Signal contents of combined monthly gravity field models derived from Swarm GPS data

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The Swarm satellite constellation's GPS receivers provide valuable gravimetric data, with which it is possible to observe Earth's large-scale mass transport process. These data have become increasingly relevant given the on-going GRACE/GRACE-FO gap, and are thus needed to provide continuous observations of the Earth system. In this context, the overall accuracy and maximum resolution of the Swarm temporal gravity field models are parameters with interest to the wider geophysical community.

We assess the signal contents of the gravity field model resulting from the combination at the solution level of four individual solutions produced considering different gravity field estimation approaches. The combination considers Variance Component Estimation (VCE) and is a service kindly provided by the European Gravity Service for Improved Emergency Management (EGSIEM) initiative. We assume that past GRACE solutions provide an accurate measure of the signal at the spatial lengths captured by the Swarm solutions. On the basis of this, we derive per-degree correlation coefficients and spatial correlation maps for a selection of monthly solutions that were obtained under diverse conditions of geomagnetic and ionospheric activities, as well as variability of non-gravitational accelerations.