

## **Taiwan Chelungpu Fault Drilling Project**

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The 1999 Chichi, Taiwan earthquake (Mw 7.7) was the best instrumentally-recorded large earthquake in the world and provides extensive new data for looking at the physical mechanisms of the rupture process. A prominent feature of the earthquake was the area of large (~ 10 meters) and shallow (surface displacements of 7-8 meters) slip on the northern part of the fault. The level of high-frequency ground acceleration from this asperity was relatively low, considering the large displacements. The relatively low level of high-frequency radiation along with the large slip velocities and large displacements, suggests a low level of friction on the fault during rupture. Various physical mechanisms, such as fault melting, fault lubrication, or thermal pressurization have been proposed to explain the slip-weakening process that likely occurred on this portion of the fault.

The shallow location of the main asperity of the Chichi earthquake provides a rare opportunity to examine a fault on which a large amount of slip has recently occurred. On January 17, 2004, drilling of a deep borehole (~1 km) into the fault was begun, primarily to examine the physical properties of the fault surface. Close analyses of the fault properties will likely provide information about the physical mechanisms associated with the large amount of slip that occurred on this portion of the fault. Shallow boreholes (200-300m) have already been drilled into the northern and southern portions of the fault. Preliminary analyses of these cores indicates that physical properties of the fault may control differences in the rupture dynamics of the earthquake. Determination of the frictional levels and slip mechanisms is important for understanding of how large earthquakes occur.



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