Interactive comment on “DUACS DT-2018: 25 years of reprocessed sea level altimeter products” by Guillaume Taburet et al.

Fu Lee Lueng (Referee) lee-lueng.fu@jpl.nasa.gov

Received and published: 11 March 2019

Authors: We warmly acknowledge Lee Lueng Fu for his review. All comments and remarks have been considered. In the next paragraphs we present the reviewer’s comments followed by our point-by-point reply.

This paper presents findings from assessment of the quality of the DT-2018 products versus DT-2014. I find that the most convincing improvement is near coast and in the Med Sea and the Black Sea. The interpretation of the open ocean performance is not compelling. The following are some specific comments:

P.1 Introduction- I’d suggest adding some text on the history of altimetry missions over the past 25 years.

Authors: Done

p.2 last line- Is the data from Hayaing-2 A incorporated in DT2018?

Authors: As shown in Figure1, Hayaing-2 A data are incorporated in DT2018. The particularity of the reprocessing is to integrate additional HY2A data that were not taken into account in the DT2014 production: data from March 2016 to February 2017. This paragraph has been rewritten to be more explicit.

p.3 first line- What about the data distribution by NASA?

Authors: L2P data are only distributed by CNES and EUMETSAT. The data distribution by agencies NASA, NSOAS, ISRO, ESA, EUMETSAT, CNES… are taken into account in L2 products. DUACS processing only uses L2P data. The sentence has been reformulated in the manuscript.

Line 6- is the altimetry community represented by the OSTST? If so, please mention it.

Authors: Done

p.5 first line- cite Table 2 when the mean period (MP) is first introduced.

Authors: Done

Line 5- what is "upstream measurements"?

Authors: These “upstream measurements” correspond to the L2P products that have been presented previously. The sentence has been rewritten.

Line 17- give a reference for the MSS.

Authors: Done.

Line 18 - delete "of" after "benefit"

Authors: Done.

Line 24 - What is "Theoretical Track"?

Authors: The authors added a reference (Dibarboure et *al.*, 2011) which provide appropriate details: "Altimetry satellites generally use repetitive orbits: after 10–35 days, the sensor flies over the same locations, hence the notion of cycles (time needed to revisit the same location) and the ability to co-locate data. However, the satellite ground track cannot be perfectly controlled and is kept only in a band about 1 km wide. It is thus necessary to use an arbitrary and mission-consistent position for the co-location process. SSH measurements are then projected onto these co-location points."

p.6 line 11-give reference for the MSS

Authors: Done.

p. 7 line 16- delete "at" after "be"

Authors: Done.

line 29-30 - Is "additional variance for high variability regions in DT2018" an improvement? if so, why?

Authors: At this stage, this diagnostic is only used to characterize the impact of the new mapping process and new altimeter corrections. It is not presented as an improvement (It might as well also correspond to noisier DT2018 products). The only conclusion is that there is more variability in DT2018 products. It is only in a second step, by comparing with independent dataset and *in-situ* measurements, that we show that this gain of variability corresponds to an improvement.

p.8 line4- why is the difference of variance important? What does it mean?

Authors: The authors have reformulated this sentence.

Line 9- How is the EKE at the equator computed while geostrophy breaks down there?

Authors: The geostrophic current products disseminated to users are computed using a nine-point stencil width methodology (Arbic et al., 2012) for latitudes outside the ±5°N band. In the equatorial belt, the Lagerloef methodology (Lagerloef et al,1999) introducing a β plane approximation is used. The EKE is computed from this geostrophic estimation. This methodology did not changed since DT2014 version.

As at the equator the geostrophy breaks down, the ±5°N band is usually masked at the equator. Figure 5 has been corrected.

Line 11- What does it mean by "less important"?

Authors: The authors have reformulated this sentence.

Line 16- Given the issue of geostrophy near the equator, how would one interpret the equatorial EKE reduction as improvement?

Authors: The equatorial EKE reduction is a direct consequence of the increase of the noise measurements considered in the OI process: Observation errors have been increased in the equatorial belt, so the SLA signal is smoother and less energy is observed in this region. It has been noted that in DT2014 products, there was too much noise at the equator.

In the ±5°N band, near the equator, the EKE has been masked.

p.9 line 4- Is the fact that DT2018 products underestimate absolute geostrophic current an improvement? If not, what is the interpretation?

Authors: It is presented as a fact, not an improvement. Main reasons are that absolute geostrophic current from altimeter are smoother (fewer small scales) than with drifters, there is probably still some ageostrophic signal left in drifters' data.

line 5- The equatorial regions in Fig 6 are blocked but not in Fig 5?

Authors: The authors have corrected this mistake.

line 13 - What does it mean by "improvement is clearly visible in the intra-tropical band" while the regions are blocked in Fig 6?

Authors: The sentence has been reformulated to take into account that the ±5°N band is masked.

p.10 line7- Please quantify the global reduction of the variance.

Authors: Global reduction of the variance is around 0.6%. it has been added in the document.

line15 - What are the "three estimates"? I see only two in Fig 8 left.

Authors: The authors have reformulated the sentence. The first estimate using along-track measurements of the reference mission only (Ablain et al.,2017) is not display here.

p.11 lines 13-15- I think the information of Table 5 is sufficient and Fig 9 can be deleted. It does not convey much additional information.

Authors: The authors have replaced the figure with the difference of the root mean square of the SLA minus independent Tope/Poseidon along-track SLA, using successively DT2018 and DT2014 gridded product. The authors thought that the spatial information conveyed by this comparison would be more relevant. We have added a description of this new figure in the body of the manuscript.

Line 26- Please quantify the overall improvement shown in Fig 10.

Authors: Overall reduction of the variance for Mediterranean product is around 0.4%.