



## **Reconstruction of Greenland and Antarctica Mass Changes Prior to the GRACE Mission**

R. Steven Nerem (1), Matthieu Talpe (1), Emily Pilinski (1), Frank G. Lemoine (2), and Douglas S. Chinn (2)

(1) University of Colorado, CCAR and CIRES, Boulder, Colorado, United States (nerem@colorado.edu), (2) NASA/Goddard Space Flight Center, Planetary Geodynamics Laboratory

Low order coefficients of the gravity field can be determined using conventional satellite tracking data such as satellite laser ranging (SLR) and DORIS, a method that extends the gravitational data record across multiple decades. More recently, the Gravity Recovery and Climate Experiment (GRACE) mission has contributed monthly solutions of the gravity field to degree and order 60, which have led to fundamental advances in our knowledge of changes in the distribution of water across the planet. In particular, GRACE has provided new insight into mass changes in Greenland and Antarctica. The objective of this work is to extend mass change data beyond the ten years of the GRACE mission using SLR data that both predates the GRACE mission and is expected to continue beyond it. This work uses a technique to fuse the two data sets by applying empirical orthogonal function (EOF) analysis to the GRACE data to isolate the temporal variability and spatial maps associated with the critical modes of mass change. The EOF modes are then reconstructed using the conventional tracking data allowing for a comparison of reconstructed EOF modes and GRACE data products. We will show results from reconstructing Greenland and Antarctica mass changes during the GRACE mission (to validate the technique) as well as prior to the launch of the GRACE mission in 2002. The technique also has important implications for bridging potential gaps between the GRACE and GRACE Follow On missions.