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Water volume change in major river basins from analysis of GRACE geoid data

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Since its launch in March 2002, the GRACE mission has provided a spatio-temporal mapping of the Earth's gravity field at the unprecedented spatial resolution of 400 km. Tiny variations of gravity field detected by GRACE directly reflect surface redistributions of water mass, and especially over continents. Several groups provide the monthly and/or 10-day Stokes coefficients of geo-potential models estimated from raw GRACE measurements (CSR, JPL, GFZ, GRGS). We have analysed the time variations of the water volume in the largest river basins at seasonal and inter-annual scales, and confront the results obtained using different sources of GRACE geoid data. We also compare over these basins the geoid solutions directly expressed in terms of water height with results based on the generalized least-squares inversion. These comparisons allow us to quantify uncertainties associated with the estimated water volumes variations in different river basins. We also investigate other sources of errors, in particular those due to truncation of the spherical harmonics and leakage of hydrological signals. The results are further analysed to place bounds on the contribution of land waters to sea level rise over the recent years.