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Assessing weathering damage in Arenitic Rock using Non-Destructive Testing: the case study of the stone coats of arms of Palazzo Ricasoli in Florence

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The conservation of architectural heritage often involves studying the effects of weathering on stone materials exposed to polluted environments with characteristics unfavorable to their preservation. The decay phenomena that occur in urban environments can lead to destructive effects on stone material, resulting in the need for specific analysis to assess the mechanical properties of these artifacts.

In this study, we analyzed three stone coats of arms that decorate the facade of Palazzo Ricasoli in Florence using non-destructive diagnostic techniques (NDTs) to assess their degree of weathering.

Palazzo Ricasoli is a historic Renaissance palace, located in the center of Florence, that features three stone coats of arms on its façade that are currently in critical condition, showing signs of very advanced degradation. The stone of which they are composed is a type of local sandstone rock commonly used in Florentine historical architecture.

To investigate the properties of the material we used *in situ* techniques, such Sonic test and 3D scanning. The results obtained with these techniques were then compared with those obtained from laboratory analysis of micro-samples using methods such as Fourier transform infrared spectroscopy (FTIR), X-ray Diffraction (XRD), X-ray Fluorescence (XRF), and optical microscopy.

Using NTDs we were able to gather data and insights on the mechanical properties of weathered

rock used in historical buildings, obtaining crucial information that can be used to develop appropriate and detailed conservation strategies to ensure the long-term stability of these materials in their environmental conditions.