



## Urban climate and environmental sciences for integrated urban services for sustainable cities

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Migration to cities creates densely populated environments and associated infrastructure, which result in ever increasing vulnerabilities and exposure to natural and anthropogenic hazards. The United Nations has identified “sustainable cities and communities” as one of its Sustainable Development Goals (UN SDG11).

Many organizations, including WMO, recognize that rapid urbanization necessitates new types of services that make best use of science and technology. To support the implementation of UN SDG11, WMO has adopted a cross-cutting urban focus as one of its priorities and suggested the novel concept and approach of Urban Integrated Hydro-Meteorological, Climate and Environmental Services – known as Urban Integrated Services (WMO, 2018) to support safe, healthy, sustainable and resilient cities. Such integrated urban weather, environment and climate services (Grimmond et al., 2014; Baklanov et al., 2016, 2018) should assist cities with planning and in facing hazards like storm surges, floods, heatwaves and air pollution episodes, especially in changing climates. The aim is to develop science-based urban integrated services that meet the special needs of cities through a combination of dense observation networks, high-resolution forecasts, multi-hazard early warning systems and long-term urban climate projections at sub-urban scales for the design and planning of sustainable and resilient cities.

To develop such systems a solid scientific background for understanding and predicting atmospheric conditions and their interactions with other components of the Earth System in cities at multiple scales are needed (WWOSC, 2015), including: (1) development of high-resolution seamless coupled environmental prediction models that include realistic city-specific processes, boundary conditions and fluxes; (2) enhanced observational systems to support these models to provide high quality forecasts for new urban services; (3) provision of meteorological and related environmental variables to aid protection of human health and the environment; (4) new targeted and customized delivery platforms using modern communication techniques, developed with users to ensure that services, advice and warnings result in appropriate action; and (5) development of new skill and capacity to make best use of technologies to deliver new services in complex, challenging and evolving city environments. Several recent international scientific studies have been initiated to explore these issues. Relevant achievements and outcomes from key European and WMO research projects will be demonstrated.

The presentation will demonstrate the novel concept and approach of Urban Integrated Services on examples of several selected cities on different continents with good existing practice and provide a synergy of cities experience, achievements and research findings, as well as existing gaps in knowledge and further research needs.

### References

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