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GRACE Follow-On Gravity Field Recovery from Combined Laser Ranging Interferometer and Microwave Ranging System Measurements

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Besides a K-Band Ranging System (KBR), GRACE-FO carries a Laser Ranging Interferometer (LRI) as a technology demonstration to provide measurements of inter-satellite range changes. This additional measurement technology provides supplementary observations, which allow for cross-instrument diagnostics with the KBR system and, to some extent, the separation of ranging noise from other sources such as noise in the on-board accelerometer (ACC) measurements.

The aim of this study is to incorporate the two ranging systems (LRI and KBR) observations in ITSG-Grace2018 gravity field recovery. The two observation groups are combined in an iterative least-squares adjustment with variance component estimation used to determine the unknown noise covariance functions for KBR, LRI, and ACC measurements. We further compare the gravity field solutions obtained from the combined solutions to KBR-only results and discuss the differences with a focus on the global gravity field and LRI calibration parameters.