

Interactive comment on “Accuracy of the mean sea level continuous record with future altimetric missions: Jason-3 vs. Sentinel-3a” by L. Zawadzki and M. Ablain

Anonymous Referee #1

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Review “Accuracy of the mean sea level continuous record with future altimetric missions: Jason-3 vs. Sentinel-3a” by L. Zawadzki and M. Ablain

This paper uses simulated sea level anomalies for two upcoming radar altimetry missions, Jason-3 and Sentinel-3A, to estimate bias errors between the missions. It uses these errors to estimate their contribution to the uncertainty in the rate of global and regional sea level rise.

Major comments:

This work has a basic contradiction in its approach to estimating the bias error between two satellite missions that should be addressed. An assumption appears to

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be made that the bias error can be estimated by constructing simulated data that has natural variability taken from an ocean model combined random errors the errors from the Jason-1/Jason-2 cal/val phase. Experience in error sources from altimeter missions would suggest that the errors are not simply random errors, but are often geographically-correlated. The actual errors are a combination of once-per-revolution and other orbit determination errors, drifts and sudden offsets in the wet troposphere correction, tracker errors and biases from non-ocean like surfaces, etc. The authors implicitly acknowledge that there are geographical biases, by estimating the bias error for a region, implying that the regional bias is potentially different from the global bias. However, their simulated data does not adequately reflect geographically-correlated errors. My guess is that is why the simulated errors are lower than the results from Jason-1/2 and Envisat. I feel that these results are flawed by considering only errors that are temporally-correlated.

2. The methodology section could be clearer in several sections. Many of the details about the methodology appear in a report (Zawadzki and M. Ablain 2014) that does not appear to have been peer reviewed. More of the details of the construction of the synthetic data that are included in the appendix of that report should appear somewhere in this paper.

3. With the North Atlantic, the authors have chosen a particularly challenging region to estimate a regional bias error. The basin is relatively small and as they acknowledge, it is dominated by mesoscale variability. If the bias were truly a constant in the region, it would be more effective to either mask out the mesoscale portions or downweight them, which should reduce the bias error.

4. The paper should address the impact of errors in the current mean sea surface models on mean sea level measurements made by Sentinel-3A initially on the new ground track. Deviations of from the nominal track will sample areas where the mean sea surface has not been measured before. The authors can cite results from the Jason-1 geodetic phase, which sampled a new ground track. While the mean sea

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surface along S3A's ground track will eventually be well-determined, this could increase the error in including S3A in the climate record. This paper does not include these errors in the simulation of determining the Jason-2/S3A bias.

5. It is not clear what the length of the Sentinel-3A/Jason-2 overlap period was assumed to be. Also, in constructing the Sentinel-3A/Jason-2 bias differences, it is not clear what time sampling was used. The ~ 10 day Jason-2 cycle? The Sentinel-3A 27-day cycle?

Minor corrections:

page 1512, line 16: Reword "would prevent from meeting climate users requirements" to "would not meet climate users requirements".

page 1513, line 10: Better references for the GMSL time series are: GSFC (<http://climate.nasa.gov/vital-signs/sea-level/>) and NOAA (<http://www.star.nesdis.noaa.gov/sod/Isa/SeaLevelRise/>)

page 1513, line 11: Change "orbits" to "orbit".

page 1513, line 12-13: The calibration phases were 20 cycles or 200 days, which is slightly less than 7 months rather than 9 months.

page 1513, line 14: "a few seconds apart" implies that the separation times were < 5 seconds. T/P and Jason-1 were separated by about 71 seconds and Jason-1 and Jason-2 were separated by an average of 55 seconds. It would be more accurate to say "about 1 minute apart".

page 1513, line 26: Update the expected launch date of Jason-3.

page 1513, line 28: 7 months rather than 9 months

1516 In several places in the draft "Noises were", "noises have", etc. should be "noise was" or "noise has", etc. "theses noises" should be "this noise".

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1518 "results at global scale" should be "results at the global scale".

The results from Jason-1/Jason-2 should include a citation.

Interactive comment on Ocean Sci. Discuss., 12, 1511, 2015.

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