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The re-analysis on the raw data processing of KBR and LRI on GRACE-FO

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The KBR (K-Band ranging instrument) and LRI (Laser Interferometer) are used to measure the distance variations between the twin spacecraft, which is one of the most important observations used for temporal gravity field recovery. The data pre-processing from raw or so-called Level-1A into the Level-1B format, which is suited for gravity field recovery, is a key step. Although Level-1B files are made publicly available by the GRACE-FO Science Data System (SDS), it has been shown that alternative Level-1B datasets may yield improved the results of gravity field[1]. Investigations of the pre-processing may allow us to improve the gravity recovery strategy and are essential to support developments of gravimetric satellite missions in China, such as TianQin-2 project. The pre-processing normally includes the time-tag synchronization, filtering and resampling, and other corrections, e.g. light-time correction for both instruments and antenna offset correction for KBR. We re-processed the Level-1A data of KBR and LRI to the Level1B using code developed at IGG/Wuhan. The results show good agreement in case of the RL04 KBR data, i.e. the differences between IGG-KBR1B and SDS-KBR1B are about three orders of magnitude lower than the instrument noise level for KBR. For the LRI, we found that phase jumps are not removed completely in the SDS-LRI1B products. As shown by Abich[2], these phase jumps in the LRI phase observations are mainly coincident with thruster activations. Our work will analyze the impacts of different processing methods of the raw data on post-fit residuals and the gravity field recovery based on IGG-KBR1B and IGG-LRI1B datasets.

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