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# The hunt for ice-melting fingerprints in GRACE ocean data

**D. Chambers** (1), R. S. Nerem (2), J. Willis (3)

(1) Center for Space Research, The University of Texas at Austin (chambers@csr.utexas.edu), (2) Cooperative Institute for Research in Environmental Science & Colorado Center for Astrodynamics Research, University of Colorado, (3) Jet Propulsion Laboratory, California Institute of Technology

Theoretically, self-gravitational changes from ice-melting on Greenland, Antarctica, and glaciers should cause distinct “finger-prints” of sea level change that differ from a globally uniform, or eustatic, sea level change. The general pattern will be a significantly smaller rate near the source of the ice-melting, and a slightly higher rate in the far-field. Although this self-gravitational signal has been observed in long-term tide gauge measurements, it has not been successfully detected in shorter-term measurements from satellites. Since the signal is gravitational, it should be observable in the observations of the Gravity Recovery and Climate Experiment (GRACE). However, because GRACE is most sensitive to the longest-wavelength gravity changes, large changes in land water storage, such as from ice-melting, will leak into maps of sea level change made from GRACE around coastlines and potentially obscure the self-gravitational signal. Re-distribution of mass within the ocean from ocean dynamics can also cause rises or falls in sea level along coastlines and obscure the signal.

In this presentation, we will make a first attempt to find these self-gravitational sea level fingerprints in GRACE data from January 2003 until August 2008, after removing ocean dynamical effects using ocean bottom pressure from the JPL_ECCO model. We will quantify the level of possible hydrology leaking into the data by using simulations based on currently estimated ice-melting rates and patterns derived from GRACE data over Greenland and Antarctica.