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# A prototype visualization tool for exploring mass variations in the Earth system

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In many scientific environments, scientists face two major difficulties in observing spatial and temporal dynamics of geo processes. First, measurements of an observable usually contain a superposition of signals of interest; the interpretation of a measurement therefore requires scientists to simultaneously assess multiple complementary observables and/or simulate the processes generating the signals. Second, many quantities of interest cannot be directly measured but need to be inferred from a limited amount of observables.

Here we present a prototype visualization tool for supporting scientists in exploring the spatial and temporal mass change variations within System Earth. Mass change cannot be measured directly but need to be derived from satellite measurements of the Earth's gravity field. The first visualization shows the simulated mass anomaly (here, with respect to the annual mean), and the second visualization shows the calculated gravity field taking the simulated mass change as input data. The third visualization shows the mass change inverted from the measured gravity field of the Earth as input that is shown in the fourth visualization. Individual components of the simulated mass change arising from different subsystems can be (de)selected and the imprint in the gravity field is visualized. The user can navigate through time, as well as zooming and rotating of the spheres and adjustment of the color scale are possible. The behavior of all four spheres is synchronized. The combined representations of these visual views supports scientists 1) assess the overall quality of the modeled versus the observed gravity field signals, 2) determine the influence of different processes to the measured variation of the Earth's gravity field in the region of interest, and to understand which fine-grained variation in the mass change cannot be inferred from the satellite measurements.

This presentation will present the prototype visualization tool and provide a discussion on how our it supports geoscientists to study the relationship between simulated and mass change variation recovered from the Earth's gravity field.