Study on Large Area Crust Deformation with GNSS Vertical Components

Wanju Bo, Shengtao Feng and Jianfeng Su (China, PR)

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SUMMARY

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Crust deformation monitoring is an important way to study on mechanism of strong earthquake preparation and strong earthquake prediction. And the vertical crust deformation has more sensitive relation to the stress variation inside the crust. Thus to monitor the vertical crust deformation and to study their distribution in space and variation in time is an important part of researches on crust deformation. The traditional method to monitor vertical crust deformation is precise leveling. But because of the huge workload, to do the precise leveling for all the networks in China continent needs a few years or even longer, and it is difficult to extract the vertical crust deformation during the leveling period, and of cause it is impossible to analyze and use it reasonably. By contrast, the period of re-measurement of relatively dense regional (mobile) GNSS covering mainland China is shorten greatly, and it make us possible to extract vertical crust deformation in large area within a shorter time. In this paper, the vertical component data from some auto-recorded GNSS stations and the multi-period of data form the nationwide GNSS regional stations in China Continent are preliminarily processed and analyzed, and, it is studied and discussed how to extract and use the information of vertical GNSS component under high noise background; Combined with the mechanisms of crust movement and that of earthquake generation, the possibility of strong earthquake prediction and crust movement study are further discussed with the use of GNSS vertical components. Although there are many kinds of disturbances including from the ionosphere, atmospheric moisture, satellite orbit perturbation in vertical direction and earth tidal etc. in the GNSS data, the differences of vertical components between two periods of Preliminary processing data of GNSS have shown that the distribution of relative ascending points and descending points are closely related with geotectonic structures and great earthquake generation areas, and this means that there may be a certain relationship on the internal mechanism. With fine data processing such

an abnormal ascending and descending can be weakened or eliminated by corrections based on some disturbing factors. But the factors' abnormal variations are also in all probability related with great earthquake generation. The cognitions above have referential value for crust deformation research and great earthquake prediction.