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Interannual variations of the simulated hydro climatology in WGHM

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Since 2002, the GRACE (Gravity Recovery and Climate Experiment) satellite mission provides estimates of changes in the global terrestrial water storage. Up to now, the length of the data series (5 years) only allowed for characterising storage variations up to annual time scales. Possible long-term variations are only anticipated as part of observed trends, which could be misinterpreted. Prominent climate variations like the El Niño Southern Oscillation (ENSO) or the North Atlantic Oscillation (NAO) give typical impacts on the hydro-climatology at the continental scale and for longer time periods. In this study, interannual variations of water storage on the continents as affected by ENSO and NAO are analysed for a time period of nearly 100 years, using simulated water storage of the WaterGap Global Hydrology Model (WGHM).
The model is forced with different climate datasets which represent observations, the CRU TS2.1 (1901-1995) and a recent analysis of the Princeton University (1948-2000). The use of an ensemble of a global climate model, the ECHAM4-T42 (1903-2002) as input for WGHM increases the signal-to-noise-ratio by constituting the ensemble mean.
Principal Component (PC), Canonical Correlation Analysis (CCA) and Wavelet transformation show the typical interannual variations of the continental water storage dependent on SST anomalies (e.g. North & South America and Australia) or mean sea level pressure variations (e.g. Europe). The results indicate that inter-annual water storage changes resulting from these prominent climate variations are of the size which could be detected by GRACE or other future missions.