



A comprehensive assessment of GRACE decorrelating filters for hydrological applications

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The Gravity Recovery And Climate Experiment (GRACE) satellite mission provided time-variable gravity field solutions for about 15 years. The GRACE data, in the form of such solutions, are extensively employed in terrestrial hydrological monitoring at a large scale. This includes terrestrial water storage change evaluation, hydrological components of groundwater and evapotranspiration (ET) retrieval, droughts analysis, and glacier response of global change. The GRACE-based time-varying field solutions are contaminated with pronounced along-track inaccuracies, so-called stripes, due to aliasing and an anisotropic sensitivity of GRACE K-band ranging measurements. Several filters have been developed to mitigate these inaccuracies. They have shown different performances in different geographical regions. This study offers a comprehensive assessment of various filters for hydrological applications. We validate the results against independent sensor data, e.g., radar altimetry, over a number of homogeneously distributed selected lakes. Moreover, we look into time-varying signal variations over quiet areas, e.g., deserts, where the signal is expected to be small. The outcome of the study is invaluable in the sense that it allows for a more informative choice of the filter when studying hydrological variations.