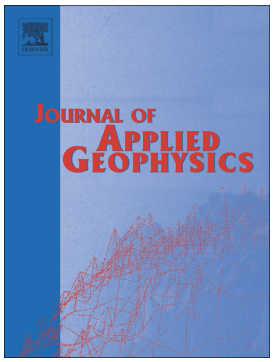

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Ambient noise tomography of three-dimensional near-surface shear-wave velocity structure around the hydraulic fracturing site using surface microseismic monitoring array

Ying Liu[1], Haijiang Zhang[1,*] zhang11@ustc.edu.cn, Hongjian Fang[2], Huajian Yao[1], Ji Gao[1]

[1]School of Earth and Space Sciences; Laboratory of Earthquake and Physics of Earth's Interior, University of Science and Technology of China

[2]Massachusetts Institute of Technology, Department of Earth, Atmospheric and Planetary Sciences

[*]Corresponding author.

Abstract

Surface microseismic monitoring array has been widely used to monitor hydraulic fracturing process for developing unconventional oil/gas reservoirs. Here we take advantage of relatively dense surface seismic stations for monitoring the fracturing process of a shale gas reservoir in southwest China, to determine the shallow Vs structure around the fracking site using the ambient noise tomography. Having a detailed three-dimensional (3D) Vs model is important for 3D seismic structure inversion. For ambient noise tomography, we use 21 days of continuous ambient noise data to extract Rayleigh wave group and phase dispersion data in the period band of 0.1-0.5 s. The 3D Vs structure is inverted by the direct surface wave tomographic method that directly inverts surface wave dispersion data for 3D Vs model. With the spatial coverage of 4 km by 4 km for this surface seismic array, we can determine the Vs structure down to 400 m. Our inversion results show that shear wave velocity in this