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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.***

### **Anonymous Referee #1**

Received and published: 16 July 2014

This paper provides an interesting study on the wet troposphere corrections applied to satellite altimeter data over the last two decades, in particular from meteorological models and onboard microwave radiometers. The paper strives to improve upon the component of the mean sea level error budget, as observed by satellite altimeters, that is attributed to the wet troposphere correction. It shows that the best consistency between model and radiometer representations of the wet troposphere correction is achieved through the use of the ERA Interim reanalysis model. The results and analysis are interesting and worthy of publication.

On page 1622, there is a statement that “biases between the different radiometers have been removed”. More detail on these biases, e.g. a table of values, and the method by

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which they were determined would be useful. Whether or not the models were used to determine those biases seems relevant to this paper.

Throughout the paper, there is use of the terminology “SSH performances”. This is a rather broad term, whose meaning is either ambiguous or vague. Might there be a better term to use, or perhaps some statement about what “SSH performances” means. Does it mean “altimetric sea surface height error budget”?

On Page 1625, line 12-15. The two sentences starting, “However, these reduced differences. . .” are confusing. Please rephrase for clarity.

At least visually, Figure 7 seems to suggest ERA interim has worse consistency with the radiometer than ECMWF operational for the 2002-2012 (Jason-1) period. Yet the text suggests otherwise. Might it be worth including quantitative metrics such as standard deviation of the values in each panel of Figure 7, to reinforce the discussion.

Page 1626/1627: The scale on the maps for Figure 7 is +/- 1 cm, yet the text says the bottom panels reveal differences of several centimeters. Is the scale saturated, and if so then the scale should be changed to reinforce the statement in the text.

Page 1628, line 25: The meaning of “thanks to intermediate data consisted by the altimeter measurements, separating different temporal and spatial scales” is unclear. Recommend rephrasing.

Below are minor suggestions and questions for the authors to consider.

Minor suggestions for text:

The term “SSH variance differences at crossovers” is used a few times in the text and figure captions. Might it be better to use, “relative SSH crossover variance”?

Abstract: “the relevance of synergies between the “altimetry” and “atmosphere” communities.” Page 1616, Line 4: There are references to radio sounding, but are there references to GPS comparisons?

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Page 1616, Line 23: “to assess the long-term stability of the radiometer corrections”.

Page 1617, Line 5: Is it fair to say that the reanalysis “should no be affected by jumps”, since the changing data being assimilated into the models might result with “jumps”? Perhaps instead, “have been more uniformly processed than the operational models, thereby eliminating jumps due to changes to the processing strategy.”

Page 1617, Line 10: “the assessment of the modeled and instrumental WTC..”

Page 1617, Line 24: “The NCEP/NCAR reanalysis. . .”

Page 1618, Line 3: “model and 2.5 . . .”

Page 1618, Line17: Is it “Mixed-GDR” or “Merged GDR”?

Page 1618, Line 24: Is it “neuronal” or “neural”?

Page 1619, Line 4: Should it be “effect of the spatio-temporal sampling by the altimeters.”

Page 1619, Line 8: Perhaps, “we are able to assess the quality of the WTC by evaluating the primary signals that are representative of climate scales.”

Page 1619, Line 23: “the impact of the WTC at shorter periods. . .

Page 1620, Line 6: “additional editing of the crossover points is performed: using only data with latitudes lower than. . .”

Page 1620, line 21: “becomes insignificant”

Page 1622, lines 11-14. “Longer timescales are also impacted by improved precision at shorter timescales since. . .”

Page 1622, line 23: What is meant by “which model is the most adapted”? Is it “which model is most consistent”.

Page 1623, line 11: “is slightly smaller with ERA interim compared to the NCEP re-

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analysis”

Page 1625, line 9: “MSL trends compared to those derived from the radiometer”

Page 1627, line 25: “Thus, very good knowledge. . .”

Page 1629, line 25: “since the expertise of each is of benefit to the other.”

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