Let's talk about sea level rise

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Abstract

Satellite missions to monitor sea level rise

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Sea level can be observed whenever you are at the coast. But how do we know sea level is changing?

To answer this question, we can install a tide gauge and measure the local sea level around the clock. With the harmonics subtracted, a trend may appear. To eliminate the impact of land motion, e.g. subsidence because of post-glacial motion or water extraction, we need to monitor that by GPS.

Then we will find that there are very few long-period records of tide gauges that are linked to a GPS. We get far from a global picture. The only solution is to observe sea level from space.

A satellite altimeter is basically a tide gauge in space. A radar measures its distance to the sea surface, and the GPS is now on the satellite. The orbital altitude as determined by the GPS *minus* the height determined by the altimeter range give you sea level (although a number of additional corrections are needed).

A satellite like the Copernicus Sentinel-6 mission covers most of the globe in just ten days. So, every 10 days we can measure the global mean sea level. We have been doing so with its predecessors TOPEX, Jason-1, Jason-2 and Jason-3 since 1992. A clear increase of 11 cm in the 32 years since appears. But these are not the only missions that show this phenomenon. Nine complementary missions, including the Copernicus Sentinel-3A and -3B corroborate the trend, the acceleration, and the interannual variations in minute detail.

Sea level rise is clear and undisputable given this evidence.

EUMETSAT that provides the ocean data for Sentinel-3A, -3B and -6 is committed to continue this time series with the planned Copernicus Next Generation missions.