Geological features of landslides of pyroclastic fall deposits induced by the 2018 Eastern Iburi Earthquake and other previous earthquakes

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2018 Eastern Iburi Earthquake induced numerous numbers of landslides in Atsuma town and its neighborhood with the seismic intensities of 7 and 6+. This was one of the most devastating earthquake-induced landslide hazards in Japan. Geographical Information Authority of Japan published a map showing the distribution of landslides, which counted 8000 in an area of 400 km^2. Most of the landslides were of pyroclastic fall deposits and highly mobile. Those deposits were of Ta-d pumice of 9 ka and En-a pumice of 20 ka, and their sliding surfaces were made within specific beds, which were the bottom of Ta-d, reworked Ta-d in its base or reworked En-a beneath Ta-d, or volcanic soil with pumice grains beneath the Ta-d or volcanic soil beneath En-a. The materials that accommodated the sliding surfaces were heavily weathered to be rich in halloysite, which mineral has been found from the sliding surface materials of previous earthquake-induced landslides of pyroclastic fall deposits and is supposed to be very weak to earthquake shaking. The depths of the landslides varied from 2 to 3 m. Most of the beds that slid were undercut at the lower portion of the slopes, because of man-made cutting or convex slope breaks of which origin is in dispute.

Landslides similar to the landslides stated above have previously occurred in Japan, Indonesia, and El Salvador. They were 1923 Kanto, 1949 Imaichi, 1968 Tokachi-Oki, 1978 Izu-Oshima-Kinkai, 1984 Naganoken-Seibu, and 2011 Tohoku earthquakes in Japan, 2001 El Salvador earthquake, and 2009 Padang earthquake in Indonesia (Chigira and Suzuki 2016). The oldest beds that accommodated a sliding surface and was dated was 330 ka and the youngest was 9 ka of Ta-d. The beds of the sliding surfaces were rich in halloysite and most of the landslides were undercut like those by Eastern Iburi earthquake.

Chigira, M. & Suzuki, T. 2016. Prediction of earthquake-induced landslides of pyroclastic fall deposits. In: Aversa, S., Cascini, L., Picarelli, L. & Scavia, C. (eds.) Landslides and Engineered Slopes. Experience, Theory and Practice. Associone Geotecnica Italiana, Rome, 93-100

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