Confidence envelop of the Global MSL time-series deduced from Jason-1 and Jason-2 altimetric missions.

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Overview
With satellite altimetry missions (TOPEX/Poseidon, Jason-1, Jason-2), the Global Mean Sea Level (GMSL) has been calculated on a continual basis since January 1993. Knowledge of the errors impacting MSL calculation is needed in order to respond to users’ requirements, see Tab 1.

- Releasing a confidence envelop is an adequate means to monitor errors in time. It also provides a complementary approach to estimate the error budget of GMSL rate, see Ablain et al, 2009 and 2012.

Methodology

**Approach:** Generate a set of GMSL time-series that a priori have equivalent qualities by tuning identified parameters.

- Standards: MSS (CNES/CLS, DTU), Tidal models, etc...
- Data Selection: Selection of near-coast measurements is a cause for uncertainty: data is selected in 3 different ways (bathymetry > 0, 100 or 200 m)
- Average Mesh grids: Several mesh grids with a priori the same relevance are used in the set to compute the average grid at each cycle: 1°x3°, 1.5x3°, 1x3.5°, etc ...
- Missions Linking: Choice of the central cycle and the width of the window used to compute the inter-mission linking bias during verification phases is subjective. These 2 parameters take several values in the set.

Confidence Envelop Use cases

**Instantaneous uncertainty**
- The approach allows the computation of an instantaneous uncertainty envelop, see Fig 2 and 3.
- Fig 3 is a detrended and centered view of Fig 2 in order to better analyze the dynamics of the confidence envelop.
- One may notice the error remains relatively stable over time. It rises mainly during strong La Niña or El Niño episodes (e.g. 2011, 2013). Our first analyses attribute it to the Wet Troposphere Correction sensitivity (Legeais et al., 2014) and the choices in computation methodology (Henry et al., 2014)

**Comparison between Global MSL time-series**
- Deducing the long-term error from the instantaneous uncertainty requires: the propagation in time of systematic errors (e.g. linking errors) and setting a common same reference for each time-series (e.g. averaged at 0 over 2002).
- The resulting envelop allows to verify Colorado University and Aviso products both stay within the confidence interval, see Fig 4.

Conclusions & Outlooks
- GMSL confidence envelops permit a complementary approach to estimate altimetry errors in agreement with former studies.
- They have been requested by users involved in MSL closer budget studies (combining mass and steric components).
- They could be specifically designed according to other users’ needs: therefore users feedbacks are essential.
- They could be refined by taking into account altimeter instrumental instabilities (neglected here), and extended to other missions (T/P, Envisat, ERS, …).