Seismogenic structures of the collision-subduction zone in the eastern Taiwan

Wen-Shan Chen, Yih-Min Wu, Hsiao-Chin Yang, Po-Yi Yeh, Yi-Xiu Lai, Ming-Chun Ke, Siao-Syun Ke, and Yi-Kai Lin
National Taiwan University, Geosciences, Taipei, Taiwan (wenshan@ntu.edu.tw)

The Taiwan orogenic belt is relatively young and active with an ongoing arc-continent collision since the middle Miocene. In this study, we systematically investigate the use of seismic tomography, focal-mechanism and distribution of earthquakes to analysis the seismogenic patterns in the collision-subduction zone in the eastern Taiwan, which can be delineated five seismogenic zones of the Longitudinal Valley Fault Seismic Zone (LVFZ), the Central Range Fault Seismic Zone (CRFZ), the Backbone Range Seismic Zone (BRSZ), the Ludao-Lanyu Fault Seismic Zone (LLFZ), and the Wadati-Benioff Seismic Zone (WBSZ).

The LVFZ and CRFZ, formed along the collision zone between the Philippine Sea and the Eurasian Plates, earthquake focal mechanisms show P axes distributed in direction of 285-335°, reflecting the compressive stress field due to the collision. The LVSZ is the collisional boundary between the Philippine Sea and Eurasian plates. The LLFZ is a high-angle, east-dipping reverse fault separating the Luzon Volcanic Arc and the North Luzon Trough. The Eurasian plate (the South China Sea oceanic crust) subducts beneath the Philippine Sea plat in the southeastern Taiwan forming the WBSZ to a depth of 160 km.

The CRFZ, located along the eastern limb of Backbone Range, is formed by a zone of west-dipping reverse fault. In addition, the earthquakes on the BRSZ generated by normal and strike-slip faults at about 5-15 km depth which occur in response to left-lateral transtensional deformation by the collision. Earthquake focal mechanisms show P and T axes distributed in direction of 280-330° and 20-70°, respectively.