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Interactive comment on "On the wind stress formulation over shallow waters in atmospheric models" *by* P. A. Jiménez and J. Dudhia

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The topic discussed in the manuscript by Jimenéz and Dudhia, a poor parameterization of the sea surface roughness in the mesoscale model WRF as a reason for the deviation between simulated and observed wind speeds and the presentation of a parameterization leading to an improved agreement is very interesting and of relevance, e.g. for the purpose of an improved accuracy of offshore wind resource estimates. The manuscript is well written and presents innovative and new results. However, we think that there is especially a lack of information on the observational data used in this study. Therefore, we would like to ask the authors to extend their description of the observational data and how it has been processed for the purpose of their study. The authors should mention how they took into account the previously reported

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(e.g. http://www.dewi.de/dewi_res/fileadmin/pdf/publications/Magazin_40/09.pdf) mast shadow effects of the FINO1 met mast in their analysis and how they took into account in their analysis that the measurements at FINO 1 have been disturbed by the construction, testing and operation of the wind turbines in the wind farm alpha ventus since spring 2009 (http://www.alpha-ventus.de/fileadmin/user_upload/av_Factsheet_engl_Dec2012_2.pdf). Alpha ventus is situated only 400 m east of FINO1. Did the authors filter for the mast shadow (north-westerly winds for the cup anemometers, south-easterly winds for the sonic anemometers at FINO1) as well as for possible wind turbine wake effects (easterly winds, i.e. about 0°-180°)? The first sentence in section 4 let us assume that there was no filtering of the data done, as according to that sentence fig. 1 contains data from 8760 h of 2009, i.e. from the whole year 2009. In fig. 1 it seems as if the overestimation of observed wind speeds by WRF starts at about 3-4 m/s. Interestingly, this is about the cut-in wind speed of the wind turbines of alpha ventus. According to fig. 3 the performance of the WRF model with Charnock parameterization seems to get worse with increasing wind speeds. Note that the velocity deficit due to the mast shadow impacting the anemometers at FINO1 for certain wind directions also increases with increasing wind speed.

Our further comments/questions are as follows:

- The simulations were performed with 36 vertical levels. Did the authors perform sensitivity studies with a varying number of vertical levels? When comparing with met mast data (100 m top height) wouldn't it be better to have more vertical levels especially in the lowest 100 m? - The authors should state on the physical reason for the different performance of the roughness parameterization for different atmospheric stabilities as seen in fig. 3. - Data of two different met masts situated at sites with similar water depths are used. Besides the parameter 'water depth' also the parameter 'distance to the coast' might be a crucial factor determining the wave heights and therefore the wind conditions at the site, see e.g. Dörenkämper et al., Boundary-Layer Meteorol., doi:

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10.1007/s10546-015-0008-x. While FINO1 is situated about 45 km from the coast, the distance from the Noordwijk site to the coast is only 10 km. - Data at 60 m: There are both cup and sonic anemometers installed at that height. It should be clarified the data of which sensor has been used for this study? - The authors show results for different atmospheric stability conditions. Which stability parameter has been used? - What is meant by percentile-percentile plot (fig. 1)?

Interactive comment on Geosci. Model Dev. Discuss., 7, 9063, 2014.