



Comparisons of various sea level reconstructions and sea level from data synthesis products: 1960-2012

Mark Carson (1), Detlef Stammer (1), Armin Köhl (1), Benoit Meyssignac (2), John Church (3), Jens Schröter (4), and Manfred Wenzel (4)

(1) CEN, Universität Hamburg, Hamburg, Germany (mark.carson@uni-hamburg.de), (2) LEGOS-CNES, Toulouse, France, (3) CSIRO Oceans and Atmosphere Flagship, Hobart, Australia, (4) Helmholtz Centre for Polar and Marine Research, Alfred-Wegener-Institute, Bremerhaven, Germany

We investigate sea level trends and variability as reconstructed from tide gauge data and ocean data assimilations (ODA) over the last 60 years. Tide gauge reconstructions (TGR) are mostly based on statistical approaches using selected EOFs, or trained from variability patterns, from altimetric sea level and tide gauge data to extrapolate regional sea level evolution backward in time. Reconstructions also exist from dynamical ocean modeling approaches with and without data assimilation. We intercompare all results and provide ensemble mean and ensemble spreads to describe estimates of past regional sea level changes and their uncertainties.

While tide gauge reconstructions match tide gauge data better than ODA, they exhibit less variability in the open ocean. TGRs match the trends and variability better during the satellite-altimetry era than for the entire period from 1960-2012, whereas the ODAs mostly do not. An average of all products produces the best statistics for comparing to the set of tide gauges. The results are mixed. The TGRs and ODAs can be useful in some respects, such as calculating a global sea-level signal, and matching altimetric data, and each other, well in the Pacific. But the regional open-ocean sea-level change and variability found from altimetric data are not well reproduced over substantial portions of the ocean. Over periods earlier than the satellite era, these reconstructed regional patterns may not be trustworthy, nor can they be verified.