

Determining earthquake susceptible areas Southeast of Yogyakarta, Indonesia –Outcrop analysis from structure from motion (SfM) and geographic information system (GIS)

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Located approximately 250 kilometres north of Sunda Megathrust, Java island has a complicated geology and geomorphology characteristics. The study area, Pleret Sub-District, is one of rapid growing outskirts areas that located 15 km southeast of Yogyakarta City. In general, this area is part of the Bantul's Graben. In the middle part of study area flows the Opak River which often associated with Opak Fault. This normal fault has a complex local fault which can affect the amplification level when earthquakes occur in the study area. However, the geology map of Yogyakarta scale 1: 100,000 is the only data that provides the rough information of Opak Fault. Hence, the integrated method of geographic information system (GIS), structure from motion (SfM), and direct outcrop observation was conducted in the study area. This study aims to determine the susceptible area of the earthquake based on the outcrop study.

The main finding of this study was the evidence that the study area has a complex fault system. At least 56 faults evidence was found in the middle part of stud area. The maximum of fault displacement is 2.39 m which were found in the outcrop 17 segment 3 that located in the Srumbung Sub-Village. This fact signifies that the middle part of the study area has the most complicated geologic structure.

The north part of Segoroyoso Village, the middle part of Wonolelo Village, and the middle part of Bawuran village are very unstable and vulnerable to the ground motion amplification due to their proximity to the complex faults system. The further studies such as geo-electric survey, boreholes survey, and detail geological mapping are still needed in the study area to get the better understanding of Opak Fault and other unchartered faults. Additionally, the carbon testing of charcoal that found in the outcrop and identification of the exact location of the ancient eruption source also need to be conducted.

Keywords: Outcrop study, Fault, Structure from Motion