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This study directly utilises GRACE Level-1B (L1B) KBR post-fit residuals (provided by the Center for Space Research), transformed into line-of-sight gravity differences (LGD), as the basis for high-frequency gravity field models. The methodology involves summing LGD geo-fits with filtered post-fit residuals. Geo-fits represent the LGD L1B data fitted to monthly Spherical Harmonic models in the traditional least-squares gravity retrieval. The post-fit residuals represent the discrepancies between the reduced observations (pre-fits) and the corresponding geo-fits. We spatially interpolate sub-weekly sets of LGD post-fit residuals and sum them to geo-fits, resulting in gridded high-frequency (hf) geo-fits. Finally, we derive an empirical and spatially distributed quadratic transformation from LGDs to equivalent water height (cm). In contrast to models like the ITSG-Grace2018 daily solutions, which embed geophysical constraints or hydrological priors, our approach exploits only the spatiotemporal information contained in GRACE Level-1B KBR post-fit residuals. We derived a spatially explicit empirical transformation that directly translates residual range accelerations/LGDs (nm/s²) into equivalent water height (cm), providing a pathway to obtain instantaneous along-track equivalent water height estimates from post-fit residuals rather than relying on simplified assumptions such as point-mass approximations.
Presentation file
cuadratgrzybowski-michal.pdf
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