Geophysical Research Abstracts
Vol. 17, EGU2015-10766, 2015
EGU General Assembly 2015

On the advance of non-invasive techniques implementation for monitoring moisture distribution in cultural heritage: a case study

María Inmaculada Martínez Garrido (1,2,3), Miguel Gómez Heras (1,2,4), Rafael Fort González (1,2), Javier Valles Iriso (2,5), María José Varas Muriel (1,6)

(1) Instituto de Geociencias, IGEO, (CSIC-UCM), Madrid, Spain, (2) CEI Campus Moncloa, UCM-UPM and CSIC, Madrid, Spain, (3) Departamento de Ingeniería Telemática y Electrónica, ETS Ingeniería y Sistemas de Telecomunicación, UPM, Madrid, Spain, (4) ETS Arquitectura, UPM , Madrid, Spain, (5) CAI de Arqueometría y Análisis Arqueológico, UCM, Madrid, Spain, (6) Departamento de Petrología y Geoquímica, Facultad Ciencias Geológicas, UCM, Madrid, Spain

This work presents a case study developed in San Juan Bautista church in Talamanca de Jarama (12th –16th Century), which have been selected as an example of a historical church with a complex construction with subsequent combination of architectural styles and building techniques and materials.
These materials have a differential behavior under the influence of external climatic conditions and constructive facts. Many decay processes related to humidity are affecting the building's walls and also have influence in the environmental dynamics inside the building.

A methodology for monitoring moisture distribution on stone and masonry walls and floors was performed with different non-invasive techniques as thermal imaging, wireless sensor networks (WSN), portable moisture meter, electrical resistivity tomography (ERT) and ground-penetrating radar (GPR), in order to the evaluate the effectiveness of these techniques for the knowledge of moisture distribution inside the walls and the humidity origin.

North and south oriented sections, both on walls and floors, were evaluated and also a general inspection in the church was carried out with different non-invasive techniques. This methodology implies different monitoring stages for a complete knowledge of the implication of outdoors and indoors conditions on the moisture distribution. Each technique is evaluated according to its effectiveness in the detection of decay processes and maintenance costs.

Research funded by Geomateriales (S2013/MIT-2914) and Deterioration of stone materials in the interior of historic buildings as a result induced variation of its microclimate (CGL2011-27902) projects. The cooperation received from the Complutense University of Madrid's Research Group Alteración y Conservación de los Materiales Pétreos del Patrimonio (ref. 921349), the Laboratory Network in Science and Technology for Heritage Conservation (RedLabPat, CEI Moncloa) and the Diocese of Alcalá is gratefully acknowledged. MI Martínez-Garrido and M. Gomez-Heras are funded by Moncloa Campus of International Excellence (UPM-UCM, CSIC) PICATA fellowships.