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# Assessing the urban parks cooling island effect in Barcelona by field measurements, remote sensing and outdoor thermal simulation

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Due to commonly abundant vegetation and unsealed surfaces, the parks present lower temperature than other open urban spaces and generate a cooling island effect (PCI) that extents on their surroundings. Optimize the influence of physical attributes of the parks on this effect, presents a possible strategy to mitigate warming and reduce health risks during summer daytimes in cities. However, the propagation of the cooling effect outside the perimeter of the park is defined by the relationship between its own characteristics and the microclimate of its surroundings, so recognizing the role of the attributes of these spaces in the PCI, is crucial in the generation of strategies to optimize this effect. The present work studies the relation between physical characteristics of urban parks and their cooling effect at small scale in two urban parks of the city of Barcelona: Turó Parc and Parc del Centre del Poblenou. With field measurements, remote sensing retrieval of the Land Surface Temperature (LST) from Landsat 8 and outdoor thermal simulation with the ENVI-met model, the climatic behavior was recorded inside and around the parks during the day and night on a summer day. Then, intensity and extent of the cooling effect were calculated from the air (Ta) and surface temperature (Ts). As well as the physical descriptors of vegetation, types of surfaces and building index at each measurement point were obtained by remote sensing methods and geographic information systems. The results showed a cooling extent of 80m outside the perimeter of Turó Parc and 90m in the Parc del Center del Poblenou, as well as its highest PCI intensity in the Ts during night, with 2.89 and 2.75°C respectively; and physical descriptors registered vegetation with the highest influence on temperatures inside parks and on their surroundings. Last, conclusions highlight the accuracy of the different methods applied in the micrometeorological characterization in the city of Barcelona and the potential of the parks design and location attributes in the optimization of the cooling island effect to help reduce the warming in the cities. The present study is part of the "Urban-CLIMPLAN. The urban heat island: effects on climate change and modeling for territorial and urban planning strategies. Application to the metropolitan region of Barcelona". Financed by the Ministry of Economy and Competitiveness of Spain (MINECO) and the European Regional Development Fund (ERDF).