Title

The gravity field model based on the second invariant of the GOCE gravitational gradient tensor: IGGT_R1

Abstract

IGGT_R1 is a static gravity field model based on the second invariant of the GOCE gravitational gradient tensor, up to degree and order 240. Based on tensor theory, three invariants of the gravitational gradient tensor (IGGT) are independent of the gradiometer reference frame (GRF). Compared to traditional methods for calculation of gravity field models based on GOCE data, which are affected by errors in the attitude indicator, using IGGT and least squares method avoids the problem of inaccurate rotation matrices. IGGT_R1 is the first experiment to use this method to build a real gravity field model by using GOCE gravitational gradients. This new model has been developed by Wuhan University (WHU), German Research Centre for Geosciences (GFZ), Technical University of Berlin (TUB), Huazhong University of Science and Technology (HUST) and Zhengzhou Information Engineering University (IEU). More details about the gravity field model IGGT_R1 is given in our paper "The gravity field model IGGT_R1 based on the second invariant of the GOCE gravitational gradient tensor" (Lu, B., Luo, Z., Zhong, B. et al. J Geod (2017). https://doi.org/10.1007/s00190-017-1089-8). This work is supported by the Chinese Scholarship Council (No. 201506270158), the Natural Science Foundation of China (Nos. 41104014, 41131067, 41374023, 41474019 and 41504013) and the Key Laboratory of Geospace Environment and Geodesy, Ministry Education, Wuhan University (No. 16-02-07).

Parameters

static model

modelname	IGGT_R1
product_type (e.g., gravity field)	gravity_field
earth_gravity_constant	0.3986004415E+15
radius	0.6378136460E+07
max_degree (e.g., 240)	240
norm (e.g., fully normalized)	fully_normalized
tide_system (e.g., tide-free)	tide_free
errors (e.g., formal)	formal

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Keywords

Data Description

Reference

Lu B., Luo Z., Zhong B., Zhou H., Flechtner F., Foerste C., Barthelmes F., Zhou R., 2017, The gravity field model IGGT_R1 based on the second invariant of the GOCE gravitational gradient tensor, J Geod (2017). https://doi.org/10.1007/s00190-017-1089-8

Other references

Foerste C, Flechtner F, Schmidt R, Stubenvoll R, Rothacher M, Kusche J, Neumayer H, Biancale R, Lemoine J-M, Barthelmes F, Bruinsma S, Koenig R and Meyer Ul, 2008, EIGEN-GL05C - A new global combined high-resolution GRACE-based gravity field model of the GFZ-GRGS cooperation, Geophysical Research Abstracts, Vol. 10, EGU2008-A-03426, 2008 SRef-ID: 1607-7962/gra/EGU2008-A-03426

Metzler B. and Pail R., 2005, GOCE Data Processing: The Sperical Cap Regularization Approach, Stud. Geophys. Geod. 49 (2005), 441-462

Rapp RH (1973) Improved models for potential coefficients and anomaly degree variances. Journal of Geophysical Research 78(17):3497-3500

Reigber C (1989) Gravity field recovery from satellite tracking data. In: Theory of satellite geodesy and gravity field determination, Springer, pp 197-234