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Estimated damage and loss scenarios for future major earthquakes in Luzon, Philippines

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The northernmost and biggest island of the Philippines, Luzon, is bordered both west and east by active subduction zones and, on land, the island is cut by numerous fault systems. These active systems regularly generate major earthquakes that shake the island. The largest historical earthquake was a magnitude M=8 and the last major catastrophic event was the July 16, 1990, Ms 7.8 event, that caused over 2,400 fatalities, injured over 3,500 and destroyed over 100,000 houses. Such catastrophic earthquakes will unfortunately repeat in the future and in an attempt to predict these events it has been found that for Luzon a time of increased probability (TIP) for such an earthquake exists. Considering these facts, it is of interest to evaluate the destruction and losses this event could eventually cause. We have analyzed the historical seismicity and constructed different loss scenarios. With QLARM2, a loss estimation algorithm used in real-time mode for over 10 years, we simulated the various plausible scenarios for a major earthquake (M>7) on Luzon. Results show that such an earthquake affects the majority of the island's inhabitants. As an example, for a M=7.4 earthquake, 12 km deep and 30 km from the capital city Manila, the overall maximum mean damage to be expected is 4.5 and the maximum intensity is X in the epicentral area. In terms of fatalities, QLARM2 allows to obtain first order estimates. Preliminary results suggest a conservative mean estimate of expected fatalities of 6,000, and a maximum of 18,000, values that can vary greatly, depending on location and magnitude of the future earthquake. Due to its position along the ring-of-fire and in light of our computations, Luzon will continue to be shaken by catastrophic earthquakes and should continue its effort to mitigate earthquake risk. This is particularly true for Manila, an agglomeration of over 11 million people, directly affected by the earthquake hazard.