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Simple regional analyses are still possible once correlated errors are removed

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Correlated errors in the monthly spherical harmonic coefficient (SHC) solutions provided by the GRACE data centers are estimated and removed using the destriping method of Crowley and Huang (2020). Regional estimates for mass change are calculated across Canada using the simple basin average technique of Swenson and Wahr (2002) as well as a simple mascon approach developed by the Canadian Geodetic Survey. A comparison with mascon solutions from the GRACE data centers demonstrates excellent agreement and in some cases reveals larger amplitudes and added temporal structure. This approach does not require additional constraints/dependencies, smoothing, normalizations or scaling factors and can easily be applied to any regional geometry without the need to calculate a global solution. Solutions tend to agree well when data quality is good and diverge when errors are larger. This is expected and demonstrates the underlying uncertainties that remain. The similarity in solutions using such different methodologies provides confidence in the time series solutions. We conclude with a regional validation that uses water level changes in the Great Lakes of North America to demonstrate the effectiveness of the method. The Great Lakes are large enough that GRACE clearly detects changes in their water levels. At the same time, the lakes are close enough to each other that distinguishing signals between adjacent lakes remains a challenge for any method.

References:

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