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## Faulting process and its heterogeneity on Chelungpu fault during ChiChi earthquake revealed by TCDP Hole C cores

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The Chelungpu fault is an active fault generated a large earthquake (magnitude 7.7) in Chi-Chi, central Taiwan, in 1999. Taiwan Chelungpu fault Drilling project (TCDP) drilled two vertical holes (hole A and B) and one side-track hole from the hole B (hole C). The samples from the hole C preserve whole structures including a possible primary slip zone (PSZ) and other older slip zones. Identification of the slip zone by recent earthquake is important to understand slip mechanism with combining seismic data and geological data. In this presentation we first show microstructures and discuss recent slip zone and its slip mechanism. Furthermore we discuss heterogeneity on the fault surface by comparing slip zone in hole C with those in holes A and B.

Based on detailed observation, we divided 12 cm fault zone of the hole C into thin 16 layers. All layers are classified into gouge composed of quartz, feldspar and clay minerals. Results of microstructural observation suggest that the most bottom layer in the 12 cm fault zone is related to ChiChi earthquake slip layer. Characteristics of the bottom layer is that the slip layer has 2 cm width and its slip zone is localized within thin 2mm zone.

Comparing our results from the hole C samples and previous studies about the holes A and B, slip layer activated by Chi-Chi earthquake is heterogeneous on the fault zone. Slip zone in the hole C is localized in 2 mm with adjoining drag structure with grain segregation and that in hole B is also 2 mm thick showing a layering structure with grain segregation and dewatering structure (Aubourg et al., 2010 presentation in WPGM T33B-03; Chou et al., 2010 poster in WPGM T31A-061). In contrast, slip zone in the hole A is 2 cm thick and shows random fabric (Boullier et al., 2009). These structures may be compared with experimental studies under high speed and dry or wet conditions (Ujiie et al., 2010 presentation in JPGU SSS019-15; Boutareaud et al., 2008) with fluid pressurization in the slip zone. We show possible slip mechanisms and the heterogeneity of PSZs in Hole A, B and C, by comparing PSZs microstructures in Chelungpu fault with those formed in experiments.

Keywords: ChiChi earthquake, CheLungPu fault, Accretionary complex of Taiwan