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Estimation of global sea-level rise from satellite altimetry data: beyond the mean

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Satellite altimetry is a fundamental component of ocean monitoring efforts. By providing continuous measurements of absolute sea-level on a nearly global and spatially uniform scale, satellite altimetry has allowed to study in a unprecedented way sea-level variability at the global scale. Global sea-level rise is often summarised by the global mean, obtained by spatially averaging over the whole globe the satellite altimetry measurements obtained within each cycle period (e.g. 10 days). However, altimetry observations show that sea level change exhibits considerable spatial variability, with positive and negative trends up to several times the global mean, indicating that further information can be extracted from the satellite altimetry data by going beyond the mean in the representation of global sea-level rise. This is the issue addressed in this work. Along-track gridded satellite altimetry data from Topex/Poseidon and Jason-1 missions are used to implement and compare different strategies for deriving global sea-level curves from the satellite altimetry data at individual reference points. The estimation of global sea-level based on features of the data distribution other than the mean allows to have a more complete and detailed picture of the temporal variability of global sea-level and associated uncertainties.