Ocean Sci. Discuss.,
doi:10.5194/os-2016-51-RC2, 2016
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Ocean Science Discussions
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Interactive comment on "An atmosphere-wave regional coupled model: improving predictions of wave heights and surface winds in the Southern North Sea" *by* Kathrin Wahle et al.

Anonymous Referee #2

Received and published: 31 July 2016

Manuscript "An atmosphere-wave regional coupled model: improving predictions of wave heights and surface winds in the Southern North Sea by Kathrin Wahle et al. evaluates the effect of model coupling on the accuracy of modelled wave field in coastal areas. Model coupling especially for short-term forecasting purposes is a very topical issue and it is nice to see that the progress includes also coastal modelling. However, the authors state in several places that coupling of atmosphere and wave models is not novel in itself and that coupled models have been run operationally in many forecasting centres for decades. A reader would expect more detailed analysis of the effects of coupling on the coastal modelling, which is the novelty of this paper. Also, the analysis of the results should be done more carefully. In several places there are statements

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Discussion paper

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that are not entirely supported by the Figures presented (cf. specific comments). The paper is fairly well structured, but the formulations and language require some further attention. I also recommend that the language is checked by a native speaker.

Some specific comments:

Section 1. Introduction: This section could be better structured and written. Explicit statements of what the authors are studying in this paper could be put in one place, preferably at the end of this section. Also the references to previous studies should be better formulated. Now it seems just a list of different coupled models presented in earlier studies. Please highlight their connection to the present study.

Section 2.3: Please give a short description of how the coupling was done, not just a reference to article by Ho-Hagemann et al.

Section 2.4, line 206: Here should probably be a reference to Fig. 1c, not 1b

Section 3.1, line 221: "reasons explained above" - Should it be “due to earlier explained reasons” and please give a reference to the section, where this explanation is given or explain it here.

Section 3.1: Did you compare the altimeter data against the Waveriders? How good is the accuracy of the altimeter data in the North Sea? And how was the match-up done between altimeter data and model data (distance in space and time, averaging, etc.)? What is the number of matched model-measured pairs for each altimeter and buoy?

Section 3.1, line 239-240: “In both cases measured and modelled wave heights are in good agreement” - is this really so? There seems to be quite big differences between the modelled and measured values along the track. Please be more precise.

Section 3.1, line 245-246: “the two-way coupled model results are closer to the measurements” - This is true for latitudes 54-55 and 57-58, but around latitude 56, the one-way coupled model seems to be closer to measurements. More detailed analysis is required.

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Fig. 3: Why not use the same altimeter track to compare the performance on low-wind and storm conditions?

Section 3.1, lines 266-267: “Throughout the period WAM-NS-1wc shows the highest significant wave height” - This is true for Helgoland, but not for Westerland, where WAM-GB-1wc occasionally has higher values.

Section 3.1, lines 283-284 and Fig. 4d: What actually happens on December 5th in the Westerland in WAM-GB-1wc. Why is it behaving completely differently from the other setups? Nothing in the wind field seems to be supporting this kind of behaviour.

Figure 4: Would it be possible to mark the locations of the wave buoys to figures 4a and 4b. Although their locations are shown in Fig. 1, it would be easier for the reader to evaluate the model performance, if the locations would also be marked here.

Figure 8: Please use scales that show the whole range of the presented values of the chosen periods.

Interactive comment on Ocean Sci. Discuss., doi:10.5194/os-2016-51, 2016.

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