Geophysical Research Abstracts, Vol. 8, 09653, 2006
SRef-ID:

Application of Scanning Electron Microscopy and Optical Microscopy to the study of stone weathering

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Factors leading to the damage of stone elements are both of an external nature (climatic and microclimatic, anthropogenic and biogenic) and internal natural (connected with the type of stone, its structure and mineral composition). Considerable damage of elements made of the same type of the stone depends on the differences in the mineral composition, texture, structure and certain surface properties of the stone varieties used. The widespread development of black patinas on buildings is a decay feature that predominates in urban atmosphere. The changes in mineral composition during weathering include mainly deposition of anthropogenic particles, formation of new minerals - especially salts, and iron migration within building stones. All these processes can additionally affect aesthetics of building stone surfaces. The optical microscope and scanning electron microscope have been widely used as analytical tools for description of the surface in the weathering study. The application of the Field Emission SEM and the chemical characteristics determined by EDS equipment allow to characterize changes in the composition of the weathered stone surfaces better than the conventional SEM. The current paper presents the results of morphological and chemical analyses of limestones and sandstones from historical buildings.

This study was supported by the AGH – University of Science and Technology project No. 11.11.140.158.