

WEATHERING OF ROCKS - VULNERABILITY MAPPING BASED ON BAYESIAN STATISTICS AND MARCOV CHAIN ANALYSIS

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Natural stones show a variety of responses to weathering processes, which are dependent on geochemistry, physical properties, and climate. Air pollution is an additional factor enhancing the decompositional processes of rocks. The main objective of the study was to evaluate and develop approaches for weathering vulnerability assessment of natural stone material. A Bayesian Markov Geostatistical Model (BayMar) was developed for probability estimations with respect to geological problems. Input data was based on a qualitative rating method for corrosion of natural stones, which involves interaction of large number of weathering controlling factors such as structure and texture of the stone, chemical and physical weathering rates, properties of the water solutions, and climate. A priori model consists of the existing information taken from the literature. Calibration of the model was done by input of the posteriori data received from laboratory studies, where corrosion of the natural stone was simulated in the climatic chamber. Application of non-parametric geostatistical methods in BayMar allows for use of professional judgements in situations of scarce data, and updating, as new information becomes available. Application of the methodology showed that BayMar was capable of prediction of the possible weathering sites in different natural stones with respect to mineralogy, porosity and pollution factors. Results from BayMar were used for vulnerability mapping in GIS. Vulnerability assessments could be used as decision bases for various purposes concerning use of natural stone.