

Relationship between rock hardness and debris generation by modified Selby method (Case study: Agha - Jari Sandstone)

Shirin Mohammadkhan*

Assistant Professor of geomorphology, Faculty of Geography, University of Tehran, Iran

Amir Ahmadi

PhD student in geomorphology, University of Tehran, Iran

Received:08/10/2016 Accepted: 01/01/2017

Extended Abstract

Introduction

Debris and rocky hillsides are one of the important and typical landforms in arid and semi-arid regions. In this study, the relation between the hardness of Aghajari sandstone with producing the debris has been surveyed by Selby Method. The sandstone rocks display obviously landscape features. Debris is one of these landscapes. Rock fall and rock topple can create these landscapes. Debris is characteristic of arid and semi-arid region. Geology and climate are the main mechanisms for generation of the debris. Weathering, gravity, earthquake, joints and fluctuation of temperature are other agents. Selby (1980) method was used in order to determine the effective factors on production of the debris. To determine resistance of rocks, Schmidt Rebound Hardness (SRH) is so practical. So far in geomorphology and geology, more than half a century, the SRH was used in researches. In addition to the Selby method, porosity was used to determine rock hardness in this paper. The aim of this study is to study the effects of rock hardness characteristics on generation of debris, based on modified Selby method, on Agha - Jari sandstone in southwest Iran (Masjed - Soleyman).

Material and methods

In this study, in sampling and estimation of SRH, the samples were taken along eight layers which are named from A to H. The samples A1 to A4 were taken from the oldest layer and samples H1 to H4 from the youngest. Because the thicknesses of layers vary from place to place, the sampling interval changes from 50 to 150 meters. Geomorphic map was prepared by freehand software and using 1:25,000 topographic maps of Iranian Survey Organization. Geological data, such as lithology and contacts of the Aghajari sandstone layers, were drawn by using 1:100,000 geological maps of Geological Survey of Iran. Also some factors of Selby

* E-mail: mohamadkh@ut.ac.ir

Tel: +98 9128333244

method such as properties of joints including width, spacing, lateral or vertical continuity, and orientation with respect to the slopes as well as weathering of the rocks was estimated on the field. Thin section samples were prepared from fresh rock samples. After preparing thin sections, porosity was determined via point counting by 400 points in each sample.

Results and discussion

For understanding the effects of each Selby factor with debris, we compared all factors to measure the amount of debris on the layers. The samples B, C, D and F have the most debris in all layers and A layer don't have any debris. The results showed that there is direct relationship by increasing between SRH and amount of debris with a high correlation (89%). The factors showed the correlations; Width of the joints: non correlation, the spacing of joints: low correlation (21%), weathering: high correlation (87%), lateral or vertical continuity of the joints: high correlation (83%), Orientation of joints with respect to the slopes: almost high correlation (63%) and porosity: mid correlation (56%).

Conclusion

The results of this paper showed high relationship between debris and SRH, weathering and lateral or vertical continuity of the joints and also low relationship between the spacing of joints and non-relationship between widths of the joints. Porosity and Orientation of joints with respect to the slopes have mid relationship with debris. The A layer (the oldest layer) is the weakest layer. The layers B, C, D, E, G, and F are resistances and H layer (the youngest) is mid hardness.

Keywords: *Agha - Jari sandstone, Debris, Selby method, SRH, Rock hardness.*