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Nine years of temporal gravity changes observed by the Swarm satellites

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Although a satellite mission to observe Earth's magnetic field, the Swarm satellites also collect GPS data with sufficient accuracy to observe Earth's gravity field with a spatial resolution of roughly 1500 km. These monthly models are available from 2014 to the present and do not rely on any other source of gravimetric data nor any a priori information in for example the form of temporal and spatial correlations. This time series covers the gap between the GRACE and GRACE-FO missions, as well as any other short gaps in their time series. Given the healthy state of the Swarm satellites, it is also likely that it will provide gravimetric information during possible gaps in the GRACE-FO data, and future dedicated gravimetric satellite missions.

We are a consortium of international research institutes, composed of The Astronomical Institute of the University of Bern, the Astronomical Institute of the Czech Academy of Sciences, the Delft University of Technology, the Institute of Geodesy of the Graz University of Technology, and the School of Earth Sciences of the Ohio State University. These activities are supported by the European Space Agency and the International Combination Service for Time-variable Gravity Fields (COST-G). We publish the models every 3 months at ESA's Swarm Data Access server (<https://swarm-diss.eo.esa.int>) as well at the International Centre for Global Earth Models (http://icgem.gfz-potsdam.de/series/02_COST-G/Swarm). Each institute exploits different gravity inversion strategies, thus producing independent solutions, which are combined at the solution level using weights derived with Variance Component Estimation. In this way, we ensure the published models are not biased towards particular strategies or assumptions.

We illustrate the geophysical signal captured by Swarm's GPS receivers over large hydrological basins, the errors represented by the variability of the models over the oceans and the agreement with GRACE and GRACE-FO. All analyses span the GRACE/GRACE-FO gap, to illustrate the importance of the Swarm satellites to bridge the absence of low-low satellite-to-satellite tracking data.

To be submitted to session [G4.1 Satellite Gravimetry: Data Analysis, Results and Future Mission Concepts](#) of the EGU 2023.