

Confidence envelop of the global MSL time series deduced from TOPEX, Jason-1 and Jason-2 altimeter missions.

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Abstract

With the satellite altimetry missions, the global mean sea level (GMSL) has been calculated on a continual basis since January 1993. 'Verification' phases, during which the satellites follow each other in close succession (TOPEX/Poseidon--Jason-1, then Jason-1--Jason-2), help to link up these different missions by precisely determining any bias between them. The global mean sea level (MSL) deduced from these 3 altimetric missions provides a global rate of 3.2 mm from 1993 to 2013 applying the post glacial rebound (MSL AVISO website <http://www.jason.oceanobs.com/msl>).

Within the ESA Climate Change Initiative program, the users requirements have been collected and for the users of the Sea Level ECV, it is crucial to know as much as possible the errors impacting the MSL calculation in order to analyze the MSL variations and in fine to interpret correctly the geophysical mechanisms underlying these variations. The characterization of these errors was performed over the whole altimetric period separating several time scales as the long-term evolution (mean sea level trend), but also the inter-annual and periodic signals (see table below).

However, it will also be very useful to provide the confidence envelop (or error envelop) of the global MSL time series in order to know the exact error level at each time step. In this paper, we propose to describe in details the approach developed to compute this confidence envelop. We will also present the results obtained and how to interpret them.

Spatial Scales	Temporal Scales	Altimetry errors	User Requirements
Global Mean Sea Level (10-day averaging)	Long-term evolution (> 10 years)	< 0.5 mm/yr	0.3 mm/yr
	Inter annual signals (< 5 years)	< 2 mm over 1 year	0.5 mm over 1 year
	Periodic signals (Annual, 60-days,...)	Annual < 1 mm 60-day < 5 mm	Not defined
Regional Mean Sea Level (2x2 deg boxes and 10-day averaging)	Long-term evolution (trend)	< 3 mm/yr	1 mm/yr
	Inter annual signals (> 1 year)	Not evaluated	Not Defined
	Periodic signals (Annual, 60-days,...)	Annual < 1mm 60-day < 5 mm	Not Defined

MSL error budget at climate scales derived from altimetry data over all the altimetry period