Satellite Orientation effects on Centre of Mass Corrections

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The current centre of mass correction values employed by ILRS analysts for the processing of SLR observations to spherical geodetic satellites are station-, satellite-, and operation-specific, and are available for most stations that have contributed significant volumes of data over their tracking history. By design, these corrections are averaged values over all possible orientations of the satellites. The underlying assumption here is that instantaneous departures from the computed mean values do not affect in significant ways the quality of the thus corrected observations, and therefore their derived products. Far from being a neglected topic, several 21 groups have devoted in the last years substantial efforts towards improving current data reduction strategies, even if not always explicitly framing the problem as an orientation dependent effect or a centre of mass correction issue. Here we examine the extent to which the variability present in SLR normal point data, in particular for single-photon operations, is caused by changes in the relative orientation between the satellites and ground stations, present a simple method to account for this effect, and discuss the impact on the actual geodetic products computed from the data in global solutions.