

Significance of the Median Tectonic Line in Japan, New Zealand, and Taiwan

^aYuan-Hsi Lee, and ^bRuey-Juin Rau

^a*National Chung Cheng University, Taiwan, leeyuanhsi@gmail.com*

^b*National Cheng Kung University Taiwan*

Northeastern Taiwan and Kyushu, Japan are located respectively on the western and eastern ends of the Okinawa Trough. Both areas show high similarity in tectonic settings such as a stress change from compression to extension and the GPS dataset show crustal clockwise and anti-clockwise rotations, respectively. A disastrous Mw7.1 Kumamoto earthquake occurs in the Kyushu area in 2016. Base on the tectonic similarity, will big earthquakes strike northeastern Taiwan as well? In order to evaluate the potential earthquake hazards in northeastern Taiwan, we compared the crustal deformation style in both areas.

Kyushu Island lies on the overriding plate above the subducting Philippine Sea Plate (PSP). In the west of Kyushu, the western PSP subducted beneath the Eurasia Plate with significant slab rollback and resulted in an extensional crust—i.e. the Okinawa Trough. While in the east of Kyushu, the eastern PSP subducting rather smoothly and form a compressional plate boundary. Kyushu locates on the transient zone between the compressional and extensional stress fields on the overriding plate that associated with a large right-lateral shear zone running through the central part of the Kyushu Island. The shear zone is an extension of the median tectonic line (MTL) that originates from Honshu Island and transects Shikoku, and the 2016 Kumamoto earthquakes were activated along the MTL.

In northeast of Taiwan, a subduction polarity reversal occurs as the Philippine Sea plate switches from an overriding plate above the east-dipping South China slab to a northward subducting plate under the Ryukyu arc and the Eurasian continental margin. This results in active volcanisms and crustal rotations since Quaternary. The GPS data showed that the crust rotates along the preexisting Lishan fault, which is similar to the MLT in Kyushu area. Considering the rotational boundary of the GPS slip vector, a devastating strike-slip faulting earthquake is also possible to occur along the Lishan fault, especially in the northern segment to the northeastern Yilan.

Similar subduction polarity reversal can be found in northern New Zealand as well, wherein the GPS data show clockwise rotation associated with major strike slip shear zone. Comparing the tectonic characteristics of these three areas could help us to understand how the crustal deformations accommodate the block rotation while changing the tectonic stress.