

Analysis of distribution of linear depressions based on decision-tree model in Kiso Mountain Range, central Japan

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Few studies have focused on mountain gravitational deformation in the sight of landform evolution. In this presentation, we discuss the relationship between linear depressions and (1) geomorphological processes and (2) geomorphological condition. We select the area of granodiorite (Geological Survey of Japan, AIST, 2015) in the northern part of Kiso Mountain Range.

Linear depressions, cirques and periglacial smooth slopes were classified based on Geospatial Authority Information of Japan (GSI) color aerial photographs. Cirques and periglacial smooth slopes were referred to Aoki (2000) and to Yanagimachi and Koizumi (1988) respectively. Landslides were based on landslide mass of landslide distribution map published by National Research Institute for Earth Science and Disaster Prevention. Drainage network and topographic data were obtained based on Fundamental Geospatial Data (10m mesh elevation) by GSI using ArcGIS10.2.2. We did decision-tree analysis using WEKA 3.6.13 (Hall et al., 2009) for investigating distribution of linear depressions. Explanatory variables are as follows: number of stream, average stream length, average stream gradient, average stream relative height, drainage density, stream bifurcation ratio, stream slope ratio, stream length ratio and drainage density ratio of each stream order, and maximum altitude, minimum altitude, relative height, stream length, stream gradient, drainage density, area, slope direction (East or West), slope direction (North or South), existence of glacier in Last Glacial Maximum, that of glacier in Younger Dryas, that of landslide mass and that of periglacial smooth slope in each unit drainage basin. Explained variables are two groups of unit drainage basins divided by density of linear depressions. Its value is 0.5 [km/km²].

It is suggested that the characteristics of unit drainage basins with high density of linear depressions are as follows: (1) existence of landslide mass and (2) third-order stream with gradient greater than about 30 degree.

Keywords: Decision-tree, Linear depressions, Kiso Mountain Range, Mountain gravitational deformation, Geomorphological analysis