



Thermo-hygrometric characterization and human thermal comfort in open leisure spaces: a seasonal microclimatic analysis in public squares in Sobral/CE

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Directed to scientific initiation, this research aimed to perform a thermos-hygrometric characterization and evaluation of human thermal comfort from the analysis of parameters and methodologies used in five

public squares in Sobral/CE (Figure 1), considering the seasonality (dry and rainy periods, pre-season, and post-season) in 2021 and 2022.

Figure 1 – The selected parks and squares for thermos-hygrometric analysis.



It was believed, hypothetically, that such leisure pieces of equipment had specific microclimates since they present a significant presence of vegetation, shading, and even water bodies that contribute to easing the feeling of thermal (un)comfort of the

inhabitants who transit and use them daily, contrasting with other places in their surroundings, more artificialized, degraded and with little or no presence of vegetation or water bodies.

To proceed with the analysis, five squares, and parks were selected in different contexts of the city, located both in central portions of the urban perimeter, as well as in more distant locations, even those that have a more forested environment, presence of water resources, among other factors. The temperature and humidity variables of five sites around the city were confronted to evaluate the physical-natural and material/human characteristics that possibly interfered in the thermal load and human thermal (un)comfort analyzed from indexes.

In all, four fields were performed in different periods, considering the seasons of the year: spring (October 2021), summer (January 2022), autumn (April 2022), and winter (August 2022), generating a large amount of primary

From the graphs prepared for the five selected parks and squares, it was possible to evaluate the hourly variation of humidity and temperature over the four seasons, comparing dry and rainy periods and the pre- and post-rainy seasons. The records revealed that Cuba Square is the most uncomfortable point (Figure 3), possibly due to the significant thermal load present in the location and surroundings, with the high flow of people and vehicles, area of intense urbanization, thermal property of the building materials, besides the little presence

data, which were later treated and tabulated. The hourly measurements of each field started at 6 am and ended at 8 pm, using especially thermo-hygrometers positioned in white wooden mini weather shelters, portable pieces of equipment (anemometers, barometers, and altimeters), and sensory observations made (Figure 2) with the aid of a drone, which flew over the five points analyzed.

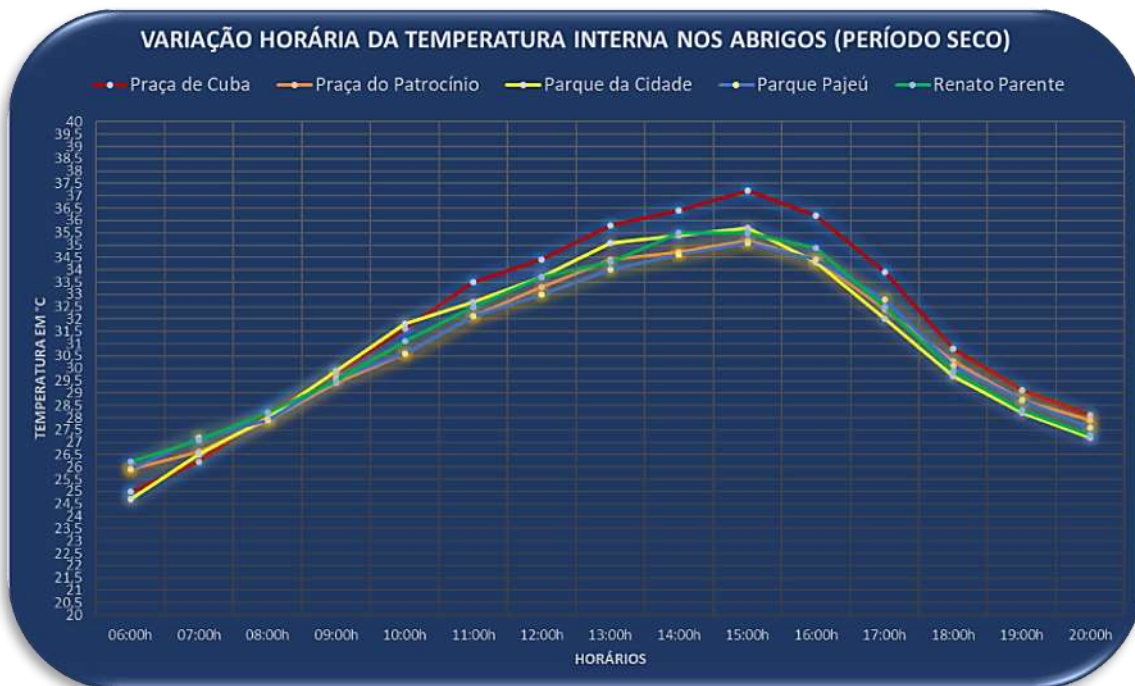
Figure 2 – Fieldwork carried out at different times of the year.



of green spaces in the surroundings, which could mitigate such discomfort.

Pajeú and Renato Parente Squares presented themselves as the locations that registered the most pleasant indices concerning comfort. The significant vegetation density and presence of water bodies in the first one and the proximity to the Meruoca Residual Massif of the second one offered a rebound in the thermos-hygrometric data, softening the feeling of discomfort, even in more critical periods and times.

Figure 3 – Hourly temperature variation in the dry season.



Through the records in the squares and parks of Sobral, the influence of urbanization on the local climate is evident, giving rise to the so-called Urban Climate, especially when assessing microclimates in these spaces considered in the research. The analyses in the studied points indicate that, although Sobral is of medium size, it presents alterations in its thermal and hygrometric field and that the urban climate system already experiences environmental consequences from the urban growth process and use and improperly soil occupation in urban areas, whose cause may be the substitution of green zones by concrete, in the view of economic activities and real estate speculation. Therefore, urban planning can

mitigate the environmental and social problems present in the cities, especially in small and medium-sized cities, which have a significant potential for such interventions. Some measures can minimize the (un)comfort typical of semi-arid environments, such as planting trees, maintenance of water bodies, and interventions in squares and parks since these can represent real humid enclaves within Sobral that contribute to the thermal comfort.

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