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# Assessment of GRACE signal and noise using high-fidelity numerical simulations

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Detailed and high-fidelity numerical simulations of the gravity field recovery from GRACE data processing are an effective tool to assess the signal and noise in the GRACE (Level-2) gravity field data products. We report the results from such numerical simulations, which include the effect of sensor noise as well as errors due to rapid (relative to solution interval) geophysical variability. These simulations differ from previous efforts in several respects. The simulations are carried out over a one-year data span, along the actual ground-track and observation geometry of the GRACE mission itself. The parametrization is the same as used for RL04 Level-2 products. The sensor noise models are derived from several years of experience with GRACE Level-1 data, and attempt to reproduce the best-known error spectra of actual GRACE data. Special care has been taken to model the geophysical variability of high-amplitude and small spatial extent, as this is an aspect where the capabilities of the GRACE mission data products has been most tested. The error characteristics of the simulations are compared to the errors in the RL04 gravity field data products. The results of these simulations are useful not only for assessing the errors in the current generation gravity field products, but also for design trade studies of future GRACE-like missions.