Geophysical Research Abstracts,
Vol. 10, EGU2008-A-00083, 2008
SRef-ID: 1607-7962/gra/EGU2008-A-00083
EGU General Assembly 2008

A simple and non-destructive approach to predict the weathering state of limestone blocks used as building stone

K. Zorlu

Mersin University, Geological Engineering Department, Ciftlikkoy, Mersin, Turkey

Applying an engineering geology study in historical places under conservation is very difficult because of sampling restrictions. In order to overcome this difficulty, the purpose of this study is application of some non-destructive methods to predict the weathering degrees of the building stones used in historical buildings. For this purpose, extensive field studies including the Schmidt hammer test application, development and application of a simple visual based classification and photograph shootings for fractal geometry were performed. A total of 114 blocks were considered during the field studies. The weathering type provides a facilite to apply this study because solution type of weathering changes the shapes of the blocks. As a result of this process, the shape of the blocks changes and the micro-pores increase at the surfaces of the blocks. During the field studies, a simple visual-based classification is introduced. This classification includes three weathering classes: slightly weathered blocks, moderately weathered blocks and weathered blocks. The weathering states of each blocks are described visually by employing this classification. Using the changes in the block shapes depending on the weathering, the fractal geometry is applied and the fractal dimensions of each block are determined. Depending on the increase in weathering degrees of the blocks, the Schmidt hammer rebound values and fractal dimensions decrease. However, the visual classification introduced in this study is completely descriptive. To quantify this classification, a fuzzy inference system having two inputs such as fractal dimension and Schmidt hammer rebound number and one output (weathering degree) is constructed and its performance is assessed.. The VAF and RMSE values for 114 blocks are calculated as 72.7% and 0.1 respectively. Also, the model produces plau-

sible results because the average error for the 114 blocks is -10.39%. These results show that the model produces sufficient quality outputs during the restoration efforts. Combination of the various employed methods provides a non-destructive and a simple methodology for the description of the weathering states of the building stones. However, this method is applicable only if the original geometry of the blocks are similar and the change in the shapes of the blocks results from the weathering process. Otherwise, it is impossible to apply the fractal geometry for this type of study.