プレート内部活火山下のマントル速度構造
Seismic imaging of the mantle structure beneath intraplate volcanoes

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We have used high-resolution seismic tomography to study the 3-D seismic velocity structure of the mantle or upper mantle beneath several intraplate volcanoes, including Erebus (Gupta et al., 2009), Yellowstone (Tian and Zhao, 2002), Cape Verde (Liu and Zhao, 2014), Tengchong (Lei et al., 2009; Wei et al., 2012), Hainan (Wei et al., 2012), as well as Changbai, Ulleung and Jeju in NE Asia (Zhao et al., 2009; Zhao and Tian, 2013; Wei et al., 2015). Beneath Erebus and Cape Verde, prominent low-velocity (low-V) anomalies are revealed in the upper mantle down to 500-600 km depths, whereas the structure in the lower mantle is not imaged because of the small aperture of the portable arrays deployed around each of the volcanoes. A significant low-V anomaly from the surface down to a depth of about 1000 km is revealed clearly beneath Yellowstone using abundant data recorded by the dense and large-aperture USArray. Beneath the Changbai, Ulleung and Jeju volcanoes, low-V zones are revealed in the crust and upper mantle down to about 400 km depth, whereas a high-velocity (high-V) zone is visible in the mantle transition zone (MTZ), suggesting that these intraplate volcanoes in NE Asia are caused by hot and wet upwelling flows in the big mantle wedge (BMW) above the stagnant Pacific slab in the MTZ. A similar feature is found for the Tengchong volcano in SW China, which may be caused by hot and wet upwelling in the BMW above the subducting Indian plate (or the Burma microplate). Beneath Hainan, a low-V zone exists in the upper mantle, which seems to extend down to at least 1000 km depth. These results indicate a great variety of the mantle structure and origin of the intraplate volcanoes.

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