

Article

Indoor Microclimate Analysis of the San Panfilo Church in Tornimparte, Italy

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Abstract: This work presents the results of a microclimatic analysis in the church of San Panfilo in Tornimparte, in the Abruzzo region, Italy. The church of San Panfilo, dating from the XII–XIII century, preserves in the presbytery some marvelous frescoes of Saturnino Gatti (1494). A measurement campaign was organized from February 2021 to April 2022 with the aim of investigating the microclimate inside the church in view of the organization of fresco restoration. The monitoring activity was performed with intensive measurements on specific days during the year and with continuous measurements throughout the whole year. The main microclimatic parameters, relative humidity and temperature, were monitored in various sites inside and outside the church. Some physical quantities, such as dew point temperature, dew point spread and specific humidity, were computed from measured data. Measured and computed data permitted to evaluate the daily and monthly values, their evolution during the year, the daily fluctuations and delay times caused by the building. The resulting discussion allowed to identify potentially dangerous events for the conservation of the frescoes. Moreover, the historic climate inside the church was detected.

Keywords: microclimate; cultural heritage conservation; historic church; indoor environmental monitoring



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1. Introduction

Some historic buildings have miraculously been preserved to the present day, overcoming many adversities such as wars, fires and earthquakes. In addition, some historic buildings preserve wonderful artworks that amaze, comfort and delight people who can admire them. The conservation of artistic and cultural heritage is therefore a duty; moreover, due to the proximity of beauty, it is also an enjoyable commitment for professionals.

The aim of studying microclimate for cultural heritage is to investigate the environmental conditions around a work of art and to individuate critical and dangerous conditions [1,2]. In fact, works of art can be conserved over time if the surrounding environment does not favor the processes of degradation. Microclimatic monitoring is therefore essential to know the environmental situation and possibly to propose solutions or improvements in order to promote conservation.

In order to establish safe ranges in microclimatic variability, some standards have been proposed, such as UNI 10829 [3] and EN 15757 [4]. The UNI 10829 standard established the methodology to evaluate the microclimate and suggested the range of variability for microclimatic parameters in order to properly preserve artworks. This norm has the advantage of giving practical guidance in organizing a measurement campaign and in fixing the safe zone using threshold values for 33 classes of artworks; its disadvantage lies in the rigid safe ranges that are not applicable in every environment. The EN 15757 standard overcame this