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Geocenter motion from space geodesy. What precision can be expected from current estimations?

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The net translations of the networks of stations that track satellites with respect to crust-based secular terrestrial frames are expected to contain the signature of the geocenter motion. This phenomenon is defined to be the motion of center of mass of the Earth (CM) with respect to the center of figure of the solid Earth surface (CF), which is normally realized by a specific network whose frame center is the center of network (CN).
We specifically study here the translation time series derived from satellite laser ranging technique (SLR) data and their non-linear variations. We show, using two loading models derived from fluid data and a GPS displacement field inversion, compared with SLR results, that the expected loading signal ranges between two to four millimeters at the annual frequency depending of the component. Additionally, the level of SLR translation bias due to SLR network size and distribution should be reasonably at the level of one millimeter, mostly along X and Z components at the annual frequency with a scatter of about 1.5 millimeters. These quantities should consequently be analyzed with caution. We suggest some methods to cope with this problem.
Assuming that random errors affect station positions uniformly, this problem partly relies on how closely the center of network of stations approximates the center of figure of the Earth. It is more critical for secular variations of the geocenter motion, related to station velocities. It also relies on the capacity of the SLR data analysis and of an ITRF-like combination to generate station velocity field expressed with respect to the CM. Based on current ITRF networks and geometric considerations, we wish to evaluate the long-term geocenter motion error that could be derived from the ITRF velocity field.