

International Combination Service for Time-variable Gravity Fields (COST-G)

Chair of the Directing Board: Adrian Jäggi

Vice-Chair of the Directing Board: Frank Flechtner

Analysis Center Coordinator: Ulrich Meyer

Terms of References:

Objectives and Background

The International Combination Service for Time-variable Gravity Fields (COST-G) is the Product Center of the International Gravity Field Service (IGFS) for time-variable gravity fields. COST-G provides consolidated monthly global gravity models in terms of spherical harmonic (SH) coefficients and thereof derived grids by combining existing solutions or normal equations (NEQs) from COST-G analysis centers (ACs) and partner analysis centers (PCs). The COST-G ACs adopt different analysis methods but apply agreed-upon consistent processing standards to deliver time-variable gravity field models, e.g. from GRACE/GRACE-FO low-low satellite-to-satellite tracking (ll-SST), high-low satellite-to-satellite tracking (hl-SST), Satellite Laser Ranging (SLR).

COST-G recognizes and emphasizes the existence and acknowledges the contribution of every individual AC and PC. Their participation is a crucial and mandatory prerequisite to the consolidation of monthly global gravity fields within COST-G.

COST-G continues the activities of the H2020 project European Gravity Service for Improved Emergency Management (EGSIEM) to realize a long-awaited standardization of gravity-derived mass transport products and to improve the quality, robustness, and reliability of individual solutions and to enable hydrologists, glaciologists, oceanographers, geodesists and geophysicists to take full advantage of one well-defined, consolidated monthly gravity product.

Products and Goals

COST-G performs a quality control of the individual contributions before combination. COST-G provides

- Combined gravity field solutions in SH coefficients (Level-2 products) derived from a weighted combination of individual normal equations (NEQs) generated by the different ACs,
- Spatial grids and other high-level products (Level-3 products) of the Combined Solutions for hydrological, oceanic and polar ice sheets applications.

The Level-2 products are made available through the International Center for Global Earth Models (ICGEM, <http://icgem.gfz-potsdam.de>), the Level-3 products by the Information System and Data Center (ISDC, <https://isdc.gfz-potsdam.de>). The products can be visualized

at the COST-G Plotter (<http://cost-g.org/>) and the Gravity Information Service (GravIS, <http://gravis.gfz-potsdam.de>).

Components and Roles

COST-G accomplishes its objectives through the following components and roles:

- Central Bureau (CB)
- Analysis Centers (ACs)
- Partner Analysis Centers (PCs)
- Analysis Center Coordinator (ACC)
- Level-3 Product Center (L3C)
- Validation Center (VC)
- Product Evaluation Group (PEG)

Central Bureau

The Central Bureau is the executive arm of the COST-G Directing Board, and is responsible for all operational activities of the Service. The Central Bureau coordinates COST-G activities, facilitates communications and maintains documentations.

Analysis Centers

The COST-G ACs produce time-variable gravity field solutions according to the specifications defined by the COST-G Processing Standards defined by the COST-G Directing Board. They regularly send their solutions to the Analysis Center Coordinator for combination together with a summary describing their processing strategy. Depending on the availability of new or improved AC contributions, new combined solutions will be released on a regular basis. GRACE contributions need to cover at least the time period 2003 to mid 2016 to be included in the combination. GRACE-FO contributions need to be delivered with a maximum latency of 3 months. Shorter periods may be considered for testing. Corresponding rules for hl-SST, SLR contributions will be defined when data will become available. The Directing Board may approve new COST-G ACs fulfilling the COST-G Processing Standards.

Partner Analysis Centers

COST-G will in addition make use of existing and publicly available solutions or NEQs of other processing centers, denoted as Partner Analysis Centers (PC), who are primarily centers that are part of the GRACE and GRACE-Follow On project and will produce quality controlled products following project requirements. Any additional contribution is on best-effort basis with no additional commitment. COST-G retains the right to exclude solutions if they either deviate from the COST-G Processing Standards or do not comply with decisions of the COST-G Directing Board. Exploring avenues toward a closer relationship between PCs and COST-G is strongly encouraged by the COST-G Directing Board.

Analysis Center Coordinator

Tasks of the ACC include:

- Comparison of the individual gravity fields for quality control
- Pair-wise comparison of solutions passing quality control to define empirical weights for the individual contributions
- Combination of accepted solutions to generate a combined field using normal equations

Validation Center

Tasks of the VC include:

- Evaluation of the noise of the solutions over dedicated areas of low variability
- Evaluation of the quality of the solutions through comparison with external data sets such as altimetry
- Validation through LEO satellite orbit tests

Level-3 Product Center

Tasks of the L3C include:

- Computation, visualization and description of user-friendly Level-3 products based on the most recent GRACE and GRACE-FO data releases from COST-G
- Provide COST-G Level-3 products for download at GFZ's Information System and Data Center (ISDC)

Product Evaluation Group

Tasks of the PEG include:

Assessing COST-G products for studying mass variations related to:

- Terrestrial water storage over non-glaciated regions
- Bottom pressure variations in the oceans
- Ice mass changes in Antarctica and in Greenland

Directing Board

The Directing Board sets the objectives, determines policies, adopts standards, and sets the scientific and operational goals for COST-G. The Directing Board exercises general oversight of the activities of COST-G including modifications to the organization that are deemed appropriate and necessary to maintain efficiency and reliability. The directing board is responsible for assigning and removing ACs, ACCs and VCs. The directing board may determine appropriate actions to ensure the quality of the COST-G products. No member of the Directing Board shall hold more than one responsibility at the same time.

Membership

The members of the Directing Board are:

- Director of the Central Bureau
- Analysis Center Coordinator
- One representative from each Analysis Center
- One representative for all Partner Analysis Center
- One representative for all Validation Centers
- One representative from the Level-3 Product Center
- Three members from the product evaluation group
- ICGEM representative
- IGFS representative

The Directing Board may nominate additional experts without voting rights.

COST-G Chair

The COST-G Chair is one of the Directing Board members and is elected by the Board for a term of four years with the possibility of reelection for one additional term. The Chair is the official representative of COST-G to external organizations. He is deputized by a Vice-Chair who is also elected by the Board for a term of four years with the possibility of reelection for one additional term.

Decisions

Most decisions by the Directing Board are made by consensus or by simple majority vote of the members present. In case of a tie, the Chair decides how to proceed. If a two-thirds quorum is not present, the vote shall be held later by electronic mail. A two-thirds vote of all Board members is required to modify the Terms of Reference, to change the Chair, or to replace any of the members before their normal term expires.

Meetings

The Directing Board meets at least annually or more frequently if meetings are called by the Chair or at the request of at least five Board members. The Board will conduct periodic reviews of the COST-G organization and its mandate, functions, and components.

Attachment of the ToR

Central Bureau

The Central Bureau is hosted by AIUB (Bern, Switzerland).

Analysis Center Coordinator

- Astronomical Institute, University of Bern (AIUB)

Analysis Centers

The initial Analysis Centers, in charge of computing time-variable gravity field solutions, are (in alphabetical order)

- Astronomical Institute, University of Bern (AIUB)
- Centre National d'Etudes Spatiales (CNES)
- German Research Centre for Geosciences (GFZ)
- Institute of Geodesy, Graz University of Technology (IFG)

Partner Analysis Centers

- Center for Space Research (CSR)
- NASA Jet Propulsion Laboratory (JPL)

Level-3 Product Center

- German Research Centre for Geosciences (GFZ) in collaboration with the Alfred-Wegener-Institut (AWI) and Technische Universität Dresden.

Validation Center

- Groupe de Recherche de Géodésie Spatiale (GRGS)
- German Research Centre for Geosciences (GFZ)

Founding Committee and current Directing Board

Chair of COST-G: A. Jäggi, Switzerland

Vice-Chair of COST-G: F. Flechtner, Germany

Director of the Central Bureau: A. Jäggi, Switzerland

Analysis Center Coordinator: U. Meyer, Switzerland

AIUB AC Representative:	M. Lasser, Switzerland
CNES AC Representative:	J.M. Lemoine, France
GFZ AC Representative:	C. Dahle, Germany
IFG AC Representative:	A. Kvas, Austria
PC Representative:	elected among the PCs
Level-3 Product Center Representative:	F. Flechtner, Germany
Validation Center Representatives:	J.M. Lemoine, France
Scientific Product Evaluation Representatives:	A. Groh, Germany
	A. Eicker, Germany
	A. Blazquez, France
ICGEM Representative:	E.S. Ince, Germany
IGFS Representative:	R. Barzaghi, Italy
Non-Voting Members:	S. Bourgogne, France
	M. Weigelt, Germany
	T. Mayer-Gürr, Austria