

Processing of Satellite Laser Ranging data to GNSS satellites at IGiG WUELS

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Satellite Laser Ranging (SLR) is a precise geodetic technique that provides range measurements to artificial satellites equipped with laser retroreflectors. The International Laser Ranging Service (ILRS) unites and coordinates all laser stations and their activities in terms of tracking satellites. Due to the fact that almost all the Global Navigation Satellite System (GNSS) satellites are equipped with the laser retroreflector arrays, SLR measurements are performed with cm-accuracy. As a result, the SLR technique can be used for the validation of GNSS-derived products as well as for the independent GNSS orbit determination.

SLR serves as an independent validation technique for the GNSS-derived orbits due to the fact that SLR uses optical wavelengths in contrast to GNSS which is based on the microwave observations. Since March 2017, a new Associated Analysis Center (AAC) of the ILRS has been established at the Wrocław University of Environmental and Life Science (WUELS) who runs an online platform GOVUS for the SLR validation of microwave-based orbit products. The web-service GOVUS allows the users to perform fast and advanced online analyses on the stored SLR validation results which are calculated automatically.

Apart from the independent validation tool, SLR solely may serve for the determination of the GNSS satellite orbits. We calculated the boundary conditions for the precise Galileo orbit determination using at least 60 SLR observations provided by 10 homogeneously distributed SLR stations within 5 days. Based on solely SLR data we obtained Galileo orbits with the accuracy at the level of 4 cm.

The SLR constitutes a valuable tool for both the accuracy assessment as well as an independent orbit product provider. Based on the two techniques, SLR and GNSS microwave, it is possible to provide the combination of two types of observations whose preliminary results will be shown in this contribution.