3-D Seismic Tomographic imaging in eastern Taiwan-southwestern Ryukyu regions

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The three-dimensional velocity structure and hypocentral parameters of the eastern Taiwan-southwestern Ryukyu region are computed. Data for 2735 local earthquakes is used in this study, consisting of first-arrival times of P and S waves recorded by 82 seismic stations in the range 23.0º-25.0ºN and 121.5º-124.0ºE, including 9 stations of the Japan Meteorological Agency (JMA) and 73 stations of the Central Weather Bureau of Taiwan (CWB). The data set was selected from thousands of earthquakes recorded by the JMA and CWB from January 1, 1996 to March 31, 2002. The results reveal two important features beneath the junction between Taiwan and the Ryukyu Arc. The first feature is that the subducted Gagua Ridge, which is formed as a result of piling up of the oceanic crust, is imaged as a low-velocity anomaly that extends to a depth of 60-80 km beneath the cross-backarc volcanic chain and that cuts obliquely across the Okinawa Trough. Partial melting of the subducted Gagua Ridge is therefore inferred to have been responsible for the cross-backarc volcanic trail. The second feature is that the subducted thick oceanic crust is imaged as a low-velocity anomaly beneath the Nanao basin, with an associated earthquake cluster. The subduction of thick oceanic crust would cause the cross-backarc volcanic chain at the Okinawa Trough and forearc seismicity at the junction between eastern Taiwan and southwestern Ryukyu arc, resspectively.