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Using in-situ measurements to assess the error on the global mean sea level trend

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The global Mean Sea Level (MSL) trend estimation is an essential indicator of satellite altimetry, as it is related to global climate change. To date, a global rate of 3.1 mm/yr is provided by TOPEX/Poséidon (T/P) and Jason-1 satellite altimetry without applying the post glacial rebound since 1993 (Aviso: http://www.jason.oceanobs.com/msl). Even if altimetric data provide a reliable estimation of the MSL trend, some potential drifts have been identified due to geophysical corrections, orbit solutions and the uncertainty to link the different MSL time series. In order to assess the error on the global MSL trend, comparisons to independent in-situ datasets are of main interest.

First, T/P and Jason-1 altimetric data have been compared with tide gauge measurements by the means of a dedicated method which aims at detecting potential drifts in Sea Surface Heights (SSH). The tide gauge network processed is the GLOSS/CLIVAR "fast" sea level database. Second, an innovative method with similar objectives has been developed using thousands of free-drifting profiling floats of the ARGO network. Thus, altimetric data have been compared to sea level heights computed from these in-situ temperature/salinity profiles. Both methods complement each other since the first one concerns coastal areas while the second one is widespread enough to get an assessment of the MSL in the open ocean.

From these comparison methods, altimetric/in-situ data trends lead to a computed drift lower than 0.5 mm/yr whatever in-situ data is used. This value results both from the error on datasets and the intrinsic error of the method, partly linked to the space/time colocation of altimetric and in-situ measurements. Finally, this study provides an up-

per bound of the error of the global MSL trend.