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Along-track gradiometry with GRACE and GOCE

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This contribution aims at a regional improvement of the Earth's gravity field by analyzing the data of satellite missions. Beside the analysis of the orbit, also instruments like the K-band ranging system of GRACE or the Gradiometer of GOCE are used for more detailed information.

The GOCE gradiometer provides an approximation of the second derivatives of the gravity field in the direction of the instrument axes. In the GRACE mission, the distances and the range-rates between the two satellites are measured. By introducing a reference field, the GRACE observations are interpreted as a one-dimensional gradiometer in the line-of-sight direction.

To compare the line-of-sight gradient of GRACE with the along-track component of GOCE, the same reference field is subtracted from the signals. The residual gradients in flight direction are modeled by radial base functions for a test region. This leads to a regional improvement of the gravity field per mission, which differs due to the orbit height and the accuracy of the gradiometry. The study shows up to which extend the GRACE mission can complement the along-track measurement of GOCE.