

Seismic structure and dynamics beneath eastern Tibet: Insight into large earthquakes and Tengchong volcano

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We review recent studies of seismic tomography and earthquake sequences, and discuss their implications for seismotectonics and mantle dynamics beneath eastern Tibet. The crustal structures in the source areas of the 2008 *M*_s 8.0 Wenchuan and the 2013 *M*_s 7.0 Lushan earthquakes are similar and exhibit prominent low-velocity (low-*V*) and high-Poisson's ratio anomalies in the source areas, indicating that in addition to compositional variations, fluid-filled rock matrices exist in the Longmenshan fault zone, which may have influenced the nucleation of the two earthquakes. Significant low-*V* anomalies are revealed between the Wenchuan and Lushan mainshocks, which may explain why their aftershock zones extend northward and southward, respectively. The relocated aftershocks of the 2011 *M*_s 5.8 Yingjiang and the 2014 *M*_s 6.5 Ludian earthquakes show a conjugate-shaped distribution, which may explain why the two moderate-sized earthquakes caused heavy damage. The large earthquakes in eastern Tibet are located at boundaries of low- or high-velocity anomalies in the upper mantle. The structural heterogeneities in the crust and upper mantle are associated with hot and wet upwelling and corner flows in the big mantle wedge above the subducting Indian slab beneath eastern Tibet, as well as slab dehydration, which affect the seismogenesis in the region.

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