

Earth Syst. Sci. Data Discuss., author comment AC2
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Reply on RC2

Matthias Fuchs et al.

Author comment on "High-resolution bathymetry models for the Lena Delta and Kolyma Gulf coastal zones" by Matthias Fuchs et al., Earth Syst. Sci. Data Discuss.,
<https://doi.org/10.5194/essd-2021-256-AC2>, 2022

Reply to anonymous reviewer #2

Reviewer comment (RC): In their manuscript "High-resolution bathymetry models for the Lena Delta and Kolyma Gulf coastal zones", Fuchs et al. provide bathymetric models of 50 m and 200 m resolution of the Lena Delta and Kolyma Gulf coastal zones. The data underlying the models is based on nautical charts published since the 1940's. The authors provide a comparison with recent depth measurements independent of the nautical charts, showing a very good agreement. The authors make it very convincing that their bathymetry is a significant step forwards for these poorly surveyed region, and especially the near coastal zone.

I find little to criticize with this paper. It is well structured, easy to follow with well annotated figures. The Pangaea-download contents are easy to load and understand in GIS. Congratulations to the authors for their work.

Author's reply (AR): We are grateful and thank reviewer #2 for this very positive feedback and are happy about the feedback that our data set is easily accessible and usable.

We hope to address with this reply all the comments and questions raised by the reviewer.

RC: I have a few suggestions, which are however not critical for acceptance in Earth-System Science Data (were I to decide).

AR: Thank you for your suggestions. We hope to answer all your questions with this reply.

RC: Abstract: I am missing a mention of the resolution of the available models here. Also, it is not clear to the reader of the abstract what "large-scale" nautical maps are.

AR: Thank you for this comment. We added the scale of the nautical maps used (1:25,000 – 1:500,000) and the resolution of the final bathymetrical models (50 m and 200 m) to the abstract.

RC: 95ff The difference could also be related to the decades inbetween the measurements of the map. This comes up in the discussion later on, but the thought could be introduced here as well. I agree with the procedure using the higher resolution maps though. In this regard, it would be a suggestion to provide maps showing the boundaries and overlapping areas of the nautical charts. It appears the boundaris could be easily added to Figure C1

and C2 in the supplement (they "shine through" in the point densities anyway). A further suggestion would be to add the date of the nautical chart (or reference to the nautical chart) as an attribute to the shape file. It may be relevant for future studies to have the age of the depth measurement. I fully realize the effort to do so may be prohibitive and this cannot be done.

AR: Yes, we agree, the difference between the maps certainly can have several reasons, among them the different times of the map production. We added a short note in the text about the different survey times and different map compilation dates. In addition, we added figures in the appendix of the revised manuscript showing the extents of the nautical charts (Figure A1 for the Lena and Figure A2 for the Kolyma region). Also, we added an additional column to the attribute table of the depth points indicating a reference to the nautical chart. However, we cannot add a year of collection to each point because the nautical charts consist of points collected during multiple years. There unfortunately is no information on the nautical charts specifying in which year an individual depth point was measured.

RC: 170 Is it certain that the CTD profiles were cast down to the seafloor?

AR: For our own collected data points, we are confident that we reached the seafloor, because we added an additional weight to the CTD device and had the ship's sonar as a rough benchmark for the depth at the sampling location. For the Transdrift data we are confident that the depth measurements are very accurate too. Janout et al. (2017) writes that in shallower waters (<200m), the water column was profiled all the way to the seafloor, while in deeper waters, only the upper 200-350m were sampled. Since we did not use sample points deeper than 200 m we are confident that the validation points reached the seafloor.

RC: 229: It could be argued to integrate chapter 4.1 and 4.2 to chapter 3, although this is probably a matter of taste.

AR: Thank you for this suggestion. Our idea behind that was to only have the models and results in chapter 3 and validation of the results in chapter 4 as a discussion. In that case, we have a results and discussion chapter.

RC: 244: I do not agree with this argumentation. The outliers deviate by partly more than 5 m up to almost 20 m. If these were real bathymetric features, it would be worthwhile to plot their location somewhere.

AR: Thank you for this comment. Yes we agree, the labelling of these points as "outlier" is not correct. These points are depth measurements at locations where our model does not perform well. We added an additional figure in the Appendix (Appendix E, Figure E1) showing the location of these 14 points including the deviation from our model. As a threshold, we selected all points which deviate by more than two standard deviations from the mean (> 4.3 m) deviation. In addition, we changed the sentence in the main text to: "A few validation points show a larger deviation from the model (> 5m). These points may indicate real bathymetric features such as small scale variabilities in the sea floor, which are not captured by TTR50 bathymetry. The location of these points including the deviation from the TTR50 bathymetry are presented in the appendix E (figure E1)."

RC: 339ff: What would the values of the astronomical tides be?

AR: We added an additional reference with the information that the tidal range is less than 1.5 m.

We thank reviewer #2 for the constructive comments, which helped to improve our manuscript and hope we addressed all the questions raised by the reviewer.

References:

Janout, M. A., Hölemann, J. A., Timokhov, L., Gutjahr, O., and Heinemann, G.: Circulation in the northwest Laptev Sea in the eastern Arctic Ocean: Crossroads between Siberian

River water, Atlantic water and polynya-formed dense water. *J. Geophys. Res. Oceans*, 122, 6630–6647, <https://doi.org/10.1002/2017JC013159>, 2017.