

A Decade of Taiwan-Philippines Collaboration: GPS Measurements of Crustal Deformation in Luzon Island, Philippines

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Abstract

The Philippine archipelago is a deformed orogenic belt resulting from the collage and collision of blocks of oceanic and continental affinities. It is wedged between two converging plates: the oceanic northwest-moving Philippine Sea Plate in the east and the newly discovered Sundaland Block in the west. One of the major crustal structures of the archipelago is the Philippine Fault, a 1200-km left-lateral, strike slip fault that transects the Philippine Islands from north to south.

Historical and recent seismic data show that the Luzon segment is one of the most seismically-active segments of the Philippine Fault. One of its segments in central Luzon, the Digdig Fault, ruptured for about 120 km during the July 16, 1990 Luzon earthquake (Ms 7.9).

In order to study the present-day interseismic and crustal deformation of Luzon, a GPS network was established and first measured in 1996. The Luzon GPS network, which is composed of about 60 survey points, forms part of a greater regional network that includes the GPS network in Taiwan, aimed at studying the active deformation in the Taiwan Mountain Belt as a result of Luzon arc- Chinese continent collision.

The survey points in Luzon were measured five times using dual-frequency geodetic receivers through campaign-type surveys from 1996 to 2000. Two more campaigns were done in 2004 and 2006, respectively. We are currently processing the 2006 data as well as re-processing the 1996-2000 and 2004 GPS dataset using GAMIT/GLOBK software. The corresponding time-series now spans 10 years. The velocity field derived from 1996-2006 GPS observations will be utilized to study the active tectonics in the Taiwan-Luzon region. The slip rates on various segments of the Philippine Fault will be estimated from inversion of GPS velocity data using 2-dimensional dislocation models.