

# Seismic structure and origin of the Changbai intraplate volcanism in northeast China

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In mainland China there are three active volcanoes, Wudalianchi and Changbai volcanoes in northeast China, and Tengchong volcano in south China. They have erupted many times in the history. Many studies have been made recently for these volcanoes using geophysical, geochemical, and geological approaches. However, the origins of these intraplate volcanoes are still unclear. With the installation of 19 portable seismic stations in NE China (Wu and Hetland, 1999), teleseismic receiver function analyses have been made for this region (Ai et al., 2003; Li and Yuan, 2003). However, a tomographic study has not been made using this data set.

In order to understand the origin of the Changbai intraplate volcanism, we have determined detailed 3-D P and S wave velocity structures in NE China using the teleseismic tomography method of Zhao et al. (1994). We hand-picked 548 P and 380 S arrivals from 68 teleseismic events. Significant slow velocity anomalies of up to -3% for P wave and -4% for S wave are revealed beneath the Changbai volcano. These slow anomalies extend down to about 400 km depth with a lateral extent of about 200 km. In and below the mantle transition zone beneath the Changbai volcano, high-velocity anomalies are visible and deep earthquakes occurred there. These results imply that the subducting Pacific slab has been stagnant in the transition zone for a long time and then collapsed down to the lower mantle. Synthetic and checkerboard tests show that these features are reliable. We conclude that the Changbai intraplate volcanism is not a hotspot but a kind of back-arc volcano caused by the process of the stagnancy and deep dehydration of the subducting Pacific slab. These results are consistent with those from global tomography and receiver function analyses.