Investigation of Strong Ground Motion Characteristics for the Six Large Aftershocks of the 1999 Chi-Chi Earthquake

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In the past 100 years, several moderate-sized earthquakes occurred within Nantou area and caused some damage and casualties, e.g., the 1916 Nantou earthquake sequence, six large aftershocks of the 1999 Chi-Chi earthquake and two 2013 Nantou blind-thrust-fault earthquakes. For better understanding the source characteristics and the seismic hazard assessment in the Nantou area, we applied source-spectral fitting approach and empirical Green's function (EGF) method to investigate the strong ground motion source characteristics of six $M_w > 6.0$ aftershocks of the 1999 Chi-Chi earthquake.

Fig. 1 Stress drop of six Mw>6 aftershocks of the 1999 Chi-Chi earthquake and the two 2013 Nantou blind-thrust-fault earthquakes.

Our result showed that the strong motion generation areas (SMGA) of these six events were almost equivalent to the asperity area derived from the waveform inversion results of previous studies. The estimated stress drops of four of these six events are less than 20 MPa. In addition, considering the stress drop, rupture directivity effect and the scaling relationship for the seismic moment versus the SMGA and the rise time, four of these six events exhibited similar properties to the 2013 Nantou blind-thrust-fault earthquakes. The obvious variance in the rupture behavior and stress drop of these nearby events (six Mw>6 aftershocks of the 1999 Chi-Chi earthquake and the two 2013 Nantou blind-thrust-fault earthquakes) again highlight the stress heterogeneity and structure complexity of the Nantou area.
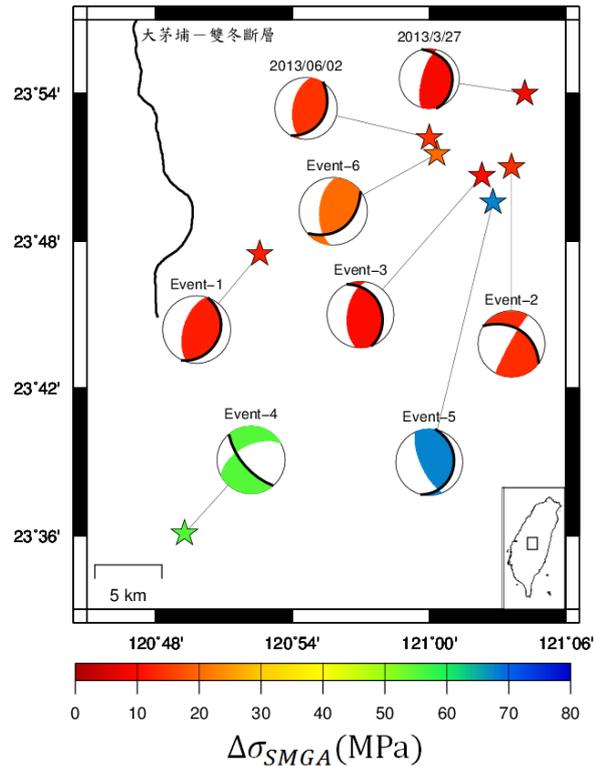
References

Miyake, H., T. Iwata, and K. Irikura (1999), Strong ground motion simulation and source modeling of the Kagoshima-ken Hokuseibu earthquakes of March 26(MJMA 6.5) and May 13 (MJMA 6.3), using empirical Green's function method, *Journal of the Seismological Society of Japan*, **51**, 431-442.

Wen Y. Y., H. Miyake, Y. T. Yen, K. Irikura, and K. E. Ching (2014), Rupture Directivity Effect and Stress Heterogeneity of the 2013 Nantou Blind-Thrust Earthquakes, Taiwan, *Bulletin of the Seismological Society of America*, **104**, 2933-2942.

Yen, Y. T., and K. F. Ma (2011), Source-scaling relationship for M 4.6-8.9 earthquakes, specifically for earthquakes in the collision zone of Taiwan, *Bulletin of the Seismological Society of America*, **101**, 464-481.