

## Activities of landslides and their precursors: Case studies in Okutabora, Gujo, Gifu Prefecture and in Kuchisakamoto, Shizuoka Prefecture, central Japan

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Forecasting the slope movement is important for the mitigation of landslide disasters. After the landslide disaster in 2011 by the Typhoon Talas in Kii Peninsula, central Japan, the landforms formed by the process of deep-seated gravitational slope deformation (DSGSD) have been expected to be useful for the prediction of deep-seated landslides. We conducted researches on DSGSD in several regions of Japan, and in this session presented the results of two case studies analyzing the relationship between the DSGSD development and landslide activity. One of them is the landslide in the Okutabora Valley, Gifu Prefecture. About 20,000 m<sup>3</sup> debris slipped down along the valley in July 2018 by a rainstorm. In June 2020 a fissure, a type of DSGSD, was found above the main scarp of the landslide by the field survey after a strong rainstorm, and after that the LiDAR measurement was performed in order to grasp the total feature of the DSGSD. Another landslide occurred along the fissure in July 2020. Another case study examined three landslides named A-, B-, and No.2-landslides in the Kuchisakamoto area, Shizuoka Prefecture. Countermeasures against the A-landslide started in 1960, and the activity has calmed down recently. The B-landslide started the active in 1988, and has been active until now in spite of the extensive countermeasures for more than 30 years. The No.2-landslide started the activity in 2013. Double ridges, one of the typical DSGSD landforms, occur on the crests or slopes above the three landslides. Although the development histories of these DSGSD features are unknown, we estimate that they formed several thousand years ago on the basis of our research results on the similar double ridges located about 10 km north of this area. The double ridges above the A- and B-landslides have no signs of deformations, though the landslide scarps have reached just below the ridges. The ground extensometer installed on the uphill-facing scarplet, also one of the typical DSGSD landforms, of the No.2-landslide have recorded no movements during the last six years. These lines of evidence indicate that the DSGSD topographies stable for many years have not affected by the landslide activities below them. We need standardization of this model by more case studies. The data used in this study were provided by Gifu and Shizuoka Prefecture offices.

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