

Interactive comment on “The effect of vertical mixing on the horizontal drift of oil spills” by Johannes Röhrs et al.

Anonymous Referee #2

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The Authors present an interesting study of modeling vertical and horizontal transport of oil spills in the Norwegian coast using a open source oil drift model. The study includes improvement of modeling system, validation of the new model results and model simulation with different types of oils and oil drift in different weather, wave and current conditions. The model developments and results are thoroughly presented. However, at places the text is quite descriptive, and one would expect more in depth analysis of the results. For example, in section 4.3 more discussion about the reasons behind the different behavior of the two approaches would be interesting. Also some discussion on how the need for tuning of the water content would affect the use of the model system in operational forecasting. In section 5 more description and discussion about the seasonal and inter-annual variation in the weather conditions in the study area is

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needed to convince the reader, that the selected period actually represents the typical weather conditions in the area. Otherwise, the selected period should be presented as case study and give an indication, why the Jan-May 2011 period was selected. In section 5 and in Conclusions it would also be good, if the Authors would more clearly state, which part of the described behavior of different oil types was expected based on previous studies and what is actually known knowledge gained by this study. I also suggest that the spelling and language is checked before accepting the manuscript.

Some specific comments:

Section 1:

In some places the text seems more a list of references (for example page 2 lines 9-22) than description of background and earlier studies. I suggest that some rewriting is done for this section.

Section 3:

What are the thicknesses of vertical layers in the Norshel reanalysis?

What is the horizontal resolution of the ERA-interim wind and wave fields.

Subsection 3.3 could be merged to 3.2

Section 4:

Fig 1. It is difficult to see the red dashed line (CODE drifter with Stokes drift subtracted) printed above the red color representing the particles in the beginning of the measurement period.

Page 11, lines 4-5, the information about the gray colors should be in the caption of Fig. 1

Page 11, line 19: What is the resolution of the WAM Stokes drift fields?

Page 11, lines 21-23: Which parameters were measured from the ship? And which

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parameters were estimated? What was the bias between measured and modeled values? And how the accuracy of the models affect the results presented in section 4.3?

Page 11, line 28: Is the beginning of this line, reference to Sec 2.1?, misplaced?

Page 12: How sensitive are these two approaches to the accuracy of the forcing wind and wave field?

Page 12: The accuracy of the drift simulation seems quite sensitive to the emulsion water content. How do you see, that this affects the model behavior and use in operational situations, where the tuning cannot be made?

Section 5:

It was said somewhere earlier in the text that in section 5 you will use parameterisation of Li et al. Maybe this information could be repeated in the beginning of this section.

Is there a specific reason for choosing year 2011 for the simulations? How much seasonal and year-to-year variation is there in the weather and ocean current conditions in this area?

Page:14, lines 28-29: If you are only using forcing data from one year, how have you defined that they represent typical weather situations from January to May.

Section 6:

Page 18, line 3→ How sensitive is your analyze to the accuracy of the forcing models in describing the conditions, especially the vertical mixing?

Section 7:

It would be good to emphasize in the conclusions what is general knowledge in the behavior of different oil types and what are your findings.