EGU2020-6329
https://doi.org/10.5194/egusphere-egu2020-6329
EGU General Assembly 2020

Applying the ICA method to extract the potential signals in GNSS timeseries

Weijie Tan, Junping Chen, and Weijing Qu
Shanghai Astronomical Observatory, Chinese Academy of Sciences, Shanghai, China (wjtan@shao.ac.cn)

Spatial filtering is an effective way to identify and reduce the so-called common mode error (CME) from the regional GPS networks measurements, which could improve GPS positioning accuracy and precision for detection of subtle crustal deformation signals. In this work, we decompose GPS coordinate time series into a set of temporally varying modes with the widely used principal component analysis (PCA) on minizine the misfit calculated using a L2 norm(x2). The results show that the decomposed components from PCA are not statically independent to each other. It is difficult to reveal the original geophysical mechanisms for the related signals only on the PCA results. To work around the problems, we reanalysis the output from PCA to recovery and separate the original signals from mixed observations with the independent component analysis (ICA). Here, we firstly apply the PCA methods on the GPS position time series in Sichuan_Yunnan region of China to evaluate the ability in discerning and charactering different source of crust deformation in the space and time domains. Using the PCA decomposed first 6 PCs, we find that the spatially and temporally correlated CME can be decomposed into two independent components by ICA, the second IC shows obvious variations in the beginning of each year, the same characters are also seen in the atmosphere press variations. Then we compare the two timeseries and demonstrated that atmosphere high frequency pressure mass loading is one of the main contributors to the CME.