Three-Dimensional P-wave Velocity Structure of the Peikang High: Implications for the Crustal Demagnetization in Central Taiwan

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Abstract

A joint analysis of gravity anomaly and seismic travel-time data has been used to construct a three-dimensional P-wave velocity structure for the Peikang High in western Taiwan. The earthquake data used in this study was collected by the Central Weather Bureau Seismological Network, whilst the gravity data around Taiwan was compiled by Hsu et al. (1998) and Wang et al. (2002). To derive a crustal velocity-density model that accounts for both types of observations, this study performed a sequential inversion of travel-time and gravity data. The results shown in the three-dimensional P-wave velocity mode are: (1) an uplifted zone with velocity greater than 6.5 kms-1 being observed in the lower crust, (2) the width and the shape of the uplifted zone being found to be strongly correlated with the Peikang magnetic high, (3) a trend by which the lower crustal high-velocity zone turns from northeast to north in central Taiwan, where the high-magnetic zone was truncated. There are several hypotheses to interpret the crustal demagnetization revealed in central Taiwan. After a combination of seismic, gravity, and structural interpretations, we concentrate on the hypotheses that concern crustal accretion and the lose of magnetization either through thermal alternation, thermal demagnetization, crust thinned by extensional faulting, or mass wasting.