Erecting and Observation Data of Broadband Seismic Array in Haiyuan- Liupanshan Fault Zone, Ningxia, China

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Ningxia Haiyuan –Liupanshan fault zone is located at the junction of southern Ningxia Hui Autonomous Region and eastern Gansu province. The seismogenesis and active structure of this fault zone are highly similar to the seismogenic structure Longmenshan fault of Wenchuan 8.0 earthquake in 2008. There is also a large thrust fault tectonic system, and there is no record of large earthquakes in history. Therefore set up broadband seismometers around Haiyuan-Liupanshan fault zone, seismic array, using seismic waves of the interior of the earth "projector", the fault zone around the earth's crust, mantle and core structures, deepen the flame breeds of deep structure in the region, environment, promote the development of earthquake prediction and earthquake prediction research, for Ningxia to make positive contribution to earthquake prevention and disaster relief cause.

Since Campillo and Paul established the relationship between the two points' wake wave cross-correlation function and green's function, and extracted the surface wave green's function, they pioneered the application of background noise in seismology. Then Shapiro and Campillo obtained California high-resolution surface wave tomography using the US array, and the background noise method has been widely used in high-resolution tomography at global scale, regional scale and small scale. The imaging of background noise combined with highly dense seismic array with uniform distribution greatly improves the horizontal and vertical resolution of imaging, and provides a possibility for the research of 3d high-resolution fine structure.

In this project, on the basis of observation data from regional fixed stations, a two-dimensional mobile seismic array consisting of 50 seismographs was scientifically and rationally arranged around the Haiyuan - Liupanshan fault zone in October 2018. Continuous seismic observations were carried out for a period of 2 years to obtain continuous waveform data (figure 1).Using the two-year data, three methods, such as the method of receiving function, the method of noise surface wave dispersion and the method of seismic surface wave dispersion joint inversion of three-dimensional s-wave velocity structure, were used to analyze the relationship between the velocity structure and the seismic mechanism and the dynamic mechanism of fault zone.

In this project, 50 sets of mobile and dense seismic array are arranged around the Haiyuan-Liupanshan fault zone in Ningxia, and the observation data are carried out for 2 years, so as to draw the following conclusions.

(1) More than 50 sets of wide-band seismographs were installed across the Haiyuan-Liupanshan fault zone for continuous observation of earthquakes over a period of 2 years, providing basic observation data for subsequent studies on fine structure of the crust.

(2) Extracted from distant earthquake seismic waveform P wave and S wave function, the study area is obtained by receiver function inversion depth of Moho surface, and on this basis, the joint background noise and obtain Haiyuan seismic surface wave dispersion inversion - Liupanshan fine 3 d crustal velocity structure in the fault zone and its adjacent area, the study of seismic activity and the relationship between

velocity structure, explore the mechanism of earthquake gestation, the seismogenic mechanism, crustal dynamics and seismic risk.

(3) Collect seismic phase travel time data of near earthquake and artificial blasting, carry out tomography research of near earthquake travel time, and obtain 3d fine velocity model of the study area.

Keywords: Ningxia Haiyuan –Liupanshan fault zone, Seismic Array, Ningxia, Observation Data