Seismogenic zones along the Central Philippine Fault Zone

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The central Philippine Fault Zone (PFZ) is the portion of the fault found in Guinyangan, Quezon down to Leyte island. It is known to be comprised of the Guinyangan, Masbate, north Leyte and south Leyte faults. In this study, we would show that the central PFZ have numerous seismogenic zones with varying seismic and faulting characteristics. Seismicity shows an apparent pattern in each of these faults. The patterns and/or characteristic seismicity were deduced from the temporal and spatial analysis of earthquakes along this part of the PFZ.

Foreshock clustering in southern Leyte along the south Leyte fault (SLF) usually precedes a moderate event with a recurrence interval of about 5-10 years. The foreshocks usually occur about two weeks before the main event a number of which are perceptible. In north Leyte fault (NLF), the earthquakes had been relatively low compared to SLF. Moreover, despite the interesting activity along SLF, NLF had been dominated by small earthquakes without any significant event. In Masbate region, two distinct seismogenic zones, the Ragay and Masbate faults were identified based on the 1998 and 2003 events. Both earthquakes caused significant damage in Masbate island. Interestingly, the moderate quakes in this are produced unusually large ground rupture. Field investigations and historical review also show that moderate earthquakes occur in this region more frequently than previously recognized. In Guinyangan area, the Guinyangan fault (GF) indicates relatively low seismicity compared to the rest of PFZ in central Luzon. The GF had a major event in 1973 which caused devastation in southeastern Luzon area.

Looking closer into the seismic pattern, it was noted that there is a northern migration of significant events in central PFZ. This was perceived both in the historical and recent seismicity in the region. Thus, after the 2003 event along Masbate fault, the Guinyangan fault was anticipated to experience some changes in local stress field. However, the temporal and spatial plots of seismicity indicate a west-northwestward propagation of seismic activity along the Sibuyan fault. Sibuyan fault is an offshore fault traversing the Sibuyan Sea and probably into Taal area and/or branches out into the southern part of Marinduque island.

Considering the amount of data available and the peculiar seismic activity along the central PFZ, we try to examine the seismicity and correlate them to possible regional and local stress change in a specific portion of the PFZ. Considering the importance of the results of this study and in view of the presence of major cities and towns in southern Luzon, the Sibuyan and Guinyangan faults need more attention for seismic and crustal deformation studies. In terms of disaster mitigation and preparedness in the southern Luzon regions, finding(s) from these researches would be important for the probability analysis of local earthquakes.