Japan Geoscience Union Meeting 2011
(May 22-27 2011 at Makuhari, Chiba, Japan)

SCG008-06 会場:301A 時間:5 月 26 日 09:45-10:00

Insight into the tectonic deformation patterns along eastern Taiwan from seismological observations

Insight into the tectonic deformation patterns along eastern Taiwan from seismological observations

Wen-Tzong Liang[1*]
Wen-Tzong Liang[1*]

[1]Inst. Earth Sciences, Academia Sinica
[1]Inst. Earth Sciences, Academia Sinica

To decipher the siesmotectonic structures in the Taiwan region, we have obtained more than 1,900 centroid moment tensor (CMT) solutions by inverting the broadband waveforms recorded at the BATS network. This dataset reveals the characteristics of faulting types along the eastern coast of Taiwan that is associated with the interaction between the continental margin and the NW moving Philippine Sea plate (PSP). In general, to the south of Hoping (24.3^{o}N), the faulting type is dominated by thrusting and the sigma-1 direction is almost perpendicular to the strike of Costal Range. However, between Hopin and Lanyang river, the strike-slip faulting type is prevailing along some EW trending geological boundaries in the crust with sigma-1 directed in NW-SE. Some low-angle dip-slip events at depth around 20 km were observed in the vicinity of Hopin. We infer that they may correspond to the interface earthquakes, where the underneath subducted slab moves westward. To the north of Lanyang river, the crust is dominated by normal faulting, which is believed to be caused by the spreading of the Okinawa Trough. On the other hand, for those intermediate depth earthquakes occurred beneath Ilan plain, the determined focal mechanisms show thrusting pattern with sigma-1 sub-parallel to the trench. Therefore, Kao and Jian(2001) suggested that the subducted PSP slab is colliding with the mantle lithosphere of EUP. Chou et al.(2006) also discovered the folding at the western edge of slab. Based on seismicity and 3-D velocity structures, Wu et al.(2009) proposed that the intersection of the Ryukyu Trench with Taiwan is placed at the latitude of 23.7^{o}N, placing the northern part of the Costal Range on EUP. This is consistent with the uplifting rate along the Costal Range and the modeled deformation pattern. According to these observations, we concluded that the PSP starts subducting at 23.7^{o}N and the upper plate boundary approaches the bottom of the brittle seismogenic layer at about 24.3^{o}N, where very low-angle dip-slip events may occur. Once the slab subducts completely underneath the seismogenic layer, the faulting type in the crust would be dominated by pre-existed boundaries subjected to a torque that may be imposed by the trench retreat and the opening of back-arc basin. Behind the Lanyang river, the Okinawa Trough plays an important role for the occurrence of shallow normal faulting events.

キーワード: CMT, Focal Mechanism, Seismotectonics, Stress Tensor, Collision, Subduction
Keywords: CMT, Focal Mechanism, Seismotectonics, Stress Tensor, Collision, Subduction