# DETECTING HYDROLOGICAL SIGNALS IN TIME SERIES OF IN-SITU GRAVITY MEASUREMENTS: A FIRST APPROACH

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A new generation of in-situ gravity meters and remote sensing techniques enable the detection of small variations (equivalent to less than 10 mm water layer) in mass at the Earth's surface, such as water storage in surface and subsurface reservoirs. The general aim of the research is to investigate the possibility to detect variations in river basin water storage from measurements of the time dependent gravity field, and to assess the accuracy of these estimations based on in-situ and satellite observations of the gravity field. This could be beneficial for water balance models and catchment water management in general

This poster describes a first approach to detect hydrological signals, caused by seasonal processes or sudden events, in time series of in-situ gravity measurements. Based on data from the Global Geodynamics Project (GGP), all available time series of gravity that are accompanied with hydrological measurements will be analysed. Other elements of the observed gravity field, such as tides, air pressure and instrumental drift are subtracted from the raw gravity signal to obtain the residual gravity. Precipitation and groundwater table data, are used to estimate the change of water storage in the direct vicinity of the in-situ gravity meter. A method is used to quantify correlation between the observed and expected residual gravity change at multiple measuring sites. A first order statistical analysis will be performed by splitting each time series in different time scales, based on spectral analysis, and comparing the observed gravity change in each time scale class with the expected gravity change. The expected gravity change is estimated from the change in water storage. The relative difference between observed and expected gravity for all time scales, can be compared for all stations of the gravity measurement network. A pattern of high and low correlation in the bias for certain time scales could reveal the relative influence of uncertainties in other geophysical factors like air pressure, snow, instrumental errors and subsurface geology. Some provisional results of this first order analysis will be shown at the poster.