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Origin and age of LiDAR-detected scarplets on the mountain slope: a case study around Iyano in Neo valley, central Japan

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Recent airborne LiDAR survey has detected many scarplets in the mountains around the northern tip of the active Neodani fault, central Japan, which is one of the faults that were ruptured during the 1891 Nobi earthquake. To examine origin and formation age of some of these small scarps, we conducted LiDAR-data analysis, geomorphologic and geologic mapping, and pit excavation around Iyano in Nogo valley. Our results show that the scarps around Iyano are sagging features associated with gravitational mountain deformation, and can be explained by a model in which toppling and block rotation of reverse-dip slope associated with gravitational subsidence of mountain top creates parallel uphill-facing scarps. In addition, our pit excavation in a linear depression along one of the scarps reveals that the scarp was formed before 15th century. Furthermore, the scarp is likely to have grown at least once after its formation. Further study of similar scarplets elsewhere may clarify the relationship between formation and growth of those scarps and surface-faulting history of the Nobi active fault system, including the Neodani fault.

Keywords: Neodani fault, mountain slope, airborne LiDAR, scarplets, Nobi Earthquake, sagging