

**Job title:** Post-doctoral research position in hydrology: analysis of the behaviour of low impact development techniques on an urban campus

**Geographical location of the position**

78190 Trappes, France

**Position start date and duration**

January 1, 2024 ; for 12 months

**Presentation of the team :**

CEREMA is a center for resources and scientific and technical expertise on public policies for sustainable development. The Ile-de-France division employs 190 people, and its Trappes site employs around 100, including part of the Ville Durable department, which works in the fields of the environment and urban living conditions. This department is home to the TEAM group, which conducts research into water transfers in built environments (cities and transport infrastructures) and their interactions with soil, climate, and vegetation.

**Mission :**

Managing rainwater at source in cities has been gaining momentum for several years now, against a backdrop of increasing pressure (climate change and urban growth) and social aspirations to reintegrate water and nature into urban spaces. Retention, infiltration and evapotranspiration of rainwater are encouraged, but the impact of their widespread use on the scale of a development project remains poorly understood. This is the aim of the MYSTIC research project signed between the G.Eiffel University, the Établissement Public d'Aménagement Paris-Saclay and Cerema's TEAM in 2011, which focuses on the development of the Moulon urban campus. On more than 300ha, rainwater management using Low Impact Development techniques (LID) is widespread, despite an unfavorable context (low permeability of soil and shallow water table). MYSTIC is structured around 3 actions: i) a 3-dimensional geological model of the area has been built; ii) detailed hydrological monitoring is carried out continuously on a variety of objects and variables (water table levels, water pumping from 4 buildings underground, hydrological balance of an infiltration basin, and flowrates at the rainwater network outlet); and iii) an integrated hydrological model is implemented to simulate the interactions of various development scenarios (URBS model).

The proposed post-doctoral work involves investing available observations to better understand the hydrological behavior of the Moulon district, and in particular the interactions between rainfall, LID techniques, underground developments and the water table. The available database is extensive, with variables acquired continuously over several years, representing a diversity of processes at various spatial scales. The first task will be to familiarize ourselves with the available data and the supporting IT environment (Python language). The next step will be to exploit and interpret the data, from different angles and with a critical eye on their quality (uncertainties estimation). Without prejudging the relevant interpretations to be made, particular attention could be paid to i) interactions between the behavior of different techniques (subsoil, infiltration basin) and water table levels, and ii) the consistency of behavior at different spatial scales, from technique to watershed. Depending on the progress of the work and the possible extension of the post-doc, contributions to the modelling of the observed behaviours will be possible, either with the URBS model already implemented, or with a more conceptual and simplified approach.

**Condition:**

The proposed monthly salary is around €2,100 net, to be adapted according to experience. The duration of the post-doctoral is 12 months, starting on January 1, 2024; a 6-month extension is possible (depending on funding).

**Contact:**

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