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Long-term evolution of the dynamic ocean topography as observed by satellite altimetry and GOCE

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Along the ground tracks of satellite altimetry we subtract the geoid of the GOCE-only gravity field from the altimetric sea surface heights, with both quantities filtered in exactly the same way to ensure spectral consistency between sea surface and geoid heights. This way we can estimate the absolute dynamic ocean topography (DOT) for individual ground tracks of any altimeter satellite. It has been shown that averaging all DOT profiles of a single satellite provides a representative estimate of the mean DOT for a specified time period. In case of carefully cross-calibrated altimeter missions a mean DOT with significant higher spatial resolution can be constructed using the complete set of all multi-mission profiles. The resulting DOT patterns agree extremely well with those structures predicted by hydrodynamic modeling. In the present paper, we focus on the long-term evolution of the global DOT, constructed from cross-calibrated multi-mission altimeter time series for a period of nearly two decades. The result is an animation, showing the sequence of DOT states, sampled every 10 days. A principal component analysis is performed in order to identify the most dominant variations of the DOT time series.