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

Guillaume Drouen, Daniel Schertzer, Auguste Gires, and Ioulia Tchiguirinskaia

ENPC, HM&Co – Laboratory of Hydrology Meteorology & Complexity, France (guillaume.drouen@enpc.fr)

Urban areas are at stake 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 cities 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.

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. The mission of the Fresnel platform is to facilitate synergies between research and innovation in the pursuit of upstream research and the development of innovative downstream applications. With profiled access for specialized services, it provides the concerned communities with the necessary high resolution measurements in real time and in replay form, that easily yield Big Data.

The Fresnel platform unites several components. One of them, the RadX SaaS platform, provides online tools to study rainfall data over the greater Paris area (i.e., about 50 km radius and more). It provides an easy access to various products based on precipitation measurements performed by the ENPC polarimetric X-band radar at the pixel scale of 125 m. It broadcasts these measurements in free access and in real-time (<https://radx.enpc.fr>) together with a point measured environmental parameters provided by another component of Fresnel, namely the exTreme and multi-scAle RAiNdrop parIS observatory (Taranis) observatory, containing several, a 3D sonic anemometer and a meteorological station.

The RadX platform was developed in participatory co-creation, and in scientific collaboration with the world industrial leader in water management. As the need for data accessibility, fast and reliable infrastructure were major challenges, the platform was constructed as a cloud-based

solution. The components that make up this platform are designed to be configurable for specific case studies using an adjustable visual interface. Depending on a case study, specific components can be integrated to meet particular needs using maps, other visual tools and forecasting systems, eventually from third parties.

Developments are still in progress, with a constant loop of requests and feedback from the scientific and professional world.