Geophysical Research Abstracts, Vol. 9, 04740, 2007
SRef-ID: 1607-7962/gra/EGU2007-A-04740

Geocenter motion and reference frame – geophysical and geodetic perspectives

X. Wu

Jet Propulsion Laboratory, California Institute of Technology, USA
(Xiaoping.Wu@jpl.nasa.gov / Fax: 1-818-393-4965 / Phone: 1-818-354-9366)

The motion of center-of-mass of the total Earth system (CM) with respect to the center-of-figure of the solid Earth surface (CF) is a consequence of mass redistribution on the surface and in the interior. Driven by ocean tides, climate surface mass transport, and Glacial Isostatic Adjustment (GIA), geocenter motion occurs at sub-daily to secular time scales, and has a one-to-one correspondence with degree-1 spherical harmonic surface load. Accurate determination of the degree-1 modes of mass variation is essential to form a complete mass variation spectrum with GRACE gravity and other measurements. Understanding geocenter motion is also critically important for the realization and stability of the origin of International Terrestrial Reference Frame (ITRF), which severs as a fundamental datum for satellite based global change measurements. Among other things, the sparseness, uneven global distribution, and ever-evolving nature of the geodetic tracking networks pose a serious problem to geocenter motion study and ITRF stability. The motion of CM with respect to various networks is also different from that with respect to CF and different among themselves. The network measurements are further complicated by higher degree load-induced and other deformation at different time scales. On the other hand, an inverse approach has recently emerged to solve for degree-1 load and thus geocenter motion from global deformation, gravity, and altimetry data combination. While the results of recent direct and inverse determinations of geocenter motion will be presented, we will also examine the complementary nature of these approaches, and discuss merits and challenges of further data combinations.