



Modern Tectonic Deformation in the Active Basin-and-Range Province Northwest of Beijing, China

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Our study region is the northwest of Beijing, northern north China. The most typical extensional active tectonic area of the China continent, called the active basin-and-range province northwest of Beijing, exist there. This active tectonic province is made up of several NE-trending Quaternary graben basins and horst ranges between basins. An about 1500-year-long written historical record has suggested that there have been no major earthquakes with magnitude 7 or greater occurred in most of the study region since AD 512. So, the characteristic of modern tectonic deformation of the study region and its implication for the future seismic potential of major earthquakes are important scientific issues.

In this study, based on data of regional GPS station velocities and active tectonics, combining relocated earthquake distribution, we make a preliminary analysis on the characteristic of the modern tectonic deformation of the study region. We design three zones across different segments of the active basin-and-range province to analyze both the present tectonic deformation from the GPS velocity profiles and the major fault's downward-extents from the relocated hypocenters. Our analyses reveal that: (1) Significant NNW-ward and SSE-ward horizontal extension exists on different segments of the active basin-and-range province northwest of Beijing at rates of 2 to 3mm /yr, accompanied with right-lateral shear deformation at 1 to 2mm/yr. (2) On the western and middle segments of the active basin and range province, most of the total horizontal extension and shear deformation happen in the width from the Huangqihai basin to the Datong-Yanggao basin, suggesting that some major faults in this width could have had relatively-high strain build-up. (3) It is possible that one or more basement detachment belts exist under the active basins, and it or they possibly dip(s) southeastern-ward. (4) The modern tectonic extensional rate is up to 2 to 3mm /yr in the study region. However, no major earthquakes of magnitude 7 or greater has occurred in most of the study region for the last about 1500 years. Such a contradiction suggests that the active basin-and-range province in northwest of Beijing would face the next major earthquake.