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Climate change impact on vernacular and archaeological cultural heritage building materials in Europe and Latin America

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The analysis and interpretation of past climate data and simulations of climate models for future periods will allow us to know future climate conditions and their differences with past ones. One of the many applications of these analyzes is the study of the impacts of climate change on two types of cultural heritage that differ due to their geographical location and therefore their climatic conditions, as are vernacular cultural heritage in Europe and archaeological sites in Latin America, but they share a fundamental similarity in terms of the use of materials and construction techniques.

The first objective of our study is to review and quantify the impacts of combined climate (mean and extreme) and pollution on building materials of cultural heritage under future IPCC socioeconomic scenarios with high and low mitigation measures at years 2030, 2050 and 2070, using peer-reviewed dose-response equations.

We also focus on the degradation effects due to compound extreme events (heatwave, dry spells and extreme rainfall/flood) of each of the selected regions of our case study (European project SCORE: Sustainable COnservation and REstoration of built cultural heritage 2021-2024), in order to determine how future climatic conditions may affect the cultural heritage of some sites in Europe and Latin America. The foregoing by applying these climatic conditions in different models, based on scientific literature, that allow determining the consequences of these conditions on the materials in which these structures were built.

Finally, based on the literature review, we deliver preliminary results on a “cocktail of extreme events” experiment in laboratory specifically designed to quantify the damages and degradation of building materials due to a realistic series of adverse climate and pollution events.