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Seismic evidence for central Taiwan magnetic low and deep-crustal deformation caused by plate collision

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Abstract

Crustal seismic velocity structure was determined for the northern Taiwan using seismic travel-time data to investigate the northeastern extension of the northern South China Sea's high-magnetic belt. In order to increase the model resolution, a joint analysis of gravity anomaly and seismic travel-time data have been conducted. A total of 3385 events had been used in the inversion that was collected by the Central Weather Bureau Seismological Network from 1990 to 2015. The main features of the obtained three-dimensional velocity model are: (1) a relatively high Vp zone with velocity greater than 6.5 km/s is observed in the middle to lower crust, (2) the high Vp zone generally parallels to the north–south structural trending of the Chuchih fault and Hsuehshan Range, (3) at 25 km depth-slice, the high Vp zone shows structural trends change from northeastward to northward in central Taiwan, where the values of high-magnetic anomalies are rapidly decreasing to low values. A combination of seismic, GPS, and structural interpretations suggests that the entire crust has been deformed and demagnetized in consequence of the collision between the Philippine Sea plate and the Asian continental margin. We suggest that the feature of sharp bending of the high Vp zone would migrate southwestward and cause further crustal deformation of the Peikang High in the future.

Keywords: Seismic tomography, Magnetic anomalies, Crustal deformation, Taiwan

1. Introduction

A large positive magnetic anomalies (Xia et al., 1994; Hsu et al., 1998), lying on the northern continental margin is a dramatic feature of the northern South China Sea