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SLR in the framework of the EGSIEM project

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This contribution describes the three roles Satellite Laser Ranging (SLR) is playing within the European Gravity Service for the Improved Emergency Management (EGSIEM). The purpose of this Horizon 2020 project is to combine monthly gravity field solutions from the Gravity Recovery and Climate Experiment (GRACE) mission that are derived by different institutions. The combined gravity field product will provide complementary information to traditional products for flood and drought monitoring and forecasting. First, SLR is used to validate Global Navigational Satellite System (GNSS) orbits, which are computed at the Astronomical Institute of the University of Bern. To ensure a consistent set of GNSS products (orbits, Earth rotation parameters, and clocks) a reprocessing campaign was initiated. The reprocessed products are based on the new Empirical CODE Orbit Model, which is used for all orbit products generated at the Center for Orbit Determination in Europe (CODE) from January 4, 2015 onwards. Since the kinematic orbits of GRACE will be based on these orbits, we present an in-depth validation of the GNSS orbits using SLR. Second, SLR to geodetic satellites is crucial for the estimation of the dynamical Earth's flattening term (C20) since this coefficient is degraded by aliasing when derived from GRACE data. We will compare the temporal variation of C20 with external solutions and demonstrate the benefit of involving a larger number of geodetic satellites. The third aspect is based on the fact that the gravity field product delivered by EGSIEM will include GRACE and SLR data. It is thus desirable to establish a reference frame based on both GNSS data and SLR observations. For this purpose it is planned to analyze SLR measurements to GNSS satellites equipped with a retroreflector array and to estimate common parameters such as station coordinates and geocenter coordinates from a combined set of SLR and GNSS data. We will present a workflow how to derive a common reference frame.