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Stability and accuracy of relative scale factor estimates for Superconducting Gravimeters

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Superconducting gravimeters (SG) are known to be the most sensitive and most stable gravimeters. However, reliably determining the scale factor calibration and its stability with the required precision of better than 0.1% is still an open issue.

The relative comparison of temporal gravity variations due to the Earths tides recorded with other calibrated gravimeters is one method to obtain the SG scale factor. Usually absolute gravimeters (AG) are used for such a comparison and the stability of the scale factor can be deduced by repeated observations over a limited period, or by comparison with precise tidal models.

In recent work it was shown that spring gravimeters may not be stable enough to transfer the calibration between SG. A promising alternative is to transfer the scale factor with a well calibrated, moveable SG. To assess the perspectives of such an approach, the coherence of records from dual sphere SGs and two SGs which are being operated side by side at the stations Bad Homburg and Wettzell (Germany) and other GGP sites is analysed. To determine and remove the instrumental drift, a reference time series from the combination with AG measurements is used. The reproducibility of the scale factor and the achievable precision are investigated for comparison periods of different lenght and conclusions are drawn to the use of AG and the future application of the moveable iGrav™ SG.