

Dear anonymous ESSD reviewer,

first, thank you for reviewing our manuscript for ESSD. We appreciate your voluntary work during pandemic times which enables us to still publish research and make the EasyGSH-DB data collection available to the public. Let us answer to your remarks below.

Sincerely,

Robert Hagen (on behalf of the authors)

### **Answers:**

The manuscript provides a thorough and detailed overview of the process of collection and generation of a large data set of tides, salinity and waves for the German Bight. The efforts towards systematization, validation and gridding of the data set are substantial and professional, and have led to a multi-purpose data base that can be used for a variety of different tasks. The time interval (20 years) is shorter than the time period used for quantification of the climate (30 years) but hopefully the data set will be extended to fully cover at least one classic climatological time period (e.g., 1991–2020).

I am in favour of publication of this paper and only recommend adding a few remarks and adjusting several minor items.

- 1) While the data about tides and salinity match the relevant measurements well, the deviations of the measured wave properties from the hindcast ones are fairly large. Some shortages (part of the systematic mismatch of hindcast and measured wave periods) seem to stem from model-specific properties.

Answer: A systematic mismatch between observed and calculated mean wave periods were related to the calculated wave spectra by SWAN in the past (beginning of Sect. 4.4 in the manuscript). Larger differences of the peak wave period may arise from the model set-up, which neglects the wave boundary conditions at the open boundaries to the North Atlantic as you have stated.

Action: We revised some statements in Sect. 4.4 in the revised manuscript towards neglecting open boundary wave conditions and implications.

- 2) As the K-model does not involve nonlinear interactions of waves, it is natural that it underestimates the wave periods in some occasions. It is essentially a coastal model and works well in situations where most of the wave fields are relatively young wind seas. The inability of the SWAN model to capture some wave periods is somewhat more intriguing and should be commented separately. I guess that this feature is unavoidable as swells generated by storms between Norway and Island may easily reach the German Bight, and they are not captured by the particular model set-up. The discussed feature does not diminish the value of the paper and the underlying data sets but I would still recommend to make clear in the conclusions that the quality of some parts of the data set of wave properties is lower than that of the majority of this pool of data, and to indicate the reasons.

Answer: We agree with your point that model limitations towards swell waves from the Northern Atlantic should be emphasized more. In addition to our revision from 1), we gave some more remarks on the ability of SWAN and UnK to capture mean and peak wave periods. Moreover, considering the comments on the limitation of the quality of the SWAN simulation results

(see Lines 417-419 in the original manuscript), we agree that swell wave events are not fully captured by the particular model set-up due to missing wave boundary conditions along the open model boundaries to the North Atlantic which might lead e.g. to an underestimation of peak wave periods during calm-weather conditions. We have also elaborated more on the differences between the two wave models.

Action: We added additional information on that issue in the beginning of Sect 4.4 in the revised manuscript. Additional information on the differences between the wave models was added at the end of Sect. 2.2 and at the end of Sect. 4.4 above Table 3.

Minor issues:

Generally, all abbreviations should be explained at their first appearance.

- 3) Line 35: consider saying “spatially varying tidal range” instead of “spatially varying increase and decrease in tidal range”.

Answer: The spatially varying increase and decrease concerns spatially variable change rates of tidal range, not the spatial variability of tidal range itself.

Action: Changed “increase and decrease in” to “change of”

- 4) Line 45: probably ERA-40 is meant.

Action: Changed to “ERA-40” in the manuscript.

- 5) Line 68: explain FES.

Action: We added a definition and a short description to the manuscript.

- 6) Line 90: it is better to explain also CSV.

Action: Changed in the manuscript.

- 7) Line 91: explain THREDDS or give a link address.

Action: We have added an explanatory link.

- 8) Line 97: TM1 and TM2 are probably the same quantities as described on page 11, line 254. Please unify.

Action: Changed in the manuscript.

9) Line 135: explain BAW.

Action: We added an parenthesis to the reference, as BAW in this case is part of a reference.

10) Line 228-229 and elsewhere: perhaps it makes sense to use g/kg instead of ppt or at least say that g/kg is today a standard unit.

Action: As the unit  $1\text{e-}3$  (i.e. ppt) is documented within our salinity product data, we suggest to keep “ppt” in the text. We acknowledge your point by adding (i.e. g/kg) in the beginning of Sect. 3.1 after the first mention of ppt.

11) Line 265: “The annually, tidally averaged salinity” sounds strange; please clarify.

Action: We agree and have removed the “annually” because it is mentioned several times in the manuscript that analyses products are annually averaged results.

12) Line 294: the last symbol in UnTRIM2 should be a superscript; also on lines 443, 498, 499.

Action: Changed in the manuscript (no track changes).

13) Line 315, caption to Table 1: it is recommended to use “degrees” instead of the degree sign

Action: Changed in the manuscript.

14) Line 423: here it is only UnTRIM, with no “2” at all; please unify.

Action: Changed in the manuscript (no track changes).

15) Line 448: “Differences  $>12$  s between the observed peak periods are present...” is ambiguous; please specify whether peak periods over 12 s are meant or is the difference between the observed and modelled peak periods that exceeds 12 s. This may of course happen for extremely long-period swells that are not resolved by the model.

Answer: This sentence was revised completely due to the remarks of reviewer #2. For this reason, we have not conducted specific changes for this point.

16) Line 461: simply “in ASCII format”.

Action: Changed in the manuscript.

- 17) Line 533: “squared” would render the resulting value of the Pearson correlation coefficient into the range [0, 1] and make perfect and antagonistic correlations indistinguishable; is this what you mean? Anyway, I guess something is wrong with Eq. (5) as the expression under the square root can easily be negative and the entire right hand side of this equation expresses square root of the Pearson correlation coefficient. Also, Eq. (4) is missing.

Answer: There has been a wrong wording in Appendix 10.1. We did not mean to mention the index of agreement  $d$ , but the coefficient of determination  $R^2$  which does fit into a range [0, 1]. After rechecking our text, however, we do not believe Eq. (5) to be essential, as it is a well-known parameter for the goodness-of-fit in regression /curve-fitting and has only been used once in Section 4.2.

Action: We have reworded the last paragraph in 10.1 to a simple description of  $R^2$  and removed Eq. (5).

- 18) References: Some titles are fully capitalized, some not. Several references are incomplete. For example, volume number is missing in (Battjes and Janssen), Jänicke et al. (2020) seems incomplete, Janssen et al. (1999) is distorted, the number of pages of (Kösters et al., 2014) and especially (Plüss, 2003) is surprising, Müller (2011) misses some data, it should be “height” in van Rijn et al. (2000), and Winter (2011) is incomplete.

Action: We have adjusted references as follows (no track changes):

- Some article titles are capitalized depending on the journals policy at the time. JGR: Oceans for example has changed their spelling to capitals after 2017. We have changed our citation style to “Copernicus\_Publications [As of 2019]” (as required by ESSD) which unified some capitalization in the references. Note, that some German titles still show additional capitalization as this is required by German spelling. I would like to leave further design decisions concerning capitalization with ESSD editing, as their example section contains both, capitalized and non-capitalized reference titles.
- Battjes and Janssen (1978): Added a 1978 behind Coastal Engineering, as the conference, not the journal is referred to.
- Jänicke et al (2020): Changed reference type to article, which fixed the issue
- Janssen et al. (1999): Removed the spare DOI
- Kösters et al. (2014): Changed this source to the AufMod project synthesis, which references all AufMod results alike: Heyer, H., Schrottke, K., Zeiler, M., and Plüß, A.: Synthese der interdisziplinären Forschung in AufMod, Die Küste, 181–191, 2015.
- Plüß (2003): Added the correct citation information
- Müller (2011): Removed page numbers (not necessary here)
- van Rijn et al. (2000): added missing “h”.
- Winter (2011): We are unsure how this title is incomplete. Here is the citation suggested by JCR: “Winter, C. (2011). Macro scale morphodynamics of the German North Sea coast. *Journal of Coastal Research*, 706-710. Retrieved March 24, 2021, from <https://www.jstor.org/stable/26482263>”. We have added “(retrieved March 24, 2021)” at the end of our citation. Since this was a conference proceedings issue, there is no volume number or DOI available.