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Quantifying the contribution of land water storage changes to sea level variability

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We investigate the effect of water storage changes in the major hydrological catchment basins on seasonal and long-term global sea level change. We perform a joint inversion with GRACE and Jason-1 data and compare our results with those obtained with other methods. As the fresh water mass exchange between oceans and land is one of the contributors to sea level variability, it is important to quantify its influence.
In this study, we employ a fingerprint method to determine the time-dependent magnitudes corresponding to dedicated spatial patterns of sea level change. In a joint inversion using GRACE and Jason-1 data we estimate the temporal components for $\sim$100 fingerprints considering glacier and ice-sheet melting, thermal expansion, changes in the hydrological cycle and glacial isostatic adjustment. In particular, for the hydrological changes we use fingerprints of the 33 largest catchment basins, instead of empirical orthogonal functions (EOF) from the WaterGap Global Hydrological Model (WGHM) as we did in previous studies.
For comparison, we calculate the contributions to sea level change of the individual catchment basins from GRACE observations directly using a standard basin averaging method. A third estimation for the water storage changes is given from the WGHM. We compare the results for the individual catchment basins obtained from the three methods.