

## Anonymous Referee #1

### **Interactive comment on “3D dynamics of the Southeastern North Sea, effects of variable resolution” by Ivan Kuznetsov et al.**

This manuscript provides a validation and an evaluation of an unstructured ocean modelling configuration that is applied to the German Bight and its vicinity. The article tries to focus on the advantage of unstructured ocean modelling, and how the resolution affects the quality of the results. The idea is good, although I believe the article in its present state would perhaps fit better in a journal such as GMD because an important part is devoted to validation more than to this specific point. So I think the manuscript could be published in Ocean Science after major revision, but I would suggest to re-design it if possible. Below are ideas on how this could be achieved.

1) First the model description part should be made shorter and more concise. There are too many subsections in Section 2 that could be merged, and the model features should be summarized so that the description is quicker to read and gets to the point.

*We have restructured this part of the article. We hope that it has become more concise.*

2) The validation part is way too long, it is very descriptive. What readers want to see is a quick assessment of what works and what does not work so well in the model.

*We would not like, if possible, to follow the proposed recommendation. The reason is as follows: we have created a new coastal model (FESOM-C) that has yet to prove its robustness compared to existing models. The main goal relates to the maximum validation of the model according to the available extensive database by analogy with the works (Gräwe et al., 2016; Stanev et al., 2016...), which use only partial data from the database we use.*

3) Section 4 is where the manuscript gets more interesting: it is when one sees the influence of the resolution and what getting at high resolution can achieve or not. The description validation sections were too long, but this one is way too short and just provides a quick assessment of the influence on cumulated sea level values. I suggest to expand this part which is the most interesting and provide an analysis on how resolution and wetting drying affects the comparison with observations etc...

*We have significantly expanded the analysis of this section. Added analysis of histograms of the solution difference for the sea level height and horizontal velocity components for meshes with different spatial resolutions. Some general conclusions are drawn from the influence of the wind component on the convergence of numerical solutions.*

**General comments:** I had started the manuscript review with some remarks about the language, but stopped after 2 pages because there were just too many. I strongly recommend a professional native speaker to check the manuscript before submitting a revised version. → **Proofreading (professional native speaker) done. Thanks.**