

Contribution of SLR observations to GNSS and LEO satellites for validating and improving LAGEOS-based parameters

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Currently, the SLR observations to passive geodetic satellites, such as LAGEOS and Etalon, are used for the determination of global geodetic parameters and for the realization of the International Terrestrial Reference Frame (ITRF). Despite a large number of SLR observations to new GNSS satellites, such as Galileo, GLONASS, BeiDou and QZSS, and to active Low Earth Orbiters (LEO), these observations are typically used only for the GNSS and LEO orbit quality assessment and the validation of the employed orbit models. No SLR observations to active GNSS and LEO satellites are engaged for the ITRF realization. The quality of GNSS and LEO orbits has recently been remarkably improved which allows for new applications of SLR observations to active satellites at different orbit heights.

In this study, we show that the SLR observations to active GNSS and LEO satellites can support classical LAGEOS solutions by validating SLR station coordinates and evaluating systematic effects on stations, such as range biases. The GNSS and LEO data can also be used for deriving high-quality parameters, such as SLR station coordinates, thanks to the good observation geometry and state-of-the-art quality of LEO and GNSS orbits. Combination of SLR observations to passive and active geodetic satellites improves the station coordinates especially for those stations which are dedicated to tracking specific constellations, e.g. GNSS. We will assess what is the contribution of combining SLR observations to active and passive satellites in the context of fulfilling the challenging GGOS requirements of high-quality geodetic products.