CHARACTERISTICS OF RAINFALL TRIGERRING LAHARS AND THEIR GEOMORPHIC IMPACTS AT PINATUBO VOLCANO, THE PHILIPPINES

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The June 1991 eruption of Pinatubo Volcano is one of the biggest eruptions of the century. The eruption deposited about 5 to 7 km3 of pyroclastic flows around its surrounding watershed with thickness attaining 200 meters along deep pre-eruption valleys. These deposits were emplaced hot (~500°C), mostly sandy (1-2 phi in diameter), non welded and highly erodible. During the rainy seasons, usually from June to November, moderate to strong rainfalls are triggering numerous destructive lahars. Lahars are flowing mixtures of highly concentrated volcaniclastic sediments and water, and can have as much as 40 to 80% sediment to water ratio. In some cases, lahar flows occur more devastatingly that are brought by lake break-out in the upper watershed without good precursors. In order to give timely lahar warnings to the populace and to understand the amount of rainfall that would trigger lahars, several telemetered raingauges and flow sensors were installed in the upper slope into the different major watersheds. The raingauges operate with a tipping bucket (about 1mm per tip), while the flow sensors use geophones that measures active lahar ground vibrations in three frequencies. With this set-up, rainfall intensities and lahar flow magnitudes can be detected instrumentally in real time. This gives great advantage over manned lahar watchpoints who are tasked to give warnings especially at night. There are six digital rainfall and seven flow sensors that transmit data in the central computer receiving station at the Pinatubo Volcano Observatory providing continuous information on the conditions of the different watershed. During lahar events, data are transmitted at a higher frequency giving good correlation on the rainfall intensity and lahar magnitude. Several years of these data were analyzed to study the characteristics of rainfall-lahar triggering thresholds. The Sacobia-Pasig Catchment was the focus of this study because its lahars give significant geomorphic impacts and pose the highest threats to lives and properties. Geomorphic accidents such as stream piracy will also be discussed that yield significant unrecognized lahar hazards to the low-lying areas. A video documentation of active lahars will also be presented in order to give a better insights of the Pinatubo lahars and its destructive nature.