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Poster
Space gravimetry from GRACE/GRACE-FO (GGFO) provides quasi-monthly estimates of mass redistribution that can be mapped to elastic surface displacements. Although coarser in spatial resolution than point-wise GNSS, GGFO-derived elastic displacements show strong consistency with GNSS', particularly in the vertical component where correlations with IGS Repro3 solutions reach ~0.7 for both CSR and JPL mascon products.

The spatial-scale complementarity between geometric and gravimetric techniques has fostered the emerging field of hydrogeodesy, where joint inversions exploit the point-wise nature of GNSS and the global-scale of GGFO data to recover terrestrial water storage and other load-induced signals.

Beyond hydrological applications, terrestrial reference frame (TRF) geodesy can also benefit from this synergy. At JPL, frame products are generated with a square-root information Kalman filter in the spatial domain -a formulation well suited to the assimilation of GGFO-inferred surface deformation.

In standard realizations such as JTRF2020 and its update JTRF202-u2022, non-tidal loading is represented by co-estimated seasonal oscillators. As an alternative, GGFO-derived deformation can be introduced directly as exogenous control inputs, driving the load-responsive components of the TRF state without treating GGFO data as observational constraints.

Here we report on the methodological developments and current status of efforts to assimilate GRACE/GRACE-FO observations into JPL terrestrial reference products, highlighting the potential to embed space-gravimetry and geometric geodesy within a unified state-space framework.
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