Geomorphic Features Measurement for Various Rock types based on GIS Analysis

Daisaku Kawabata[1]

[1] Geoscience and Technology, AIST

Because it is connected with prevention of Because it is connected with prevention of a disaster reduction, grasping of the geomorphic features (e.g. altitude, slope degrees, aspect and curvature) and geological condition of the area which a landslide appeared is very important. Many things become clear about the form of each landslide by a lot of field investigations. But, it is difficult to analyze the form of the landslide from the viewpoint of wide area only by the field investigations. The geomorphic features of the landslide area in a wide region can be measured by digital elevation data quantitatively. And, it is possible to spatial analysis with the geological data based on GIS. In this study, I measured altitude, slope and aspect of some landslide areas where a geological condition is different in Japan. I particularly investigated the frequency distribution of altitude, slope and aspect for each geological unit (e.g. granite, sandstone-dominant, mudstone-dominant, sandstone-mudstone alternation). I also examined altitude-slope relationship because of the strong dependence of the slope angle on the altitude has already been indicated.

In this study, I measured geomorphic features in Chubu, Kinki and Shikoku region. For example, mean slope angle and mode of landslide area is lower than no landslide area in the Chubu region. All of altitude-slope relationships, include no landslide area, for each geological unit show that the slope angle in lower altitude zones (ca. upper 800 m) tends to increase with increasing altitude, but those in higher zones (ca. lower 800 m) are relatively constant. Mean slope angles in higher altitude zones are different according to bedrock geology but most of them are between 28 and 35 degrees. In contrast, landslide distributed area (Paleogene mudstone-dominant sedimentary rock, Mikura Groups) has lower slope angles in high altitude zones. Most terrains in the study area have similar altitude-slope relationships irrespective of bedrock geology indicating that geology plays a relatively minor role in determining slope angles. Terrains underlain by some specific rocks, however, are highly susceptible to slow gravitational landslides and thus have markedly reduced slope angles than other terrains with similar altitudes. Among terrains underlain by rocks with equivalent ages, mudstone-dominant areas tend to have slightly lower slope angles than sandstone-dominant areas. This observation is also ascribable to the higher landslide susceptibility of mudstone.