

Interactive comment on “Analyses of altimetry errors using Argo and GRACE data” by J.-F. Legeais et al.

Anonymous Referee #2

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In this work, the authors present an analysis of altimeter errors by comparing SLA obtained from altimetry with in-situ DHA computed from the Argo array. This independent reference is used to compute the relative altimeter drift and bias. Moreover, GRACE data is used together with the Argo array in order to estimate absolute altimeter drifts. On the other hand, errors associated with the methodology followed to compare the different datasets are investigated through some sensitivity analyses to several parameters related to the datasets.

I think that this paper presents original work and therefore I consider that it must be published in Ocean Science with some minor corrections. I have, however, some suggestions and questions that should be taken into account. There are also some typographical and grammatical errors that need to be corrected.

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In the following there is the list of my comments:

[1] My first comment is related to the methodology to compute DHA. In section 3, the authors state that “in-situ DHA are referenced to a synthetic mean Argo Dynamic height calculated over the period 2003 to 2014”. This synthetic mean dynamic height was already mentioned in section 2.2 but no information is given concerning to both how this synthetic climatology is obtained and the reference depths used to compute it. I think that a description about the procedure followed to compute it should be included in the text.

[2] In section 4.1 it should be written “. . . has been related to the altimeter standards . . .” instead of “. . . has been related with the altimeter standards . . .” please change it.

[3] Caption of Figure 1 should include the color of the lines associated with Jason 1 and Envisat missions. It is unclear in the figure.

[4] The same for caption of Figure 2. Please include the color related to the East and West boxes.

[5] In section 4.3 the sentence “At low frequencies (in blue), the SL_cci product (triangle) is more in agreement with in-situ data than the SSALTO/DUACS product (circle) which is in favour of a product dedicated to climate studies” is not clear. Please reword it to clarify.

[6] Concerning to correlations given in Tables 1 and 2, it is unclear in the text which is the confidence interval (90%, 95% . . .) used to compute them. Please add this information in the new version of the manuscript.

[7] In section 5.2, the authors state that the variability of SLA-DHA is larger in regions of high ocean variability as a consequence of the procedure followed for the collocation of Altimeter (10-days box-averaged along-track SLA) and Argo measurements. In the same paragraph it is mentioned that “this effect could be reduced by computing maps of altimeter measurements by optimal interpolation. However, this is a very time

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consuming ...” I wonder if the authors have tried to compute these maps at least for one specific mission in order to check the decrease of the error associated with the collocation of Altimetry and Argo data in these areas of high ocean variability.

[8] Regarding to the previous point, at the beginning of the second paragraph of this section the authors indicate that areas with ocean variability larger than a given threshold are removed before the comparison of altimetry and Argo data; and this fact does not affect the detection of altimeter drifts. Nonetheless, almost at the end of the same paragraph it is written that according to results reported in Figure 6, “This suggests that the areas of large ocean variability significantly contribute to the global statistics computed between altimetry and Argo data”. This sentence emphasizes the idea of retaining all the areas of high variability instead of removing some of them before the computation and opposites the aforementioned. I think that this paragraph could be a little bit confusing for the reader and it should be re-written in order to clarify.

[9] Labels and legends in Figure 10 (both panels) should be enlarged in order to make them easier to read.

[10] The first sentence in section 5.7.1 “According to the reference pressure used to integrate the in-situ Argo profiles, no DHA will be computed for all the floats whose mean maximum pressure does not reach this reference level.” is a little bit confusing. Please reword it to clarify.

[11] In the sentence in section 5.7.3 “. . . whereas a reduced variability is found with the in-situ steric measurements referenced to a shallower level (900 dbar) . . .” should be specified that it is represented by a triangle in Figure 15 in order to avoid confusion. Moreover, the end of the sentence “. . . with 0.85 proportion compared with altimeter SLA” should be also re-written to clarify.

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