



## **Long-Term Changes in the Geoid Observed Through SLR and DORIS Tracking**

**C.M. Cox** (1,2), B.F. Chao (2)

(1) Raytheon ITSS, (2) NASA GSFC Spec Geodesy Branch  
(Christopher\_M\_Cox@Raytheon.com, 301-614-6099)

Observations of change in the Earth's gravity field provide a powerful constraint on past and present mass transport within the Earth's systems. Changes in the geoid can effect assessment of post glacial rebound (PGR) models, present data mass storage changes, as well as estimates of regional sea level change. Past analyses of Satellite Laser Ranging (SLR) tracking data has yielded solution rates for the low-degree zonals, in some cases up through or higher. Robust recovery of the zonals is made possible by the secular effects that these terms have on the satellite orbits. Recovery of the non-zonal gravity rates terms is not as certain, but is possible nonetheless. For the first time we can have a reasonable look at the geographical pattern of the secular changes that can be compared/contrasted with geophysical models. Initial global geoid change estimates, complete through spherical harmonic degree four over the period 1980-2002, show reasonable agreement with ICE-3G derived PGR model predictions, as well as significant deviations. An issue will be the interpretation of the results, which include both present day mass changes and the Earth's response to past changes, as well as recent significant interannual changes. For example, data from 1980-1998, when a large anomaly occurred in the observed J2 series, and the post 1998 data show different patterns in the geoid change.