



## **Evaluation of recent GRACE monthly solution series with an ice sheet perspective**

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GRACE monthly global gravity field solutions have undergone a remarkable evolution, leading to the latest (Release 5) series by CSR, GFZ, and JPL, to new series by other processing centers, such as ITSG and AIUB, as well as to efforts to derive combined solutions, particularly by the EGSiEM (European Gravity Service for Improved Emergency Management) project. For applications, such as GRACE inferences on ice sheet mass balance, the obvious question is on what GRACE solution series to base the assessment.

Here we evaluate different GRACE solution series (including the ones listed above) in a unified framework. We concentrate on solutions expanded up to degree 90 or higher, since this is most appropriate for polar applications. We empirically assess the error levels in the spectral as well as in the spatial domain based on the month-to-month scatter in the high spherical harmonic degrees. We include empirical assessment of error correlations. We then apply all series to infer Antarctic and Greenland mass change time series and compare the results in terms of apparent signal content and noise level.

We find that the ITSG solutions show lowest noise level in the high degrees (above 60). A preliminary combined solution from the EGSiEM project shows lowest noise in the degrees below 60. This virtue maps into the derived ice mass time series, where the EGSiEM-based results show the lowest noise in most cases. Meanwhile, there is no indication that any of the considered series systematically dampens actual geophysical signals.