

# Validation of GOCE Gravity Field Models

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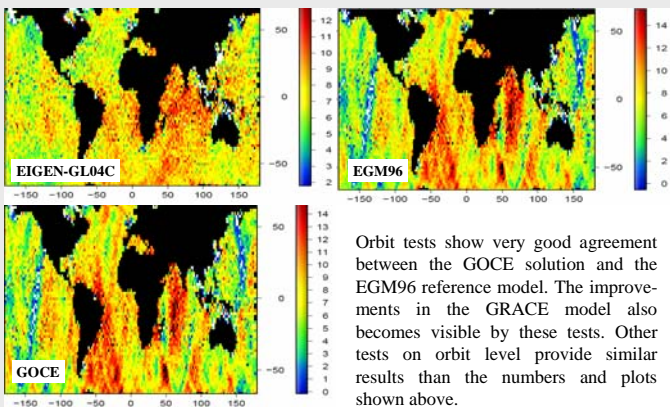
## Abstract

The GOCE High-level Processing Facility (HPF) will systematically generate global gravity field models from GOCE data applying different approaches. In order to identify the best performing solutions and in order to determine the overall quality of the final solutions an extensive validation of these models is performed before they will be released to the users as final GOCE level 2 products. For this a separate processing chain has been set up inside the HPF. The following techniques are applied for estimating the quality of the gravity field models: Orbit computation performance; Comparison to external gravity field information like geoid heights at GPS-levelling points or gravity anomalies; Comparisons of errors to signals on coefficient and degree variances level; Error propagation of full variance-covariance matrix to geoid height errors. All results of these test procedures are finally collected in a report attached to the final products. The paper provides examples for the test procedures showing results for simulated solutions as well as GRACE gravity field models.

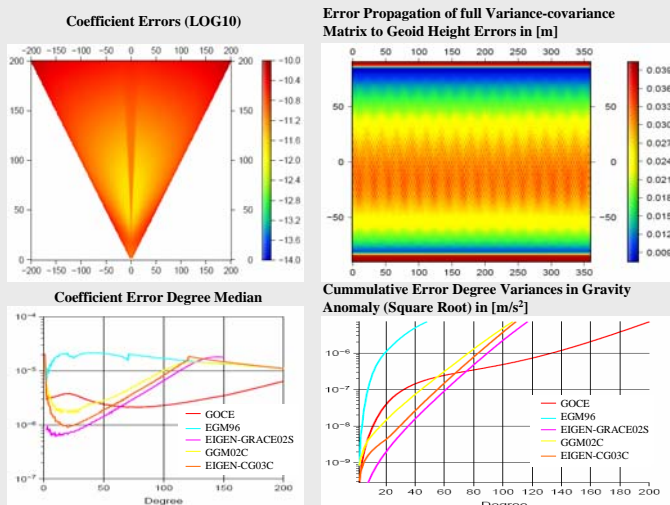
## Orbit Tests - Residuals

Model	SLR [cm]			PRARE Range [cm]	Single Mission X-over [cm]	Double Mission X-over [cm]
	ERS-2	LAG-1	LAG-2	ERS-2	ERS-2	ERS-2
GOCE	6.3	3.9	3.8	5.2	8.0	7.7
EGM96	6.3	3.9	3.8	5.2	8.0	7.7
EIGEN-GL04C	4.0	3.8	3.7	4.0	6.7	6.9

## Orbit Tests – Geographical Correlated Orbit Error



## Variance-Covariance Matrix – GOCE Solution

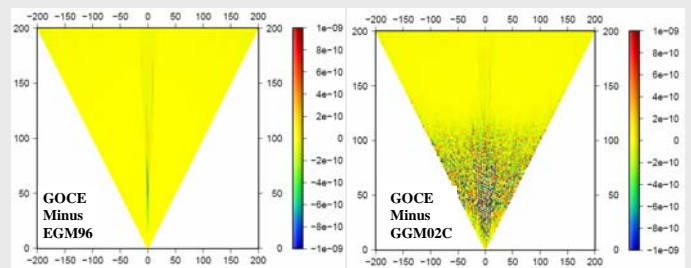


## Test Scenario

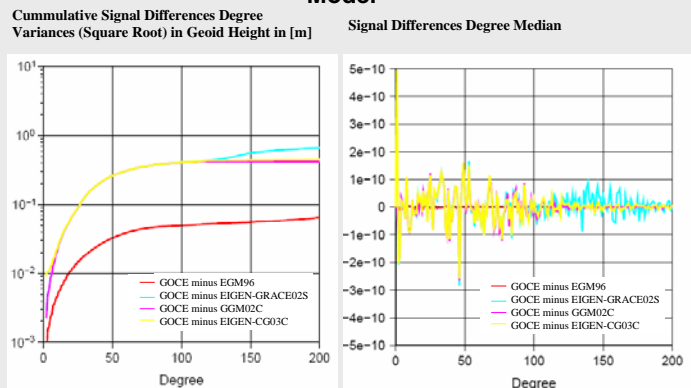
The GOCE High-level Processing Facility (HPF) recently was tested with a simulated data set. Simulated noisy gravity gradients as well as precise orbits based on the EGM96 model were made available by ESA for a time period of 60 days for this purpose. The HPF has run the complete processing chain including the final product validation. All follow-on examples are result of this validation activity.

Knowing the target model to be recovered (EGM96), tests against this ultimately show the performance of the processor when using realistic noisy data. Other tests show comparisons to external data sets identifying the overall quality of the model, which obviously cannot be better than the target model. For comparison purposes and for showing the capability of the validation tools also actual GRACE models are included in the validation process.

## Coefficient Differences to Reference Model



## Degree Variances & Median Differences to Reference Model



## Geoid Height Differences at GPS-Nivellement Stations

