EGU23-4993

European Geosciences Union General Assembly 2023 23 - 28 April 2023, Vienna, Austria

Objectives

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 continues the activities of the H2020 project European Gravity Service for Improved Emergency Management (EGSIEM, 2015-2017) to realize a long-awaited standardization of gravity-derived mass transport products.

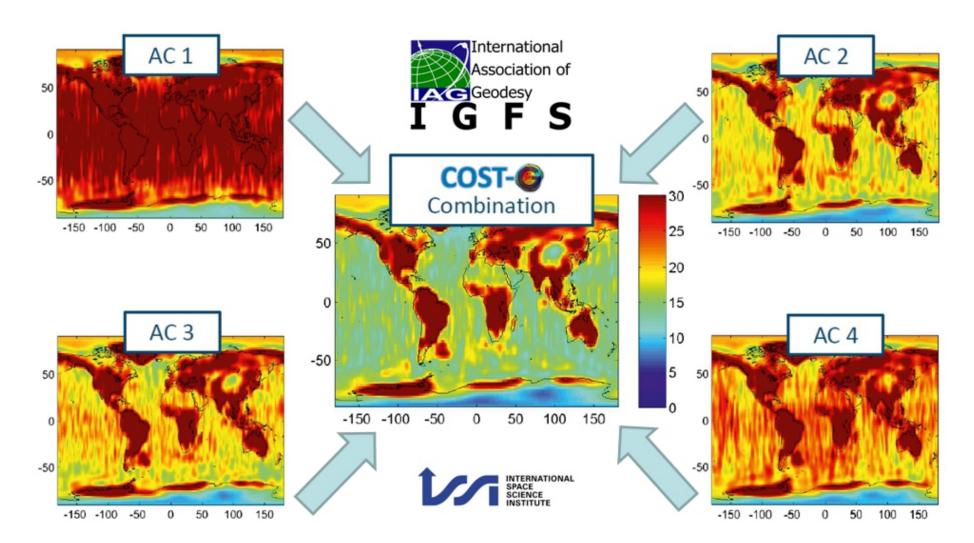
The products of COST-G are:

- Combined gravity field solutions in SH coefficients (Level-2 products) derived from a weighted combination of individual solutions generated by different Analysis Centers (ACs),
- Spatial grids (Level-3 products) of the combined solutions for hydrological, oceanic and polar ice sheets applications.

COST-G Team Members



COST-G Principle



COST-G provides consolidated monthly global gravity models in terms of spherical harmonic (SH) coefficients and thereof derived grids by combining solutions from individual ACs. The ACs adopt different analysis methods but apply agreed-upon consistent processing standards to deliver time-variable gravity field models, e.g. from GRACE-FO low-low satellite-to-satellite tracking (II-SST).

Link to Copernicus

The H2020 project Global Gravity-based Gorundwater Product (G3P, 2020-2022) was developing a product of groundwater storage variations with global coverage and monthly resolution by a crosscutting combination of GRACE/GRACE-FO COST-G solutions with water storage data based on the existing portfolio of the Copernicus services for a later operational implementation of the Essential Climate Variable (ECV) Groundwater into the Copernicus Climate Change Service. Information about G3P: https://www.g3p.eu



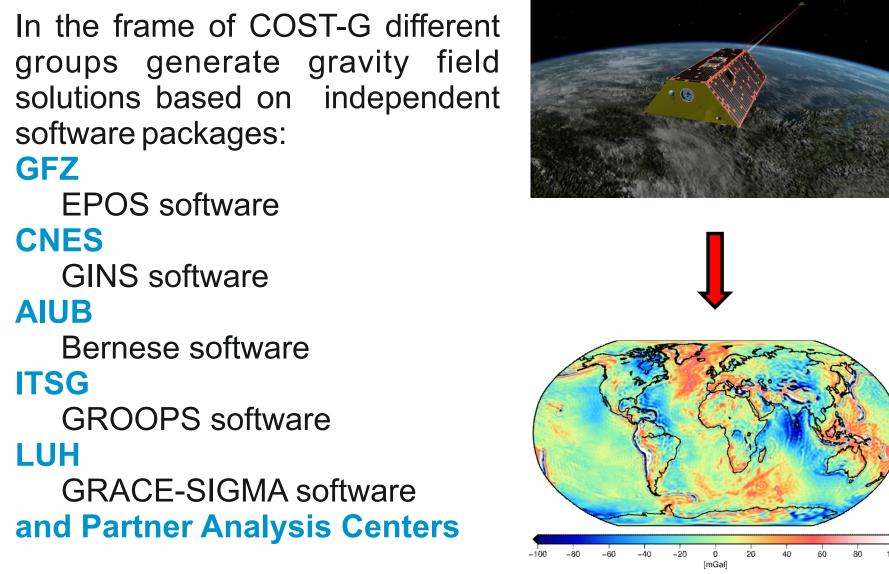
Poster compiled by Adrian Jäggi, April 2023 Astronomical Institute, University of Bern, Bern adrian.jaeggi@unibe.ch



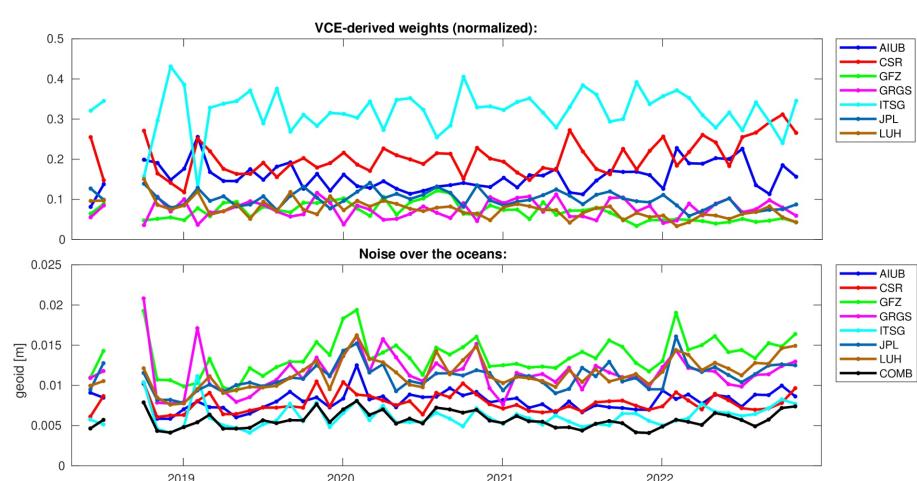


GRACE-FO Release 02

Level-2 Products



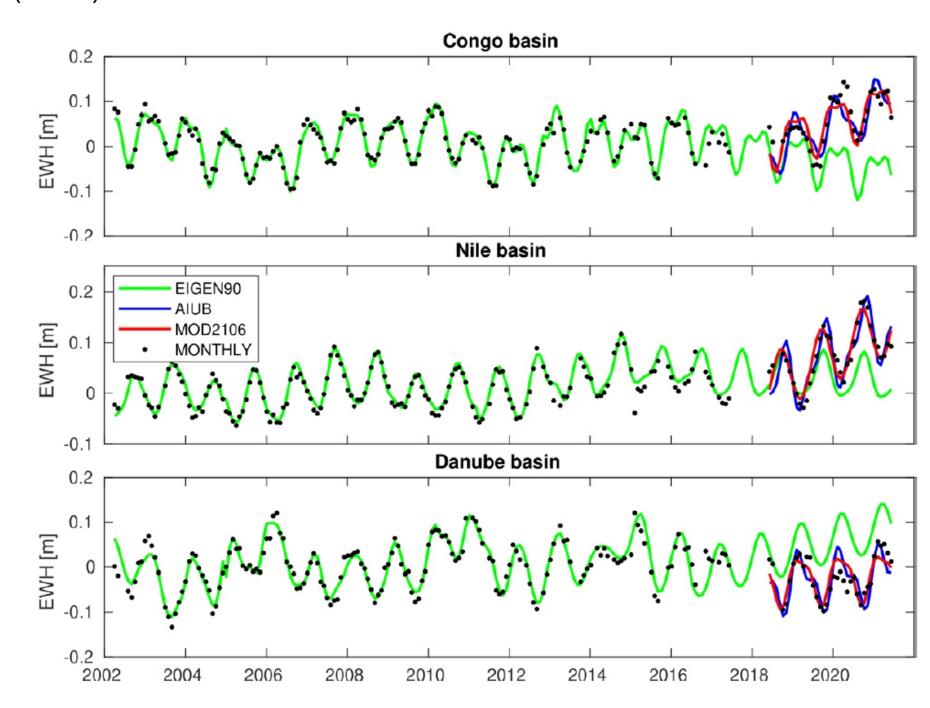
Adopting rigorous and independent processing approaches, each AC delivers unregularized and consistent gravity field solutions. This enables a meaningful combination of gravity field solutions.



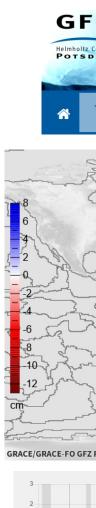
Top: Weights of the combination of monthly GRACE-FO solutions that are adopted for the COST-G Release 02. Bottom: Noise over the oceans of the monthly GRACE-FO solutions and the combined COST-G solution (labelled COMB).

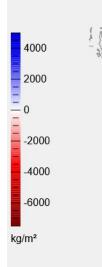
Fitted Signal Models

COST-G monthly solutions are fitted by a simple parametric model (offset, trend, seasonal signal) to provide fitted signal models (FSM) that may be used in operational Precise Orbit Determination (POD) activities:

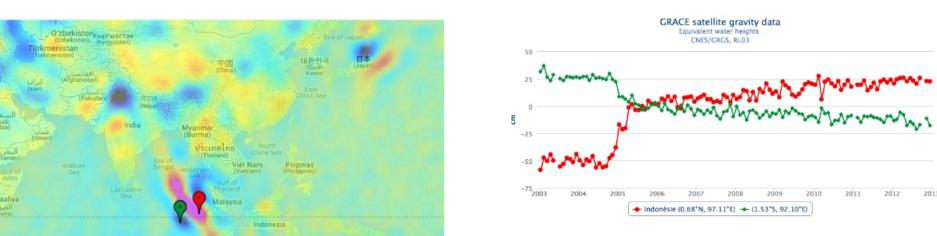


Level-3 Products Terrestrial Water Storage (TWS) variability, ocean bottom pressure (OBP) variability, mass changes of the Antarctic and Greenland Ice Sheets are provided in terms of different Level-3 products at the portals GravIS and ISDC:

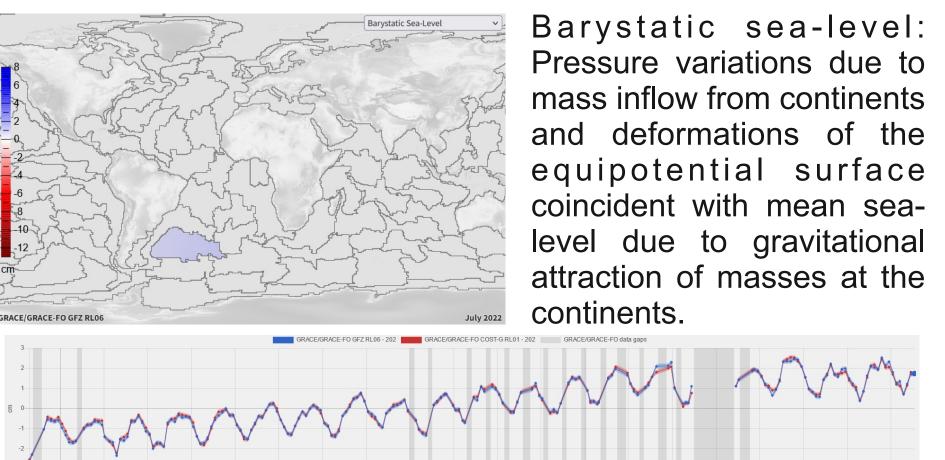




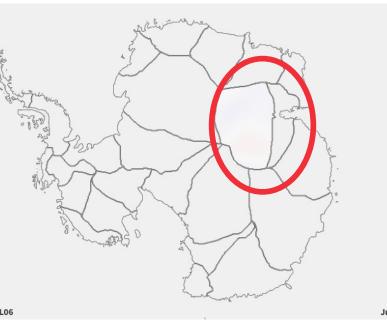
Public Outreach





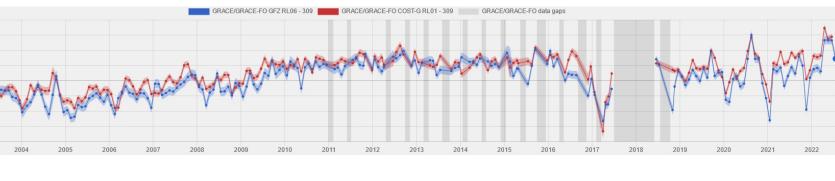


Barystatic sea-level: Pressure variations due to mass inflow from continents and deformations of the equipotential surface coincident with mean sealevel due to gravitational attraction of masses at the continents.



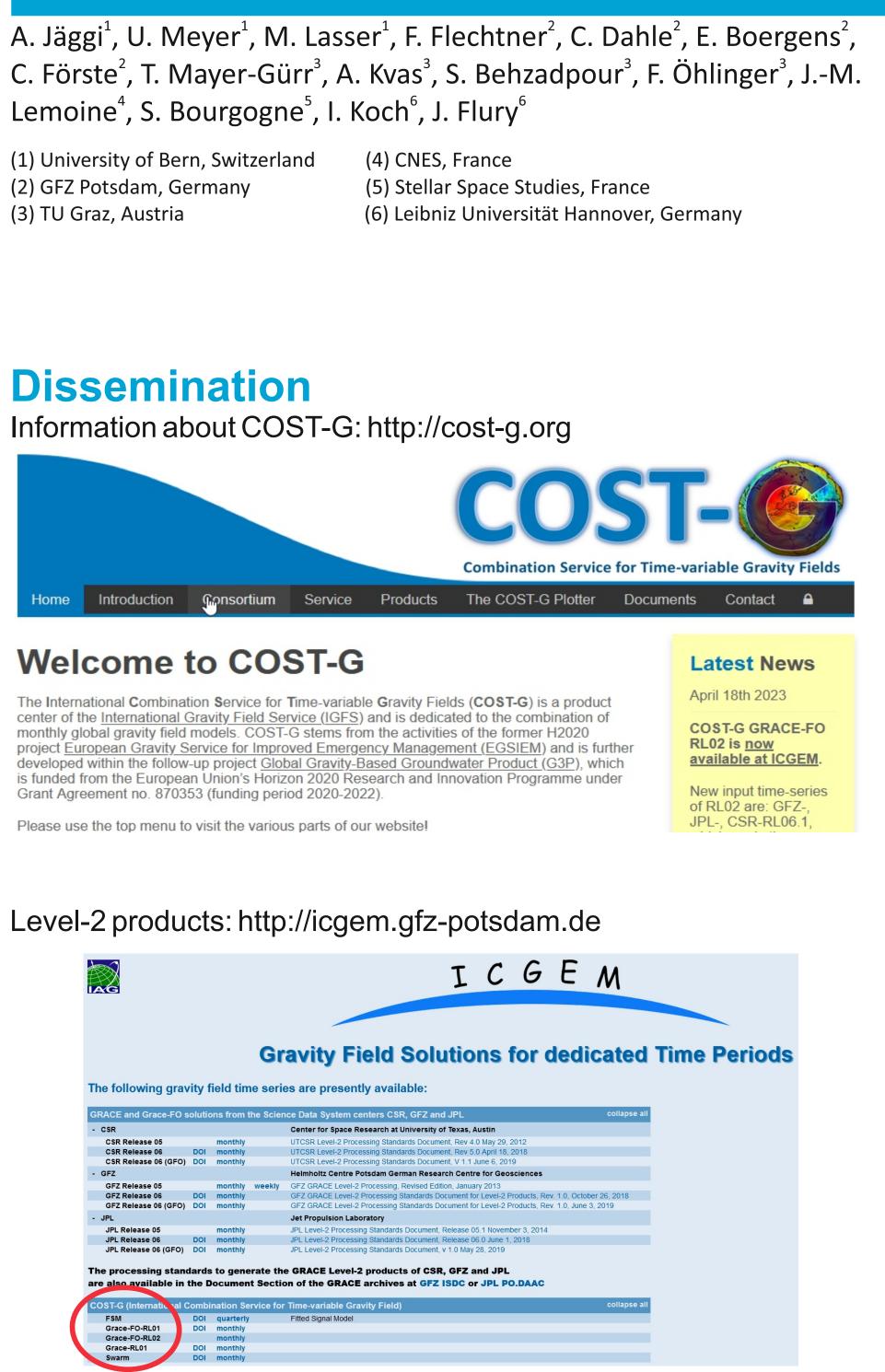
Left: Gridded ice-mass change per surface area for one drainage basin and one month. Bottom: Time series of

storage variations of the selected drainage basin in Gt, including empirical uncertainty estimates.



COST-G plotter: http://plot.cost-g.org

Data selection center, type, version. Multipl possibilities for extraction areas, custom or predefined Interactive plots





Summary

- (IAG) about 3 months.
- updates.
- irregular batches.
- from China in the near future.





Acknowledgement

The international COST-G team is receiving support from the International Space Science Institute (ISSI) in Bern, Switzerland, and from the ISSI-Beijing, China. G3P was funded by the European Union's Horizon 2020 Research and Innovation Programme, Grant Agreement no. 870353.

Contact address

Astronomical Institute, University of Bern Sidlerstrasse 5 3012 Bern (Switzerland) adrian.jaeggi@unibe.ch

- COST-G was established at the IUGG 2019.

- COST-G operates under the umbrella of the International Gravity Field Service (IGFS) of the International Association of Geodesy

- COST-G operationally provides monthly gravity field solutions from GRACE-FO data and from Swarm data with a latency of

- COST-G operationally provides fitted signal models with quarterly

- COST-G provides reprocessed monthly gravity field solutions in

- COST-G is planning to include several GRACE/GRACE-FO ACs

In collaboration with and supported by











