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## ***Interactive comment on “Sea level budget over 2005–2013: missing contributions and data errors” by H. B. Dieng et al.***

### **Anonymous Referee #2**

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Review of 'Sea level budget over 2005-2013: missing contributions and data errors' by Dieng et al.

This paper analyzes the differences in monthly global mean sea level changed measured by altimetry and from the combination of ocean mass and steric components of sea level inferred from GRACE and Argo, respectively. These residuals are thought to reflect omission errors (e.g. Argo does not measure below 2000 m or the Indonesian region) or measurement errors (e.g. the system errors for an altimeter). This paper uses a correlation analysis and comparisons with models to assess the nature of the residuals.

They conclude that one of the largest sources of variations in the sea level budget analysis is due to variations in the altimetry time series from different processing centers.

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This is not a novel observation – it has been documented by Masters et al. 2012 and Henry et al. 2013, and this analysis does not shed any additional insight into the variations among the different groups.

A much more valuable contribution is the conclusions based on the ORAS4 output, that quantifies the possible omission errors from the Indonesian region, Gulf of Mexico, etc.

Table 1: I object to the error estimates on the mean trends in ocean mass and steric sea level, which were estimated from “the dispersion around the mean”. All of these data sets used the same fundamental observations, and the variations about the mean reflect only processing choices. First, with only 3 or 4 models, the sample size is far too small for any statistical meaning. Second, the products are not independent, any assumptions about their distribution (Gaussian) are not valid. These “errors” should be removed from the table and text. It would be better if the authors referred only to the range of the processing differences.

Page 704: While I understand that the Argo fields that were used in this study report temperature and salinity changes up to 2000m, I believe that the authors have assumed that all Argo profiles are to 2000m. In fact, in the early part of their study the major of profiles are only to ~700m. The correlation of their residuals with the Argo time series could be in fact due to under sampling of the 700m to 2000m depths. By looking only at global mean time series and a full integration of the steric component, I believe that they have overlooked a possible source of error.

Minor corrections: Throughout the paper, the Roemmich and Wilson dataset is referred to as "SCRIPPS". This is name and not an abbreviation or acronym and should be spelled "Scripps".

Page 705, line 13: “Colorado University” should be “University of Colorado”

Page 718, line 30: A recent study by Karl et al. suggests that there has been no hiatus, so perhaps this sentence should be reworded.

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