



Improvements in systematic effects in satellite laser ranging analyses – satellite centre-of-mass corrections

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One of the limiting factors in reaching the GGOS-inspired scientific goal of 1-mm accuracy satellite laser ranging to the geodetic satellites is the problem of referring the range observations to the centres of mass (CoM) of the spherical satellites. The cube-corner retroreflectors that are densely distributed over the surfaces of the primary geodetic satellites LAGEOS (diameter 0.60m) and Etalon (diameter 1.29m) give rise to broad, complex distributions in the returning laser pulses that are detected by the stations. Proper treatment of the resulting range measurements that take account of the various laser-station technologies is required in order to minimize potential systematic errors in the range that can reach more than 10 mm for the two LAGEOS and up to several cm for the two Etalon satellites. Earlier theoretical results (Otsubo and Appleby, JGR, 2003) have been used to develop tables of CoM corrections and their uncertainties for all the ILRS stations that were or continue to be in operation from the period 1983 onwards. These updated corrections have been used in a pilot study by the ILRS Analysis Working Group in order to quantify their impact on the determination of the reference frame, and we report early results of this study. This work is part of the ILRS preparation towards its contribution to the next realization of the ITRF.