Earth Syst. Sci. Data Discuss., referee comment RC1
https://doi.org/10.5194/essd-2021-170-RC1, 2021
© Author(s) 2021. This work is distributed under
the Creative Commons Attribution 4.0 License.

# Comment on essd-2021-170

Anonymous Referee #1

---

Referee comment on "Sea surface height anomaly and geostrophic velocity from altimetry measurements over the Arctic Ocean (2011–2018)" by Francesca Doglioni et al., Earth Syst. Sci. Data Discuss., https://doi.org/10.5194/essd-2021-170-RC1, 2021

---

General comments:

The manuscript describes a new Arctic-wide sea surface height and geostrophic current velocity data set with a monthly resolution from 2011 to 2018 using CryoSat-2 data. They aim at documenting their product, describe the methodological steps, and final make a comparison to other products in various ways. This has been done!

The manuscript is well written, and structured in a fine manner. Though, it is a problem that the authors compare their dynamic ocean topography with a product with a different geoid and not even mention it.

The languish is fine. There are some grammatical errors and funny formulations, but all in all a nice written manuscript.

The authors need to fix the plotting issue around -180/180 longitude, and I am missing a location map of the moorings.

Specific comments:

L74-75: I am a little puzzled about these sentences. Changes in steric and mass are normally referred to changes in absolute sea level which could be dynamic ocean topography or sea level anomaly!?

L90-94: In Armitage et. al. 20220, Nature, they include density. Why are you not including this? When are the balance valid?

L102: Which retracker is used?

L183: Which tide model is this? Is it the same as the altimetry?

L195: How are leads detected?

L245: I do not understand the sentence, please reformulate.

L258: What are causing the striping effect? Have you studied the effect of the chosen geophysical corrections? Could it be due to the rather old tide model you have used?

Fig 5: Caption (c). You should add that it is an interpolation error.

L297: What is a good score, as small as possible, can you be more precise?

L318: You should mention, that the 4.2 cm comes from the cross-over error

L323: Have have you derived the 3.5 cm? Are you assuming that the standard deviations are independent?

L373: "can be appreciated" how and why?

L379-380: How are you getting the average, are the numbers in cm?

Fig 6b: What are causing the bands in the plot?

L397: Your are comparing two data sets with different geoid? Then you will see the geoid difference as well!

L405: What is $\eta'_i$?

Fig. 7 + text: Why are the errors following the bathymetry? Could this be differences in the geoid?

Table 5: assume it is for the total comparison. How have you calculated the total values?

L419: I may have missed it, but are you not comparing your data to all the moorings in table 1 and 2? If not please, delete or mark them in the table as not used.

Table7, L432-440: You should rewrite this section. I do not completely follow what you have done. What is distance covered in table caption? Distance between the moorings? Are the altimetry data averaged in the same distance? Also make a reference to section 4.5, were you describe the tests.

L441-442: Please, rephrase the sentence.

Fig. 9: Very nice figure, but what is panel (c). Are you missing something?

L495: How are these surface classifications different?

L571: Explain the deviations from the harmonic fit fig. 11c

L609-610: Do not follow the last sentence

Minor comments:

Title: I suggest to change geostrophic velocity => geostrophic current velocity (for clarification)

L6: comma: Here,

L:39-40: It would be appropriate to mention ICESat-2. ICESat-1's coverage is 86 lat, so almost the same as CryoSat.

L:59: Do you mean indicate? Could you be more specific?

L117: The figure should already be introduced in the introduction

L132: Move sentence Data are available... to the top of the paragraph.

L509: we took two steps => performed/prepared to analyzes??