



## **Indoor damage of aged porous natural stone due to thermohygric stress: a case study of opuka stone altar from the St. Vitus Cathedral, Prague (Czech Republic)**

Richard Prikryl (1), Jirina Prikrylova (2), Martin Racek (3), Kateřina Kreislova (4), and Zuzana Weishauptova (5)

(1) Charles University in Prague, Faculty of Science, Institute of Geochemistry, Mineralogy and Mineral Resources, Praha 2, Czech Republic (prikryl@natur.cuni.cz), (2) Academy of Fine Arts in Prague, Prague, Czech Republic, (3) Charles University in Prague, Faculty of Science, Institute of Petrology and Structural Geology, Praha 2, Czech Republic, (4) SVUOM, Prague, Czech Republic, (5) Institute of Rock Structure and Mechanics, Academy of Sciences of the Czech Republic, Prague, Czech Republic

Opuka stone (extremely fine-grained clayey-calcareous silicite) used for a carved stone altar located in the interior of the St. Vitus Cathedral (Prague, Czech Republic) was affected by decay phenomena (formation of the case-hardened surface, its later blistering, flaking and/or powdering of stone substrate) which are similar to those observed in outdoor environments. Through the detailed analytical study (optical microscopy and scanning electron microscopy with energy dispersive spectrometry and x-ray elemental mapping of cross-sections of surface layers, x-ray diffraction of surface layers, ion-exchange chromatography for water-soluble salts, mercury porosimetry) and analysis of long-term indoor environmental monitoring (temperature, relative humidity, sulphur and nitrogen oxides deposition), it has been found that observed decay phenomena, which are manifested on microscale by brittle damage and formation of mode I (tensile) cracks along the exposed surface of the stone, can be interpreted as a result from thermohygric stress occurring on the interface between case hardened surface layer and stone substrate.