



Measurement and characterization of space-time variability of thermo-hydric fluxes in Blue Green Solutions

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Urban areas are facing an expected increase in intensity and frequency of heat wave events due to climate change and unsustainable urbanization. Blue Green Solutions (BGS), such as green roofs or vegetated swales appear to be particularly efficient to reduce the potential impact of new and existing urban developments with respect to this issue of urban heat islands. The performances of BGS regarding cooling effect are still not accurately assessed and require experimental feedback. It is worth noting that very few existing BGS have been monitored, and usually on a short period of time. Moreover, considered as homogenous at the infrastructure scale, the internal variability of the materials has not been studied.

These previous studies have illustrated the necessity to better monitor and estimate infiltration and evapotranspiration processes, and their related spatio-temporal variability. This is necessary to better assess the water balance or the energy budget at the infrastructure scale. It is one of the main objectives of the French ANR project called EVNATURB (<https://hmco.enpc.fr/portfolio-archive/evnaturb/>) that aims to develop a platform 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, some experiments are in progress on a large (1 ha) wavy-form vegetated roof located in front of Ecole des Ponts ParisTech (Champs-sur-Marne, France). There, several devices focussed on thermo-hydric flux (infiltration and evapotranspiration essentially) and their related variability are implemented or planned to be: a scintillometer, a water content and temperature wireless sensors network, and a portable transpiration chamber. Multifractal-based tools are used on the collected data to characterize their space-time variability. This communication aims to present the first results obtained on this innovative pilot site.

The monitoring setup developed during the EVNATURB project is designed to be portable and applied in other locations. It aims to constitute a database devoted to BGS and representing a wide range of situations in terms of soil/vegetation configuration, age, climatic conditions. It will allow following these infrastructures and their related performances over time by taking into account the possible degradation of materials.