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Titel des Beitrags: Satellite laser ranging - a tool to realize GGOS?

Abstract: Satellite Laser Ranging (SLR) is currently the unique technique to determine station coordinates, Earth Orientation Parameters (EOPs) and Stokes coefficients of the Earth’s gravity field from one observation equation with a high accuracy. These parameters form the so-called ‘three pillars’ (Plag and Pearlman, 2009) of the Global Geodetic Observing System (GGOS). In its function as an official analysis center of the International Laser Ranging Service (ILRS) (Pearlman et al., 2002), DGFI is developing and maintaining software to process SLR observations called ‘DGFI Orbit and Geodetic parameter estimation Software’ (DOGS). The software is used to analyze SLR observations and to compute multi-satellite solutions. In this study, up to 10 satellites (ETALON1/2, LAGEOS1/2, STELLA, STARLETTE, AJISAI, LARETS, LARES and BLITS) with different orbit characteristics (e.g., inclination and altitude) are combined. The relative weighting of the satellites is done using a variance component estimation. The diverse orbits allow to decrease the correlation of parameters such as gravity field coefficients (GFCs) and EOPs. Beside the Earth’s gravity field (weekly GFCs with degree and order ≤ 6 and monthly GFCs with degree and order ≤ 20) and rotation (terrestrial pole coordinates, UT1-UTC)
extrapolated with LOD), 3-D station coordinates are estimated weekly or monthly. Different combined solutions are compared to LAGEOS-only solutions. If LARES is combined with LAGEOS1/2, a significant improvement in the GFCs, the EOP and the TRF can be achieved. If more satellites are combined, the variation of the pole coordinates w.r.t. the IERS 08 C04 time series can be reduced up to 56%. Furthermore, systematics in LOD are nearly completely eliminated. The variation of the station coordinates w.r.t. SLRF2008 (http://www.lirs.gsf.c.nasa.gov/science/awg/S LRF2008.html, 2013) can be reduced by about 30%.

Stichworte:
Earth gravity field; EOP; GGOS; SLR; TRF

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