

EGU22-5898

<https://doi.org/10.5194/egusphere-egu22-5898>

EGU General Assembly 2022

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Developing a new method for long-term monitoring of the weathering of historical building materials

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This contribution presents the work of research and technical development for designing a novel method for monitoring and predicting the weathering of cultural heritage, in particular of stones and timber used historically as building materials.

An apparatus for long-term field tests was designed in its hardware and software components with a twofold application:

- Exposure of a set of selected stone and wood specimens to natural weathering, at different orientations (North, South, and horizontal plane) and environmental settings (Italy and Norway).
- Non-stop acquisition of microclimate data series at different resolutions, down to the scale of the specimen surface, completed by datasets of regional stations of environmental monitoring.

Complementary laboratory analyses aim at setting a reference point for the state of conservation of each material before the exposure tests, and monitoring the changes of surface recession/topography (by 3D optical profilometry), thus reconstructing the relevant deterioration trends.

Within the framework of the EU-funded project HYPERION, this novel experimental approach is expected to help assessing the interaction of building materials with the environment and their weathering constrained by microclimate and climate variability; combining climate model simulations, the stresses brought about by climate change can also be assessed. The findings might represent a source of precious information for the activities and decision-making protocols of the stakeholders involved in the protection of cultural heritage.