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Interactive comment on "Coupling of wave and circulation models in coastal-ocean predicting systems: a case study for the German Bight" *by* J. Staneva et al.

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Answers to the reviewers' comments on "Coupling of wave and circulation models in coastal-ocean predicting systems: a case study for the German Bight" by J. Staneva et al.

Reviewer #1 We are grateful to Reviewer #1 who finds that the topic is interesting and worth pursuing to extend our understanding of wave-current interaction in the shallow coastal area. We are also grateful for his comments, which we address point by point

Rev. #1: I am also glad to see that this paper is kept short with regard to theoretical

background and model development, as many previous papers already cover this part extensively. Instead, the authors focus on the validation of a coupled model system using measurements and the discussion of the effect of the implemented wave-current interactions in the study region. Authors: We are thankful for this positive comment and this structure is being kept in the revised version of the manuscript.

Rev. #1: Please refer to Wahle et al.: "Response of the..." as "in preparation/under review", unless it is accepted for publication before you submit your final manuscript. Authors: We removed this reference from the text and explained in more detailed the coupling mechanisms.

Rev. #1: The measurements clearly show that wave fields and sea surface elevation benefit from the implementation of wave-current interaction. In fact, Fig. 3e and Fig. 5 suggest that the effect of wave-current interactions may still be underestimated in this model system. Do you agree with this view? If so, do you have any suggestion why? Authors: We agree and this has been discussed in the revised version and also in the answers of rev'2 comments.

Rev. #1: As wave-current interaction scheme, radiation stress formalism is chosen despite the fact that this scheme produces an unrealistic offshore transport, as the authors discuss in their introduction. Even though the produced errors may be small in the study region (small bottom slopes), the authors should discuss why the radiation stress formalism is chosen, and what the possible limitations for their conclusions are. I would not consider the choice of the radiation stress formalism critical for this paper because the measurements support the numeric results, but it would be good to discuss the consequences of this choice. Authors: Following the suggestion of the reviewer, we added a critical discussion in Section 2.3 on the use of radiation stress formalism and its applicability for our study area.

Rev. #1: Would you recommend to continue using the radiation stress formalism for coupling, or do you expect that the vortex force or generalized Lagrangian mean for-

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mulation for wave-current interaction may give better results in this, or other regions? Authors: We added comments on that in the conclusion (see also the comments on this issue below).

Rev. #1: Fig. 2, caption: I don't fully understand what quantity is plotted here. Is this the difference between the control run and the coupled run? Authors: We rephrased this following the reviewer's comment.

Rev. #1: p.4, line 3: Since the focus in this paper is not the parameterization, but the implication of wave-current interaction on the coastal predictions, it would be good to give some references to experiments in other regions. The introduction covers a lot of background on the parameterization & coupling techniques, but little on wave-current interaction experiments in other regions, i.e. Michaud et al. 2012, Zodiatis et al. 2015. Authors: Added in the revised version as suggested by the reviewer.

Rev. #1: p10, line 21: The effect of wave-current interactions on Lagrangian particle transport has been investigated in Röhrs et al. (2012, 2014). Authors: Added in the revised version following the suggestion.

Please also note the supplement to this comment:
http://www.ocean-sci-discuss.net/12/C1699/2016/osd-12-C1699-2016-supplement.pdf

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Interactive comment on Ocean Sci. Discuss., 12, 3169, 2015.