



## **Gravity gradients from satellite altimeter data for GOCE validation**

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Although gravity data from different sources have been proposed for GOCE cal/val purposes, satellite altimeter data has heretofore not been considered in this context. Although the numerical and conceptual challenges are manifold, the abundance of satellite altimeter data justifies an attempt to use these data for GOCE validation. We present a new method for the independent validation of the GOCE gravity gradiometer data by means of satellite altimetry. The idea is to rotate the GOCE gravity gradients, which are given in the gradiometer instrument frame, to align them with the satellite altimeter tracks. The corresponding along-track second derivatives from altimetry can be computed from the along-track high resolution data and avoids any approximation through gridding. The altimetry derived gravity gradients may be upward continued, and a direct comparison with the GOCE data can be applied to individual satellite altimeter tracks or at cross-overs of ascending and descending altimeter tracks, where a linear combination of horizontal derivatives is related to the radial gravity gradient of the disturbing potential. In order to obtain physically reasonable gravity gradients from the satellite altimeter data, we will apply smoothing splines. Different methods to determine the associated smoothing parameter will be assessed (generalized cross validation, L-curve, variance component estimation). Moreover, we will discuss the upward continuation, in particular the degree of smoothing introduced and the relation to the GOCE measurement band.