



Assessment of the hygrothermal and energy performance of cultural heritage buildings in current and future climate change scenarios

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Of primary concern to building conservation organisations is the preservation of artworks and rare artifacts housed in cultural heritage buildings; and to this end, the methods used for control and provision of suitable indoor environmental conditions for items sensitive to variations in relative humidity, temperature and light. The importance of this issue is emphasised when taking into account the environmental impact associated with indoor climate control in these types of buildings and carbon emission reduction targets.

The work to be presented includes the outcomes from a building simulation investigation of the hygrothermal and energy performance of a National Trust cultural heritage building in the UK, where a conservation heating system and wall insulation have been introduced to the building. The effect of these interventions was assessed using the integrated heat, air and mass transfer model within the whole building simulation tool WUFI Plus, drawing comparison between predicted and measured data collected from the building for energy consumption and indoor environmental conditions (in particular relative humidity and temperature). The impact of a series of climate change scenarios on the performance of these building modifications was also investigated to determine the potential risk of future damage to the objects being housed.