

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

Anonymous Referee #3

Received and published: 26 March 2019

Authors: We warmly acknowledge Rev.#3 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.

General Comment :

The manuscript presents the overall enhancement of gridded and along-track altimetry products following the DT2018 reprocessing, in a way that is similar to the DT2014 reassessment published earlier. Methods and Processing for quality assessment are therefore established, and skill assessment has not been developed further, but this is acceptable to me. I believe it is a necessary step to publish such reassessment periodically, and to synthesize skill metrics for the state-of-the-art altimetry products as proposed. I therefore support the publication of this manuscript, suggesting some modifications below. Title is appropriate.

* As a suggestion : I believe the whole manuscript could be summarized on a single figure, in the form of a target or Taylor diagram showing skill metrics for the different products (along-track, gridded SLA, geostrophic currents) and scales (regional, global coastal, global offshore, climatic, etc ..) showing DT2014 positions and DT2018 positions. This is a mere suggestion, but I think it would provide a very efficient overview of the DT2018 update. Unless there are good justifications why this can not be done (at least for part of the datasets presented), I think it would be relevant for the manuscript to consider issuing this figure. Specific Comments (I start with question mark "?" to denote a suggestion)

Authors: The authors do agree that this suggestion is a good idea. We have tried to compute such figure reusing existing results, and particularly Table 3 to 5. However, the result does not appear to us to be sufficiently successful to be published. It would deserve much more substantive work. The authors keep the idea and will try to implement it in future quality document associated with the DT2018 products and for future reprocessing.

Improvements summary DT2018 vs DT2014 for global products (in red), regional Mediterranean Sea products (in blue) and Black Sea products (in green)

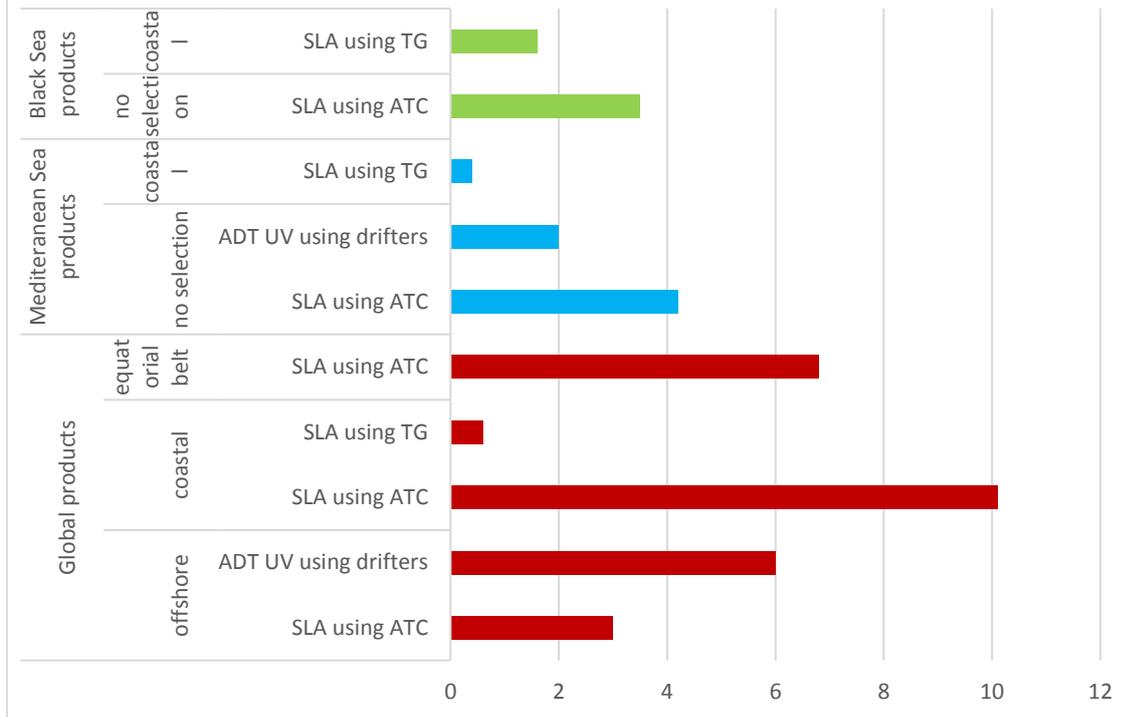
- variance reduction in percent -

ATC: Along-Track Comparison

TG: Tide gauges

SLA: SeaLevelAnomaly

ADT UV: Absol



* Abstract: P1L19 : I understand the reason for providing quantitative metrics in the abstract, but the term "errors" is too vague in the present abstract. Please precise.

Authors: The authors specified that these values have been computed using independent and *in-situ* measurements. In particular, the difference in variance of difference between altimetry and independent dataset allows to characterize this error.

* Text :

P3L5-6 :? recommendationS, correctionS

Authors: Done

P3L33: "in Deep Ocean" -> "in the deep ocean".

Authors: Done

P4L18 : It would ease the read to define "geodetic" and "drifting" mission, and help nonspecialized readers to grasp the challenges of altimetry processing.

Authors: The authors replaced the terms "geodetic" and "drifting" by "non-repetitive mission".

P4L23 : please define more clearly the "percentage of data recovery"

Authors: The authors have reformulated this sentence which was very confusing. There was no data in DT2014 products and now validated measurements are available.

P5L20 : complete: differences of ...

Authors: Difference of SLA. It has been specified both at line 19 and 20.

P5L29 "law-pass" -> "low-pass"

Authors: Done

P6L6:7: ? consider Capet et al. 2014 that adressed those issue for DT2014.

Authors: Indeed, this sentence is incorrect/misunderstood. The authors rewrote this passage taking into account the publication Capet et al., 2014.

P6L9 : Does "selection" applies on 1) altimeter data for along-track data product generation or 2) along-track product for gridded products generation ?

Authors: it is for gridded product generation. The explanation has been clarified.

P6L14:15 vs P6L20:21 : There seems to be apparent contradictions here, please C2 rephrase for clarity (".. unchanged for global and Black Sea, wrt to DT2014" VS "BlackSea paramters are NOW similar to global, except for scales ... ").

Authors: Done

P6L27: correct "Different parameters leadS"

Authors: Done

P7L30: There is a problem in the sentence "This ... variance". Even after displacing "the", the meaning is not clear, please clarify.

Authors: Additional variance, between 2% and 5%, is observed for high variability regions in DT2018 products.

P8L4: precise the sign of the 100-200 cm² difference of variance (but I think it's both plus and minus).

Authors: Done.

P8L17: rephrase "less peaky"

Authors: The standard deviation of DT2018 EKE is less important than for DT2014 EKE: EKE variations are less important. This section has been improved and details have been added.

P8L22 : could you explain why only th period 2003-2004 can be considered for this assessment ?

Authors: We choose the 2003-2004 period because it is a period over which we have 4 altimeter missions available: TP, J1, EN and GFO. This allow us to keep 2 missions independent for the validation. The remaining 2-altimeter constellation used for the mapping can be compared to the altimeter constellation available before 2003 or for the C3S production. To test the relevance and robustness of the diagnosis, we varied the independent missions over the 2003-2004 period, using alternately J1, EN and GFO as independent missions. The conclusions remain the same. Moreover, it

is a period that has already been studied in Pujol et al, 2016, so we thought it would be interesting to continue over this "reference" period. We also did the study on another more recent year (2017) and the conclusions are similar.

P8L23: The author avoided the nomenclature "two-sat"/"all-sat" up to this point. Can it be also avoided here ? (I think it is the only place where it is used).

Authors: Done

P9L8 : ? is it "COvariance and RMS" ?

Authors: The Taylor skill score (Taylor, 2001) is defined as:
$$S = \frac{4(1+R)}{\left(\frac{\sigma_{\text{mod}} + \sigma_{\text{obs}}}{\sigma_{\text{obs}} \sigma_{\text{mod}}}\right)^2 + (1+R_0)}$$

Where R_0 is the maximum correlation attainable (hereafter $R_0 = 1$), R is the correlation coefficient between the model and the observations, σ_{mod} and σ_{obs} are respectively the model and the observations standard deviations.

So it is more correlation and standard deviation than variance and rms.

P9L10 : "altimeter maps" -> "geostrophic current maps"

Authors: Done

P9L12 : lowercase "Variance"

Authors: Done

P9L20 "points" -> "data points"

Authors: Done

P9L20/22 : rephrase "We gain all points".

Authors: Done

P9L26 "in the" repeated

Authors: Done

P10L4 : Why "maximum" correlation ? Does that refer to a selection amongst the neighboring pixels ?

Authors: The processing is detailed in Valladeau et al., 2012. The method is based on a criterion of maximal correlation between tide gauge time series and altimeter gridded products, where the most consistent state of the ocean between both data time series is considered within 300km around tide gauge. The main advantage of this method is to reduce the effect of oceanic variability and the error on the MSS with respect to the same altimeter point.

p10L26 : "a measurementS"

Authors: Done

P11L3, remove "." after "yr" (2x).

Authors: Done

P11L18 "For" -> "for"

Authors: Done

P11L26:28 Why is there no TG validation for the BlackSea ? Explain.

Authors: It has been added.

P12L14 "large" -> "largeR"

Authors: Done

p12l22 "lager" -> "larger"

Authors: Done

P13L8 "for" -> "from"

Authors: Done

P13L26 Biblio ref for eddy tracking, instead of html ?

Authors: The authors have added a reference to a poster presentation which was presented during OSTST 2018 : A Delepouille et al. and the user manual that describes Mesoscale Eddy Trajectory Atlas product based on DT2018 altimetry products.

* Figures & Tables :

* Are appropriated and all useful in general. * Small to very small coordinates, axes and colorbar title. Please ensure readability.

Fig 1: What determines the end of the bars for the future ? scheduled lifetime ? please precise.

Authors: Nominal mission life time for missions before launch. Extended lifetime for launched missions. And end of next year for old missions (to account for possible obviated anomalies). Generally derived from CEOS (Committee on Earth Observation Satellites) timeline, or official announcements. Note that the launch dates and lifetimes are constantly in flux, so this figure periodically updated as an indicative timeline either than exact plan from Space Agencies.

Fig 2: Probably the less useful figure. If considered essential, should the figure be reprocessed with larger bins ? It does not provides many information as for now, except : "more data in the 20km coastal band", "lot of noise in the center" and " a strange, uncommented blue track in the center of East Med". Unless justified otherwise, i suggest to remove this figure.

Authors: The authors have decided to remove this figure.

Fig 3,: caption : rephrase "Loss ones".

Authors: The authors have rephrased this sentence.

Fig 6. Second half of the caption ("Difference of the variance ... "). Does not correspond to the figure (eg. refers to negative values). -> ? missing panel ?

Authors: The missing panel has been added to the figure.

Fig 9: Caption mentions histograms that are not visible on the figure.

Authors: This caption refers to an old version of the figure. It has been corrected.

Fig 10 : use divergent colormap for the panel f,g,h (eg. blue-white-red)

Authors: The authors have changed this figure.

* References :

* There are many references to work 'in prep.', including on to "In prep. to be submitted to OD in 2016" (Lyard et al.) . Please check with editorial office on the policy as regards reference to unpublished works.

Authors: The authors have contacted the editor. Here is the answer: In general, please note that "submitted to", "in preparation", "in review", ... can be left as is. During typesetting of your manuscript our Typesetters will check all references related to Copernicus Publications for an update. If an update is available our Typesetters will insert it and inform you accordingly.

* The reference style is not homogeneous, with years being given some times at the end, some times after the authors. Please homogenize.

Authors: Done

* There are (many) reference works not provided in the bibliography (eg. Valladeau et al, 201 ; Le Traon et al, 1998, Ducet et al 2000, Le Traon & Ogor 1998 ; Le Traon et al, 2003 ; Lumpkin et al. 2013 ; Taylor, 2001 ; Watson et al, 2015 ; Beckley et al , 2017 ; Dieng et al 2017; Ballarota, in prep ; d'Ovidio 2015.)

Authors: The authors added the missing references.

* Similarly there are (many) references in the biblio that are not mentioned in the text. I do not think it is my duty to revise this for you extensively. Please check carefully.

Authors: The authors have checked. Many references in the biblio are not mentioned directly in the text but are mentioned in the table 1. The authors did not remove any references.