Geophysical Research Abstracts
Vol. 14, EGU2012-5876-1, 2012
EGU General Assembly 2012

Discerning total salt contents and surface humidity on building stone with a portable moisture meter (Protimeter) in the region of Petra (Jordan)

M. Gomez-Heras (1,2), W Wedekind (3), and P. Lopez-Arce (2)

(1) Fac. CC. Geologicas,Universidad Complutense Madrid, Spain (mgh@geo.ucm.es), (2) Instituto de Geociencias (CSIC-UCM), Madrid, Spain, (3) Geosciences Center, Georg-August-University, Göttingen, Germany

Water and moisture are some of the main decay agents of building stone and, in general of any stone structure. Several non-invasive methods are used to quantify moisture in building stone, many of them based on the fact that moist stone presents different electrical properties than dry stone. This is the case of resistance-based sensing equipment, such as "Protimeter" portable moisture meters. Although originally designed to measure moisture contents in wood, this sensing equipment is commonly used to measure the so-called "Wood Moisture Equivalent" (WME) in other building materials, such stone and mortar. However, this type of resistance-based sensors pose a degree of uncertainty, as there are other factors that modify electrical properties, such as porosity and salt content. When assessing the overall state of decay of a structure, it might not be crucial, in some cases, to discern between salt and water content: both high moisture levels and high salt content give high WME values, and both are usually related to areas with overall poor state of conservation and/or more prone to decay. However, discerning these two factors is crucial when trying to understand the dynamics of how some decay patterns are formed. This is the case of surface runoff in vertical façades and how it leads to the formation of alveoli and tafoni through salt weathering. Surface runoff and associated salt weathering are among the main decay processes found at the archaeological site of Petra (Jordan) and its understanding is of paramount importance for the conservation of this site. Some "Protimeter" sensors include a capacitance sensor in addition to the usual resistance sensing pins, which allows to measure sub-surface electrical properties. This paper presents results on how the combination of these two measurement modes could be used to discern if high WME values are caused by high surface humidity or by high salt contents in the context of Surface runoff and associated salt weathering.

Research funded by AECID (PCI A/032184/10)