

Interactive comment on “Synergy between satellite observations and model simulations during extreme events” by Anne Wiese et al.

Anonymous Referee #1

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Overview:

This paper focusses on the issue of improving wave model performance by improving the driving wind fields. It is following many other papers on this topic but does add some originality in its assessment of the differences between wave model outputs. The wave model outputs are compared with in situ data as the ground truth. The results are similar to previous work in demonstrating that wave model results are sensitive to the wind forcing, which is not surprising or very new. A secondary part of the work is in examining the quality of satellite data on significant wave height, showing that the most recent satellite Sentinel-3A is superior to previous satellites, especially within 10km of the coast, but still requires bias correction of the significant wave height before any improvement in wave model performance could be achieved by its assimilation into an

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Discussion paper



operational model.

General:

The paper is generally clearly written and readable, apart from a few errors (listed below). However it could be improved by some reorganisation and rationalisation. The motivation for the study and the order of the presentation could be sharpened up. The satellite data assessment is stated to be the main motivation but the bulk of the paper addresses the wave model forcing by different atmospheric model wind fields and assessing which performs better. This exercise is somewhat flawed as the wind fields come from different models and it is not clear what are the differences between these. This should be discussed further. Some are reanalysis products and some are forecasts. Presumably these have different wind datasets assimilated into them. Thus it is not really a like-for-like comparison. The issue of model spatial and temporal resolution could be more rigorously assessed by sampling the same wind field at different resolutions, but this is not done. The authors state that the WAM model performs well with all the datasets, which has already been demonstrated. It is also known that higher spatial and temporal resolution improves the wave model performance. There is an interesting comparison between results, using an EOF analysis to show differences in wind speed, direction and location of the maximum affecting the maximum wave height in an extreme event. Using reference to a model ensemble where it is demonstrated that some wind fields are better quality than others seem somewhat perverse – can this be justified? Overall this paper needs moderate revision before acceptance for publication.

Detailed comments:

1. The title should include 'of wind and waves' after 'simulations'
2. The first line of the abstract is somewhat misleading as only satellite wave data are evaluated. Also this part of the work is second to the study of the spatial and temporal resolution of the wind forcing for the wave model and so perhaps should not

be introduced first.

3. P 2 line 7, suggest inserting 'in determining' to replace 'of'
4. P 2 line 31 'flagging of (data)' – explain further, this is rather cryptic.
5. P 5 line 11 – 30 times 15 does not equal 360 - check directional resolution
6. P 6, line 6, why is wind data interpolated to 0.25 deg in this case? Is this a typo?
7. On p 6 there is repeated us if increased resolution while referring to reduce grid size, this should be more clear.
8. In Table 2 use consistent units for spatial resolution
9. P 6 line 22, state extreme event is in September.
10. P 7 line 5 and subsequent – use of a strange reference to calm conditions – does this mean zero wind or less than a threshold? It seems superfluous to state the models give the same result when there is no wind! Presumably there can be residual swell. Does the model use the same boundary forcing for each case? This seems implied by p 5 line 15. Are all the wind fields consistent near the open boundary? Could this be an issue – discuss.
11. P 10 line 6 this sentence is not necessarily self-evident, why?
12. P 11, lines 9-13 – the term 'period' of the peak is a bit confusing, maybe use 'duration or persistence.
13. P 11 lines 23-24, stating the obvious?
14. P 16, lines 9-10 – using coupled model not demonstrated here – don't state this unless using reference to other work
15. Watch out for missing spaces between words in a few instances e.g. p5, p11

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