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Analytical techniques for the evaluation of past conservation treatments on stone material from archaeological sites of Roman Augusta Emerita (Merida, Spain).

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The effects that conservation treatments may have on stone material from archaeological sites are still unknown in many cases, taking into account the particular features of this material and the conditionality of each context. Unlike the standardized protocols used in other disciplines, in situ conservation of archaeological sites suffers from certain anarchy, both in the execution phase, as in that of subsequent monitoring process, usually nonexistent. That is why there are some inefficient treatments that are still in application in this field, and its effects, in terms of efficacy and durability, still unidentified. Moreover, the use of a very limited number of products has been commonly used in archaeology, not evolving as for instance architectural heritage.
The project that is been carried out in some archaeological sites of the Roman city of Emerita Augusta (Mérida, Spain) focuses on this subject. The first phase involved the documentation and location of all interventions executed in selected sites, since the beginning of excavations in 1911, until today. Selected areas for analysis both on site and in laboratory will help to determine mentioned effects after some years of application.
To assess the presence of any treatment, repair or product that has been either documented in the consulted reports and/or papers, or that can be observed just by looking, the following techniques are planned to be used:
1) In situ: portable and non destructive techniques such as Raman, XRF, spectrophotometer, roughness meter, ultrasound velocity, hardness tester, magnetometer, infrared camera, water absorption (Karsten tube) and humidity recordings of the surface.
2) Sampling: the minimum number and the smallest samples will be taken of different building materials, treated and untreated, unaltered and decayed, to be analyzed in the laboratory.
3) Samples will be analyzed by XRD, FTIR, optical and scanning electron microscope (SEM+EDS) and some properties determined as the water-repellence of the treatment by means of the contact angle analyzer. All these analyses will prove the conservation state of both the product/treatment and the substrate.
4) Some treatments will be tested in situ and its efficacy and durability measured and monitored by some non-destructive techniques and some other laboratory tests.
This work is part of a PhD project which is been carried out within two research groups:
- Analysis and Intervention in Architectural Heritage (AIPA, Universidad Politecnica de Madrid)
- Applied Petrology for Heritage Conservation Research Group, Geosciences Institute (CSIC,UCM)