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Multi-scale monitoring of a remarkable green roof: the Green Wave of Champs-sur-Marne

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The installation of green infrastructures on existing or new roofs has become very popular in recent years (more than 2 km2 of green roofs is implemented each year in France) for many reasons. Among all of the green roofs' advantages, those related to storm water management are often pushed forward, since it has been pointed out that urban runoff peak can be significantly reduced and delayed thanks to the green roofs' retention and detention capabilities. Microclimate can also be affected by decreasing the temperature in the surrounding green area. However, dynamic physical processes involved in green roofs are highly non linear and variable. In order to accurately assess their performances, detailed monitoring experiments are required, both in situ and in the lab, so as to better understand the thermo-hydric behaviour of green roofs and to capture the related spatio-temporal variability at different scales.

Based on these considerations, the 1 ha area wavy-form green roof of a section of the Bienvenüe building, called the Green Wave, is currently being monitored in Champs-sur-Marne (France), in front of Ecole des Ponts ParisTech. Initiated in the "Blue Green Dream" European project, detailed measurements systems have been implemented for studying all components of the water balance. Among others, a wireless network of water content and temperature sensors has been especially installed for characterizing spatial and temporal variability of infiltration, retention and evapotranspiration processes. In parallel, some laboratory tests have been conducted to better characterize the hydro-mechanical properties of the substrate. Moreover, at the Green Wave scale, some discharge measurements are carried out in the storm-water pipes that are collecting drained water, to determine runoff flow.

This talk will present the current monitoring campaigns and analyze the data collected in the Universal Multifractal framework. This work represents the initial stage for developing a model capable to simulate reliable hydrological responses of different kinds of green roofs. Such a tool could be used to quantify hydrological impacts and interfere with the stormwater policies at the lot scale.