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A Dislocation Model for the Crustal Deformation Along the Philippine Fault System in Luzon

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The Philippine Fault is the result of oblique convergence between the Philippine Sea Plate and the recently-discovered Sundaland Block. It is a left-lateral strike slip fault that transects the Philippine archipelago from north to south for about 1200 km. Historical and recent seismic data show that the Luzon segment is one of the most seismically active segments of the Philippine Fault. The GPS network in Luzon was established and first measured in 1996 by the Institute of Earth Sciences, Academia Sinica in collaboration with the Philippine Institute of Volcanology and Seismology. Repeated surveys were done annually until 2000. Two more campaigns were conducted in 2004 and 2006, respectively. Incorporating with continuous GPS data from 20 Taiwan and IGS sites, these 10-year survey-mode GPS data are processed by GAMIT/GLOBK software. The velocity field derived from analyzing the position time series of 28 Luzon sites is utilized to study the active tectonics in the area. The Luzon velocity vectors are moving towards the northwest with respect to stable Eurasia. The azimuths of these vectors range from 270 degree to 298 degree, with rates increasing towards the north: 40 mm/yr in the south to 82 mm/yr in the north. The interseismic deformation near the fault is modeled as the sum of a steady rigid block motion and the effect of an upper locked crust due to frictional resistance. The effect of the locked part is equivalent to that of a negative dislocation on the fault. The fault-slip rates on various segments of the Philippine Fault and optimal fault geometry parameters are estimated from inversion of GPS velocity data by using an elastic half-space dislocation model. The modeling results and their tectonic implications will be

presented.