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Stabilization of Satellite derived Gravity Field Coefficients by Earth Rotation Parameters

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Recent gravity field missions (e.g. GRACE) provide monthly solutions for the time-variable Earth gravity field. However, the low-degree harmonic coefficients are poorly resolved, especially those of degree 2. The Earth rotation parameters (ERP), consisting of polar motion and lod, and the gravity field coefficients (GFC) of degree 2 are linked by the Euler-Liouville Equation. Thus the consideration of ERP time series helps to improve the estimates of GFC2. Due to the covariances between the GFC of degree 2 and further low-degree gravity field coefficients (up to degree 10) the residuals of the first group of coefficients has to be propagated to the second group in order to guarantee an overall consistency. Previous work has shown a significant influence of ERP on GFC up to degree 4 with the results depending on the covariances assumed a priori.

This presentation shows the result of a consistent joint analysis of GRACE derived GFC and ERP in an extended Gauss-Helmert model which includes a sophisticated variance-covariance component estimation (VCCE). As the covariances of the GRACE derived GFC are largely not known, some different variance-covariance structures are assumed and estimated with the VCCE. The results are compared and discussed.