

## URBAN GEOMETRY PARAMETERS AS INDICATORS FOR URBANIZATION EFFECTS: A CASE STUDY IN PARANHOS, PORTUGAL

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Abstract

We are convinced of that applied urban climatology can constitute a good life quality and sustainability indicator and can contribute to minimize/avoid situations of danger – or simply of absence of bioclimatic comfort – for the urban population.

The area this urban climatology study is about (the parish of Paranhos - Porto - Portugal) grew substantially in the last fifty years, both concerning the quantitative population, the widening of the urbanized areas or the human activities, namely with the creation of a new University Pole. Based on the work done by T. R. Oke (Oke, 1978, 1987) and in order to improve the experimental knowledge of temperatures, we tried to evaluate, through the sky view factor (*svf*), how the urban geometry of Paranhos can be an external cause of the climatic subsystem, generating important contributions to changes in the behavior of temperature (thermal anomalies), especially in certain synoptic situations and in certain seasons. The methodology used is based on:

- i) Collection and statistical analysis of temperature data (in stationary and itinerant measurements of temperature in the parish of Paranhos);
- ii) Analysis of data from atmospheric pressure and temperature at the surface, relative humidity and wind;
- iii) Statistical/geostatistics comparison between collected data and data from weather station from Porto - Pedras Rubras;
- iv) Measurements of the width of the streets and the density of buildings (N° of buildings/hm<sup>2</sup>).

The correlation established between the buildings density and the thermal deviations show that the high occupation density of the soil is clearly an enabler key of the phenomenon of the urban heat island. Also the results of the regression between the occupation density of the soil expressed as the number of buildings /hm<sup>2</sup> and the sky view factor (*svf*) is explicit: the regression line shows an almost perfect inverse correlation and we can see that the most densely occupied areas and with less *svf* correspond to the areas where the urban heat island was identified most often.

Through the correlation between the values of the simplified *svf* calculation and the thermal anomalies, referred to the airport station, it is clear that the results are highly significant, it means, there is a strong correlation. The same is true for the correlation between the thermal deviations and the density occupation of the soil, given by the N° of buildings/hm<sup>2</sup>, it means, both factors strongly influence the phenomenon of the urban heat island.

### References

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