# ParisTech

## École des Ponts ParisTech

### RESEARCH TOPIC FOR THE PARISTECH/CSC PHD PROGRAM

**Field: Environment Science and Technology, Sustainable Development, Geosciences**

**Title:** Develop an innovative framework to assess the environmental performances of a new train station over time

**ParisTech School**: Ecole des Ponts ParisTech

**Advisor(s) Name**: Pierre-Antoine VERSINI
**Advisor(s) Email:** *pierre-antoine.versini@enpc.fr*
**Research group/Lab:** *HM&Co*
**Lab location:** *Champs-sur-Marne*
**(Lab/Advisor website):** *https://hmco.enpc.fr/*

### Short description of possible research topics for a PhD:

Train stations appear as complex infrastructures as they can no longer be considered just as some transit points, but rather as systems advocating multimodality and multi-functionality. This complexity should also be considered when studying their environmental impacts. In this context, this PhD subject aims to study, through the example of a particular station of the Greater Paris (Grand Paris Express under construction), the necessary consideration of the interactions between the different geophysical fields (temperature, precipitation), urban form (transport network, planning and green spaces) and human flows, as well as their space-time variability. Coupling literature review, measured observations, and distributed model simulations (New tools should also be developed if necessary) will led to identify and assess the main environmental issues concerning the station. They will aim to capture the space-time variability of the involved processes and variables, but also their interactions. This work should illustrate the necessity to adopt a complex system and multi-scale approach to well understand the interaction of an infrastructure with its surrounding urban environment.

### Required background of the student:

Have skills in the modelling of mechanics (graduated in fluid mechanics or environmental physics), capabilities in computer simulations, and be of interest to urban geophysics.

### A list of 5 (max.) representative publications of the group:

1. Versini, P.-A., Kotelnikova, N., Poulhes, A., Tchiguirinskaia, I., Schertzer, D. and Leurent, F., 2018. A distributed modelling approach to assess the use of Blue and Green Infrastructures to fulfil stormwater management requirements. Landscape and Urban Planning, 173: 60-63
2. Versini, P.-A., Gires, A., Schertzer, D. and Tchiguirinskaia, I., 2020. Fractal analysis of green roof spatial implementation in European cities. Urban Forestry & Urban Greening, 49, 126629