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comment

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

Anonymous Referee #2

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General Comments The paper deals with interesting topic of the performance of WAM model in the region of North and Baltic Seas. The authors analyses the sensitivity and the accuracy of the model WAM using different wind models (and considering different time steps and resolutions). They found that the time resolution is crucial (hourly data) in this region in order to reproduce the significant peak of the wave height and its correct location. Moreover, they describe which is the best (most accurate) wind forcing model in the region. The performance of the newly Sentinel-3A data is compared with other operational satellites (Jason-2 and Cryosat-2) showing the better results for Sentinel-3A in the coastal areas (mainly in the first 10km). The analysis also reveals that the Sentinel-3A quality is independent of the satellite flights direction, metocean conditions, and even for the wind direction relative to the flight direction. To

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Discussion paper

my knowledge, this is the first study that describes at this detail this kind of process and Sentinel performance in this region. In general, the manuscript is well organized and written, allowing an easy reading and following up the discussion and conclusions. In my opinion, a set of few changes would allow the publication of the manuscript in the journal. I recommend minor revision.

However, still some points that the authors should consider. 1) Are some of the wind models used for the analysis already assimilating data? If this is true, it should be considered when comparing all the results. Moreover, the validation of the winds should not include the assimilated data. 2) About EOF. I am not sure that it gives more information than observed in Figure 4. By the way, looking at Figure 4 it is clearly observed the displacement of the location of maximum Hs to the NE in the 6h models. So basically, the first mode of the EOF as you have it now are related with this "displacement". It would be nice to apply the EOF only to the 6h (or 1h) and not only for the event of 29th September, but also for the entire simulation. In that sense you can describe how are the modes related to both the time and the space variability. 3) Could you define the statistics used? RMS, Bias and correlation are well known. But what about SI? Are you referring to the RMSE normalized by the mean observed values? 4) While comparing the same model with different time resolutions seems appropriate, I do not have the same feeling when the spatial resolution comparison is done. You are comparing different models, not the same model with different resolutions. In this case, if you want to check the sensitivity of the model to different wind forcing resolutions I would suggest to do some spatial subsetting from the finer resolution.

Specific Comments P2L10-L12: This sentence seem to indicate that the wave models always worked good and with high accuracy, and bad or good results are only dependent on the meteorological models. In my opinion, it should be rephrased.

P2L18: define acronym SWAN

P3L19: what it this mail referred to?

P4: some acronyms not specified: i.e. JCOMM, ORBCOMM, GOES and WMO

P5L14-L15: some information about the coarser model simulation? Spatial, frequency and temporal resolutions?

P6L3-L11: there is a kind of a mess in these lines. All the models are "interpolated" to different resolutions (finner) than the original. However, the operational ECMWF of 9km ($0.08°$) is interpolated to $0.125°$. Aren't you losing some information in this process?

Table 2 :are the models list following some order? I would ordinate them from coarser to finer (and homogenize horizontal dimension units).

P7L30-L32 : where have you seen this? is there any figure I am missing?

P8L15: change "time step" for "instant" or "event"

P8L18: I am not sure if the word ensemble here is the most appropriate. Probably you can use: numerical tests.

P10L11-L14: could you mark the in situ measurements used here in the Figure 1?

P11_L1-L3: why don't you analyze the event two days before? It is not 7m of Hs, but more than 4m.

P12-L14: do you take into account some kind of land-mask? For example, what happens if your mooring is inside a bay, and the satellite track is outside (with land between them)?

Table 3: number of data used for the analysis please.

Figure 1: explain the black and white boxes.

Figure 2: what is M and R in the text boxes (also in Figure 3)? Do the 6h and 1h models have the same number of "entries"?

Figure 4: the OBCs seems a bit different in some cases (4a and b shows wave heights in the NW corner not observed in the others. . .). Is this related only to wind forcing?

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