

## **Are superconducting gravimeters expensive soil moisture probes?**

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This paper investigates hydrological processes and their influence on gravity at the underground geodynamic Membach station (eastern Belgium), where absolute (AG) and superconducting (SG) gravity measurements have been performed since 1996. Seasonal and short term effects are observed. A comprehensive hydrogeological investigation regarding the influence of variations in local and regional water mass on gravity measurements is presented for observations taken near the station. Applying a regional water storage model, the gravity contribution due to the elastic deformation of the Earth is derived. In addition, the Newtonian gravity effect induced by the local water mass variations is calculated, using soil moisture observations taken at the ground surface (about 48 m above the gravimeters). The computation of this gravimetric effect is based on a digital elevation model with spatially discretized rectangular prisms. The obtained results are compared with the observations of gravity. We find that the seasonal variations and shorter period effects depend on the local changes (about 100 m around the gravimeter) in hydrology. This result shows the sensitivity of SG observations to very local water storage changes. This may be useful e.g. to constrain the water budget in small systems like karst aquifers.