Geophysical Research Abstracts
Vol. 17, EGU2015-14922, 2015
EGU General Assembly 2015

What causes the trends in Geocenter motion estimates?

Roelof Rietbroek (1) and Ernst Schrama (2)

(1) IGG, University of Bonn, Bonn, Germany (roelof@geod.uni-bonn.de), (2) Faculty of Aerospace Engineering, Delft University of Technology, Delft, Netherlands (E.J.O.Schrama@tudelft.nl)

Over time, the geometrical center of figure of the Earth (CF) and the center of mass of the Earth system (CM) exhibit small changes. This phenomena, generally referred to as 'geocenter motion', is mainly caused by present-day and past surface loading and (visco)-elastic deformation processes occurring near the surface of the Earth. It is now well known that the computation of surface loading variations from the GRACE product requires the application of geocenter corrections, and not doing so introduce significant errors in estimates of, for example, melt-rates of the cryosphere. But, to understand observed geocenter motion more closely, one can also ask how much the different surface loading phenomena contribute to it.

In this study, we compare different estimates of the geocenter motion, and discuss the underlying causes, with a special focus on trends. Using a 'fingerprint' inversion approach, where predefined patterns are fitted to GRACE and altimetry data, we can now consistently break down the geocenter estimates into different contributions. We find that the present day melting in Antarctica and Greenland shift the CM-CF offset with 0.1 mm/yr and -0.3 mm/yr in the Z-direction respectively, while GIA additionally contributes with roughly -0.3 mm/yr.