



Results and Error Estimates from GRACE Forward Modeling over Antarctica

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Forward modeling using a weighted least squares technique allows GRACE information to be projected onto a pre-determined collection of local basins. This decreases the impact of spatial leakage, allowing estimates of mass change to be better localized. The technique is especially valuable where models of current-day mass change are poor, such as over Antarctica. However when tested previously, the least squares technique has required constraints in the form of added process noise in order to be reliable. Poor choice of local basin layout has also adversely affected results, as has the choice of spatial smoothing used with GRACE. To develop design parameters which will result in correct high-resolution mass detection and to estimate the systematic errors of the method over Antarctica, we use a “truth” simulation of the Antarctic signal. We apply the optimal parameters found from the simulation to RL05 GRACE data across Antarctica and the surrounding ocean. We particularly focus on separating the Antarctic peninsula’s mass signal from that of the rest of western Antarctica. Additionally, we characterize how well the technique works for removing land leakage signal from the nearby ocean, particularly that near the Drake Passage.