



Characterization and Understanding of the spatial variability of precipitation over Paris area observed by radars in the last 25 years.

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With a current population of over 12 million (Eurostat 2021), the Ile-de-France region is particularly vulnerable to climate change, air-quality and water scarcity. Socio-economic development is leading to a degradation of the urban environment as a result of all human activities and the artificialization of land. Mitigating these adverse effects requires the implementation of specific adaptation policies to make the region more resilient to extreme events (such as heat waves, floods, droughts, pollution episodes), but also to better manage water resources. To achieve this, we need to better characterize and understand the dynamics of precipitation in this region.

The presence of urban areas modifies the interactions between the surface and the atmosphere through the modifications of energy and water budgets inducing the urban heat island effect, an increased surface roughness, and anthropogenic aerosols emissions. Several studies investigated the impact of these urban areas on precipitation with various conclusions due to lots of disparity (methods, datasets, cities' characteristics, climate) between the studies (e.g Lalonde et al., 2023; Liu and Niyogi, 2019). By using a unique methodology and a radar product covering the whole Continental USA at 4km resolution or the whole Europe at 2km resolution over tens of years, Lalonde et al. (2024) still highlighted a large diversity of urban impacts between cities, concluding on the necessity of specific analysis for each city.

In this study, we use the recently available long-term 1 km/hourly radar product COMEPHORE (Tabary et al., 2012) which provide precipitation rates over France since 1997 to characterize the spatial variability of precipitation over Ile de France with a special focus on the impact of urban area. We complement this dataset with vertical profiles of reflectivity and vertical velocities provided by one radar located in a southwest suburb of Paris (most of the time upwind from Paris city center) and another one located in the city center to detect potential differences in microphysical properties of precipitation between urban and upwind environments.

In the next step, we aim to assess the role of aerosols and urban form in this variability.