



Influence of orbit filtering strategies on Swarm time-variable gravity fields

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The Gravity Recovery and Climate Experiment (GRACE) mission has delivered valuable insights about mass changes within the Earth for more than 15 years. With its decommissioning in October 2018, the time series has been interrupted and will be resumed in the near future with the successor mission GRACE Follow-On (GRACE-FO). In this gap of about one year, depending on when the first data from GRACE-FO will be available, there is no dedicated gravity field mission.

However, gravity fields can be derived from kinematic orbits of the Swarm mission with a lower resolution. Swarm was launched in November 2013 with the main objective of measuring the geomagnetic field and its temporal variability. The fact that the mission consists of three identical satellites in a low-Earth orbit provides an excellent basis for computing time-variable gravity fields. It has already been shown in earlier studies that monthly global mean ocean mass changes can be derived from Swarm with a root mean square error of 4.0 mm with respect to GRACE.

Especially in times of high ionospheric activities, the kinematic orbits are affected by systematic errors. These occur mainly around the geomagnetic equator and in the polar regions. The errors in the orbits are directly mapped into the GPS-only gravity fields.

In this contribution, we apply various mitigation strategies that improve the orbits and the monthly gravity fields. By comparing the Swarm gravity fields to the available GRACE solutions, we can assess the quality of our different techniques. In this way, we can improve both the orbits and the gravity fields for the whole mission lifetime.