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Toward quantitative indicators to assess the cooling effect of Blue Green Solutions by combining experimental and modelling approaches

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Urban heat islands (UHI) are expected to be more intense and to occur more frequently in the near future due to climate change. These phenomena result from the unsustainable urbanization and the degradation of natural capital, and make urban areas significantly warmer than their surrounding rural areas. While Blue Green Solutions (BGS) are usually presented as efficient tools to cool the air and mitigate UHI, their performances are hardly assessed and poorly quantified. This comes from the complex interactions linking water fluxes (precipitation, discharge, evapotranspiration) and other geophysical fluxes (heat, wind…) occurring at different space-time scales in a heterogeneous urban environment.

Based on this statement, the objective of the French ANR EVNATURB project (https://hmco.enpc.fr/portfolio-archive/evnaturb/) is to assess some of the eco-system services (ie stormwater management, cooling effect, or biodiversity conservation) provided by BGS at the district scale, and to promote the re-naturation of cities. For this purpose, experimental and modelling approaches are combined. On the one hand, experimental protocols have been implemented on a particular BGS close to Paris to assess both water and energy budgets. On the other hand, the existing distributed rainfall-runoff model Multi-Hydro is being adapted to represent the cooling effect of vegetation. In parallel, a review has been conducted on existing thermal comfort indicators.

This communication aims to present the first experimental and modelling results and how they are used to compute relevant quantitative indicators through different space-time scales. In the future, these quantitative indicators have to be linked with the environmental objectives usually defined by local authorities. A particular attention will be paid on environmental certification and labelling, and how BGS can comply some of the their requirements.

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