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Low-degree spherical harmonics from multi-satellite SLR

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Satellite Laser Ranging (SLR) is the major technique to determine the long-wavelength spherical harmonics of the Earth's gravity field with high accuracy. These coefficients are a matter of particular interest for various geodetic research topics. One goal of the Global Geodetic Observation System (GGOS) is to study the variable Earth's geometry and gravity and their interactions in a consistent way. Therefore, SLR can be used as it is sensitive to the time-variable Earth's gravity field as well as to the time-variable Earth's geometry.
After the launch of the LARES satellite in February 2012, up to ten different spherical passive satellites have been orbiting the Earth. Due to the fact that orbit parameters, Earth Orientation Parameters (EOP), station coordinates and the gravity field coefficients (GFCs) are correlated, observations to multiple satellites can be used to decorrelate the parameter groups. In the framework of the ILRS, DGFI is analyzing SLR observations to all spherical satellites. Furthermore, DGFI combines all observations to a multi-mission solution which contains gravity field coefficients, EOP, station coordinates and orbit parameters.
In this paper we present the results of this multi-mission solution for the gravity field coefficients of degree 2. We discuss the obtained parameter time series w.r.t. external data sets and model combinations on the basis of equatorial excitation functions as well as on the basis of orbit parameters.