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X-Band Multi Parameter (X-MP) Radar Utilization for Short Term Lahar Prediction

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In Mt. Merapi of Indonesia, rainfall is the primary trigger of lahar that frequently cause fatalities and extensive destruction of property. Prediction of lahar occurrence in this area is important, as many lahar happens within less than two hours after the maximum rainfall intensity. Considering the hazards of lahar and its strong relationship with rainfall, an X-band Multi Parameter (X-MP) radar has been installed to monitor rainfall in Mount Merapi since September 2015. Currently the radar is monitoring rainfall intensity within 30 km radius of 150 m mesh every 2 minutes. This paper aims to show the utilization of X-MP radar to predict future lahar occurrence by first, discussing the reliability of radar data compare to ground measurements, and second analyzing the rainfall intensity and duration statistically to determine the critical values of rainfall leads to a lahar event occurrence. For the statistical analysis, 39 lahar events were analyzed by using dummy regression and fuzzy c-cluster analysis. As the results, rainfall is categorized into three different groups of rainfall, which are: warning rain, disastrous rain and critical rain. This model then could be applied to X-MP radar data to know the occurrence of lahar and possible preventive measures. As it is already showing good agreement, in the future, the X-MP radar are expected to improve the monitoring of critical rainfall intensity related to lahar prediction