

# ***Interactive comment on “A multi-decadal wind-wave hindcast for the North Sea 1949–2014: coastDat2” by Nikolaus Groll and Ralf Weisse***

## **Anonymous Referee #2**

Received and published: 16 August 2017

### General Comments

This paper describes a surface wave hindcast dataset for the North Sea based on atmospheric reanalysis from 1949–2014. The primary motivation for the dataset is the discontinuation of the coastDat1 dataset in 2007. The write-up is generally clear, well organized, and fairly complete. The accessibility of the data online is convenient, though the file sizes are quite large (~100 gb per file). This could be alleviated by splitting the files into yearly output, but I respect the judgment of the authors if their target audience is capable of downloading data of that size. I provide more specific comments on the write-up below and recommend to publish this work after minor revision.

### Specific Comments

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1. My primary concern relates to properly motivating the benefits of this new dataset in comparison to other options. coastDat2 is presented here as an alternative to the ERA-Interim reanalysis and the analysis of the model output is performed relative to the ERA-Interim data. In both cases, comparisons are made to several platform observations and satellite derived data products. The study finds that the ERA-Interim data performs better on average, with larger differences in performance under high wind events. The study argues that the coastDat2 dataset has merit relative to the ERA-Interim data because (i) it provides 30 additional years of hindcast for understanding climate trends, (ii) it is a higher resolution dataset, (iii) it includes additional output parameters, and (iv) it gives a more conservative dataset in the sense that wave heights are generally overestimated.

The first point is clear, but would benefit from comparison with published coastDat1 to show if the data trends are consistent/reliable. The second point intuitively makes sense, but is not supported by the results. The higher resolution data does not seem to provide any obvious benefit at the observation locations (e.g. mixed results in Figure 2). If the authors wish to argue this point they should offer evidence that there is useful information in the high-resolution output (For example, this is contradicted by the statement at the end of page 4 that “No substantial differences in conclusions are obtained when 6-hourly instead of hourly values for the coastDat2 SWHs are used.”). The third point may be true, but little description is offered of the additional data products. I suggest expanding appendix B to comment on the additional fields including their meaning and why they are useful. I do not follow the logic behind the fourth point. If anything, the consistent positive bias in coastDat2 suggests a problem in either model physics or the forcing data. Was any attempt made to understand the source of this bias and/or correct for it? Has this version of WAM (with the same wind-input and dissipation source terms) been validated in these conditions in other locations to show it is appropriate for simulating large wave heights? Are there similar biases in the wind field? These points should be commented on rather than trying to argue that this bias may be a good thing for some applications.

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2. Please comment more on ERA-Interim data (Page 4 Line 5). Is the same wave model used? What data does it assimilate (is it the same data used in the verification, are errors consistent in the pre and post assimilation years)? What resolution was the ERA-Interim atmospheric forcing? Are the 6 hour outputs instantaneous or 6 hour mean?

3. The wave results conclude in 2014, while the coastDat2 atmospheric results conclude in 2012. It should be explicitly mentioned if the time series was extended the additional years in a consistent manner.

Technical corrections

P1L16: 'Data from wind-wave hindcast data' <- Remove 2nd "data"

P2L11: 'based on' <- What does "based on" mean here?

P2L13: 'Weisse and Günther (2007)' <- use parenthetical citation

P2L21: 'following-up' <- 'follow-up'

P3L6: 'only' <- Remove

P3L8: 'also' <- Remove

P3L10: Are these neutral winds? Is atmospheric stability accounted for?

P3L13: '(Geyer, 2014)' <- Use in-line citation

P3L22: ', in addition,' <- Remove

P4L5: Remove 'also'

P4L8: 'onwards' <- onwards to what? 2017?

Appendix A: The presentation here could be improved. E.g. in equation A1 isn't mean= $\overline{E}$ ? It may be clearer to replace this.

What is ME in equation A7?

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Appendix B: Some details about what the fields actually represent could be useful. E.g., How is significant wave height computed (and other parameters)? How is significant wave height (and other parameters) partitioned into wind-sea and swell components?

Figure 1: Add a figure title, e.g. 'North Sea Bathymetry' and include units label with colorbar.

Figure 2: Add axes labels. Indicate in caption that these are the platform observations.

Figure 4: Please include x/y axes.

Figure 5: Please include x/y axes.

Figure 6: Add axes labels. Indicate in caption that these are the satellite observations.

Figure 7: Add axes labels. Indicate in caption that these are the platform observations.

Figure 8: Please include x/y axes.

Figure 9: Add axes labels. Indicate in caption that these are the platform observations.

Figure 10: Add axes labels. A legend in 1 panel would make the figure easier to understand than describing in the captions.

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