

Seismicity and tectonics in and around Taiwan

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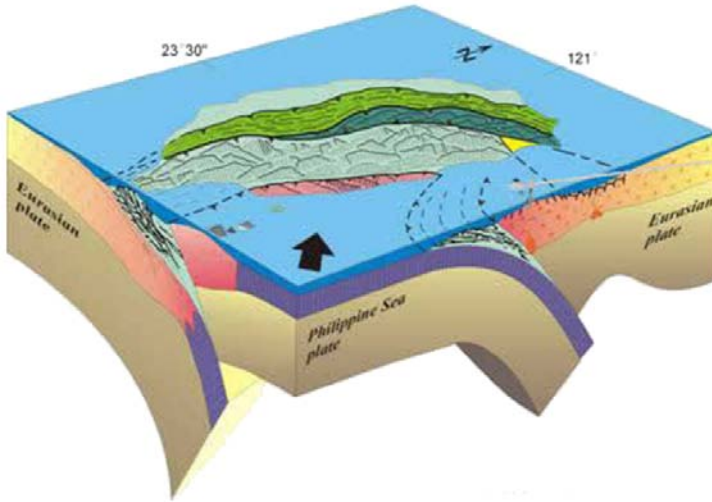


Figure 1. Tectonic outline of Taiwan (after Angelier, 1986).

Taiwan is located at the boundary between the Philippine Sea Plate to the East and the Eurasia Plate to the West, with a convergence rate of ~ 80 mm/yr in a ~N118E direction [Seno, 1977; Angelier, 1986, Yu et al., 1997]. The tectonic setting was shown in fig.1. The Philippine Sea Plate is subducting beneath the Eurasia plate along a convergent zone, extending from Ryukyu trench to the northeastern coast of Taiwan. The Ryukyu subduction

Zone is associated with a similar zone of back-arc extension, the Okinawa Trough. At Taiwan, the plate boundary is characterized by a zone of arc-continent collision, whereby the northern end of the Luzon island arc is colliding with the buoyant crust of the Eurasia continental margin offshore China.

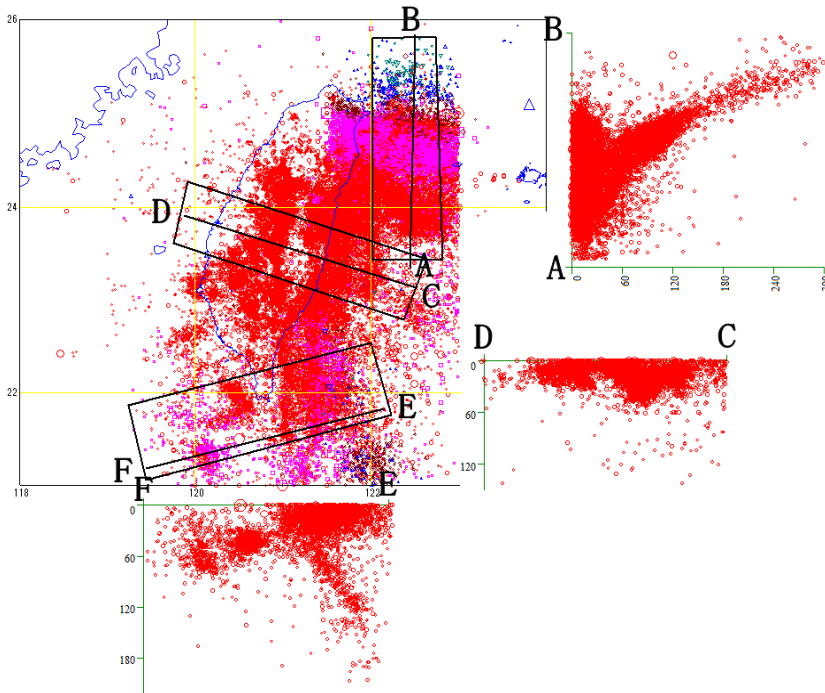


Figure 2. Epicenter distribution and 3 cross sections in Taiwan.

The seismicity in Taiwan is very high. Central Weather Bureau in Taiwan recently determined hypocenters in and around Taiwan about 20,000 events per one year. Fig. 2 shows the epicenter distribution from 1900 to 2010 and cross sections of Taiwan area. The cross section of the AB line at the end of Ryukyu islands arc shows the Wadati-Benioff zone of the Philippine Sea Plate is clearly northward dipping beneath the Ryukyu islands. The cross

section of the CD line at the middle part of Taiwan shows that the eastward subducting slab is not clear, although the 1999 Chichi earthquake showed the

eastward dipping source fault. The cross section of the EF line at the south part of Taiwan show the Eurasia Plate is subducting under the Philippine Sea Plate.

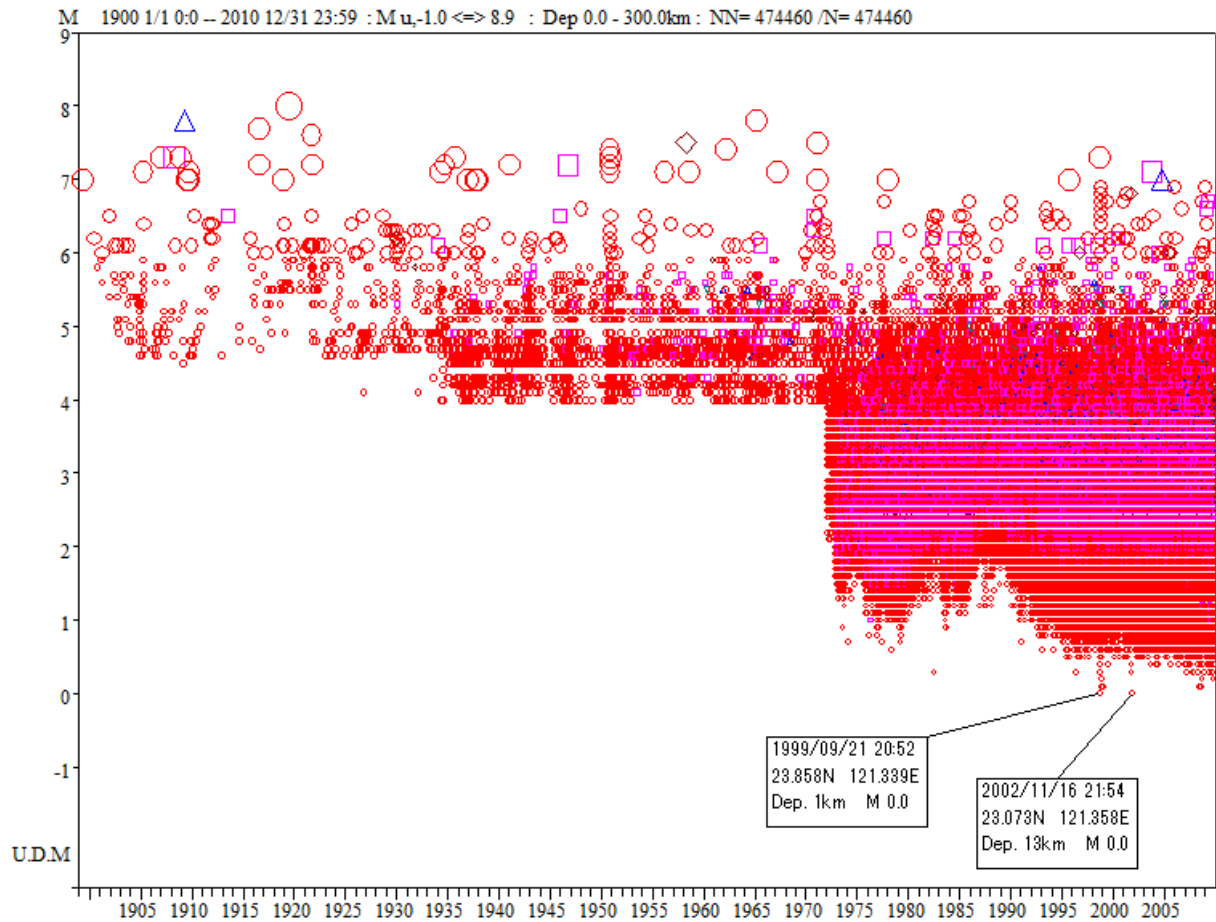


Figure 3. Magnitude-Time figure of the earthquake catalog in Taiwan.

The earthquake catalog contains more events year by year. Figure 3 shows the magnitude-time figure in Taiwan. It is clear that until 1972 events of which magnitude was less than 4.0 were not determined. But, recently some events of which magnitude are nearly 0 were determined. Two events of which magnitude were 0.0 were reported in 1999 and 2002. Before 1972, strange phenomena were found in the catalog. Magnitude 4.4, 5.0, and 6.7-6.9 events were not reported from 1935 to 1972 in the catalog. As smaller events were reported, it is supposed that the formula to estimate the magnitude was not suitable at that time.

The locations of the hypocenters in old catalog were not good, as the distribution of epicenters showed the grid type. If the hypocenters were revised, the cross section figure will show more clear tendency.

References

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- Yu, S.-B., H.-Y. Chen, and L.-C. Kuo, Velocity field of GPS stations in the Taiwan area., *Tectonophysics*, 274, 41-59, 1997.