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Stabilization of Low Degree Gravity Field Coefficients by Earth Rotation Parameters

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The earth rotation parameters (ERP) consisting of polar motion and lod and the gravity field coefficients of degree 2 (GFC2) are linked by the Euler-Liouville Equation. As long as this link is not modeled during the determination of the parameters the Euler-Liouville Equation allows an independent mutual validation of GFC2 and the EOP. The joint modeling of the time series of these two parameter sets leads to an adjustment problem to be solved with the Gauss-Helmert model. Thus, residuals for the ERP and GFC2 parameters and values for the Earth's tensor of inertia are estimated. Considering the covariances between the GFC2 and further low degree gravity field coefficients (up to degree 10) the residuals of GFC2 propagate to the other low degree coefficients. Hence it is reasonable to introduce further low degree gravity field coefficients in the Gauss-Helmert model. This poster presents a dedicated Gauss-Helmert model which is extended for additional variance component estimation. The gravity field solution ITG-Grace03 from the University of Bonn (Germany) is used which provides a static and time-variable gravity field solution with a fully occupied covariance matrix for the static gravity field. Based on the structure of this matrix some covariance matrices for the time-variable gravity field solution are modeled and tested in the extended Gauss-Helmert-Model. The effects on the estimated parameters and coefficients are studied numerically.