

WCRP CORDEX Flagship Pilot Study: “URBan environments and Regional Climate Change (FPS URB-RCC)”

Cities play a fundamental role on climate at local to regional scales through modification of heat and moisture fluxes, as well as affecting local atmospheric chemistry and composition, alongside air-pollution dispersion. Vice versa, regional climate change impacts urban areas and is expected to more severely affect cities and their citizens in the upcoming decades. Simultaneously, the share of the population living in urban areas is growing, and is projected to reach about 70% of the world population by 2050.

This is especially critical in connection to extreme events, for instance heat waves with extremely high temperatures exacerbated by the urban heat island effect, in particular during night-time, with significant consequences for human health. Additionally, from the perspective of recent regional climate model developments with increasing resolution down to the city scale, proper parameterization of urban processes is starting to play an important role to understand local/regional climate change. The inclusion of the individual urban processes affecting energy balance and transport (i.e. heat, humidity, momentum fluxes) via special urban land-use parameterization of distinct local processes becomes vital to simulate the urban effects properly.

The main aim of the Flagship Pilot Study (FPS) URBan environments and Regional Climate Change (URB-RCC) is to understand the effect of urban areas on the regional climate, as well as the impact of regional climate change on cities, with the help of coordinated experiments with urbanized regional climate models (RCMs).

While the urban climate with all the complex processes has been studied for decades, there is a significant gap to incorporate this knowledge into RCMs. This FPS aims to bridge this gap, leading the way to include urban parameterization schemes as a standard component in RCM simulations, especially at high resolutions. The results of URB-RCC aim to provide information for risk management to urban stakeholders, towards climate resilient cities.

Main objectives:

- Investigating interactions of the urban environment with local-to-regional climate for (mega)cities based on coordinated ensembles using urbanized regional climate models (RCMs) in CORDEX experiments.
- Understanding and assessing urban climate change impacts, across local-to-regional scales.
- Assessing options for urban parameterization schemes in high-resolution RCM simulations for further use in CORDEX.
- Better understanding the urban environment’s vulnerability under climate change and providing the urban climate change science to underpin climate services for cities.

URB-RCC aims to contribute to the Special IPCC Assessment Report planned for cities in AR7 Assessment cycle, WCRP Activities, and the SDGs (Sustainable Development Goals) particularly on sustainable cities (#11), climate action (#13) and health (#3).

The FPS URB-RCC encompasses around 30 partners across the globe.

The FPS URB-RCC has been officially endorsed by the World Climate Research Programme ([WCRP](#)) Coordinated Regional Climate Downscaling Experiment ([CORDEX](#)).

Project starting date: 01 May 2021
Expected lifetime: 5 years