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Assessment of current estimates of global and regional mean sea level trends from TOPEX and Jason-1 altimetry based on revised reference frame and orbits

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The measurement of mean sea-level change from satellite altimetry requires extreme stability of the altimeter measurement system. In particular, the orbit and reference frame with respect to which the altimeter measurements are referenced, as well as the associated altimeter corrections, must be stable and accurate enough over an extended time period to permit robust mean sea level (MSL) estimates at the sub-mm/y level. The terrestrial reference frame is linked inseparably to the measurement of global mean sea level estimates from satellite altimetry and provides the context for the interpretation of the causes of current mean sea level trends. In an effort to adhere to cross mission consistency, we have generated the full time series of orbits for both TOPEX/Poseidon (TP) and Jason-1 through reduced dynamic methods based on the GGM02C GRACE-derived gravity model within a consistent, well defined, and correctly scaled ITRF2005S terrestrial reference frame. The recent release of the entire revised Jason-1 Geophysical Data Records, and recalibration of the TOPEX microwave radiometer correction also require the further re-examination of current drift estimates provided by standardized tide gauge validation procedures. Here we present an assessment of these recent improvements to the accuracy of the TP/Jason-1 sea surface height time series, and evaluate the subsequent impact on global and regional mean sea level estimates.