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Assessment of noise in non-tectonic displacement derived from GRACE time-variable gravity filed

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Many studies have been focusing on estimating the noises in GNSS monitoring time series. While the noises of GNSS time series after the correction with non-tectonic displacement should be re-estimated. Knowing the noises in the non-tectonic can help to better identify the sources of re-estimated noises. However, there is a lack of knowledge of noises in the non-tectonic displacement. The objective of this work is to assess the noise in the non-tectonic displacement. GRACE time-variable gravity is used to reflect the global mass variation. The GRACE stokes coefficients of the gravity field are used to calculate the non-tectonic surface displacement at any point on the surface. The Atmosphere and Ocean AOD1B de-aliasing model to the GRACE solutions is added because the complete mass variation is requested. The monthly GRACE solutions from CSR, JPL, GFZ and Tongji span from January 2003 to September 2015 are compared. The degree-1 coefficients derived by Swenson et al (2008) are added and also the C20 terms are replaced with those obtained from Satellite Laser Ranging. The P4M6 decorrelation and Fan filter with a radius of 300 km are adopted to reduce the stripe errors.

Optimal noise models for the 1054 stations in ITRF2014 are presented. It is found that white noise only take up a small proportion: less than 18% in horizontal and less than 13% in vertical. The dominant models in up and north components are ARMA and flicker, while in east the power law noise shows significance. The local distribution comparison of the optimal noise models among different products is quite similar, which shows that there is little dependence on the different strategies adopted. In addition, the reasons that caused to different distributions of the optimal noise models are also investigated. Meanwhile different filtering methods such as Gaussian filters, Han filters are applied to see whether the noise is related with filters.

Keyword: optimal noise model; non-tectonic displacement;GRACE; local distribution; filters