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Three-dimensional seismic velocity structure and seismicity associated with arc-continent collision in central and southern Taiwan by temporary seismic observations

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To understand the details of seismic structure, including seismicity, of ongoing arc-continent collision in Taiwan, we have determined 3-D seismic velocity models for the crust and upper mantle by tomographic inversion using three temporary seismic networks; an aftershock observation of the 1999 Chi-Chi earthquake in 1999, a linear array observation across central Taiwan in 2001, and another linear array observation across southern Taiwan in 2005.

Tomographic images beneath Taiwan Island by the double-difference tomography [Zhang and Thurber, 2003] show the east-dipping alternate high- and low-velocity anomalies with reliable high-resolution by dense networks, which are well correlated with surface geological provinces. We imaged three high-velocity zones (> 6.0km/s); westernmost one corresponds to the subducting EUP, other two are located beneath the Hsuehshan Range and the Eastern Central Range, respectively. And relocated seismicity under the mountain range concentrated and limited along parts of boundaries between low- and high-velocity bodies.

We interpret these east-dipping alternate structures as two layered blocks and the subducting EUP. And then layered blocks are interpreted as parts of stacked thrust sheets of upper- and mid-crust detached from the continental (or transitional) part of EUP, as interpreted in McIntosh *et al.*[2005]. The model of continental subduction followed by buoyancy-driven exhumation can explain the existence of stacked thrust sheets [Van den Beukel, 1992]. Thus we propose a new orogenic model 'Upper Crustal Stacking Model'.