2016年南台湾地震震源域のトモグラフィーと地震発生機構
Tomography of the source zone of the 2016 South Taiwan earthquake

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On February 6, 2016, a *M*w 6.4 earthquake occurred in Kaohsiung City, southern Taiwan, at a depth of 17 km (hereinafter we call it the 2016 South Taiwan earthquake). It caused 116 fatalities and widespread damage to infrastructures, especially in the Tainan city. To clarify the generating mechanism of this damaging earthquake, we conducted seismic tomography for high-resolution 3-D *V*p, *V*s and Poisson's ratio (σ) structures in the epicentral area. We used 91,703 *P*- and 51,718 *S*-wave arrival times from 7,038 local earthquakes (0.6≤*M*≤5.8) recorded at 41 seismic stations operated by the Central Weather Bureau in South Taiwan during 2000-2011.

Our tomographic images reveal significant variations of up to 6% for *V*p and *V*s, and 10% for Poisson's ratio in the crust and uppermost mantle beneath South Taiwan. In the upper crust (depth≤10 km), the most remarkable feature is low-*V*p, low-*V*s and high-σ anomalies in areas with known active faults in the southwest and easternmost parts of Taiwan. In contrast, high-*V*p, high-*V*s and low-σ anomalies become dominant in the lower crust. The hypocenter of the 2016 South Taiwan earthquake is located in a boundary zone where seismic velocity and Poisson's ratio change drastically in both the horizontal and vertical directions. Furthermore, the hypocenter is underlain by a vertically elongated high-σ anomaly at depths of 23-40 km, which may reflect ascending fluids from the upper (or uppermost) mantle.

The low-*V* and high-σ anomalies in the upper crust coincide with areas of low heat flow (Hsieh et al., 2014), negative Bouguer gravity anomaly (Yen and Hsieh, 2010), and low magnetotelluric resistivity (Bertrand et al., 2012), which may reflect crustal fluids contained in the young fold-and-thrust belt and the dehydration of the subducting Eurasian plate (slab). The South Taiwan source zone also corresponds to an area of the maximum stress loading rate induced by erosion (Steer et al., 2014). These results suggest that the 2016 South Taiwan earthquake was triggered by the ascending fluids from the Eurasian slab dehydration, invading into an active fault with a high loading rate.

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