



The combined effect of salt weathering and clay swelling on the properties of sandstones

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Abstract

Salt weathering and clay swelling are considered as primary mechanisms involved in stone degradation phenomena and both of them are controlled by the moisture content. The exact role of the clay minerals in promoting the extent of the damage during salt weathering is not clear yet.

In this work, we present the results of a salt weathering test on two different types of sandstones: a clay-bearing stone, Villarlod molasse, and a non-clay-bearing stone, Obernkirchen sandstone. Additionally, some Villarlod molasses has been treated by a clay swelling inhibitor. Samples of each type were subjected to salt weathering test with a 10% weight NaCl solution at 23°C and 50 % RH. The salt solution flowed continuously, imbibing samples by capillary uptake. During the test the linear displacement of the samples were digitally monitored and recorded. Additionally, wetting and drying cycles using both water and NaCl solution are performed on a separate set of samples. The evolution of damage is followed by means of Mercury Intrusion Porosimetry (MIP) and Scanning Electron Microscopy (SEM), and the change of the stone material strength was followed using unconfined compressive strength (UCS) and ultrasonic velocity (Vp).