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Development of daily "swath" mascon solutions from GRACE

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The Gravity Recovery and Climate Experiment (GRACE) mission has provided invaluable and the only data of its kind over the past 14 years that measures the total water column in the Earth System. The GRACE project provides monthly average solutions and there are experimental quick-look solutions and regularized sliding window solutions available from Center for Space Research (CSR) that implement a sliding window approach and variable daily weights. The need for special handling of these solutions in data assimilation and the possibility of capturing the total water storage (TWS) signal at sub-monthly time scales motivated this study.

This study discusses the progress of the development of true daily high resolution "swath" mascon total water storage estimate from GRACE using Tikhonov regularization. These solutions include the estimates of daily total water storage (TWS) for the mascon elements that were "observed" by the GRACE satellites on a given day. This paper discusses the computation techniques, signal, error and uncertainty characterization of these daily solutions. We discuss the comparisons with the official GRACE RL05 solutions and with CSR mascon solution to characterize the impact on science results especially at the sub-monthly time scales. The evaluation is done with emphasis on the temporal signal characteristics and validated against in-situ data set and multiple models.