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Electrical Resistivity Tomography in the characterisation of wetting patterns of historical masonry

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Electrical Resistivity Tomography (ERT) is a geophysical technique widely used to identify subsurface structures based on electrical resistivity measurements made at the surface. In recent years this technique has been used for surveying historic buildings and characterise the subsurface of walls by using non-invasive EKG electrodes. This methods is used to locate wet areas based on the lower electrical resistivity wet materials have in relation to dry ones. A good knowledge of the wetting patterns of historic buildings during, for example, rainfalls is crucial to understand the decay processes that take place in the building and plan interventions. This paper presents results of transects of Electric Resistivity Tomography of walls of the Monastery of Santa Maria de Mave (Palencia, Spain), a 9th century Romanesque building, during rainfall. ERT transects were performed with a GeoTom device (Geolog2000) in areas with and without buttresses to understand how this architectural detail affected the wetting dynamics of the building. The ERT results were integrated with other resistivity-based techniques and Thermohygrometric survey in a GIS and showed how lower resistivity surface measurements ERT correspond with areas of higher humidity. Resistivity-based techniques measured and evaporation focal points take in the interior of the building mark the outer ground level. The highest moisture content measurements do not always correspond to the visibly most damaged areas of the wall. The consecutive ERT transects show the wall getting wetter as rainfall progresses.
The comparison of the measurements obtained of a wall affected by water obtained with GIS mapping, allowed to quickly studying the development of moisture in the wall over time, which is essential for a correct diagnosis of the building.

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