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Fault Rock Descriptions of the Major Thrust Fault Zones from Taiwan Chelungpu-fault Drilling Project Hole-A

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The Taiwan Chelungpu fault Drilling Project Hole-A have recovered continuous cores in the depth between 500m and 2000m, penetrating several major fault zones with various structural features. Preliminary core observations show that two thrust fault zones exist at depth 1111m and 1153m (referred as FZ1111 and FZ1153), which is near the estimated fault slip plane of the 1999 Chi-Chi earthquake from field survey and seismological studies. Here we analyze the fault architecture and the internal structure of these fault zones at the penetrated depth from our core descriptions.

Before encountering FZ1111, a slight increase in fracture density is detected at around 1080m depth, and it continues to increase gradually towards the fault plane. The intensity of deformation then increases drastically from 1105m depth, leading to the layer of 70-80 cm thick soft clayey fault gouge zone at 1111m depth. Deformation intensity decreases abruptly after passing the fault core, and is lower compared to the region above the fault core. The fault architecture of FZ1153 follows the same pattern, except that the deformation intensity is actually higher after passing through the fault core. Also the fractured rocks around FZ1153 are accompanied with many dark compacted gouge layers (5-20 mm thickness).

The fault core of FZ1111 and FZ1153 both consist of a composition of fault breccia and gouges, 1-1.5 m thick. FZ1111 was dominated by a nearly massive light gray clayey gouge layer, whereas in FZ1153, a gray foliated breccia layer with some sandy content was also a dominant member of the components. The significant feature they share is that, within the fault rocks are several layers of unknown fragile black materials. Whether they were produced related to the fault motion, or just simply are remaining clasts from the host rock, is not mentionable at this point.

Detailed description shall be posted in our presentation with aid of sketches and images in our presentation.

Keywords: TCDP; fault zone; internal structure; fault gouge.