



Evaluating the Effect of Green Infrastructure in Mitigating the Urban Heat Island Effect Using Remote Sensing

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Urban green infrastructure in the form of green roofs and vertical gardens is gradually becoming a mainstream development option to mitigate the negative impacts of dense urbanization, and primarily those associated with the urban heat island effect and the consequent vulnerability due to climate change (Nektarios and Ntoulas, 2017). Nevertheless, the quantification of the effect of green infrastructure in comparison to conventional infrastructure as well as tree parks and gardens, can be a challenge in a rapidly changing urban environment, especially due to historical gaps in environmental parameter monitoring. Here we propose the use of land surface temperature (LST) [°C] produced using freely available LandSat imagery at 30 m resolution, to evaluate the effect of green infrastructure on urban surface temperature. The method relies on the comparison of historical LST timeseries of an area of interest which has undergone urban greening interventions with adjacent city blocks that have retained their conventional urban character. The method is applied to evaluate the impact of the recently constructed Eco Campus Orange (ECO) garden, which has resulted from the renovation of 4 city blocks in Paris, France. Within an area over 3 ha, ECO employs environmentally friendly materials and 100,000 plants to feature 2,300 m² of green wall and “the largest green roof of Europe”. For the area of interest, over 250 LandSat 5, 7, and 8 multispectral images dating from 2010 to 2020, were analyzed after Ermida et al. (2020). Results show that, since its construction, LST at ECO quickly dropped by over 2 °C, reaching the LST levels of adjacent urban parks. The method is ideal for ambient temperature timeseries reconstruction where long-term monitoring is sparse and can be applied to evaluate drastic landscape changes such as urban greening or vegetation thinning.

References

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