Experiment name* North China Interior Structure Project-Experiment 4 (NCISP4)

Names of Principal Investigators and their institutions* Liang ZHAO, Institute of Geology and Geophysics, Chinese Academy of Sciences (IGGCAS)

Mobilization date* 2005-10-03

Demobilization date* 2006-09-28

Number of stations: 50

Network Code and Years: X2, 2005-2006

A brief summary of the experiment:

We have deployed a 500-km long temporary seismic array in North China, extending from the central North China Craton in the east to the Ordos basin in the west. This array consists of 50 broadband seismic stations. Using receiver function, shear wave splitting, surface wave and body-wave tomography methods, we have studied the crust and upper mantle structure beneath the stations.

Preliminary scientific results, if any:

- Using receiver function analysis of the teleseismic records, a seismic image of the Western block and the Trans-North China orogen of the North China craton was obtained. The results, combined with previous seismic imaging in the eastern North China craton, provide insight into the amalgamation of the Eastern and Western blocks and the subsequent tectonic deformation of the North China craton.
- Based upon receiver function image of the lithosphere-asthenosphere boundary (LAB), distinct variation of the LAB thickness from east to west NCC is found.
- Retrieved from shear wave splitting measurements, the complicated spatial patterns of the splitting parameters indicate that complex upper mantle deformation has occurred in the NCC.
- Both body-wave and surface-wave tomography models suggest obvious low velocity volumes in the upper mantle beneath the Central North China Craton, which imply a potential up welling of mantle flow.

Approximate amount of data (in MB): 247000

Describe any known problems with the data or particular problems encountered during the experiment:

List of publications submitted:

1. Cheng, C., L. Chen, H.J. Yao, M.M. Jiang, B.Y. Wang, 2013, Distinct variations of crustal shear wave velocity structure and radial anisotropy beneath the North China Craton and tectonic implications, Gondwana Research, 23, 25 – 38, doi: 10.1016/j.gr.2012.02.014.

2. Jiang, M.M., Y.S. Ai, L. Chen, Y.J. Yang, 2013, Local modification of the lithosphere beneath the central and western North China Craton: 3-D constraints from Rayleigh wave tomography, Gondwana Research, doi:10.1016/j.gr. 2012.06.018.
3. Zhao, L., R. M. Allen, T. Zheng, and R. Zhu, 2012. High-resolution body-wave tomography models of the upper mantle beneath eastern China and the adjacent areas, Geochem. Geophys. Geosyst., 13, Q06007, doi: 10.1029/2012GC004119.
4. Zheng, T.Y., L. Zhao, R.X. Zhu, 2009. New evidence from seismic imaging for subduction during assembly of the North China Craton, Geology, 37, 395-398.
5. Zhao, L., R.M. Allen, T.Y. Zheng, S. Hung, 2009. Reactivation of an Archean craton: Constraints from P- and S-wave tomography in North China, Geophy. Res. Lett., 36, L17306, doi:10.1029/2009GL039781.
6. Zhao, L., and M. Xue, 2010. Mantle flow pattern and geodynamic cause of the North China Craton reactivation: Evidence from seismic anisotropy, Geochem. Geophys. Geosyst., 11, Q07010, doi:10.1029/2010GC003068.
7. Zhao, L., T.Y. Zheng, G. Lü, 2008. Insight into craton evolution: constraints from shear wave splitting in the North China Craton, Phys. Earth Planet. Inter., 168, 153-162.
8. Chen, L., Cheng, C., Wei, Z.G., 2009, Seismic evidence for significant lateral variations in lithospheric thickness beneath the central and western North China Craton, Earth Planet. Sci. Lett., 286, 171-183.

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