



Application of some integrated non-invasive sensing techniques for conservation and restoration of the Underground Church and frescoes of S. Maria della Palomba's Sanctuary, Matera (Italy)

Filiberto Lembo (1), Francesco P. Marino (1), and Nicola Ambrosecchia (2)

(1) Faculty of Engineering, University of Basilicata, Potenza - Italy, (2) Logos Innovazione Srl, Matera - Italy

Santa Maria della Palomba's Sanctuary was built in XV century on a pre-existing medioeval crypt, in a splendid landscape situation, on the front looking south of the ravine on which stands Matera, integrating in a wonderful way underground and sub divo building; in fairly following time one important cycle of frescoes renewed decoration of underground church. In the long run, felt the building into decay, structures and frescoes were flooded and damaged; so that from 1980 were executed important restoration works, realizing ventilation canals under the floor of hypogeic church, in which were incorporated heating pipes, joined to solar thermic panels, wanting to determine the thermo-hygrometric optimum conditions for conservation. Almost thirty years after, willing restore the frescoes, it was necessary to characterize completely and objectively physical existing conditions. So was used an integrated mix of some non-invasive sensing techniques:

- internal and external high resolution Sanctuary's measurement, using laser scanner 3D, in WebGIS ambient, so as to specify, in particular, whether dimensional data of non accessible parts (thickness of rock-bank, morphology and way of lying down of fracture lines), whether consistence state of frescoes;
- thermo-hygrometrical sensing of surfaces, using infrared thermography, during a time of two weeks, in correspondence of many storm, so that to establish the relation between eventual atmospherical conditions variations and changes in conditions of surfaces;

- continuous sensing of condition of surfaces, by means of thermo-hygrometrical and temperature sounds;

- continuous sensing of operating temperature, by means of a globothermometer;

all these tools were linked in a net with a data logger, and informations were transmitted using Web to computer in the office of the Society responsible for the procedure.

Remote sensing integrated system proved high liability, allowing many important functions :

- to georefer all data concerning measurement and sensing;

- to manage a great deal of information, very articulate, in an homogeneous way;

- to rationally manage measurements done using laser scanner 3D, and to show them in an inter-active way or by means of base cartography with geometrical and stratigraphical drawings;

- to perform in dynamic way, on algoritmic base, many duties of sighting, of questing, of analysing, of controlling and of verifying of data collected, so that you can get to all informations you need for designing restauration and management of monumental heritage.