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On recovering transplanted GRACE/GFO accelerometer data

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In both GRACE (Gravity Recovery and Climate Experiment) and GFO (GRACE Follow-On) missions, the twin satellites are equipped with three-axis accelerometers, measuring the non-gravitational forces. Close to the end of the GRACE mission, the accelerometer onboard GRACE-B was switched off due to the reduced battery capacity and its measurements were replaced by synthetic accelerometer data, the so-called transplanted data. The transplanted data was derived from the GRACE-A accelerometer measurements, by applying time and attitude correction. Furthermore, the residual linear accelerations due to thruster firings on GRACE-B were added, proven to improve the data quality in gravity field recovery. Coincidentally, after one month in orbit, the GFO-B accelerometer data also degraded which raise demand for synthetic data in the current mission as well.

In this work, we will present an approach to recover the transplanted data by (a) implementing the state-of-the-art non-gravitational force models and (b) applying additional corrections based on extracted features of the available measurement signals in a machine learning approach. The results will be validated with the GRACE Level-1b (RL03) accelerometer data transplant.