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DRAFT CLASSIFICATION OF SLOPE GRADIENTS FOCUSING ON MASSMOVEMENT

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DRAFT CLASSIFICATION OF SLOPE GRADIENTS FOCUSING ON MASS MOVEMENT

Indeed mountain slopes that form steep slopes and cliffs are causes (predispositions) of slope disasters, but intrinsically, mountain slopes are also topographical features indicating the results of various slope formation processes and formative agents such as mass movement and slope erosion. At the very least, a slope that is clearly in the process of erosion should be considered to be in an angle of repose in the long term, and also must be considered as a dynamic entity where various types of mass movements are continuing.
Meanwhile, according to an evaluation in terms of the compressive strength of a uniaxial compression test of rock, a vertical wall with a relative elevation of a few thousand meters is theoretically considered to be self-standing, the height of actual rock slopes is far lower than this, and slopes with gentle gradients are formed. DEM (Digital Elevation Model) data that has often been put into practice in recent years facilitates a quantitative evaluation over a wide range of slope gradients, and use of measurement results by a laser profiler also allows grasping further minute slope shapes.
This time, an investigation was conducted for the relationship between the mode of mass movement and slope gradients of rock slopes by using, in a distribution area of relatively steep slopes formed mainly of relatively new rock where chemical weathering was retarded, results of topographical analysis using mainly DEM data based on a laser profiler, and a draft classification of slope gradients of the rock slopes was studied.
First, a slope gradient of 35? is a common angle of repose of debris, and with a gradient of more than 35?, it is difficult for unconsolidated material to maintain a slope shape at a certain relative elevation or more even when groundwater or the like is not a concern. Even when water is a concern, due to the variety of mass movements including landslides, deep-seated landslides, and debris flows, slopes with a gentle gradient below 35? are considered to be formed.
On the other hand, an area with a slope gradient exceeding 35? is considered to be basically a distribution area of rock maintaining the properties of an integrated solid. A slope of such a rock distribution area can possibly exhibit a slope gradient reflecting mass movement of rock. When a topographical analysis by a slope classification map using a DEM is conducted, a peak of the slope gradient is sometimes located at about 35 to 45 degrees in mountainous regions with strong slope erosion. It is also expected in such mountainous regions that the mode of mass movement is basically different at a boundary of 45?. Moreover, a result was also obtained in the process of a DEM topographical analysis of steep cliff slopes with an average gradient over 45? that a difference mainly in the type of rock failure at a boundary of about 70? is anticipated. Based on these results of topographical analysis, a draft classification of slope gradients at boundaries of 35 ?, 45?, and 75? was studied.

Keywords: DEM, Laser profiler, Rock failure, Rock creep