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# Technique-Dependent Errors in the Satellite Laser Ranging Contributions to the ITRF

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Over the past decade Satellite Laser Ranging (SLR) has focused on its unique strength of providing accurate observations of the origin and scale of the International Terrestrial Reference Frame (ITRF). The origin of the ITRF is defined to coincide with the center of mass of the Earth system (geocenter). SLR realizes this origin as the focal point of the tracked satellite orbits, and being the only (nominally) unbiased ranging technique, it provides the best realization for it. The goal of GGOS is to provide an ITRF with accuracy at epoch of 1 mm or better and a stability of 0.1 mm/y. In order to meet this stringent goal, Space Geodesy is taking a two-pronged approach: modernizing the engineering components (ground and space segments), and revising the modeling standards to take advantage of recent improvements in many areas of geophysical modeling for system Earth components. As we gain improved understanding of the Earth system components, space geodesy adjusts its underlying modeling of the system to better and more completely describe it. Similarly, from the engineering side we examine the observational process for improvement of the calibration and reduction procedures that will enhance the accuracy of the individual observations thence the final SLR products. Two areas that are currently under scrutiny are (a) the station-dependent and tracking-mode-dependent correction of the observations for the "center-of-mass-offset" of each satellite target, and (b) the station- and pass-dependent correction for the calibrated delay that refers each measurement to the nominal "zero" of the instrument. The former affects primarily the accuracy of the scale definition, while the latter affects both, the scale and the origin. However, because of the non-uniform data volume and non-symmetric geographic locations of the SLR stations, the major impact of the latter is on the definition of the origin. The ILRS is currently investigating the quality of models available for the correction of the center-of-mass offset for the primary targets contributing to the ITRF and the impact of their application on the final products, which we will discuss with examples. The second source of error is more complex, primarily due to the fact that almost each of the current stations is a unique case and quality of the applied delays must be assessed on a case-by-case basis. We will examine typical series of these corrections for some of the most important sites of the network. The current practice in SLR contribution to ITRF is to provide a "snapshot" ITRF realization from the analysis of arcs spanning one week, selected as a compromise between the requirement for an accurate enough realization of the site positions and a short enough interval to minimize biasing the estimate from mass redistributions over that interval. A comparison of these weekly realizations to the static definition of the ITRF origin results in the so-called "geocenter variation" time series. Fitting a model for the dominant frequencies in the series, allows one to extend this model for future and past time-intervals not covered by the observations. We will present and compare geocenter variations series based on different modeling underlying our SLR analysis, using the ITRF2008 as the reference.