

# An Improved GRACE time-varying gravity field model and its application in China and Antarctica

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A cross correlation analysis is carried out on the time-varying gravity field models derived from GRACE observations and provided by CSR, GFZ, JPL and ITSG. This is used to propose an improved weight determination method for producing a combined time-varying gravity field model. Taking the Antarctic region as a test area, the reliability and accuracy of the combined model is verified by comparing the changes of Antarctic ice sheet mass inferred from it and the other gravity field solutions considered. The results show that the minimum difference in mass changes (expressed as equivalent water height) between the combined model and the ITSG inversion is concentrated between -0.2 cm to 0.4 cm. To further verify the new method, China's Three Gorges region, the North China Plain region, and the Tianshan region are assessed. The results indicate that the new combined time-varying gravity field model is consistent with those models published by CSR, GFZ and JPL, and conforms best to ITSG. The combined time-varying gravity field model proposed in this paper provides a reference for the application of such models and the optimization of time-varying gravity field for future gravity satellite missions.

Keywords: GRACE, Time-varying gravity field, Combined model, Forward modeling, Equivalent water height

