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Constraining GRACE Mass Concentration Blocks using hydrological knowledge- First HYDROGRAV results from Southern Africa.

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Our target region in Southern Africa is notoriously known for the lack of river and head information for calibration of hydrological models. GRACE gravity change observations can deliver promising calibration parameters if adequate spatial and temporal resolution can be obtained. Comparisons between the hydrological model (GLDAS), GRACE 4 deg Mascon blocks, and spherical harmonic products show large phase and amplitude discrepancies on seasonal signals throughout the region. We have set up hydrological models of the 4 largest river basins in Southern Africa (Zambezi, Okavango, Limpopo and Orange) using SWAT (Soil and Water Assessment Tool), and analysed the gravity changes from GRACE through custom designed Mass Concentration blocks (Mascons). The Mass Concentrations have been solved at 10-day intervals using 1.5 by 1.5 deg blocks, constrained according to river basins and sub-basins matching the hydrological models.
The study is a part of the HYDROGRAV project (hydrograv.spacecenter.dk) which explores the utility of time-lapse gravity surveys for hydrological model calibration and terrestrial water storage monitoring