

The influence of external climate on church internal microclimate

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ABSTRACT

This paper deals with monitoring microclimate in the area of church and describes influence of exterior microclimate to interior microclimate, changes during one year. The basic parameters of the interior space, ie temperature, relative humidity, dew point and specific air humidity, were monitored in the long-term in the selected sacral building. These parameters were monitored at the same time as monitoring the surroundings in the exterior. The aim of the article is to determine the influence of climatic conditions in the exterior on the changes of the internal microclimate of the church. The monitoring period was March 2018 to March 2019. In the area of church there were several probes monitoring the microclimate. The probes were in different height level and in the different areas. The building of the church consists of two chapels, the lower one, which serves as ossuary (ossarium), is partially embedded in the ground and carries the upper single nave chapel with presbytery. The main goal was to create optimal conditions for the storage of human bones in ossuary.

By optimum conditions is meant an internal environment with stable specific air humidity during the whole year period, which at the same time must create optimal conditions for natural exhale of the structural moisture of the historical building and resist the influence of alternating humidification depending on the number of visitors to the cultural monument.

The long-term monitoring of the internal microclimate of ossuary showed significant instability of the interior environment during the annual cycle, where the appropriate limits of humidity of the environment, ie excessive moisture in the spring and over-drying in the winter, are significantly exceeded. The microclimate behavior of ossuary is also different in different height levels, where the lower space acts as a pool with heavy cold air and vice versa, the space under the vault is moistened with vapor. The fact that under no circumstances of the external climate in winter is the temperature of the interior below freezing point is specific. The negative phenomenon of the internal environment of ossuary is the fact that in certain periods optimal conditions are created for condensation of water on the surfaces of walls and interior equipment of ossuary and also for the creation of ideal conditions for the formation and development of mold.

Monitoring of the internal microclimate of ossuary during everyday operation has become the basis for the subsequent design of the reconstruction of the building. The remediation proposal must address several issues at once. It has to solve the issue of reducing moisture in the peripheral and inner walls of the building, restoring original materials while maximizing their preservation, stabilizing the internal microclimate in terms of humidity, creating optimum conditions for the natural drying of residual structural moisture and, last but not least, ensuring the mode of future operation with minimal effect on changes in the internal microclimate. Due to the historical value of the building and its layout, it is possible to use forced air treatment only to a limited extent, and great emphasis must be placed on addressing this issue by using the natural physical properties of air and phenomena involving its natural flow and controlled temperature exchange between spaces.

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