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High-resolution 3D seismic waveform imaging of the fault zone structure in southwest China using double-difference seismic tomography and generalized Radon transform

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The Sichuan-Yunnan region in southwestern China lies in the transition zone between the uplifted Tibetan plateau to the west and the Yangtze continental platform to the east. This region has a very complicated geological structure and is one of the most active areas of continental earthquakes in the world. We collected 3-component waveforms recorded by 26 Yunnan provincial stations for $\sim$5000 events in the period of 1999 to 2004 and calculated waveform cross-correlation delay times using the BCSEIS algorithm of Du et al. (2004). The double-difference seismic tomography method is used to determine event locations and the velocity structure. Clear velocity contrasts are associated with some faults, such as the Lancangjiang Fault, the Red River Fault and the Xiaojiang Fault. Seismic tomography can, however, only resolve the smooth variations in elastic properties in Earth's interior. To better characterize the structure discontinuities, the scattered seismic waveforms need to be used. The generalized Radon transform (GRT), an inverse scattering method, was recently successfully applied to the local earthquake data around the SAFOD site, California and revealed several vertical reflectors, similar to the imaging results from an active source survey (Zhang et al., 2009). We will apply the GRT to the seismic waveform data in the Yunnan region to better understand the fault geometry in depth. This research is partly supported by SinoProbe-2 Project of Ministry of Land and Resources of China.