Climate for Culture

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INDOOR-CLIMATE CONTROL AND MITIGATION STRATEGIES: METHODS AND DECISION MAKING

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ABSTRACT: One of the key objectives of cultural heritage preservation is to keep indoor-climate conditions in historic buildings safe for the building interiors as well as for valuable collections deposited and preserved there. Particularly, concerning the relative humidity and temperature of the interior air, there exist various standards and recommendations [1, 2]. Their application naturally depends on the character of the building, vulnerability of the collections (see e.g. various classes defined by ASHRAE [3]), regular number of visitors (concerning their comfort on the one hand and their negative impact on increasing relative humidity on the other hand), opening hours, etc.

In the talk, an overview of the indoor-climate mitigation measures and control methods that has been analyzed in the Climate for Culture project will be presented. Next to the passive approaches a number of active mitigation measures have been analysed, for example humidity control, conservation heating, humidistat heating, friendly heating, wall heating, controlled air exchange and novel methods designed based on mathematical models and damage functions. The analysis has been done using both the building simulation software [4] and the Case study experience and measurements. Finally, a user friendly decision support tool for mitigation, adaptation and preservation strategies of indoor-climate in historic buildings will be presented. The web based tool utilizes an open source software exDSS, which was developed and implemented for the given purpose by the authors.

[1] Bratasz, Ł., Allowable microclimatic variations in museums and historic buildings: reviewing the guidelines, *Climate for Collections - Standards and Uncertainties*, Jonathan Ashley-Smith, Andreas Burmester, Melanie Eibl (eds), Archetype Publications, London, (2012) 11-19.

[2] Camuffo, D., *Microclimate for Cultural Heritage*. Elsevier Science Ltd., Amsterdam, London, (1998)

[3] *ASHRAE Handbook - HVAC Applications*, Chapter 21, Museums, libraries, and archives, (2003) 21.1-21.16

[4] Broström, T., Vyhlídal, T., Simeunovic, G., Larsen, P.-K., and Zítek, P., Evaluation of different approaches of microclimate control in cultural heritage buildings, *Climate for Collections - Standards and Uncertainties*, Jonathan Ashley-Smith, Andreas Burmester, Melanie Eibl (eds), Archetype Publications, London. (2012), 105-115.

[5] Conservation of Cultural Property - Specifications for temperature and relative humidity to limit climate-induced mechanical damage in organic hygroscopic materials, European Standard EN15757, (2010)