Poisson’s ratio in the crust and uppermost mantle beneath China from joint inversion of P- and S-wave velocities

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We determined 3-D P- and S-wave velocity structures for the crust and uppermost mantle using local and regional arrival time data. Travel data from the Annual Bulletin of Chinese Earthquakes (ABCE) and the International Seismological Centre (ISC/EHB) are used. A total of 345,000 P-wave and a similar number of S-wave arrival times are used for the tomographies. Tomographic inversions provide 3-D P- and S-wave velocities in the crust, Pn and Sn velocities, and Moho depths under China. Good correlations between the P- and S-wave velocities are found and ground truth events are relocated with very good accuracy.

Using P and S wave differential travel times from earthquakes and receivers in China, we jointly invert P and S wave velocities to obtain Poisson's ratio variations in the crust and uppermost mantle. Our results show that high Poisson’s ratios exist beneath the East and South China Sea, Japan Sea and the Pacific Ocean. Along the east-west profiles crossing the Tibet, high Poisson’s ratios in the crust beneath part of the Tibetan plateau suggest the presence of high temperatures and/or fluid. This observation is consistent with the results of previous studies in these areas based on seismic soundings and gravity surveys. Prominent high Poisson’s ratios are observed beneath the active volcanic and geothermal sites in the Tengchong, Changbai, and Hainan regions. Our Poisson’s ratio profiles clearly indicate the presence of high temperatures beneath these well-known volcanic sites.