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Natural Hazards and Earth System Sciences
Discussions

Interactive comment on "Characteristics of landslides in unwelded pyroclastic flow deposits, southern Kyushu, Japan" *by* M. Yamao et al.

Anonymous Referee #3

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General comments: The authors attempted to investigate relationship between rainfall indices and landslide occurrence in unwelded pyroclastic flow deposit areas based on substantial data sets of landslide and precipitation. Analysis of field data was likely robust. Two different relationships between rainfall index (duration) and landslide were shown in the manuscript. This difference is interesting for readers of Natural Hazards and Earth System Sciences and worth to improve warning criteria in areas with unwelded pyroclastic flow deposits. However, structure of the manuscript should be adequately re-organized and improved for publication. In section 3.3, stability analysis suddenly appeared and effects of wetness on cohesion and safety factor are discussed. This analysis conducted for model slopes and its results are not strongly associated with the analysis of landslide data set. The other concern is duplicated descrip-

tions of mechanisms of the landslides. Throughout the chapters of results and discussion, the authors claimed the triggering mechanisms of landslides by changes in pore water pressure, suction and mass of slope (e.g., P6359L22, P6361L16, P6361L18, P6363L28). Because this study did not use any information on inside slope, these mechanism should be insisted at least in the chapter of discussion. These duplicated mechanisms of two groups of landslides likely spoiled readability and focus of the manuscript. Therefore, I am recommending this discussion paper as revised substantially before publication.

Specific comments: 1. It is curious that magnitude (volume or depth) of landslide is not considered at all in the analysis. Although landslides in the study area can be categorized into two types (P6357L6), I wonder that a huge storm potentially trigger large landslides with depths of several ten meters or more even in unwelded pyroclastic deposits. Range of magnitude of the landslides for the analysis should be noted in the text. 2. Evapotranspiration rate obtained by a previous study was employed for calculation of API7 and API30 (P6358L9). Was evapotranspiration considered only no-rain periods or days in the calculation? 3. Criteria of triggering landslides is suggested in the last paragraph of '4. Discussion.' It is very difficult to follow description of this criteria because mechanisms of landslides are involved here. The authors may arrange this paragraph or create a flow chart to clarify the criteria.

Technical corrections: 1. Division into sections is not necessary in Chapter of discussion because the chapter includes only a single section 4.1 (P6362-6364).

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