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Preparing for GRACE-FO: Level-1A and Level-1B data handling and processing in the framework of the project MAGIC

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The Gravity Recovery And Climate Experiment (GRACE) mission has enabled the study of the Earth's time-variable gravity field with unprecedented accuracy. Its successor, the GRACE-FO mission, is scheduled for launch in spring 2018. GRACE-FO is a quasi-replica of GRACE, and pursues the primary objectives of GRACE. For this purpose, evolved versions of the GRACE instruments (KBR, GPS, ACC) will be used and the attitude determination will be based on three star camera (SCA) heads instead of two. Additionally, GRACE-FO will serve as a technology demonstrator, implementing the first Laser Ranging Interferometer (LRI) between two satellites in orbit.

This work primarily aims at establishing data handling and processing routines for the future GRACE-FO Level-1A and Level-1B instrument data, to allow for a continuation and improvement of the time-variable gravity field record. Therefore, it is necessary to meet the challenges of the new data, to incorporate new observation types into the gravity field recovery (e.g., LRI observations), and to enhance both Level-1A and Level-1B data processing methodologies (e.g., combined attitude determination from SCA, ACC, IMU and LRI data). Since no real GRACE-FO data will be available yet, the presented analysis will be based on simulated GRACE-FO data, as well as on a GRACE Level-1A test dataset (provided by the UTCSR).

In future, a processing chain tailored to the data and requirements of GRACE-FO is envisaged, providing a continuation of the ITSG-Grace gravity field time series.