

Independent Component Analysis application to the gravity observation data

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ICA (Independent Component Analysis) is a multivariate method to separate signals mixed with different rates assuming independent signals are uncorrelated each other and have a large negentropy. ICA can be applied to the gravity observation data because the gravity signals are regarded as a mixed data of different sources. Some previous studies applied ICA to the satellite gravity data (Guo et al., 2014, Forootan et al., 2011 etc.) and other geodetic data successfully. ICA is expected to be applied for the gravity observation data as well. We presented in 2015 JpGU meeting that ICA worked more effectively for separating the small signals of 3 gPhone gravimeters data than PCA (Principal Component Analysis) did. However, the separated signals by ICA do not automatically guarantee any geophysical meanings, because ICA is just a statistical method. Thus, the applicable limit of ICA should be estimated in advance. Therefore we conducted several tests of ICA applicability using synthetic gravity data sets. The results showed that ICA can separate periodic variations, long term variations and trends, while it hardly separate almost gaussian signals with large differences in amplitudes. There are still problems in evaluation of the results, particularly with noise signals. By improving these points, we will try more detail and practical evaluations of ICA applicability in the future.

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