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Multidimensional environmental exposure assessment of soft mobility users; a case study in the Brussels Capital Region

Yen-Shuo Huang[1], Maider Llaguno-Munitxa, and Gabriele Manoli[2]

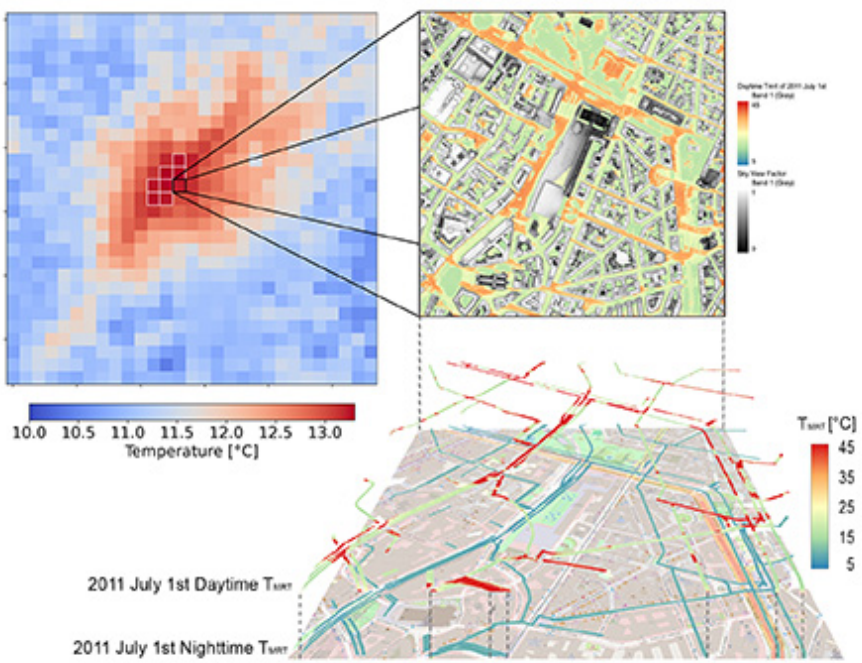
[1]Louvain Research Institute for Landscape, Architecture, Built environment (LAB) UCLouvain, Louvain-le-Neuve, Belgium

[2]ENAC IA URBES EPFL, Lausanne, Switzerland

Urban decarbonization and sustainability plans highlight the importance of sustainable mobility strategies like cycling to reduce emissions and improve citizen well-being. Cities are increasingly investing in cycling infrastructure as a key urban strategy. However, widespread acceptance of these solutions requires careful planning and assessment of environmental stressors that cyclists encounter. Ensuring safe, inclusive cycling paths is crucial to encouraging their use.

This research develops a multidimensional exposure assessment for cyclists in the Brussels Capital Region (BCR). Using detailed spatial data, it analyzes environmental exposures such as air pollution, thermal conditions, and urban greenery along cycling paths. It measures negative exposures to pollutants and heat and positive exposures to urban green spaces and sky views. The Outdoor Thermal Comfort (OTC) is assessed using the UMEP-SOLWEIG model for Mean Radiant Temperature (Tmrt), while the Digital Surface Model (DSM) calculates the Sky View Factor (SVF).

The analysis reveals spatial and temporal variations in these exposures, identifying cycling paths needing improvements. It also examines the role of green infrastructure in alleviating environmental stress, considering its types and placements along routes. This research provides a foundation for urban design policies aimed at optimizing green infrastructure and enhancing cycling path effectiveness. By pinpointing high-stress areas and times, urban planners can implement interventions to improve environmental quality for cyclists and soft mobility users. The findings offer valuable insights for shaping future urban planning strategies to promote sustainable living and soft mobility in crowded urban areas like BCR.]



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