The Role of Laser Ranging for the Global Geodetic Observing System GGOS

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Satellite Laser Ranging (SLR) plays a central role in modern space geodesy. One of its key applications is the contribution to the realization of the geodetic datum of the terrestrial reference frame. Besides, multiple other applications such as the determination of precise satellite orbits, Earth Orientation parameters (EOP), and long-wavelength variations of the static and temporal Earth gravitational field underpin the important role of the unique optical measurement technique currently used in space geodesy. Especially the contributions of SLR to the Global Geodetic Observing System (GGOS) are highly visible in modern Earth system sciences. SLR is the only technique to fully integrate the three pillars of GGOS: the Earth's geometry, its orientation, its gravity field and their temporal variations. Therefore, SLR can be used to combine geometric and gravimetric observation techniques. Moreover, based on the integrated consistent estimation of all these quantities, SLR can be used to study and understand interactions between subsystems of the complex system Earth.

In this presentation, the authors focus on selected key applications and highlight the contributions of SLR to modern space geodesy. In addition, the authors show exemplary results where SLR is used as a central observation technique to integrate the three pillars of geodesy, focussing on different aspects like the improvement of the estimated parameters and the correlations between them. The results presented in this talk are obtained from a solution where observations to the maximum available constellation of spherical SLR satellites are analysed.