

# EGU23-4993

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



## GRACE-FO Release 02

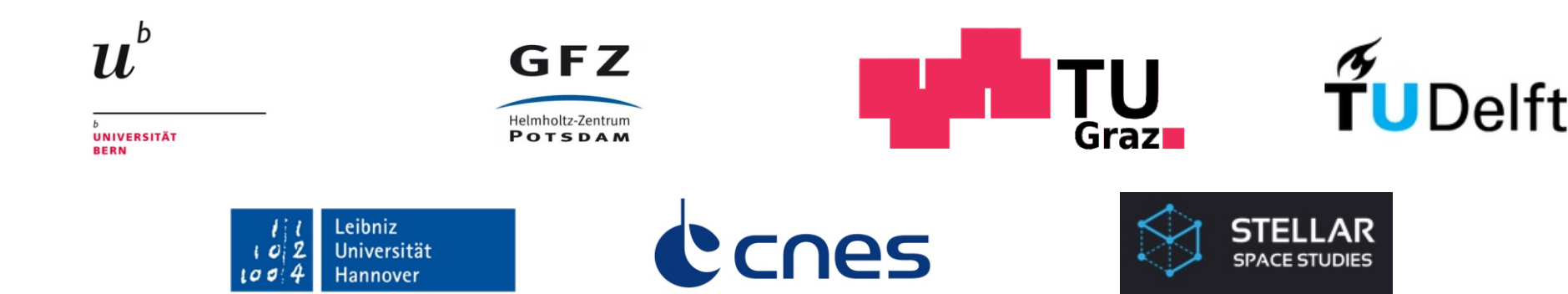
### Objectives

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.

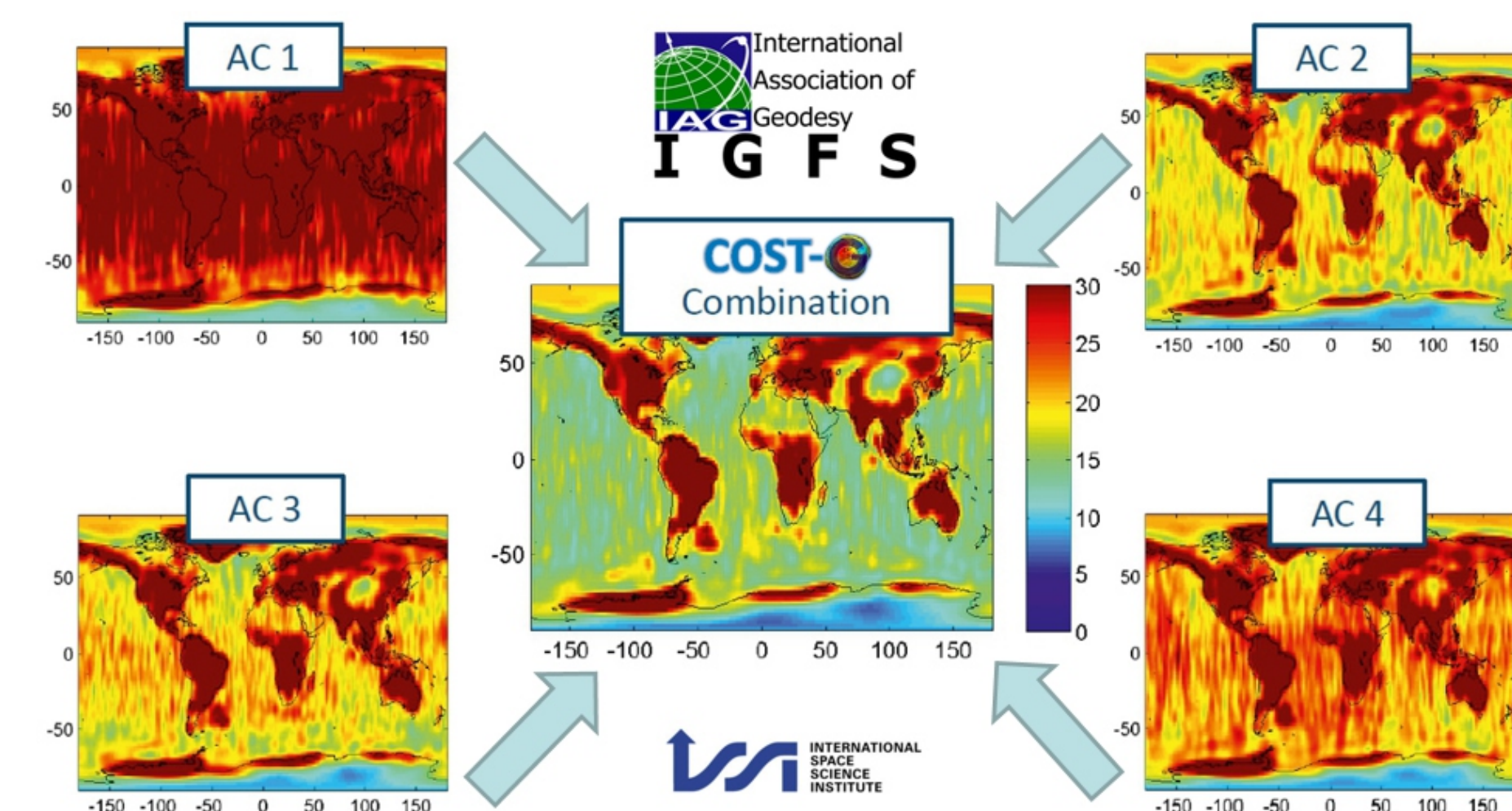
The products of COST-G are:

- **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 (ll-SST).

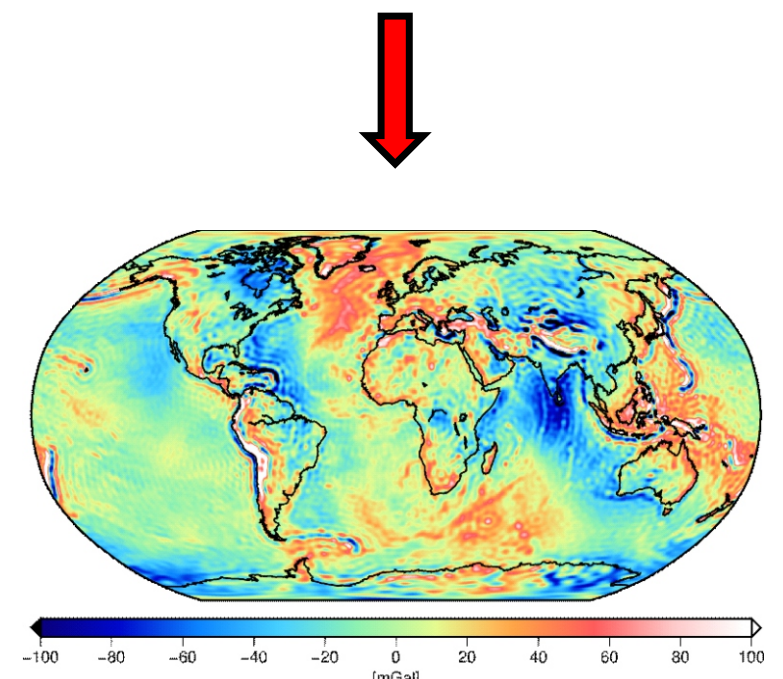
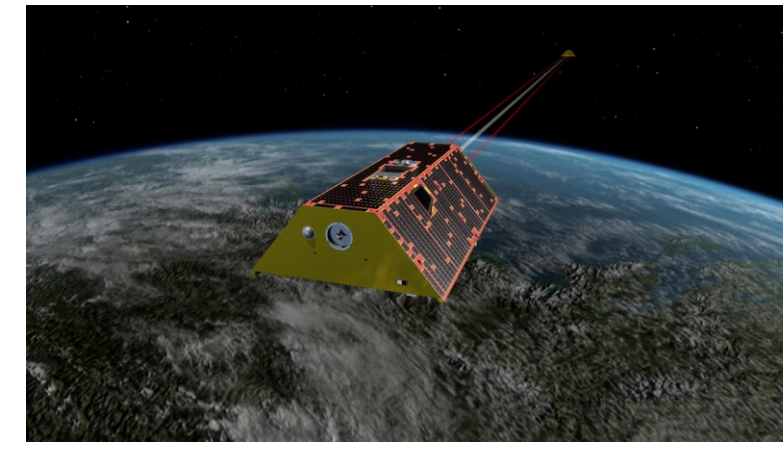
### Link to Copernicus

The H2020 project Global Gravity-based Groundwater Product (G3P, 2020-2022) was developing a product of groundwater storage variations with global coverage and monthly resolution by a cross-cutting 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>

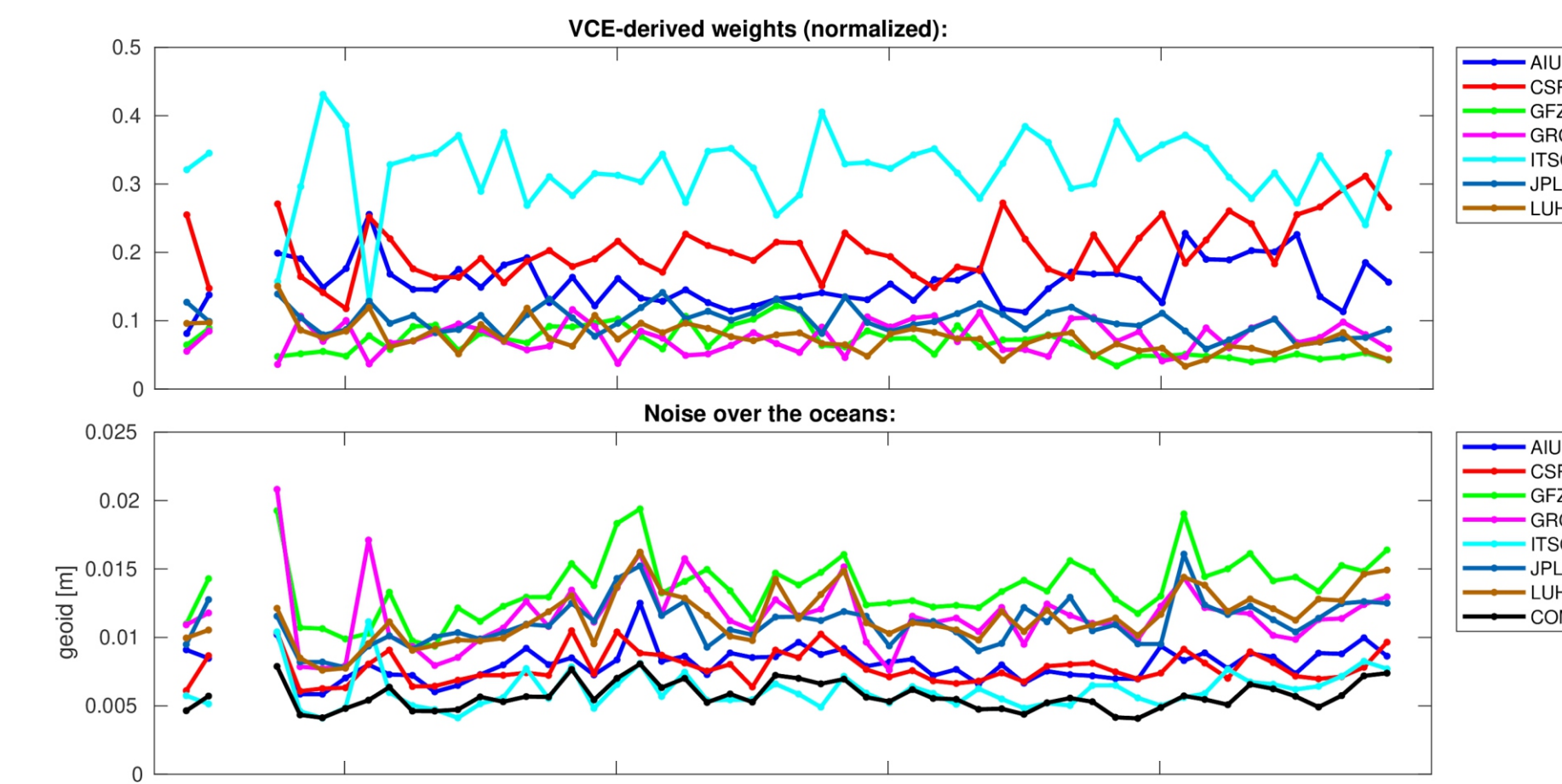
### Level-2 Products

In the frame of COST-G different groups generate gravity field solutions based on independent software packages:

- GFZ**: EPOS software
  - CNES**: GINS software
  - AIUB**: Bernese software
  - ITSG**: GROOPS software
  - LUH**: GRACE-SIGMA software
- and Partner Analysis Centers



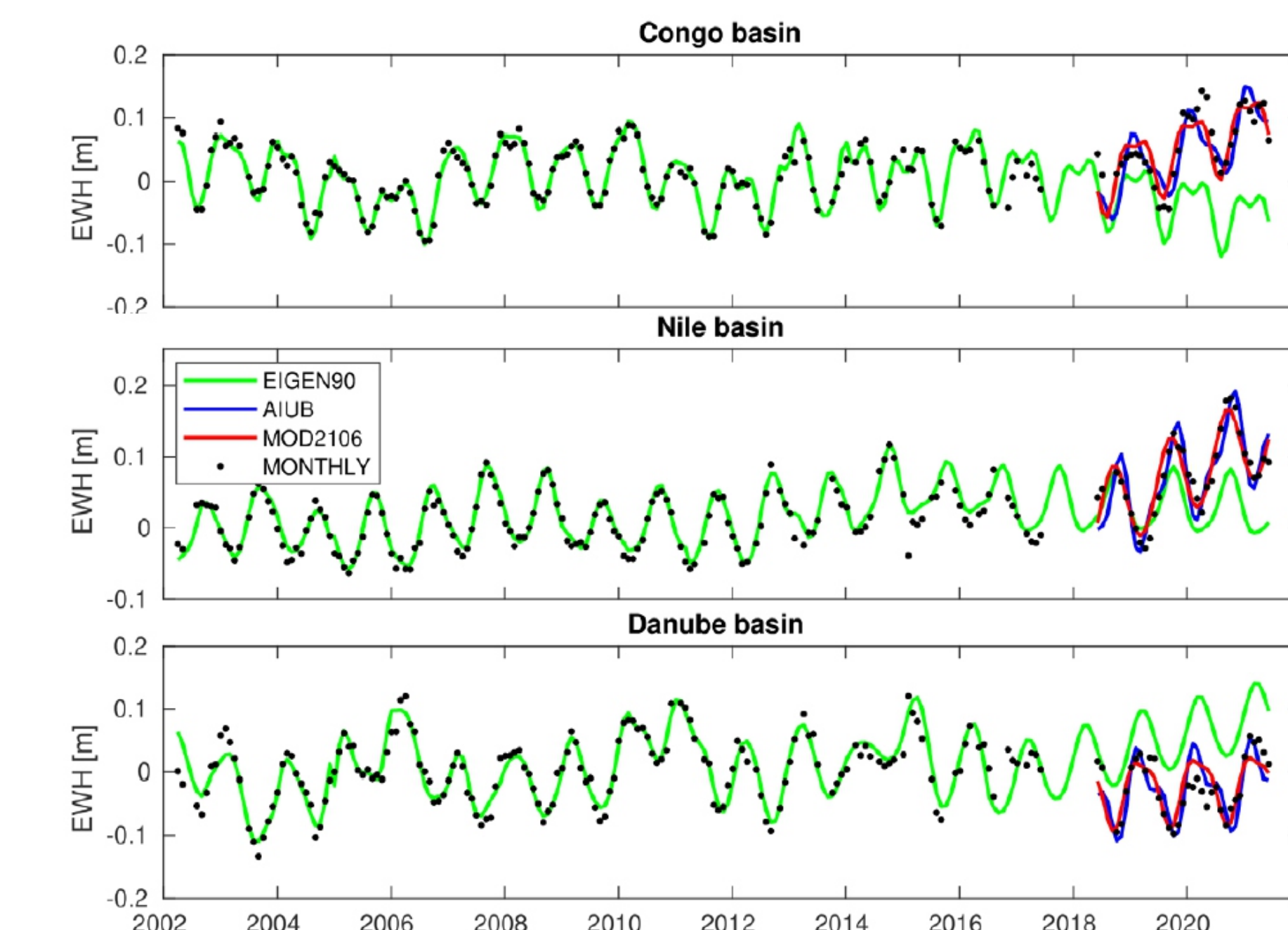
Adopting rigorous and independent processing approaches, each AC delivers unregularized and consistent gravity field solutions. This enables a meaningful combination of gravity field solutions.



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).

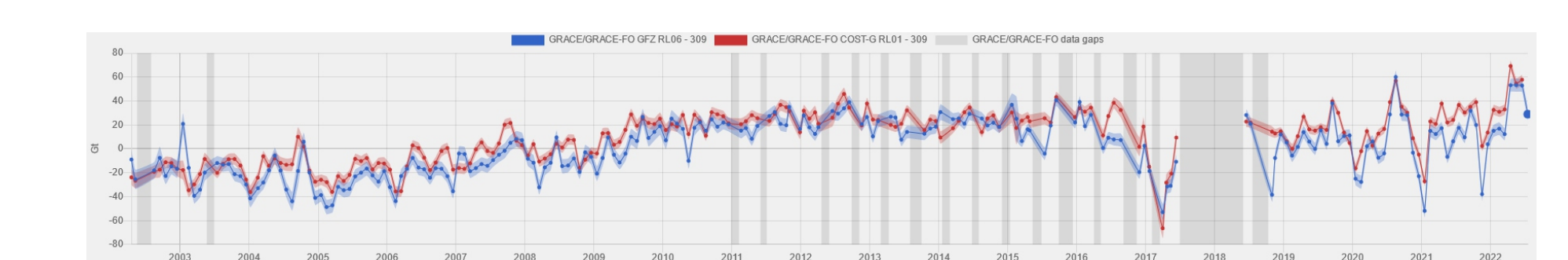
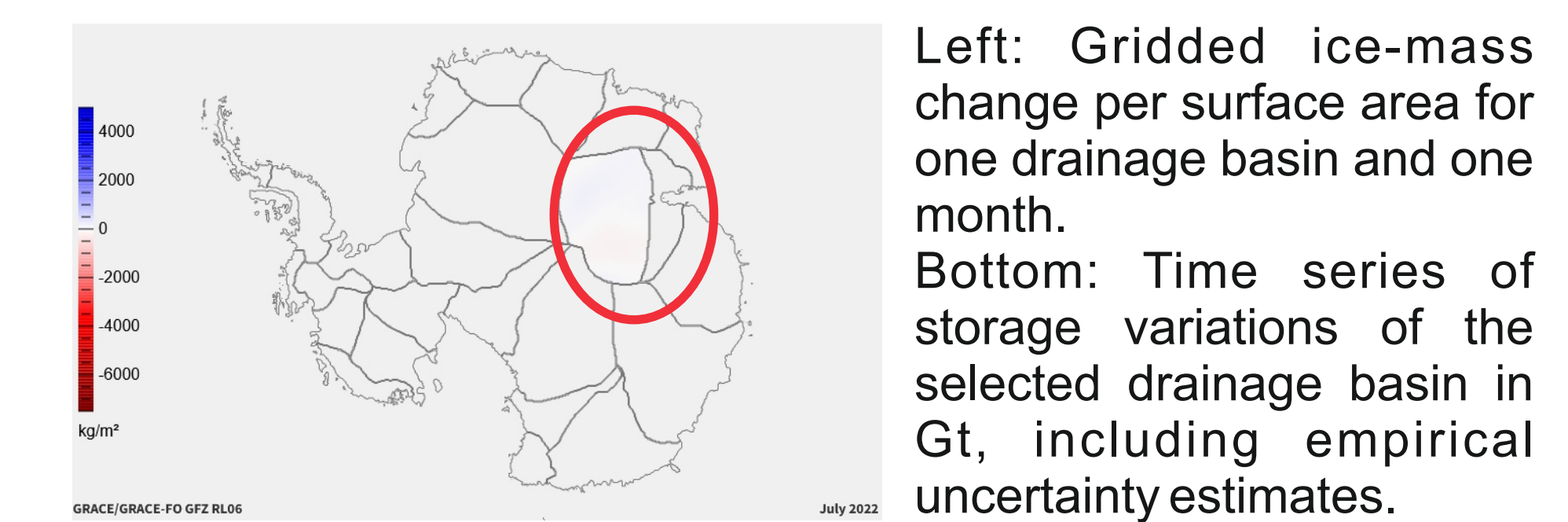
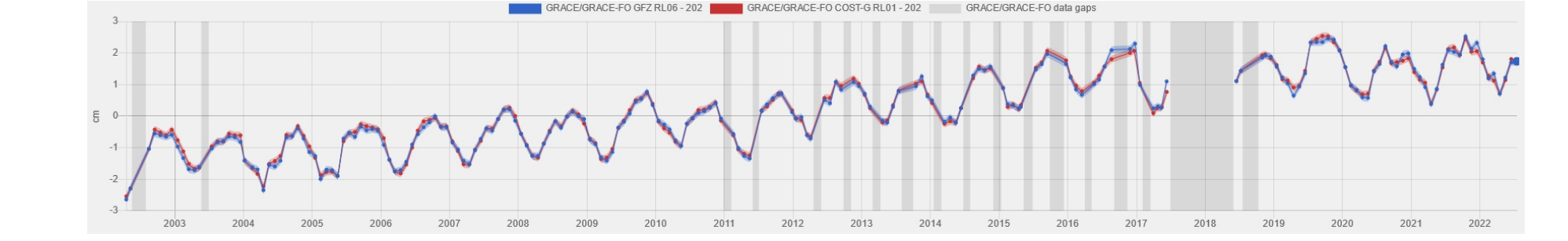
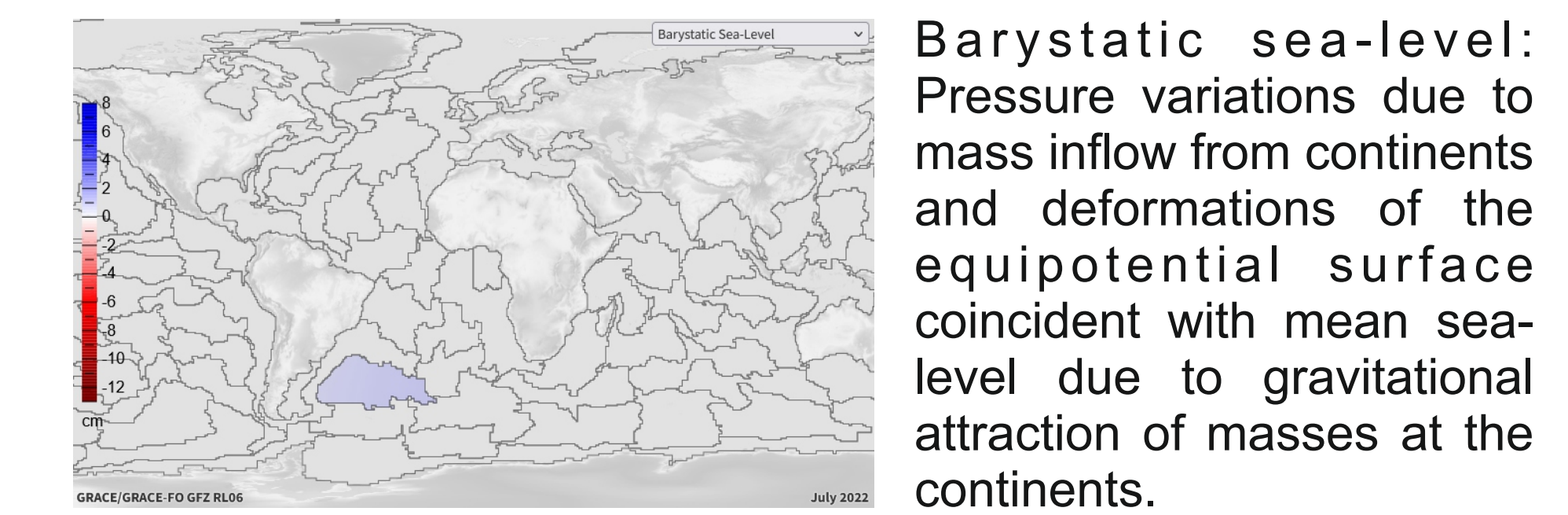
### Fitted Signal Models

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

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

**Data selection**

center, type, version ...

**Multiple possibilities for extraction areas, custom or predefined**

**Interactive plots**

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- (6) Leibniz Universität Hannover, Germany

### Dissemination

Information about COST-G: <http://cost-g.org>



### Welcome to COST-G

The International Combination Service for Time-variable Gravity Fields (COST-G) is a product center of the International Gravity Field Service (IGFS) and is dedicated to the combination of monthly global gravity field models. COST-G stems from the activities of the former H2020 project European Gravity Service for Improved Emergency Management (EGSIEM) and is further developed within the follow-up project Global Gravity-based Groundwater Product (G3P), which is funded from the European Union's Horizon 2020 Research and Innovation Programme under Grant Agreement no. 870353 (funding period 2020-2022).

Please use the top menu to visit the various parts of our website!

### Latest News

April 18th 2023  
COST-G GRACE-FO RL02 is now available at ICGEM.  
New input time-series of RL02 are: GFZ, JPL, CSR, RL06.1.

Level-2 products: <http://icgem.gfz-potsdam.de>

**ICGEM**

**Gravity Field Solutions for dedicated Time Periods**

The following gravity field time series are presently available:

Product	Center	Version	Area	Address	Latitude	Longitude	Apply
GRACE-FO RL02	AIUB	202301	Global	Bern, Switzerland	46.847622	7.444608	All
GRACE-FO RL02	CSR	202301	Global	Geoplatz/Postfach, Göttingen	52.074400	11.262200	All
GRACE-FO RL02	GFZ	202301	Global	Grav. Service, Potsdam	45.070714	15.439304	All
GRACE-FO RL02	GROOPS	202301	Global	Potsdam, Germany	52.390569	13.064473	All
GRACE-FO RL02	ITSG	202301	Global	Mannheim, Germany	52.375492	9.712010	All
GRACE-FO RL02	JPL	202301	Global	Los Angeles, CA	49.815179	8.121643	All
GRACE-FO RL02	LUH	202301	Global	Tübingen, Germany	49.815179	8.121643	All
GRACE-FO RL02	COMB	202301	Global	Tübingen, Germany	49.815179	8.121643	All

The processing standards to generate the GRACE Level-2 products of CSR, GFZ and JPL are also available in the Document Section of the GRACE/ISDC or JPL/PO.DAAC

### Summary

- 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 (IAG).
- COST-G operationally provides monthly gravity field solutions from GRACE-FO data and from Swarm data with a latency of about 3 months.
- COST-G operationally provides fitted signal models with quarterly updates.
- COST-G provides reprocessed monthly gravity field solutions in irregular batches.
- COST-G is planning to include several GRACE/GRACE-FO ACs from China in the near future.

### In collaboration with and supported by



### 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.

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