

# Characteristics of the temporally varying gravity field solutions derived from GRACE mission

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Using the monthly gravity field solutions derived from the dedicated gravity satellite GRACE launched in 2002, temporally varying geophysical signals can be detected. The solutions shows a good agreement with the seasonal varying signal in the spatial scale about 1000 km (about degree/order = 20), as shown in Tapley et al. (2004), which reported the gravity field variation from the land water variation in the Amazon drainage.

GRACE Level 2 monthly gravity field solutions include spherical harmonic coefficients up to relatively high degree of 120. However, the reliability and the error of the data in the short wavelength and the maximum degrees up to which meaningful information is contained are not enough investigated. In this study, we aim to reveal the characteristics of GRACE gravity field solutions, especially the reliability and the error characteristics in the short wavelength. The 22 sets of monthly gravity field solutions until July, 2004, that can be obtained now, are examined about a time, spatial error characteristics by comparing the expected gravity field recovery precision based on orbit information or evaluating the validity of the dealiasing model which is used for the real GRACE processing. The validation of the dealiasing model is performed by comparing with the behavior of the short-period time varying components derived from a newly developed temporally varying gravity field model. This model is based on the results of numerical simulation of each geophysical component, for example, atmosphere, ocean, land water, etc. It is virtual four-year data and not reflects directly the gravity field variation of the real GRACE mission period. However, the knowledge of the time, spatial frequency characteristics of each geophysical signal derived from the model is useful for the forecast of the signal from GRACE.

Moreover, based on the characteristic of time and spatial frequency expected from the model, an optimized filter is designed for each earth physical signal. We also discussed applicability of the filter to the real GRACE data.