

## The Possibility of Duplex Existence: An Insight from Core-Log Integration

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Taiwan Chelungpu-fault Drilling Project (TCDP) conducted continuous coring and logging in two holes 40m apart to investigate many important earthquake issues such as the geometry of the fault, possible faulting styles and rupture mechanisms for the north fault segment of the 1999 Chi-Chi earthquake. Here we present from the fault-zone correlation result between these two holes. By using visual core description and logging interpretation, three fault zones (FZ1, FZ2 and FZ3) can be correlated across these two holes. In the hole A, the fault zones at 1111m (FZA1111), 1153m (FZA1153), and 1222m (FZA1222) depth can then be correlated to those fault zones in the hole B at 1137m (FZB1137), 1194m (FZB1194) and 1243m (FZB1244), respectively.

These fault zones are obviously identified on the core examination and observed at locations with the similar pattern of lithology column, regarding to the grain size and formation thickness. By logging interpretation, the special log character of a resistivity anomaly, a slow sonic anomaly and deformation image in Fullbore Formation MicroImager (FMI) is detected for Fault Zone1 (FZA1111-FZB1137), which is corresponded to a distinct fault core in the core examination. Two deeper fault zones have been identified in the core and FMI data but no obvious log anomaly can be observed around these depths.

If the lithology column of similar pattern interrupted by fault zones are the same age, then we would be able to demonstrate the existence of a small scale duplex system (thickness is less than 100m) along the north fault segment of the earthquake. After restoring the faulting effect, the reconstructed lithology column is shown that the formations of hanging walls in the fault zones are the same. This result implied that a duplex structure existed. The implication is also supported by the logging data of Natural Gamma-Ray. The existence of a duplex is further consistent with the out-of-sequence characteristics of Chi-Chi rupture. Furthermore, it indicates that regional structures were developed upsection by the fault zone system.