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Interactive comment on “Evaluation of wet troposphere path delays from atmospheric reanalyses and radiometers and their impact on the altimeter sea level” by J.-F. Legeais et al.

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Received and published: 24 July 2014

This paper aims at determining to which extent a model based wet tropospheric correction can be used as a reference to assess the quality of the instrumental WTC and the impact of the various WTC in the sea level studies at climate scales. Although some results are not new (the problems associated with the discontinuities in the ECMWF operational model and the lack of consistency in the corrections provided by ECMWF in the various altimeter products has been documented by various authors) the analysis of the impacts of models and radiometers at the various spatial and time scales is of relevance.

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Although the authors agree that, just comparing models and radiometers it is obviously not possible to ascertain the identified signals such as the parabolic curve to models or to the radiometers, the paper contributes to a better understanding of these issues. Discussions such as the one presented at the end of section 4.1 are particularly interesting.

Therefore I recommend the publication of the paper subject to minor revision and clarification of the issues mentioned below.

1. At the very beginning of section 2.3 the authors say that “we interpolate the model’s grids on space and time (by bilinear interpolation) on the satellite ground tracks”. Then, later, they discuss the differences in the ECMWF WTC available in the OPR/GDR of the various products. Therefore, it is clear that the authors did not interpolate the models along the altimeter tracks, but rather used the interpolated values provided in the altimeter products. This should be clarified. In addition, authors should justify why they used the WTC from the ECMWF operational model provided in the altimeter products and did not estimate it from the product provided by EUMETSAT, as they apparently did for the ERA Interim and NCEP. This choice has a strong impact in the results and should be mentioned in the discussion and in the conclusions.

2. Page 1619, line 14 , “applying the Mean Sea Level (MSL) calculation method described in AVISO website”. Since SLA variations are discussed throughout the paper, the authors should give a brief summary of this procedure, with emphasis on the type of corrections which were adopted, since these may also have a strong impact in the SLA time series. For example, for Envisat, did they apply dual-frequency ionospheric corrections during the period for which the two frequencies were available or did they apply the JPL GIM model for the whole mission?

3. In reviewed literature the lack of consistency in the ECMWF model provided in the various altimeter products has already been pointed out and should be cited here. See for example. “Fernandes, M.J.; Lázaro, C.; Nunes, A.L.; Scharroo, R. Atmospheric

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Corrections for Altimetry Studies over Inland Water. Remote Sens. 2014, 6, 4952-4997". Here, various discontinuities in the ECMWF products are reported with strong impacts not only in the wet but also in the dry correction and therefore in the estimation of water level time series. Although these discontinuities are reported in the context of inland water studies, it may be of interest to investigate if similar impacts exist in open ocean studies.

4- Page 1620, lines 5-7 – Was the criterion used to select the crossover points also used in the selection of the points used in the other analyses? Please clarify. In addition, for this type of study it is important to know the criteria used to select the valid measurements for the onboard radiometer-based WTC, i.e., which validity criteria (flags, thresholds, etc.) for the radiometer WTC were used? For example, were rain/ice contaminated measurements used?

Minor points:

Page 1618 line1, the ERA Interim grids are at $0.75^{\circ} \times 0.75^{\circ}$, not $0.7^{\circ} \times 0.7^{\circ}$

Page 16 18 line 17 "T/P Merged-GDR products" ?

Page 1618 line 25 define OPR

Page 1619 line 26 and in various subsequent parts of the paper – "SSH performances is"- this is a loose expression, please use a more precise one.

Page 1620 line 25 "should better solve the small spatial and temporal scales than its reanalysis" – All ECMWF models have the same temporal resolution of 6 hours, therefore the temporal scales will not be solved better in the operational model

Page 1622, line 18 "wet troposphere parameter"- may be replaced by "wet troposphere correction" or "wet path delay"

Page 1622 line 25 "the biases between the different radiometers of the altimeter missions have been removed." Please explain how this was done and give the values of

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the various removed biases.

The word onboard is used throughout the paper whether it is an adjective or an adverb while in the second case the expression “on board” should be used instead. We should say “TMR is the TP onboard radiometer” or “TMR is the radiometer on board TP”.

Interactive comment on Ocean Sci. Discuss., 11, 1613, 2014.

OSD

11, C621–C624, 2014

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