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Salt action and damage in the Basilica of Santa Croce in Lecce (Southern Italy).

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The Basilica of S. Croce (1549-1679), in Lecce town is one of the most remarkable example of baroque architecture of Southern Italy. The church has a richly decorated façade with animals, grotesque figures and vegetables, and it has a large rose window. The interior has a nave and two aisles with 14 lateral chapels, each of them containing an altar made with Lecce stone (fine-grained calcarenite), also employed for the building of the masonry. The chapels, mainly those located on the right side, were affected by a heavy decay problems, such as pulverization, exfoliation, efflorescences and saline crusts which allowed to identify in the salt action the main cause of decay. Previously to the restoration work, a diagnostic campaign was performed. It was aimed to identify and to quantify soluble salts, their distribution in both height and depth within the masonry. The survey of the salts was accompanied by measurements of both water content in the masonry and environmental parameters (Temperature and Relative Humidity) inside the church.
An extensive sampling was carried out following a regular grid which was realized along the two aisles. Samples for the analyses of the soluble salts were taken from the masonry at different height (0-4.70 m) from the floor and different depth from the surface (0-9 cm). The same depth was adopted in order to take samples for the water content determination, being 2.30 m the maximum sampling level from the floor.
The analyses of the soluble salts were performed by Ion Chromatography (IC) and X-Ray Diffractometry (XRD) techniques. The water content (W.W.) was determined by weight measurements. The environmental parameters were acquired throughout one year by means of data loggers placed in four different areas of the church.
On the base of the collected data and their statistical analysis, hypotheses concerning the nature of the salt compounds were done. A model of salt and humidity distribution within the masonries and their provenance was also traced, as well as a comparison between the presence of the saline compounds and the environmental parameters.