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## The 9th International Conference on Urban Climate

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## ABSTRACT

The study of urban climates now represents a full scientific field on its own. The 9th International Conference on Urban Climate (ICUC-9), held in July 2015 in Toulouse, France, provided a recent forum for urban climate scientists to share the results of their research. This introduction paper presents the 20 articles of this special issue. They are representative of the variety of the themes that are encompassed by the urban climate community: study of urban climate processes, new observational and modeling techniques and methods, urban design with climate, geospatial datasets, bioclimatology and health, interdisciplinarity, climate change mitigation & impacts in urban environments, and transfer of urban climate knowledge to urban planners. These papers were selected from student awards winners as well as from more senior researcher contributions. ICUC-9 was the largest ICUC held to date, reflecting the increased interest in climate and meteorology at the urban scale by the research community. The selection of articles helps point towards areas of future urban climate research. More planners, social scientists and scientists from outside the 'pure' discipline of urban climate were present than during previous editions, allowing the rise of new themes as interdisciplinary and transfer to urban planners.

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## 1. The conference

The study of urban climates now represents a full scientific field on its own. The growth in urbanization worldwide has induced many societal and scientific questions related to the impact of cities and human

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settlements on the atmosphere, at various temporal and spatial scales. From its early beginnings in the 1960s, when the first observations of urban meteorological processes appeared and the study of urban climates expanded from descriptive climatologies, the field of urban climatology has expanded to include closer links with meteorology and has matured to become a predictive scientific field of study.

The 9th International Conference on Urban Climate (ICUC-9), held in July 2015 in Pierre Baudis congress center, Toulouse, France, provided a recent forum for urban climate scientists to share the results of their research. The ICUC conference series is organized on behalf of the International Association for Urban Climate (IAUC) on a triennial basis. ICUC-9 is the continuation of a series of similar conferences starting in Kyoto, Japan in 1989, followed by those in Dhaka, Bangladesh in 1993, Essen, Germany in 1996, Sydney, Australia in 1999, Lodz, Poland in 2003, Göteborg, Sweden in 2006, Yokohama, Japan in 2009, and Dublin, Ireland in 2012. ICUC-10 is scheduled for New York, USA in 2018. The success of this series has helped to create a cohesive international community of urban climate scientists. The aims of these conferences are to provide an international forum where the world's urban climatologists can meet to showcase and discuss modern developments in research, and the application of climatic knowledge to the design and management of cities. They cater to the interests of a diverse community of meteorologists, climatologists, hydrologists, ecologists, engineers, architects, urban planners and others interested in these topics.

ICUC-9 was held jointly with the 12th Symposium on the Urban Environment organized by the Board of the Urban Environment of the American Meteorological Society. For five full days from July 20–24, 2015, nearly 600 delegates from more than 60 countries representing every continent, shared their results, exchanged views, opened new collaborations and discussed future research (Fig. 1). ICUC is also the formal moment during which the urban climate community, through the IAUC, rewards eminent researchers for their career and contribution to urban climate with the Luke Howard award (Fig. 2). During ICUC-9, Professors Kanda and Brazel received the 2014 and 2015 Luke Howard awards, respectively.

Perhaps due to the crucial societal issues arising in Asian megacities, scientists from Asian countries (mostly from Japan, China, Hong-Kong, Korea) formed the largest group of attendees, followed closely by scientists from European countries. While most urban climate research has often focused on mid-latitude cities, ICUC-9 included many presentations of work on tropical cities in Africa, South-America and Asia. In total, 338 oral thematic presentations (Table 1) were organized in four parallel sessions, and nearly 300 posters were presented. All the abstracts and the majority of oral presentations are available online on <http://www.meteo.fr/icuc9>.

The conference sessions were organized following eight themes (Table 1). Four plenary sessions by renowned researchers were representative of the variety of conference themes: Robert Bornstein from San José State University, USA, focused on the physical processes of how cities impact precipitation and thunderstorms. Lee Chapman (University of Birmingham) presented new possibilities for intra-urban meteorological networks composed of hundreds of stations, with the arrival of connected and low cost stations, and the forthcoming revolution of crowd-sourced data. These sensors and networks may help overcome limitations of past urban climate observations that have often been limited to either a few site measurements, or a more spatially intensive, but temporally limited network operated during experimental campaigns. In the framework of climate (and global) changes, Andrew Coutts from Monash University, Melbourne, Australia, focused on advances of urban greening adaptation strategies and urban tree benefits. Edward Ng, from the Chinese University of Hong Kong presented his architect's view on how to transfer the relevant climate information to urban planners in an efficient manner and how to tackle the coming climate change challenges in Asian cities.

The 20 articles of this special issue are representative of the variety of the themes that are encompassed by the urban climate community. They were selected from student awards winners as well as from more senior researcher contributions.

## 2. Classical disciplinary themes

As expected, classical disciplinary themes studied by the urban climate community for several decades, were well represented:

- Sessions on the 'Study of urban climate processes' form the disciplinary core of urban climate understanding. Many results on urban climate processes in the atmospheric boundary layer were found by coupling several instrumental techniques or instruments, with remote sensing information more widely used.

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