The Fresnel Platform for increasing the Greater Paris resilience to spatio-temporal variability of local rainfall

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Objectives

Urban areas are under the threat of climate change. To overcome this challenge it is necessary to deepen our understanding of heavier and particularly local rainfall to avoid flooding and build resilient cites that can become sustainable. The main difficulty is that geophysics and urban dynamics are strongly nonlinear with associated extreme variability over a wide range of space-time scales.

Paris flood, 2016

To better connect theoretical and experimental research on these topics, an advanced urban hydro-meteorological observatory with associated SaaS (Software as a Service) developments, the Fresnel platform of the Co-Innovation Lab of the École des Ponts ParisTech, has been purposely set-up.
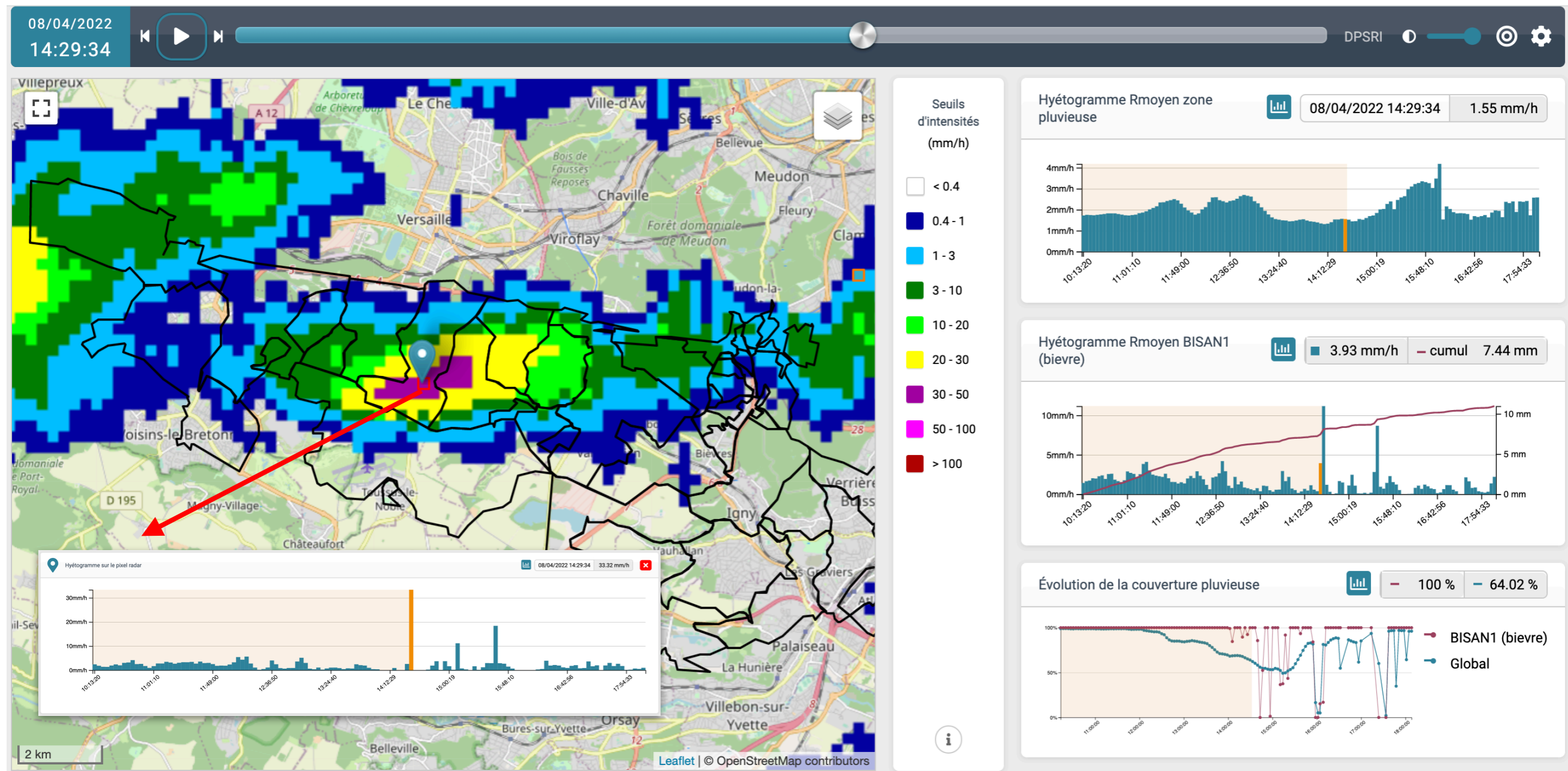

X-band radar at ENPC

RADX SAAS ARCHITECTURE
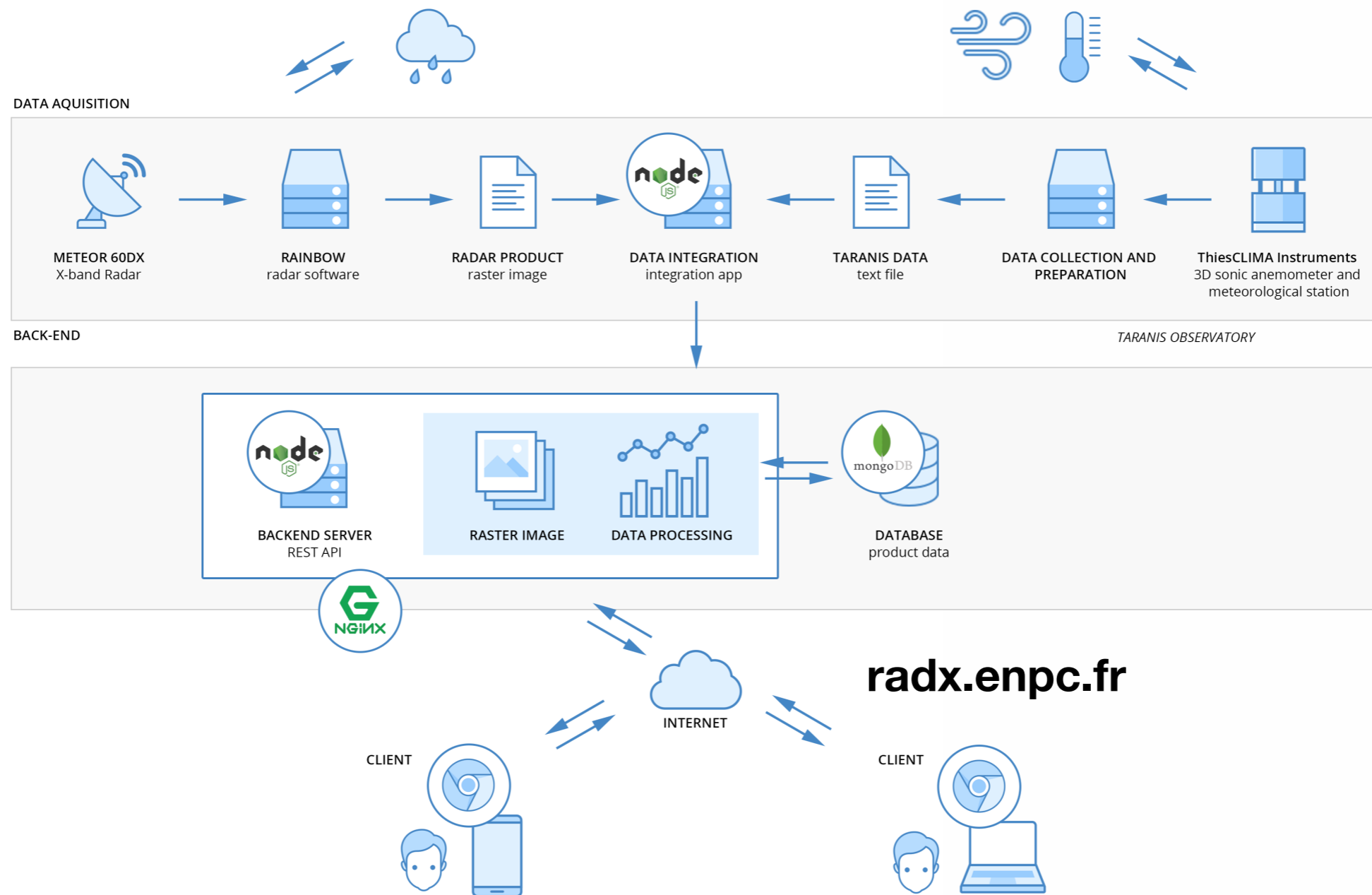
Results

**Measurement of high spatial and temporal resolution of precipitation over the catchment**

radx.enpc.fr provides users with rainfall on catchment analysis, with a high spatial resolution up to 125m, and a temporal resolution of 3 min 26 s.
Illustrated here is *Vallée de la Bièvre* catchment located south-west of *Paris*.

Results

Coupled with the data from the exTreme and multi-scAle RAiNdrop parIS (TARANIS) observatory from the Fresnel platform.
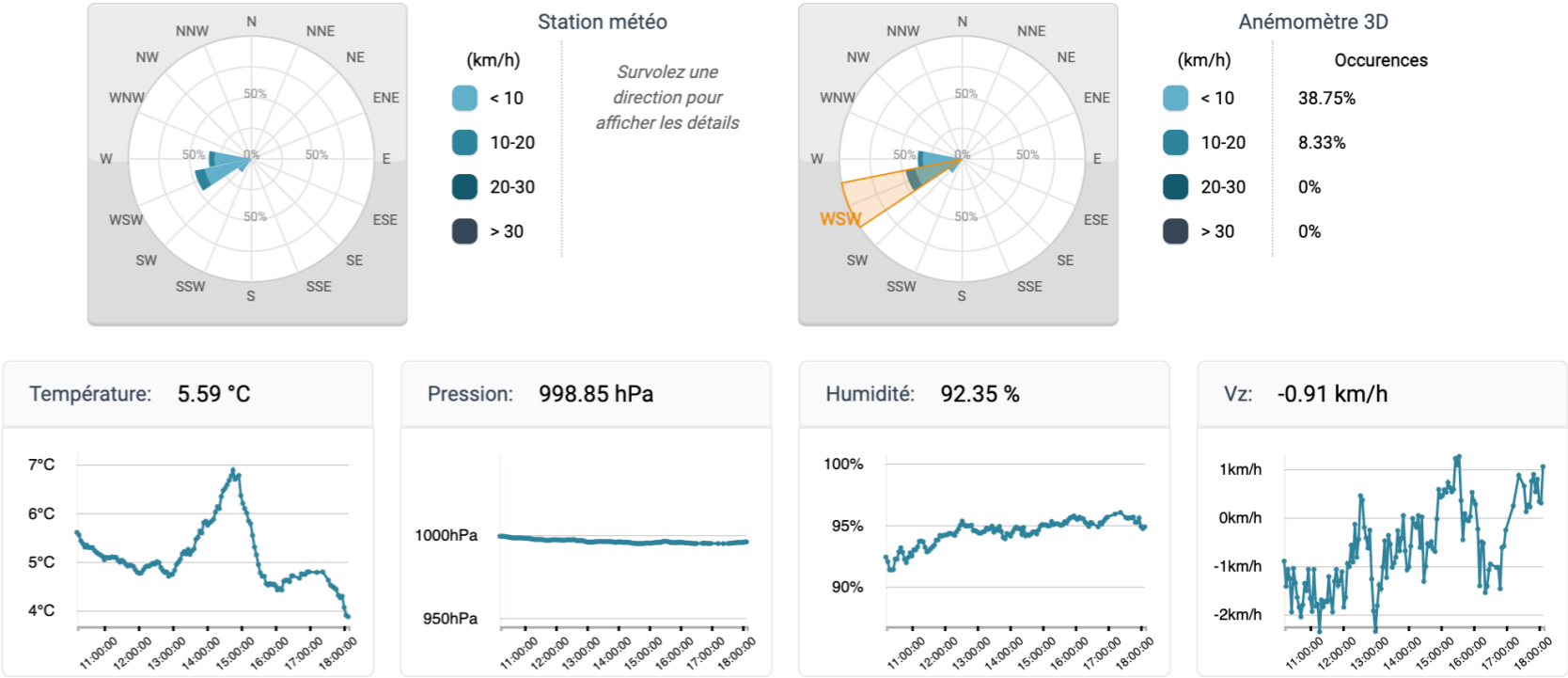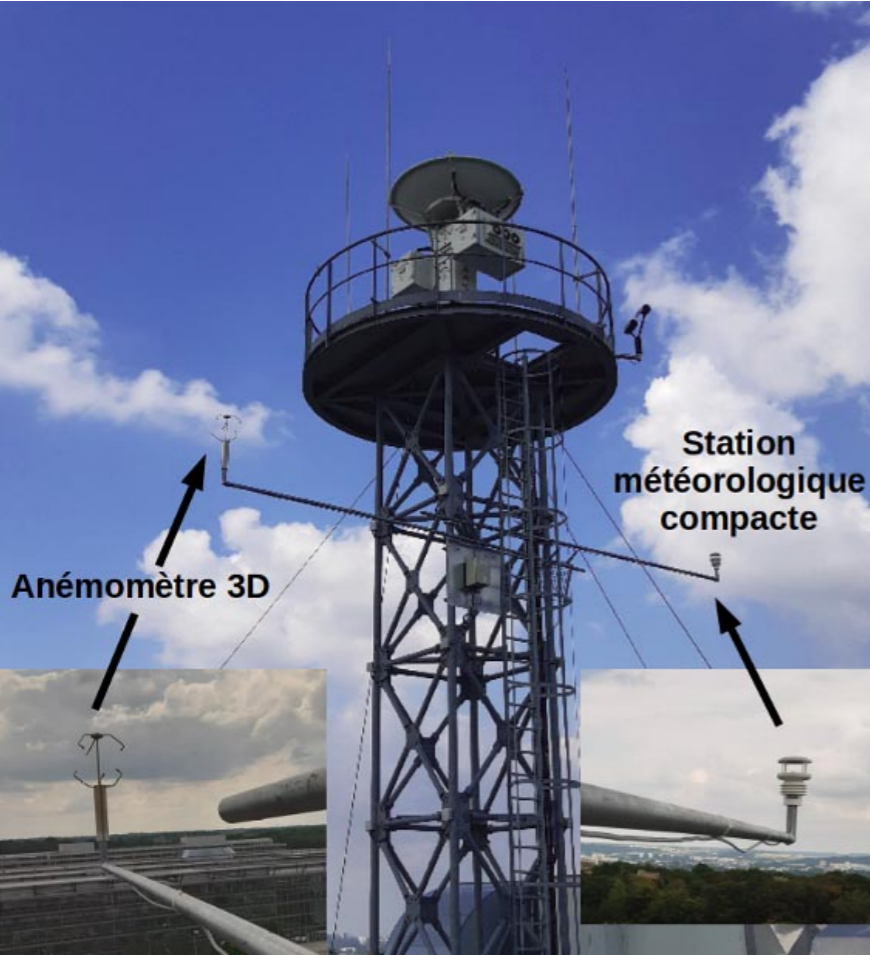
3D sonic anemometer and a meteorological station (ThiesCLIMA) provide information about the weather situation at the radar position such as 3D wind, temperature, pression and humidity.

Next steps

Coupling with Multi-Hydro…

Multi-Hydro is a distributed physical model that has been developed from four open-source software applications already used separately by the scientific community. Its modular structure includes a surface flow module, sewer flow module, a ground flow module and a precipitation module. A final module for modeling green roofs has been added to study the benefits of these nature based infrastructures.

Multi-Hydro surface flow module output from the Guyancourt catchment for illustration purpose, rendered in QGIS.
In blue <=1mm water infiltration, in yellow more than 1mm.
Spatial resolution: 10m
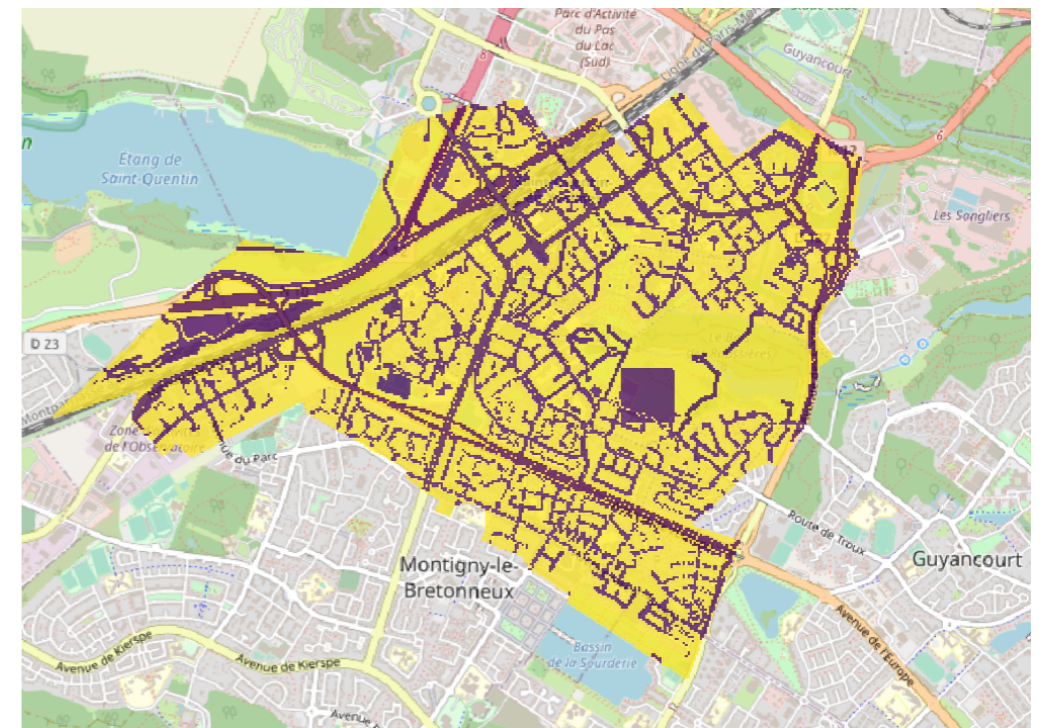
…that will enable: user interface for simulations, nowcasting and flooding alerts.