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Hydrological mass changes inferred from high-low satellite-to-satellite tracking data

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The technique of deriving time variable gravity (TVG) field observations from high-low satellite-to-satellite tracking (hl-SST) is beginning to establish itself as a valuable and supplementary source for the determination and description of long wavelength geophysical phenomena. Recent developments in data processing techniques have pushed the limits of the accuracy of these types of observations and now allows for realistic determinations of long-term trends and annual amplitudes of hydrological signals. We use CHAMP data and a dedicated signal processing to derive annual and inter-annual variations in the largest catchments of the Earth system, e.g. Amazon, Ob and Lena. Results are validated by computing the correlation of aggregated water storage changes from CHAMP (and GRACE) with the hydro-meteorological storage changes. High noise levels demand a stronger filtering, e.g. larger filtering radius (1000-1400km), than usually applied in case of GRACE. We therefore also investigate the effect of filtering on the consistency with the hydrological mass changes and estimate the signal to noise ratio and the spatial and temporal dependency of the noise. We will show that hl-SST observations are a viable source of information for TVG which can potentially serve as a reliable substitute in the likely event that GRACE fails before GRACE Follow On is launched.