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GRACE Follow-On Accelerometer Data Recovery by High-Precision Environment Modelling

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The Gravity Recovery and Climate Experiment Follow-On (GRACE-FO) satellites are equipped with high-precision three-axis accelerometers to measure all non-gravitational accelerations acting on the satellites. The accelerometer data are mainly used to account for the influence of these accelerations in the gravity-field-recovery process. Unfortunately, after only one month in orbit the accelerometer on one of the two satellites produced decreasingly accurate measurements. Due to this, the GRACE-D accelerometer data have to be replaced by artificial data. The procedure for the official GRACE-FO Science Data System (SDS) data products is a so called transplant of GRACE-C data.

As an alternative approach, we present a modelling method, where the GRACE-D accelerometer data are based on high-precision non-gravitational force and disturbance modelling. We compare our modelled data to thruster-free accelerometer data derived from the official SDS data products. With this, we can evaluate the performance and show details of our approach. For example, the influence of an in-situ drag-coefficient estimation based on Sentman's approach. In contrast to other GRACE-FO accelerometer-data-recovery approaches, no transplant of data is incorporated.

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