

Geocenter motion driven by large-scale mass redistribution

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The geocenter is defined as the earth's center of mass (CM) including solid earth and geophysical fluid. Precise determination of the geocenter plays an important role in determining the orbit of artificial satellite as well as constructing the terrestrial reference frame. The dynamic Earth forms the large-scale circulation system, resulting in temporal variations of the position of geocenter. The Satellite Laser Ranging (SLR) is the best technique to measure the geocenter motion with respect to the earth's center of figure (CF). In this study, we derive temporal variations of geocenter from SLR analysis, and investigate its driving source. We used an analysis software package named "c5++" developed by the Hitotsubashi University and National Institute of Information and Communications Technology of Japan to derive the geocenter motion from SLR data (Otsubo et al., 1994). Here we used LAGEOS-1 and LAGEOS-2 data spanning over 20 years from November 1992 to May 2013. The obtained geocenter time-series showed the shift in secular trend in all three components before and after ~2002. Matsuo et al. (2013) reported that the large-scale ice mass depletions in the polar ice-sheets produced the shift in secular trend of the earth's low-degree gravity field in the same period. We are going to perform numerical simulation of geocenter motion driven by ice mass depletions and its subsequent sea-level rise, and investigate their impacts on the observed geocenter motion.