Technical Note

GravIS Ice-Mass Change Level-3 Products

for

GFZ GravIS RL06 (V. 0005)

COST-G GravIS RL02 (V. 0001)

Created: 13 March 2026

Prepared by:

Ingo Sasgen, Alfred-Wegener-Institut, Helmholtz-Zentrum für Polar- und Meeresforschung

Contact: ingo.sasgen@awi.de

Martin Horwath, Technische Universität Dresden, Institut für Planetare Geodäsie

Contact: martin.horwath@tu-dresden.de

1. Introduction

This Technical Note describes the processing scheme and product details of the Ice-Mass Change Level-3 products that are visualized at the GFZ web portal GravIS (https://gravis.gfz.de) and provided at GFZ's data archive ISDC.

2. Data Product Details

Ice-mass change products are provided both as basin averages and as gridded products for (i) the Antarctic Ice Sheet (AIS), and (ii) the Greenland Ice Sheet (GIS); each individual file contains the complete available time series.

Filenames: **GRAVIS-3_ccccc_rrrr_sss_tttt_iii_vvvv.xx**

where:

ccccc is either GFZOP if the product is based on GFZ GRACE/GRACE-FO monthly gravity field models, or COSTG if the product is based on combined GRACE/GRACE-FO monthly gravity field models from COST-G

rrrr is the corresponding 4-digit release number of the underlying monthly gravity field models (either 0600 for GFZ or 0200 for COST-G)

sss specifies the ice sheet (either AIS or GIS)

tttt specifies the type of product (either BAVE for basin average products or GRID for gridded products)

iii specifies the institute (either AWI for Alfred-Wegener-Institut or TUD for Technische Universität Dresden)

vvvv is the 4-digit version number of the most recent product release

xx is the file extension (either .asc, or .nc)

Format: basin average products: **ASCII**

gridded products: **NetCDF**

Product links: GFZ, AIS: **https://isdc-data.gfz.de/grace/GravIS/GFZ/Level-3/ICE/AIS/**

GFZ, GIS: **https://isdc-data.gfz.de/grace/GravIS/GFZ/Level-3/ICE/GIS/**

COST-G, AIS: **https://isdc-data.gfz.de/grace/GravIS/COST-G/Level-3/ICE/AIS/**

COST-G, GIS: **https://isdc-data.gfz.de/grace/GravIS/COST-G/Level-3/ICE/GIS/**

3. Processing Details

3.1 Basin Average Products

Produced by: Ingo Sasgen (ingo.sasgen@awi.de)

Basin-average ice mass variations for the AIS and GIS are obtained from unfiltered GravIS Level-2B coefficients (https://gravis.gfz.de/corrections), either for GFZ RL06 (Dahle & Murböck, 2019) or COST-G RL02 (Dahle & Murböck, 2025). The definition of 25 major drainage basins for the AIS and 7 drainage basins for the GIS, as well as the inversion procedure based on a forward modelling approach follows Sasgen et al. (2013) and Sasgen et al. (2012), respectively. Further details are provided in Dahle et al. (2025) (section 2.2.1).

3.2 Gridded Products

Produced by: Martin Horwath (martin.horwath@tu-dresden.de)

Gridded ice mass variations for the AIS and GIS obtained from unfiltered GravIS Level-2B coefficients (https://gravis.gfz.de/corrections), either for GFZ RL06 (Dahle & Murböck, 2019) or COST-G RL02 (Dahle & Murböck, 2025), are provided at polar-stereographic grids with a grid spacing of 50km x 50km. The applied algorithm (Döhne et al., 2023; Groh & Horwath, 2021) has been successfully used to generate gravimetric mass balance products within the ESA Climate Change Initiative (CCI) projects for the AIS and the GIS. Further details are provided in Dahle et al. (2025) (section 2.2.1).

4. Citation

The GravIS ice-mass change Level-3 products are published as data publication via GFZ Data Services and should be cited as follows:

GFZ RL06 products:
Sasgen, I., Groh, A., Horwath, M. (2019): GFZ GravIS RL06 Ice-Mass Change Products. V. 0005. GFZ Data Services. https://doi.org/10.5880/GFZ.GRAVIS_06_L3_ICE

COST-G RL02 products:
Sasgen, I., Döhne, T., Boergens, E., Horwath, M. (2026): COST-G GravIS RL02 Ice-Mass Change Products. V. 0001. GFZ Data Services. https://doi.org/10.5880/COST-G.GRAVIS_02_L3_ICE

When generally referring to the GravIS portal and its products, please cite Dahle et al. (2025).

5. References

Dahle, C., Murböck, M. (2019): Post-processed GRACE/GRACE-FO Geopotential GSM Coefficients GFZ RL06 (Level-2B Product). V. 0004. GFZ Data Services. https://doi.org/10.5880/GFZ.GRAVIS_06_L2B

Dahle, C., Murböck, M. (2025): Post-processed GRACE/GRACE-FO Geopotential GSM Coefficients COST-G RL02 (Level-2B Product). V. 0001. GFZ Data Services. https://doi.org/10.5880/COST-G.GRAVIS_02_L2B

Dahle, C., Boergens, E., Sasgen, I., Döhne, T., Reißland, S., Dobslaw, H., Klemann, V., Murböck, M., König, R., Dill, R., Sips, M., Sylla, U., Groh, A., Horwath, M., and Flechtner, F. (2025): GravIS: mass anomaly products from satellite gravimetry, Earth Syst. Sci. Data, 17, 611–631, https://doi.org/10.5194/essd-17-611-2025

Döhne, T., Horwath, M., Groh, A., Buchta, E. (2023): The sensitivity kernel perspective on GRACE mass change estimates. Journal of Geodesy, 97(1), 11. https://doi.org/10.1007/s00190-022-01697-8

Groh, A., Horwath, M. (2021): Antarctic Ice Mass Change Products from GRACE/GRACE-FO Using Tailored Sensitivity Kernels. Remote Sensing, 13, 1736. https://doi.org/10.3390/rs13091736

Sasgen, I., van den Broeke, M., Bamber, J., Rignot, E., Sørensen, L., Wouters, B., Martinec, Z., Velicogna, I., Simonsen, S. (2012): Timing and origin of recent regional ice-mass loss in Greenland. Earth and Planetary Science Letters, 333-334, p. 293-303. https://doi.org/10.1016/j.epsl.2012.03.033

Sasgen, I., Konrad, H., Ivins, E., Van den Broeke, M., Bamber, J., Martinec, Z., Klemann, V. (2013): Antarctic ice-mass balance 2003 to 2012: regional reanalysis of GRACE satellite gravimetry measurements with improved estimate of glacial-isostatic adjustment based on GPS uplift rates. The Cryosphere, 7, p. 1499-1512. https://doi.org/10.5194/tc-7-1499-2013