

Prof. K. Aki and Seismic Tomography: Its initiation, Progress and Future Perspective

Dapeng Zhao[1]

[1] GRC, Ehime Univ

<http://www.jpгу.org/meeting/>

It is well known that Prof. K. Aki pioneered the study of seismic tomography. Aki and Lee (1976) developed the local earthquake tomography method, and Aki et al (1977) developed the teleseismic tomography method (the so-called ACH method). The two papers were revolutionary, but there are some drawbacks on the early tomographic methods, e.g., artificial velocity boundaries between blocks are introduced into the model, etc. Later, Thurber (1983) adopted grid nodes instead of blocks to express the Earth structure, thus no artificial velocity boundaries exist in the model. Nolet (1985) and Hirahara (1988) introduced iterative matrix solvers to solve the large and sparse tomographic problems. Zhao et al. (1992) proposed a new tomographic method that can deal with complex velocity discontinuities in a study area such as the Moho and subducting slab boundary. Zhao et al. (1994) proposed to conduct joint inversions of local and teleseismic data so that the drawbacks of each approach can be overcome while their advantages can be preserved. Bijwaard et al. (1998) adopted irregular size blocks to conduct global tomography. Zhao (2001, 2004) extended the method of Zhao et al. (1992) to global scale so that multiscale tomography studies can be made with the same computer program. Local tomography outside a seismic network has also become feasible (Zhao et al., 2002; Wang and Zhao, 2005). Zhang and Thurber (2003) proposed double-difference tomography. Montelli et al. (2004) and Hung et al. (2004) proposed finite-frequency tomography using the Banana-Doughnut theory, but this approach has been criticized recently (e.g., de Hoop and Hilst, 2005). Zhao et al. (2005) used only 2 stations to determine local crust tomography using S, SmS and sSmS reflected waves from the Moho generated by the Landers aftershocks in Southern California. Waveform tomography has also been started recently in regional and local scales (e.g., Friederich, 2004; Pollitz and Fletcher, 2005). Future directions of seismic tomography include detecting and using many later phase arrival times from high-frequency seismograms and waveform tomography.