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New quantitative, in-situ characterization of weathering in geomaterials.

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The mineralogical and microtextural analyses of weathered rocks and mortars are the main diagnostic tools to address the materials exposed under different environmental conditions in order to enucleate and mitigate the decay factors.
The characterization of weathering intensity is mostly descriptive and non-quantitative (ICOMOS Glossary, 2008); the Fitzner indexes in arenites (Fitzner et al., 2002) and more recently applied to marbles (Scrivano et al., 2013) provide an operator dependent method.
The current diagnostic of decay (Drdàcky & Slìzkovà, 2014) based on a scotch tape tearing off the surface was improved by a specifically adapted pocket penetrometer, and a joint gravimetric + minero-chemical analysis under SEM of ablational decay products. The steps are the following:
i) Preparation of stubs for SEM with adherent conductive carbon tape (surface area 1.3 cm2)
ii) Weighing of stub + tape + its plastic envelope at 0.001 g precision
iii) Connecting the stub to a pocket penetrometer
iv) Non invasive sampling of the incoherent dust applying a constant pressure of 2 kgf for 1 minute, and then packing away the stub without loosing grains
v) Weighing of stub + tape + weathering products + their plastic envelope at 0.001 g precision
vi) Recast the weight of removed material
vii) Addressing the weathering products to SEM – EDS.
Our quantitative peeling test was applied on a 96m long cladded wall in the Staglieno Monumental Cemetery in Genoa. The wall shows weathering gradients due to a neighbouring interred stream and to different insulation.
Slabs of ophicalcite marble were tested from three different areas (5 samples were collected to the E, 5 samples at the centre, 5 samples to the W). The results highlighted capillary rise up to 2 meters height and a more weathered central area.
On the whole, our protocol allows a delicate, virtually not impacting and reproducible factual sampling. Moreover, if carried out on a statistically significant population, the decay intensity results are defined and categorized.

Drdàcky M. & Slìzkovà Z., 2014. In situ peeling tests for assessing the cohesion and consolidation characteristics of historic plasters and render surfaces. Studies in conservation, vol 0.

Fitzner B. & Heinrichs K., 2002. Damage diagnosis on stone monuments weathering forms, damage categories and damage indices. - In: Prikryl R. and Viles H.A. (eds.): Understanding and managing stone decay. - Proceedings Internat. Conf. “Stone weathering and atmospheric pollution network (SWAPNET)”: 11–56, Charles Univ. Prague (Karolinum Press).

ICOMOS.ISCS, 2008 Illustrated glossary on stone deterioration patterns, 78 pp.

Scrivano S., Gaggero L. & Taddei A., 2013. Alteration patterns of marble under different environmental exposures: a systematic approach from the Staglieno Monumental cemetery and museum collections in Genoa (Italy). In: Proceedings of the 12th International Congress on Deterioration and Conservation of Stone, New York, 22-26 October 2012. In press.