile plots would be helpful here.

5: Fig 4. I was first confused over how the return levels were estimated here. I think it should be stated in the caption that they are non-parametric, and I also suggest that you add a second panel showing there parametric counterparts for the same time period. Also a non-parametric return level curve for the whole data set would be interesting.

6: Page 10 just before Sect. 3.2, it is stated that other grid points are similar to Cuxhaven. I don't dispute this, but the figure shows a mean of the other gridpoints, and says noting about the spread, so I would rephrase.

7: Sect. 3.2 What about the correlation of the running mean series from Fig 4. It looks like it might be higher?

8: Fig.9 and all wavelet figures. Please state which series leads which for a given arrow direction, not just the first series.

9: Sect. 3.4. I think you could develop the last thoughts in this paragraph more, and also show the SLP pattern when BSL has been removed as an additional panel in Fig. 8

10: Page 19 around line 30. You mention the lack of melting ice-sheets, but not the thermosteric effect. I assume your model is Boussinesq so you don't have this either?

Technical corrections: 1: End of page 1 start off page 2, you could get rid of the German Bight at the end.

2: Page 7 line 3-4. This sentence seems misplaced in the text.

3: Page 7 line 30. Yet, other ..... –> However,?

4: Page 13 line 13-16, some odd sentences here, missing a .

5: Page 17 line 28, In contrast –> Similarly?

6: Page 17 line 29-35, The sentence is difficult to read

7: Page 19 line 14. Only?

8: Fig A3 I would prefer a normalised y-axis