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BOOK OF ABSTRACTS

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Salt weathering: advancements in experimental research on assessment and forecasting

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Abstract: Salt weathering is one of the most recurrent damage processes affecting both the natural and the built environment. Due to the complexity of the process, numerical models are rarely applied in practice; accelerated weathering tests in laboratory are still the most common way to assess and forecast durability of (conservation and renovation) building materials. In the last years, extensive research has been done by the RILEM Technical Committee 271-ASC [1] to improve the reliability of accelerated salt crystallization tests. Salt transport and crystallization have been investigated and a new approach to the experimental forecasting of durability to salt damage has been proposed, aiming at replicating the development of salt damage in the field. This starts from the fact that the accumulation of a certain amount of salt in pores is necessary in order to initiate damage; salt damage can thus be seen as a two-stage process: accumulation of salt in pores followed by appearance and propagation of the damage [2]. This approach can facilitate the assessment of the remaining service life of materials, by relating the salt amount introduced in the stone with that measured in the field, and forecast the durability of a material in more or less harsh environments, thanks to the use of different concentrations of salt solutions.

Validation of the results of accelerated salt weathering tests, both by simulations and observations in the field, is scarce. Not only a time-ratio between accelerated conditions and the field situation is unknown, but also the reliability of the durability ranking and the damage type assessed by the test have never been sufficiently addressed. The first results of the application of the RILEM TC 271-ASC procedure show that this test can reproduce the durability ranking and the damage type observed in the field [3]. However, a more extensive validation is needed to confirm these preliminary findings. Means for improving the validation of salt weathering tests can be provided by the use of techniques (such as laser scan and photogrammetry) for quantifying surface changes, in combination with sensors for monitoring relevant variables, such as climate, moisture and salt content in the material.

References:

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(2) Flatt, R. J. et al., 2017, Predicting salt damage in practice: a theoretical insight into laboratory tests. *RILEM Tech. Lett*. 2, 108–118

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