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From the IAUC President

Colleagues, welcome to the 45th edition of the newsletter for the IAUC, *Urban Climate News*. Included in this edition is a report on the recent **8th International Conference on Urban Climate** (ICUC8), which was held in collaboration with the 10th Symposium on the Urban Environment. The collaboration between the IAUC and the AMS ensured that there would be one conference dedicated to the study of urban climates during 2012. ICUC8 was held in Dublin where I had the honour of acting as host. For my part, I was pleased with the event and the opportunity to meet many colleagues who travelled from far and near. Fortunately, the weather agreed with the occasion – for those of you unused to the vagaries of Irish weather, it was a minor miracle to get a 'dry' week in the midst of the wettest summer on record. I have stored a number of images taken at the event at a flickr page, which I hope resurrects good memories (a sampling can be seen here on pages 23-24).

In this issue, **Rohinton Emmanuel** summarises the conference so let me focus on just a couple of related topics. First, let me congratulate **Tim Oke** on receiving the Founder's Prize in recognition of his role in establishing the IAUC, which is now 12 years old. Since its inception, it has developed a unique profile as an organisation with a distinct focus and membership. Its success is in large part due to the spirit in which it was formed and with which it functions.

Second, please take note of the paper by **Jason Ching** in this issue. Much of the material in it is based upon his plenary presentation to ICUC8. It has often struck me how little we know of the physical geography of the cities of the world – their construction materials, buildings, roads, layout, vegetation, etc. This ignorance poses a real barrier to our understanding of the different urban effects and our ability to compare places. I hope that the project outlined by Jason can be developed to involve the wider IAUC community in a project that will fill in some of these gaps.

Finally, I would like to use this column to thank the large number of people who ensured the success of ICUC8. These include the Local Organising Committee, the Boards of the IAUC and of the Urban Environment, the members of the Student Awards Committee, the Session Chairs and the student volunteers. We are now in the process of deciding on ICUC9, which will be held in 2015 where I hope we can meet up again.

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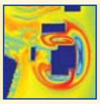
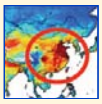
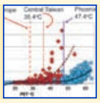
Inside the Fall issue...







Looking back at ICUC8 in Dublin

Urban climate addressed at International Geographical Congress in Cologne

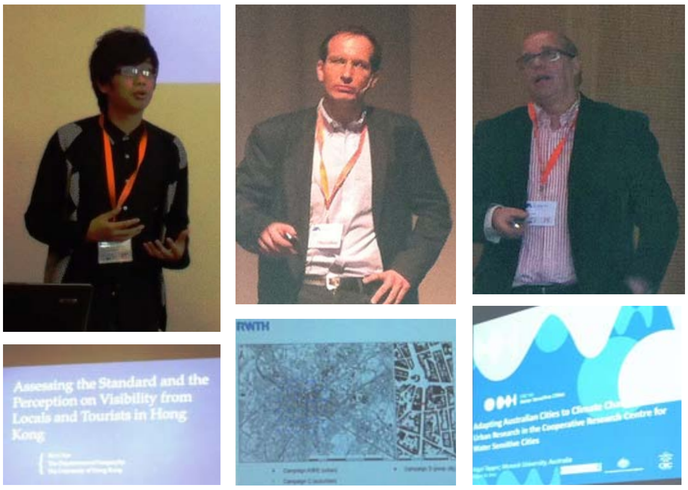
August 2012 — Climate change over a range of temporal and spatial scales was a major theme at the **32nd International Geographical Congress** held in Cologne, Germany on August 26-30, 2012. Two sessions at the congress were devoted exclusively to the climate of cities.

Nigel Tapper of Monash University explored the links between population size, urban density, removal of storm water and the urban heat island. He stressed that typical maximum UHIs for large cities are on the same order of magnitude as projected warming in many regions during the 21st century, so a realistic concern is that urban consolidation with no consideration of the climatic effects of such a process will be problematic, particularly in the face of climate change – the so-called "urban climate-climate change nexus." He proposed is that a holistic approach needs to be taken in urban design, using green infrastructure, maintenance of water in the urban environment and smart building materials as the urban consolidation procedes.

Tapper also emphasized that not all heat island mitigation approaches are appropriate in all urban environments. Under the auspices of the Cooperative Research Centre for Water Sensitive Cities at Monash University, Melbourne, multi-disciplinary research efforts are currently being devoted to, amongst other things, identifying what heat reduction strategies, particularly those associated with water in the environment, are best applied in a range of Australian climates. Actively pursuing heat reduction strategies in urban environments, where most of the global population live, and where temperatures are already elevated, might provide some "head room" to manage the increased temperatures associated with future climate change.

Nina Schwarz (Helmholtz Centre for Environmental Research - UFZ) looked at ways in which urban form influences the surface urban heat island (SUHI), using remotely sensed land surface temperatures to describe urban temperature patterns. It was stressed that the SUHI is especially important in the light of climate change, likely inducing rising mean temperatures and more frequent heat waves. When assessing measures to adapt cities to climate change – such as altering their physical configuration or protecting and/or creating more green urban areas or water surfaces – Schwarz said it is essential to analyse the influence of the overall spatial structure of cities on the SUHI. As such, the study she presented investigates the effect of urban form on the extent of the SUHI for European cities.

A number of data sources were used, including MODIS monthly land surface temperature data products and landscape metrics based upon CORINE land cover data. Classification of urban regions was done according to European Larger Urban Zones, proposed by Eurostat and the Urban Audit initiative, and meteorological and climatological factors (precipitation, thermal climate zone) were considered together with topography (elevation, distance to coast). A statistical analysis was used to quantify the influence of urban form on the SUHI in European Larger Urban Zones when controlling for overall climate and topography, providing insights into the relationship of the spatial form of a city and its SUHI as well as implications for spatial planning.



Photos: Hadas Saaroni, Tel Aviv University

Pak Hong Yue (The University of Hong Kong) examined the increasing trend toward visibility degradation in recent decades. While the level of visibility has proven to be related to pollutant levels in the atmosphere, visibility degradation would be a signal for deteriorating air quality and a potential threat to the health of local populations. Hong Kong has long been famous for its fabulous vistas as viewed from "The Peak," which in 2010 was visited by 28% of the more than 36 million tourists in the city. The blurring of these views caused by visibility degradation can impair their enjoyment and impact economic activity.

In this study, questionnaires and meteorological measurements were used to analyse the impact of visibility degradation in Hong Kong. The perception of visibility reduction of tourists and locals was examined to outline the factors affecting their choices of perception and their responses to the problems. Also, the study aimed to deduce a perceived standard of visibility violation through photographic investigation, and to yield insights for government planners, tourist boards and monitoring organizations to develop better regulation and standards for visibility inHong Kong.

Shogo Shimizu and **Hideo Takahashi** (Tokyo Metropolitan University) investigated the seasonal variation in cool island effects of urban green spaces. Year-round temperature variations within and in the vicinity of two urban green spaces of different sizes in the Tokyo metropolitan area were observed, showing that diurnal patterns of cool island intensity vary with season. In summer, daytime cool island intensity was larger than nighttime intensity, whereas it was the opposite in winter. This was attributed to the shade effect of tree canopies and high transpiration rate from tree leaves in summer, and leaf abscission in winter. In spring and autumn, diurnal variation of cool island intensity was smaller than that in summer and winter.

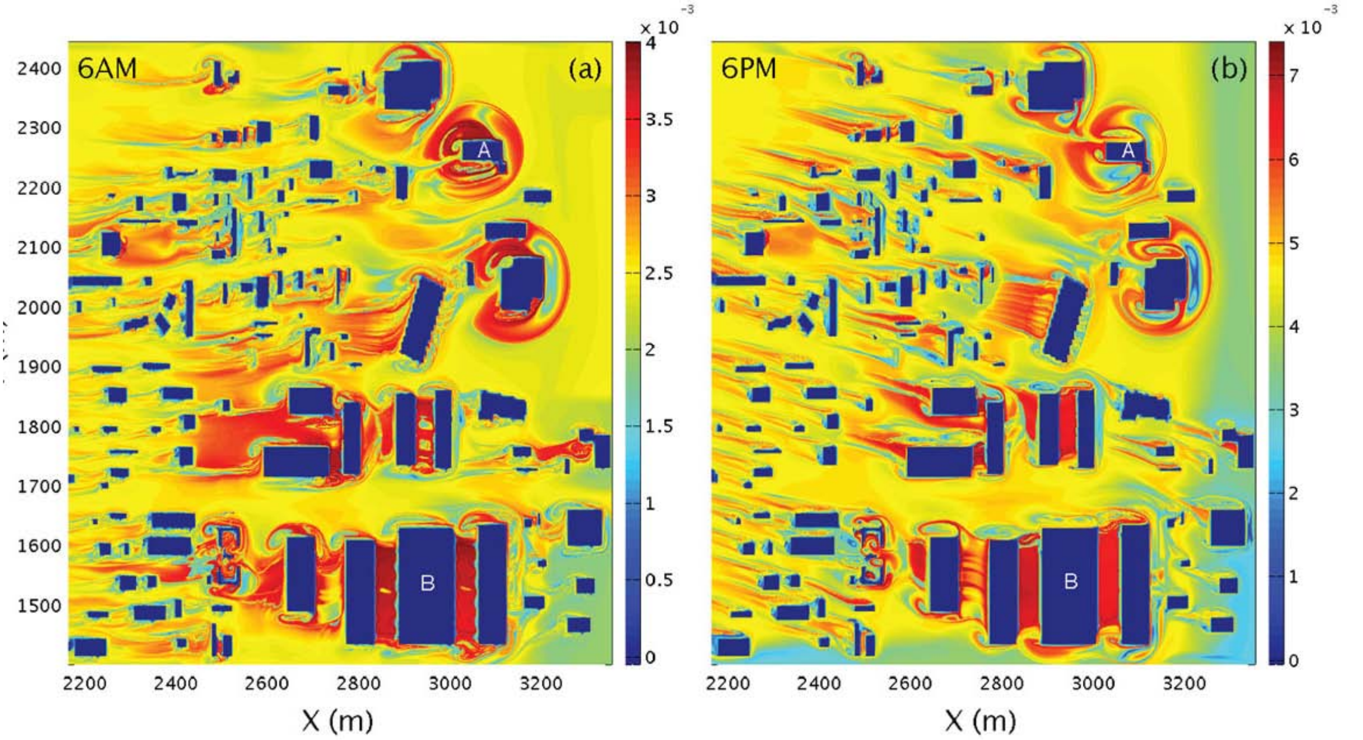
Wind Concentrates Pollutants With Unexpected Order in an Urban Environment

August 2012 — Cities – with their concrete canyons, isolated greenery, and congested traffic – create seemingly chaotic and often powerful wind patterns known as urban flows. Carried on these winds are a variety of environmental hazards, including exhaust particles, diesel fumes, chemical residues, ozone, and the simple dust and dander produced by dense populations.

In a paper published in the American Institute of Physics (AIP) journal *Physics of Fluids*, researchers present the unexpected finding that pollutant particles, rather than scattering randomly, prefer to accumulate in specific regions of the urban environment and even form coherent structures. "The unexpected finding is coherent patterns in fluid flows were thought to have no real analog in nature," said Wenbo Tang of Arizona State University in Tempe. "In previous studies, the existence of these patterns in fluid flows was only verified with idealized 'theoretical' flows. It was not known if such structures were robust enough to manifest in the environment."

The researchers were able to verify this by using a new mathematical formula, the first of its kind, to simulate the long-term random motion of pollutant particles as would be found in the real world. These more realistic simulations revealed that coherent patterns emerged from the random motions of particles carried along by the urban flow. The results can be used to generate maps of well and poorly mixed regions and highlight urban areas that are most susceptible to high concentrations of pollutants, indicating locations that should be avoided or remedied.

According to the researchers, the modeling capabilities developed in this project directly benefit decision makers addressing issues related to urban pollution, human comfort, and the effects of climate change on urban areas. The research also aims to understand the interconnection of urban flows with the regional and global atmosphere. *Source:* http://www.sciencedaily.com/releases/2012/08/120824081917.htm



Mapping of urban flow patterns using inertial Lagrangian coherent structures. The comparison shown is for PM$_{2.5}$. at Z = 1, in the morning (left) and evening (right). ***Source:*** American Institute of Physics

Progress and Challenges in Urban Climate Adaptation Planning: Results of a Global Survey

A recent survey finds that "79 percent of cities worldwide report that in the past five years they perceived changes in temperature, precipitation, sea level, or natural hazards that they attribute to climate change."

JoAnn Carmin, co-author of the study, is an associate professor of environmental policy and planning at the Massachusetts Institute of Technology's Department of Urban Studies and Planning. The report is available at: http://web.mit.edu/jcarmin/www/carmin/Urban%20Adaptation%20Report%20FINAL.pdf

World's Largest Green Roof Tops a Parking Garage

September 2012 — Believe it or not, the world's largest green roof sits on top of two underground parking garages and an active commuter rail yard in Chicago.

Millennium Park, in downtown Chicago, was filled to the brim when hundreds of thousands of people celebrated President Obama's election in 2008, and the award-winning outdoor center hosts many of the cities most prestigous cultural events.

You'd never know it's a roof – it looks just like a park, with winding pathways, seating for 11,000 people who attend symphonies, and 2.5 acres of native plants.

The 24.5 acre, 99,127 square meter green roof sits on top of Millennium Garages. It extends over the parking garage at Soldier Field, home of the Chicago Bears football team – the recipient of a Green Roofs for Healthy Cities Award of Excellence in 2004.

At a cost of $500 million, it's the brainchild of former Mayor Richard M. Daley, and one of the first public/private partnership construction projects in the city.

Millennial Park's green roof is 20,000 square meters larger than the second largest green roof in the world at Frankfurt International Airport in Frankfurt, Germany.

Chicago now boasts more green roofs than any US city and some of its largest are built over underground structures. It has more than 200 green roofs, covering a total 2.5 million square feet. A green roof tops Chicago's City Hall and Cultural Center, which also have beehives.

A green roof is an ecological workhorse, reducing storm water runoff and energy consumption. It provides acoustic protection, creates habitat for birds and insects, and is key to mitigating the urban heat island effect.

Although the cost is higher upfront, the payback over time for green roofs is significant in energy savings and in protecting the roof membrane, making it possible to skip up to three replacement cycles.

In Bronx, New York City, a 36,512 square meter golf driving range is even considered a green roof – it's being built on top of the Croton Water Filtration Plant, which is sited on a golf course. It's expected to open in 2014.

And the largest green roof in Australia is also being built on top of a water plant, reports Engineering News-Record. The Victorian Desalination Plant near Melbourne, Australia will host a 26,000-square-meter green roof next year. It is being planted with natives that will camouflage the water plant, while providing corrosion resistance, thermal control and acoustic protection.

Stuttgart, Germany, requires green roofs on all new flat-roofed industrial buildings. In the US, Portland, Oregon, requires new city-owned buildings and existing buildings that replace roofs to install a green roof on at least 70% of the area. *Source:* http://www.sustainable-business.com/index.cfm/go/news.display/id/24056

Millenium Park in Chicago, the largest green roof in the world. *Source*: Engineering News-Record

Also among the largest urban green roof projects in the world: Georgia International Plaza in Atlanta (top), and Village on False Creek in Vancouver (bottom).

Source: Engineering News-Record

White Rooftops Lower Temperature, But Reduce Rainfall

In environmental science, the law of unintended consequences cannot be denied.

September 2012 — Cities are heat "islands" that raise temperatures by absorbing sunlight during the day, storing this energy, and releasing it back out at night, adding heat to an already changing climate. Painting roofs white relieves the so-called heat island effect, lowering temperatures in urban areas – and it has become popular in many cities.

But scientists at Arizona State University report that the practice can make things worse in some places.

Reflecting sunlight to keep world temperatures cool is common in nature. Snow and ice, for instance, have a high albedo (reflectivity) and help keep temperatures from rising. Scientists believe one of the reasons the world's climate is warming is that there is less ice now. Cities, which generally are paved over and covered with buildings, absorb heat from the sun, driving up the temperature.

Studies show that white roofs, which reflect sunlight instead of absorbing it, will cool temperatures in places that are heavily developed, like the Eastern Seaboard between Washington, D.C. and Boston. However, the ASU scientists project that lowering the temperature with reflective roofs can reduce much-needed rainfall part of the year, at least in their part of the world.

"Most of the work has been focused on temperatures," said Matei Georgescu, an assistant professor at ASU's School of Geographical Sciences and Urban Planning. "Do white roofs cool an area? The answer is, they do. We don't find any contradiction."

The researchers focused on the projected urban expansion of what is known as the Sun Corridor, the fastest-growing metropolitan area in the U.S., which includes metropolitan Phoenix, Tucson, Prescott and Nogales. The area is expected to have a population of 9 million by 2040.

They found that the growth would decrease annual rainfall by 12 percent. Painting all the rooftops white could reduce annual rainfall by another 4 percent.

Painting roofs white -- or sometimes, planting gardens on rooftops -- has become popular in places like New York City and Chicago. Research by the National Center for Atmospheric Research shows that black asphalt roofs raise temperatures 2-4 degrees F and in theory, painting roofs white could mitigate that.

Computer models indicate that if every roof in every city were painted white the demand for air conditioning would be reduced, and temperatures in the cities would be reduced by an average of 0.7 degrees F.

Using scenario-based data from the Maricopa Association of Governments, a long-range planning agency for the region, the researchers modeled that projected growth would rise statewide average temperatures – already blazingly hot in the summer – another 1.8 degrees F.

Bimetallic coil thermometer. *Source*: Inside Science

"For precipitation to form, two elements are necessary: moisture and a lifting mechanism to condense air parcels," Georgescu said. "The decrease in low-level heating resulting from the white roofs stabilizes lower levels of the atmosphere, and to some degree, removes the natural lifting mechanism required for condensation to occur."

Rainfall in Arizona occurs during the summer and winter; the summer rains are associated with the North American monsoon system. When it rains, the water collects on the ground or percolates into the soil and by the next day it is ready to either sink into the ground or evaporate into the air. After that, it can be lifted back into the air and moves away or may fall back as rain. In cities, that doesn't happen because the land surface and its soil have been paved over. The water simply collects on the pavement and runs off, Georgescu said.

Heat drives the process. If you reduce the heat – as white roofs do – the air parcels are less likely to rise.

"We find this effect to occur mostly in the summer. During the winter the more prominent large-scale flow dominates weather," Georgescu said.

"Cloud formation and rainfall, these are complex processes," said Stuart Gaffin, Lamont assistant research professor at Columbia University's Earth Institute, one of the leading authorities on urban albedo, who was not involved in the ASU research. "The question is, is the model capturing it accurately? It may be plausible, but it has to have a lot more testing and verification before it is used as an argument against using high albedo for heat control."

The ASU study was published in the journal *Environmental Research Letters*. *Source:* http://www.insidescience.org/?q=content/white-rooftops-lower-temperature-reduce-rainfall/790

WUDAPT: Conceptual framework for an international community urban morphology database to support meso-urban and climate models

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1. Introduction

Urban models provide an important means to assess the nexus of (a) population growth and (b) climate changes, two of the major issues confronting today's society. Regarding population growth, it has been documented that urban areas are now home to half the world's population with projections for continued increases in urban proportion thereafter (Fig 1). The five nations with the most cities of one million or more are China (89), India (46), US (42), Brazil (21) and Mexico (12).

Some cities will become megacities; their numbers and size will increase and when in proximity, their expansion can create a conurbation of immense geographical size and total population as shown in the example of the Pearl River Delta (PRD) (Fig 2). Based on a recent UNEP projection (Garrigan, 2011) and other studies (Seto *et al.*, 2012) the formation and rapid growth of many new urban areas will occur especially in the underdeveloped areas of the world.

Urban areas have a variety of impacts on the atmosphere at many scales. This is due to both their morphology and their metabolism. Urban morphology refers to the physical form of the city including the dimensions and fabric of roads, buildings, parks, etc. and their geographical distribution. Urban metabolism refers to the material, energy and water needs that are required to maintain its functioning and much of which is deposited as wastes into the overlying atmosphere.

The extent and the morphological structure of cities create a unique spatial and temporal structure of the vertical thermal and turbulence layers, which produce quite complex intra-urban flows

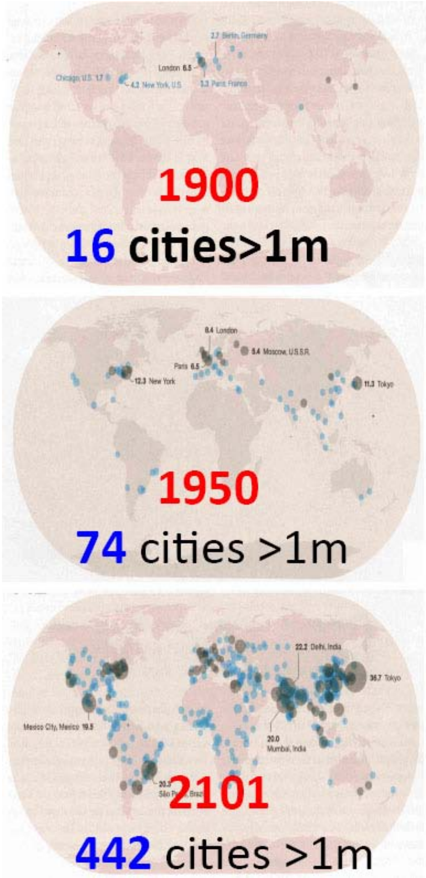


Figure 1. Global urban population changes. (Source: *National Geographic*, 2011. Courtesy of J. Fung)

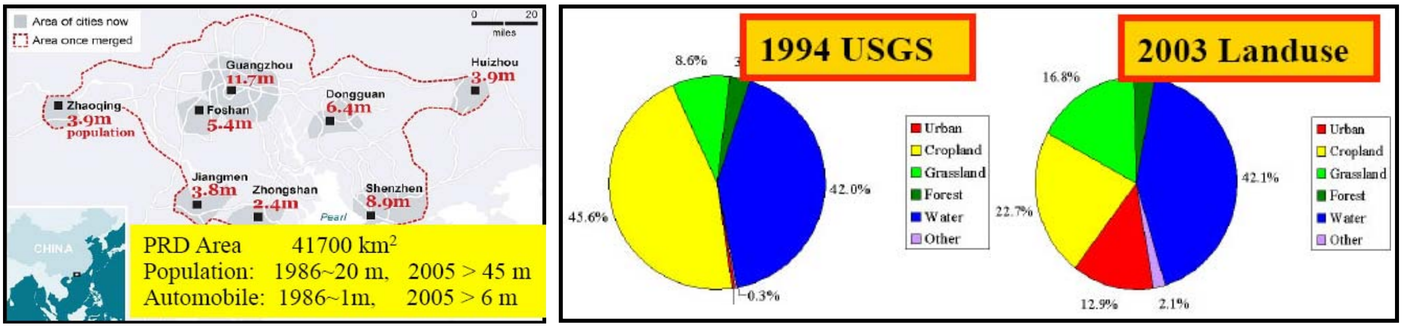


Figure 2. The Pearl River Delta region, soon to be the world's largest megacity (with a projected population of 60 million). Between 1994 and 2003 the proportion of urban area increased from 0.5% to 12.9%, and cropland decreased from 45.6% to 22.7%.

(ventilation). These changes regulate the transport and dispersion of pollution from local and upwind regional sources, which affects human comfort and health (Fig 3).

Urbanization and climate change on regional and global scales are linked. Urban areas are major contributors to the atmospheric greenhouse burden, including carbon, NMHC and photochemical species (ozone). In turn, it is thought that climate change will be manifested in cities and elsewhere in a variety of direct and subtle ways, e.g., by more extreme and adverse weather events, such as heat waves, droughts, and increases in the degree of thunderstorm severity. It is also highly probable that the rising intensity of urban heat islands, coupled with increased imperviousness, building height and density will further modulate convective activity and lead to the initiation and/or increased severity of thunderstorm activity and thus affect the city's hydrology.

Regarding heat island mitigation strategies, Brian Stone's recent book *The City and the Coming Climate: Climate Change in the Places We Live* (Cambridge University Press; see the June newsletter) states that "the world's largest cities are warming much more rapidly than the planet as a whole". Stone identifies a range of heat island mitigation strategies ranging from adaptive (those with secondary local climate management benefits) to non-adaptive (direct mitigation by the simple replacement of high- with low-carbon content fuels) rules. Clearly, guidance is needed to provide a sound basis for decisions to the problem facing urban planners and those responsible for urban growth management as they assess the relative effectiveness of different mitigation strategy options.

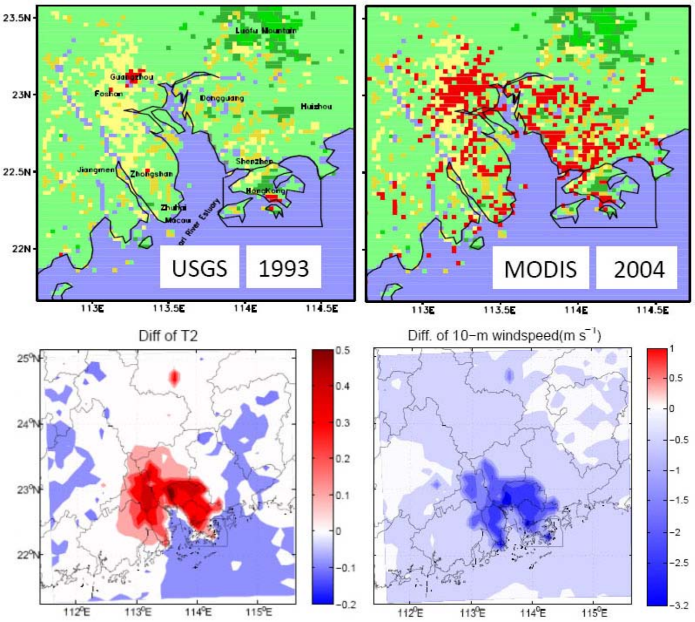
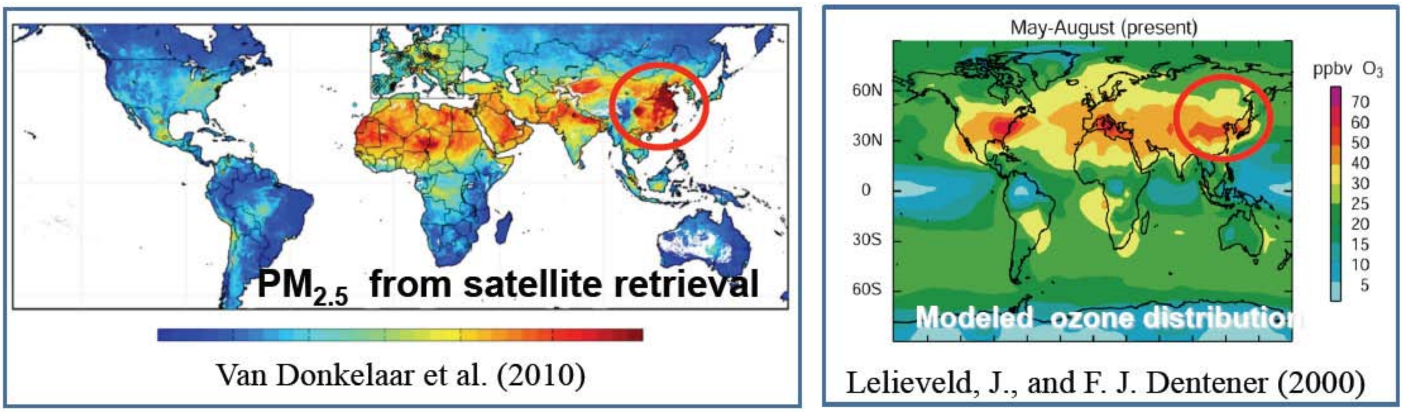


Figure 3. Rapid urbanization in the Pearl River Delta region is illustrated by the growth of urban areas (in red) between 1993 (top left) and 2004 (top right). WRFChem modeling shows that over this period, temperature increased by up to 0.5°C (bottom left), and wind speed decreased by up to 2 m s^{-1} (bottom right). (Courtesy of Xuemei Wang)

One of the most pressing urban issues is that of air quality, which has long been studied and modeled for planning purposes. Air pollution is a mixture of different chemicals, both locally emitted and from transported regional sources (Figure 4). The concentrations of air pollution from local sources as well as the mixing of pollution from regional sources are controlled by the transport and dispersion capability of the flow field in the urban canopy layers and in turn by the vertical structure of the urban



Van Donkelaar et al. (2010)

Lelieveld, J., and F. J. Dentener (2000)

Figure 4. Concentrations of PM$_{2.5}$ (left) and O$_3$ (right), both of which are recognized as significant air quality challenges. The impacts of urbanization on air quality and climate occur on regional as well as urban scales. (Courtesy of Xuemei Wang)

mixed layer.

The urban climate community has been engaged to retrofit state-of-science regional, mesoscale and climate models for urban applications to be employed as tools to support urban planning decisions. Although each urban area is unique due to its geographical location, terrain and climate, as well as its size, emissions and morphological content, these models have the design capability to handle this diversity. However, they often lack the urban-specific data to do so. In particular, our ignorance of the morphology of much of the world's urban settlements impedes the application of these models.

2. Community-based State-of-Science models for weather: U-WRF and climate: CAM-CLMU and air quality CMAQ and WRF-Chem

It is often said, "Climate is what you expect, weather is what you get." In this section we focus on mature, major worldwide community-based modeling systems for climate and weather e.g., the Community Atmospheric Models' Urban Climate and Land Use (CLM-U) climate (www.cesm.ucar.edu) and the Weather Research and Forecasting (WRF) system (www.wrf-model.org) weather modeling systems. There are also similarly configured community systems for air quality, e.g., the Community Multiscale Air Quality (CMAQ) (http://cmaq-model.org) and WRF-Chem (http://www.acd.ucar.edu/wrf-chem/). The reader is invited to peruse these aforementioned web sites that provide descriptions and frequent model documentation updates of the system and their components; for our purposes, we introduce and highlight key aspects to focus on relevant input data requirements. These powerful state-of-science based systems provide a framework for meeting the challenges of population growth, climate changes, air quality, urban sustainability, livability, and human comfort confronting decision makers and society. These systems are generally similarly designed; they each have a set of requisite preprocessors with interface links to the core system and post-processing systems (Table 1). State-of-science in both preprocessors and core is maintained in periodic updates called "Versions"; these updates come from contributions by their respective communities. Major attributes of each system include a dynamic development framework for introducing science upgrades, options for multi-scale applications (with domain nests), and that they are open source. These systems, and their versions, are available as downloads; user-friendly setup and controls allow choices of available science options, and updates to documentation provide transparency to the underlying science. Each system provides community support infrastructure through annual workshops and tutorial services at NCAR and for CMAQ and affiliated models, by the CMAS Center in Chapel Hill, NC (www.cmascenter.org). The feedback between meteorology and chemistry core processing and the means to assimilate data are on-going challenges that are currently being addressed.

Table 1: Common *Community* Model Design Features
Examples: WRF (Meteorological); CESM_CAM_CLM-U (Climate); CMAQ (Air Quality)

System Components	**Attributes**
Preprocessors	Community contributions
Input data	Science options
IC/BC	Database
Interface linkages	Processors
Translator for user control	Transparency of Science
	Science, System documentation
Core System	
Climate	Version controls for updates
Weather	Community support through:
Air quality	Workshops
Post Processors	Tutorials

Customized applications throughout the world are nuanced, and each of these model tools will in large part be dependent on the input data. Each system has provisions for requisite data inputs including initial and boundary conditions and emissions (air quality systems), and static information such as land use classes, terrain, vegetation, be it through available standard table lookups derived from a variety of data sources including remotely sensed data, or from satellites as well as from customized inputs. The setup and application of each system requires that their specific requirements need to be understood and fulfilled; e.g., (a) model outcomes are scale dependent; the response time scale differs for different applications, (b) specifics regarding data forms, as well as their availability and spatial/temporal coverage will affect model outcomes and (c) we cannot depend on remote sensing (e.g., satellite data) alone, as their outputs may not represent what is needed. With care, both systems can be set up for appropriately addressing specific issues, thus meeting the requirements of

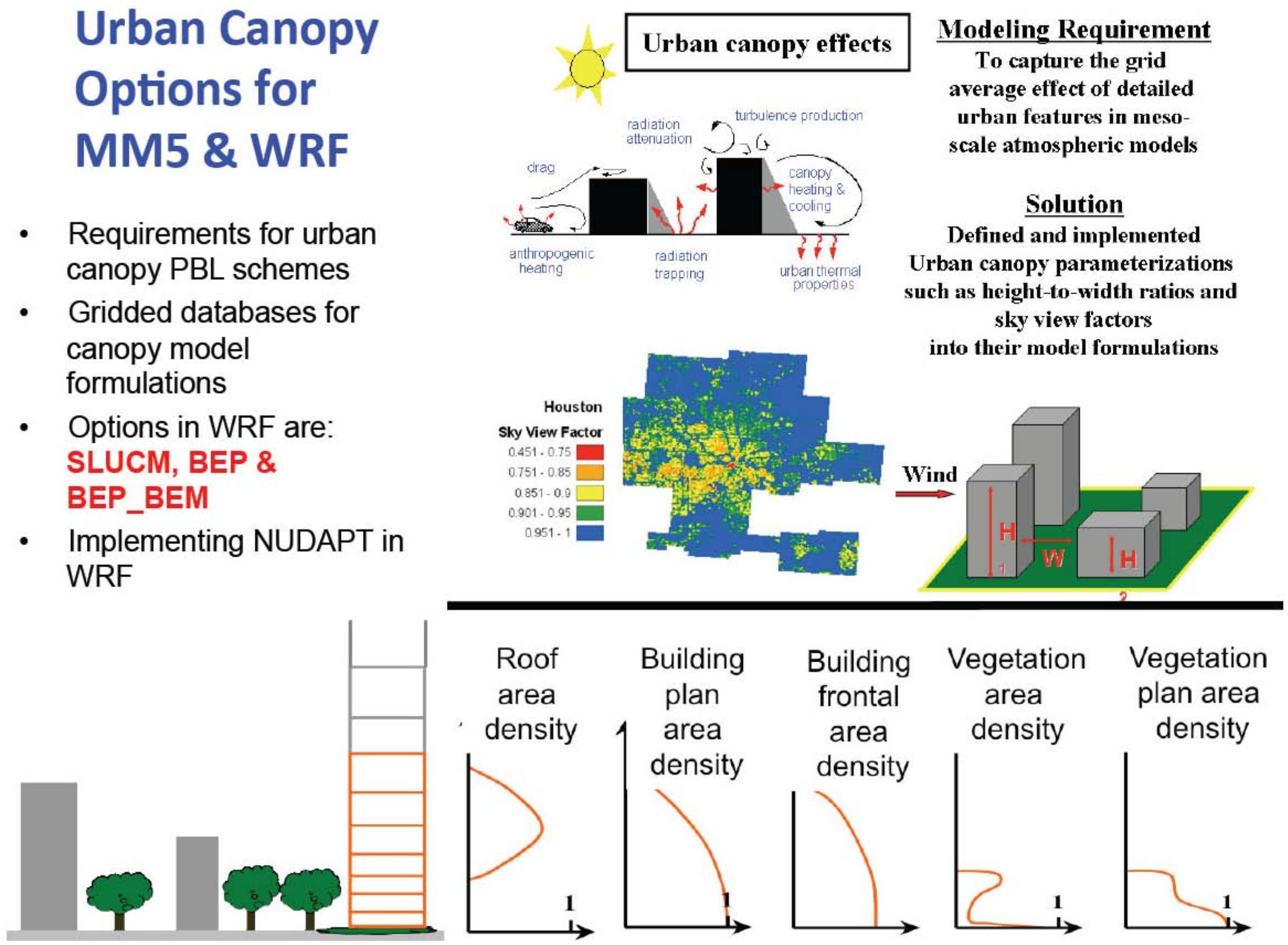


Figure 5. Schematic of an urban canopy parameterization (UCP) framework for use in urban climate modeling.

being fit for purpose.

There are at least three major considerations when applying these modeling tools for urban modeling applications. First, the spatial complexity of the underlying surfaces must be addressed, and a similar regard for emission details for air quality modeling. Second, the grid resolution must be commensurate with the desired outcome; spatial gradients of both the inputs and thus the output fields tend to be highly complex in urban areas. So, for any grid resolution, the unresolved subgrid information content can be quite large. Finally, as applications require outputs at increasingly finer grid resolutions on the order of 1 km or so, a major model issue is confronted, the so-call "terra incognita" problem (Wyngaard, 2004). An important and illuminating review of these and other issues is presented by Martilli (2007). In simple terms, mesoscale models typically parameterize the effects of turbulent transport. For typically large grids > 1 km, parameterization schemes can adequately capture the essence of turbulent properties of flow; however, when the model grid mesh is comparable to the scale of turbulence (typically of order 1 km or so), the model is attempting to resolve turbulence, but cannot do so accurately, and moreover, using built-in parameterizations already incorporated for the turbulent fields. This problem is currently being addressed for the WRF system at NCAR.

For the remainder of this discussion, we focus on the specialized data requirements for urban modeling. Commensurate with current urban models, models are cast in terms of the underlying urban morphology in each grid. Given the existence of urban building-street canyons and the interspersed vegetation, the fundamental equations for flow, thermodynamics and radiation are required, and moisture has now been recast with treatment for the influences of these morphological features using urban canopy parameterizations or UCPs (Dupont *et al*., 2004; Otte *et al*., 2004 Martilli *et al*., 2002). A schematic of this framework is shown in Figure 5. A relatively large effort to provide gridded UCPs has been undertaken

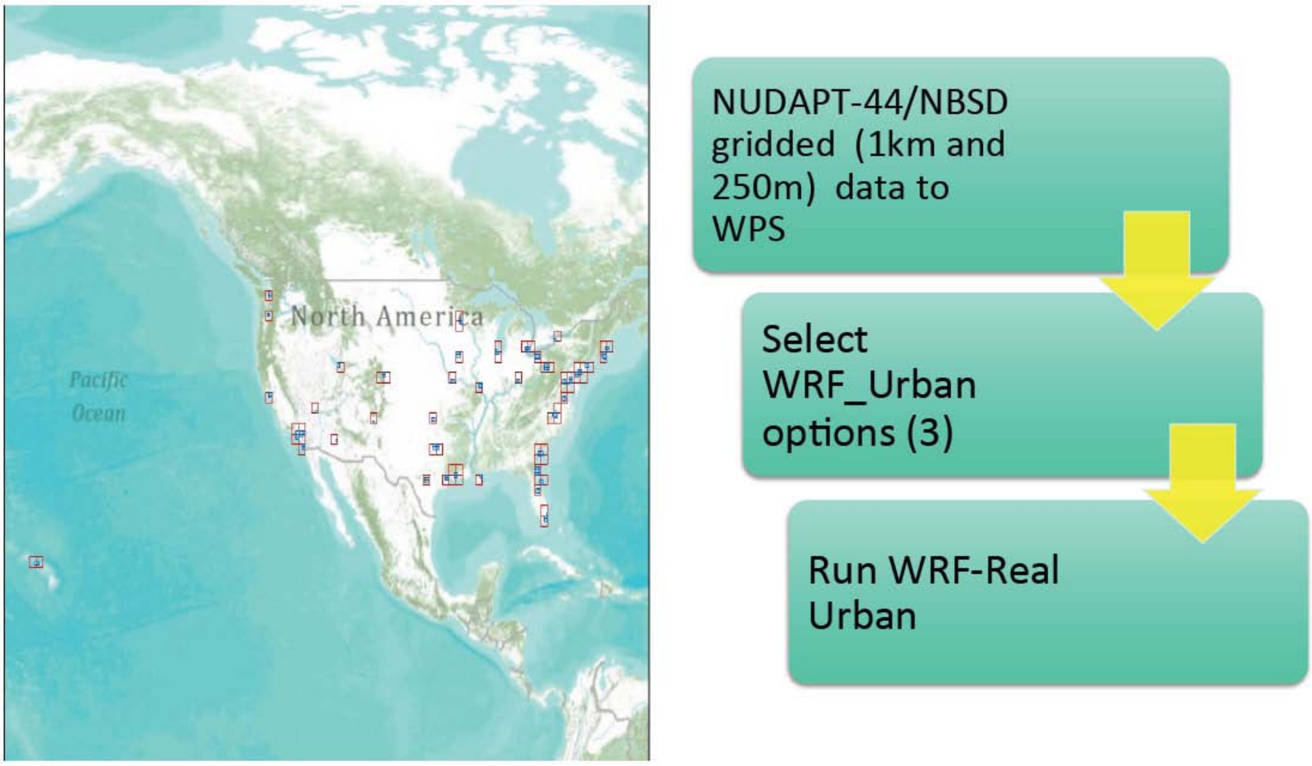


Figure 6. Geo-referenced NUDAPT-44 gridded database: large 1° (1km) and small 0.25° (250m) tiles in WPS for WRF (Glotfelty *et al.*, ICUC-8, Dublin 2012). The current effort to implement and deploy the NUDAPT gridded UCPs into the WRF model is nearly completed, with plans to accompany the 2013 WRF release.

in the Prototype NUDAPT project (Ching *et al.*, 2009). On September 11, 2001, the terrorist attack in NYC and Washington DC prompted the need for the USA to be proactive in developing advanced modeling tools for urban applications. A survey conducted by the Board of the Urban Environment (BUE) of the American Meteorological Society (AMS) resulted in an Initiative to the Office of the Federal Coordinator for Meteorology (OFCM) for a supporting database to the MM5, now WRF. The US Environmental Protection Agency (USEPA) responded, and in a collaboration of representatives from private, academic and public agencies, formed a Consortium to develop an initial prototype of an urban modeling database. This Consortium embraced the concept of a community-based system and called its implementation the National Urban Database and Access Portal Tools (NUDAPT). Elements of this Prototype included a detailed effort by the USEPA for the collection and processing of a special urban canopy dataset of urban canopy parameters for Houston TX. Other agencies contributed and the National Building Statistics Database (NBSD) (Burian *et al.*, 2007) emerged with leadership and guidance of Mike Brown of Los Alamos National Laboratory. NBSD was derived from airborne lidar data of buildings data for 44 (of the 133 cities) collected by USA Federal agencies under the auspices of the Nunn-Luger -Domenici Act (Defense against Weapons of Mass Destruction Act of 1996). The resulting sets of UCPs were gridded at 1 km and 250 meter grids; they focused on each city's high-density building districts. Recently, NCAR agreed to host this data set and make it available to its community mesoscale modeling system, the WRF. A current effort to implement and deploy the NUDAPT gridded UCPs for 44 USA cities into the WRF model (Glotfelty *et al.*, 2012) is shown in Fig. 6. This effort is nearly completed with plans to accompany the 2013 WRF release.

Greater specificity on surface composition (such as building roof and wall construction materials) is essential for accurate modeling of the all important

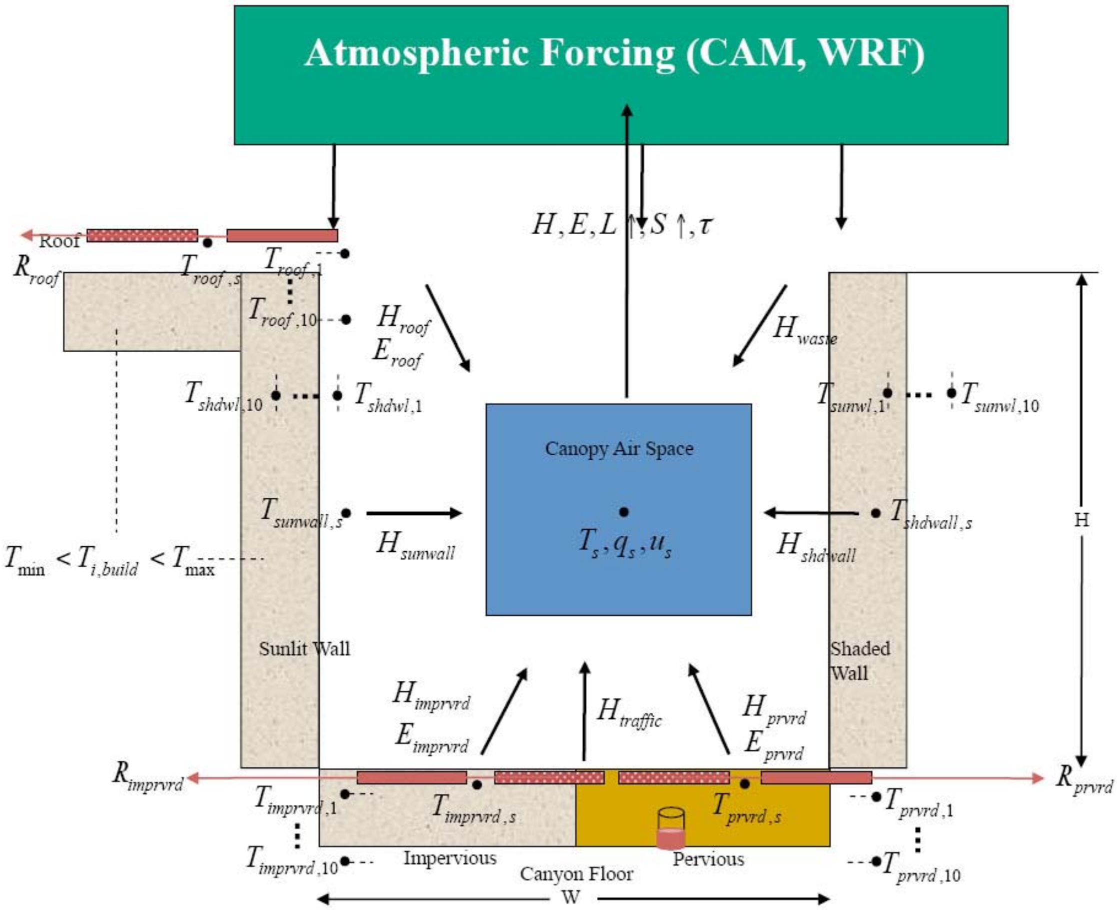


Figure 7. Schematic diagram showint surface energy components used in the detailed urban climate model CLM-U (Jackson *et al.*, 2010).

urban surface energy components (Fig. 7) used in the CLM-U (Jackson *et al.*, 2010), the urban subcomponent of the Community Environmental System Model being implemented at NCAR; Figure 8 provides the climate modeling database framework for this implementation. CLM-U is highly detailed, including for example, comprehensive information on buildings and structural materials such as highly modernized "green materials" as well as locally sourced materials common to their geographic locations, with different thermal properties. Given the CLM-U scale of coverage, geographic and population density information on a global basis covering all climatic regions is introduced. CLM-U is thus designed to be able to predict the degree and characteristic of each city's urban metabolism and thus its own unique heat islands, thermal canopy layers and climates.

Currently in NUDAPT, the spatial coverage of the gridded UCP is in each of the cities is limited, and while large in number, only covers 44 USA cities. As a base map, it does provide a capability for dynamic growth scenarios. There is need for improvement to the specification of urban land use fractions; in par-

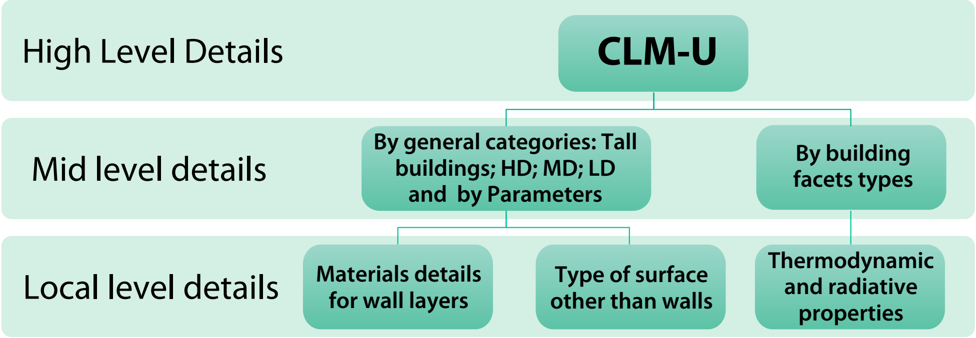


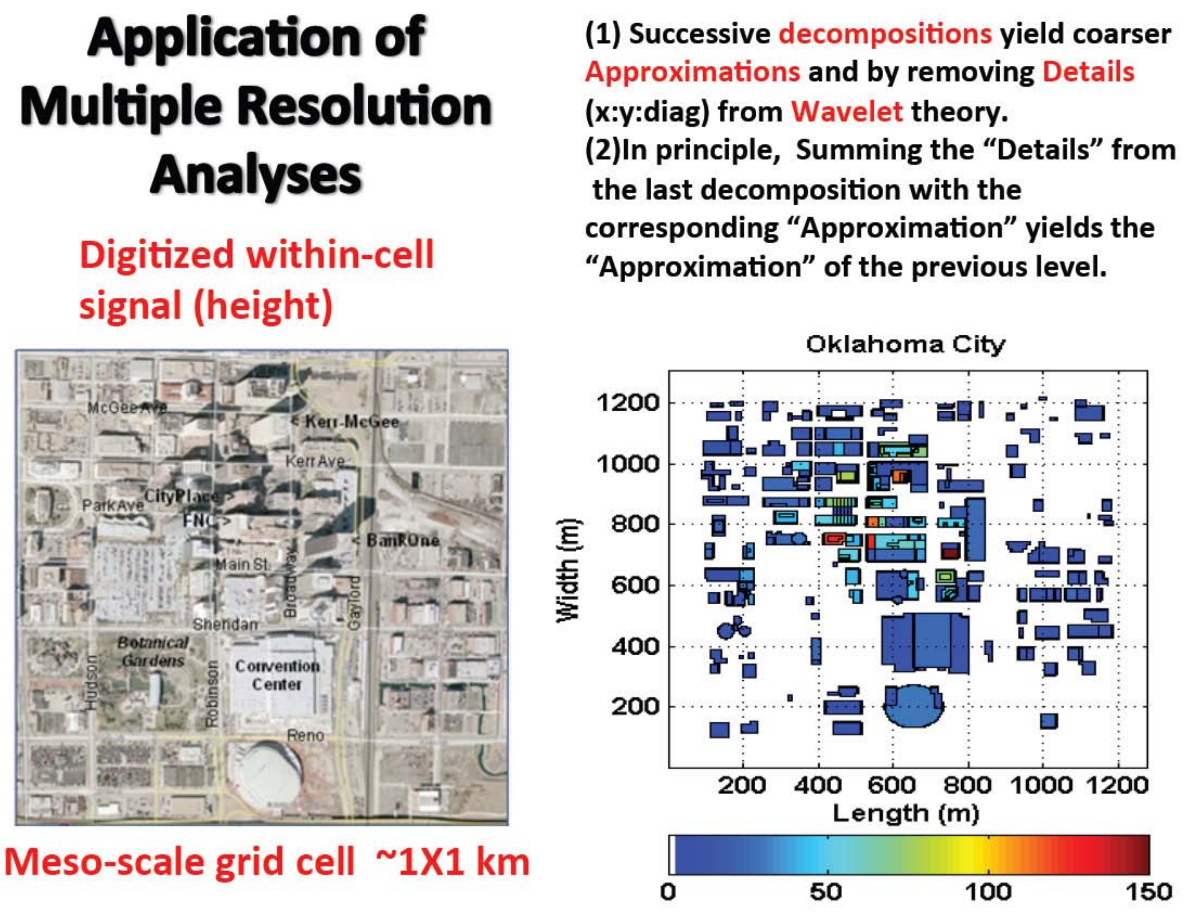
Figure 8. CLM-U modeling database framework: worldwide coverage, hierarchy of tables

ticular, LU schemes in models (dominant vs fractional) need to be reviewed. In CLM-U, while the current tables are highly detailed, coverage is worldwide, and the quality of inputs varies greatly. In general, extensibility to more cities and greater areal coverage is a high priority for mesoscale and climate models. Further efforts to explore the merging and enhancing capabilities of existing CLM-U and NUDAPT are highly desirable, especially to enhance it with geometric morphology (NUDAPT) and urban properties (CLM-U) from each system. Ideally, and for the purpose of utilizing the power of these new urban modeling systems as planning and assessment tools, it would be highly desirable for obtaining and generating a database coverage of UCPs and detailed materials for buildings and other urban morphological structures for cities, worldwide, and especially for those in developing countries. In the next section, we explore and suggest several innovations and technologies that can potentially be employed to achieve this objective.

3. WUDAPT: Conceptual framework for urban databases on a global scale

In this section, we explore the generic requirements for meeting the urban data requirements for both WRF-U and CLM-U. Our objective is to make real the capabilities of WRF-U and CLM-U as modeling tools capable of providing robust assessments for urban planners dealing with major issues including climate change, population growth for their specific urban area of concern, and for any and all urban areas in the world. For this worldwide scope, we suggest the term WUDAPT for Worldwide Urban Database and Access Portal Tools, which has similarity but a wider scope and somewhat different development strategies than NUDAPT.

In particular, we discuss and explore two key properties (worldwide in scope and yet retaining and characterizing the unique characteristics of each and every urban area) and several recent technical innovations making possible this desired community database. The first property of WUDAPT is



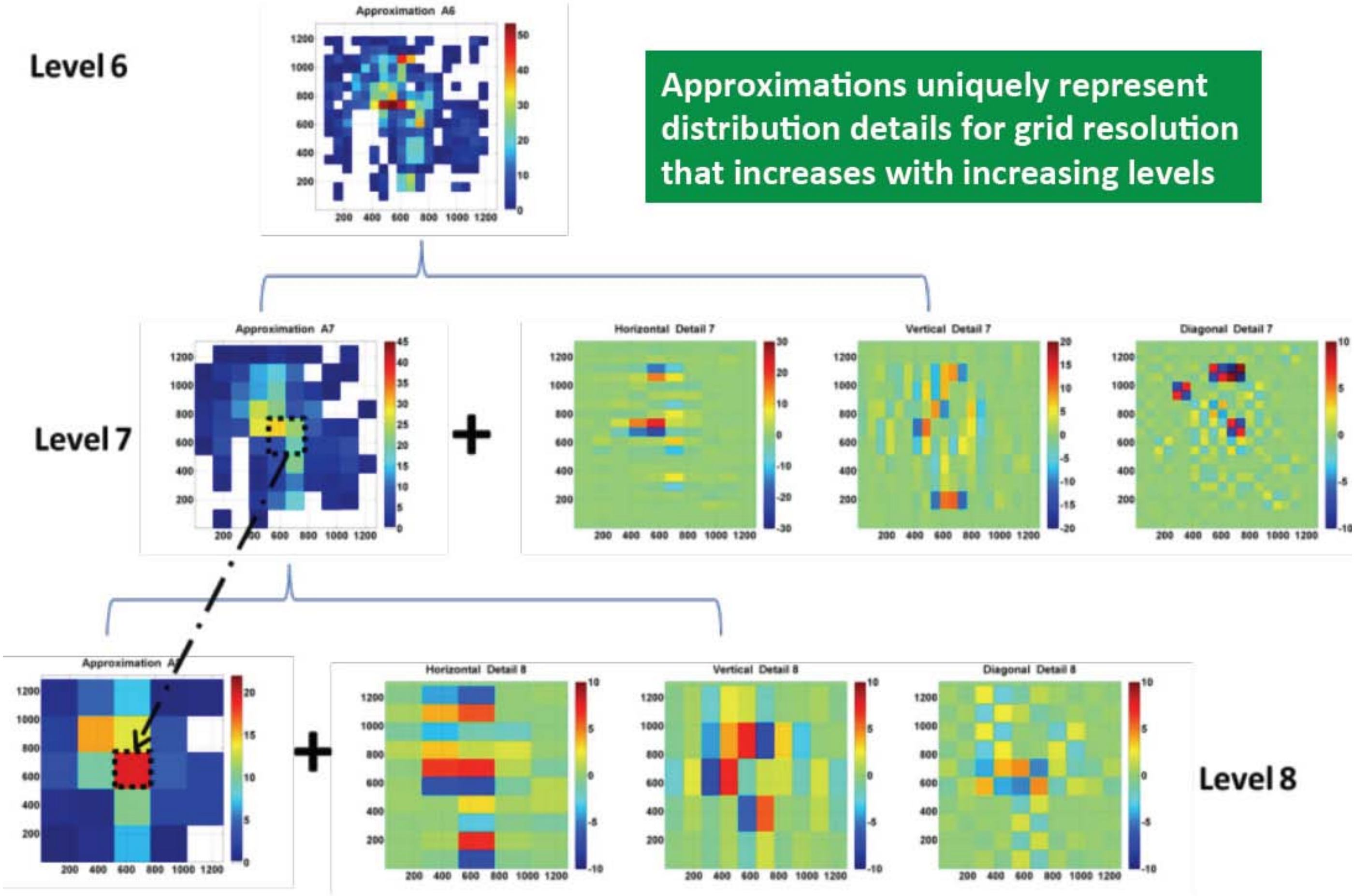
Application of Multiple Resolution Analyses

Digitized within-cell signal (height)

Meso-scale grid cell ~1X1 km

(1) Successive decompositions yield coarser Approximations and by removing Details (x:y:diag) from Wavelet theory.
(2)In principle, Summing the "Details" from the last decomposition with the corresponding "Approximation" yields the "Approximation" of the previous level.

Figure 9. Illustration of the multi-resolution analysis technique for quantifying the "unique" morphological character of an urban area.



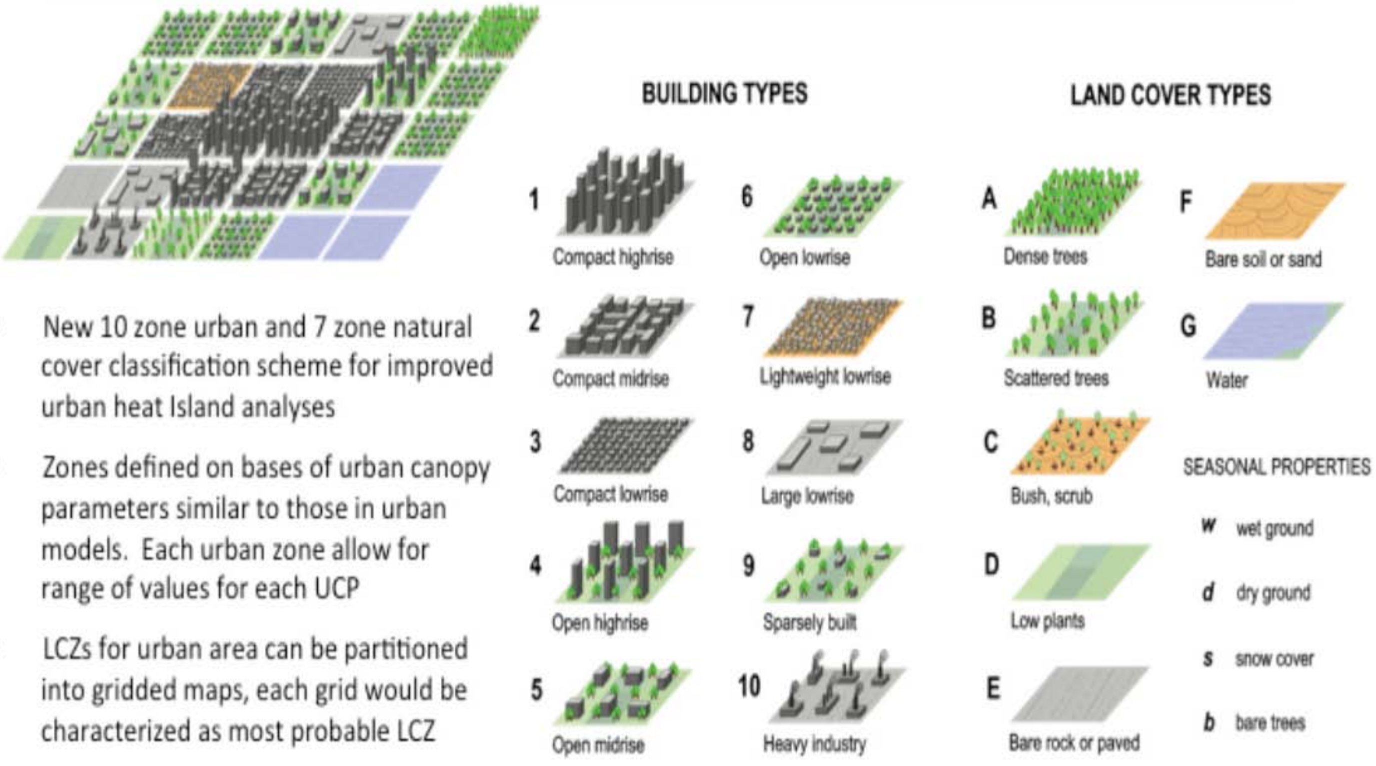
Approximations uniquely represent distribution details for grid resolution that increases with increasing levels

Figure 10. Pictorial representation of the MRA decomposition of the Oklahoma urban "signal" for Levels 6-8.

its worldwide coverage of necessary gridded information about urban morphology and composition, and in this respect, the IAUC has the potential to play a critical role. The second is an innovative new technology described by Mouzourides *et al*. (2012) which provides the ability to retain and quantify the unique character of each and every city, and as a function of grid size.

Cities are unique; it is an interesting exercise to attempt to define the character and attributes of any given urban area. For many, cities have historical and cultural merits; for others it might be the seat of geopolitical power, or an important center of commerce. These characterizations are qualitatively based. We are now aware of a promising new capability with the ability to quantify "uniqueness". Based on Wavelet theory, and using various combinations of morphological parameters, the multiresolution analysis (MRA) technique (Mouzourides *et al*., 2012) provides grid-scale characterizations called "Approximations" of properties of urban morphological fields (Figure 9, preceding page) and important subgrid descriptions called "Details" at each grid scale (Figure10). Further, the subgrid information provides the basis for sequentially finer grid characterizations, and its concomitant subgrid details. Current UCPs in mesoscale models attempt to capture major and important "structural" and "material" features with urban canopy parameters controlling momentum, thermodynamics and energetics of the flow. Mesoscale models with urban options may treat UCPs differently, via categorization using dominant land use vs fractional-mosaic (partitioning) approaches. Important aspects of subgrid "details" are ignored; future improvements to models might include the incorporation of sub-grid morphological features perhaps aggregated into canopy parameterizations that have some "meaning" in the forcing equations.

The MRA provides an innovative means to perform forensic analyses and descriptions of any urban area: in essence, the DNA-like description of a city (Mouzourides *et al*., 2012). For models, the MRA provides gridded and scaled attributes as well as subgrid information for a hierarchy of grid sizes. The MRA can, in principle, provide a powerful means to



New 10 zone urban and 7 zone natural cover classification scheme for improved urban heat Island analyses

Zones defined on bases of urban canopy parameters similar to those in urban models. Each urban zone allow for range of values for each UCP

LCZs for urban area can be partitioned into gridded maps, each grid would be characterized as most probable LCZ

Figure 11. The Local Climate Zones (LCZ) scheme for describing urban morphology (Stewart and Oke, 2012).

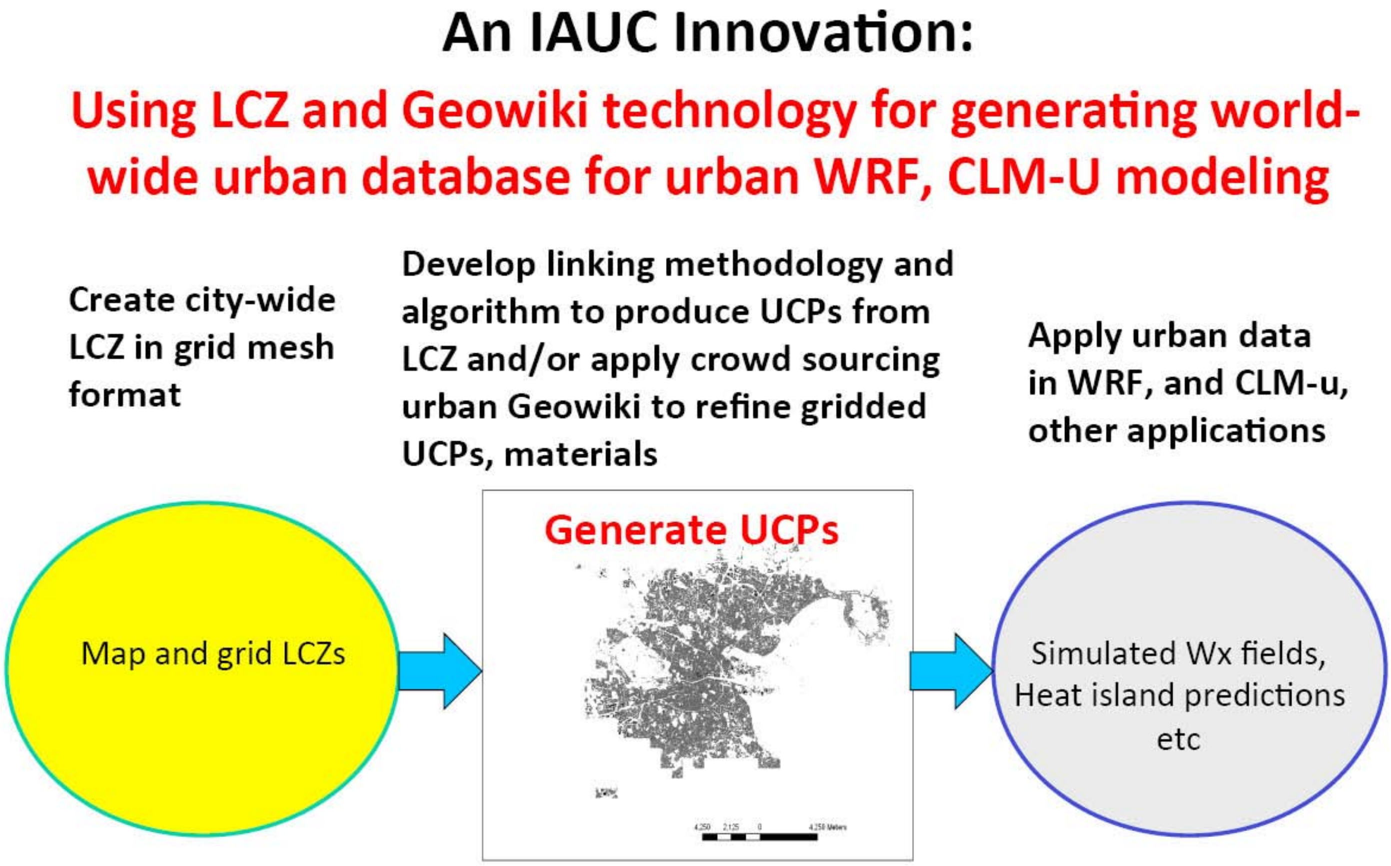
explore and utilize information at the subgrid scale to inform the mesoscale analyses, a very powerful resource for multi-scale modeling studies.

What follows is a conceptual proposal for an international database of urban parameters for advanced community weather and climate models. When viewed by urban planners around the world, grid models can provide important tools to provide guidance when dealing with all issues with which they are confronted. State-of-science community-based models are available, and their science basis and capabilities continue to be advanced. What are required are the all-important model inputs to apply these models successfully. Look-up tables based on land use classification schemes provide default values; gridded inputs reflecting actual values at each grid in the modeling domain are preferable, and studies show that their use provides significantly superior model results.

We ponder strategic and tactical approaches to meet this challenge, and outline a conceptual framework and an implementation plan to achieve this goal. At the outset, we seek to model domain-wide gridded urban canopy parameters and details on materials in building and morphological structures. This can be a costly venture; to address this problem, we suggest the following implementation framework based upon incorporating elements of Local Climate Zones (LCZ) as described in Stewart and Oke (2012) and illustrated in Fig. 11 above, remotely sensed information such as that found in Google Earth, and the use of Geo-Wiki technology (Fritz *et al*., 2012).

Conceptually, a tactical strategy would be to (a) map LCZ parameters onto model grids, rectifying the broad ranges of canopy parameters in LCZ with remotely sensed databases such as those available in Google Earth, (b) presume or develop relationships linking the gridded LCZs to a set of UCPs, and (c) adapt for use by local observers using specialized mobile geo-referenced (GPS) APPs, the urban Geo-Wiki system (Fig 12). The latter step provides an on-site, “boots-on-the-ground” strategy to obtain quantitative details and or verification of the critical urban canopy parameters and material contents for the different morphological features. The advantages are that:

- LCZ are relatively quick, expedient and inexpensive to generate; this results in huge cost benefits and potential worldwide scope.



An IAUC Innovation:

Using LCZ and Geowiki technology for generating world-wide urban database for urban WRF, CLM-U modeling

Create city-wide LCZ in grid mesh format

Develop linking methodology and algorithm to produce UCPs from LCZ and/or apply crowd sourcing urban Geowiki to refine gridded UCPs, materials

Apply urban data in WRF, and CLM-u, other applications

Map and grid LCZs

Generate UCPs

Simulated Wx fields, Heat island predictions etc

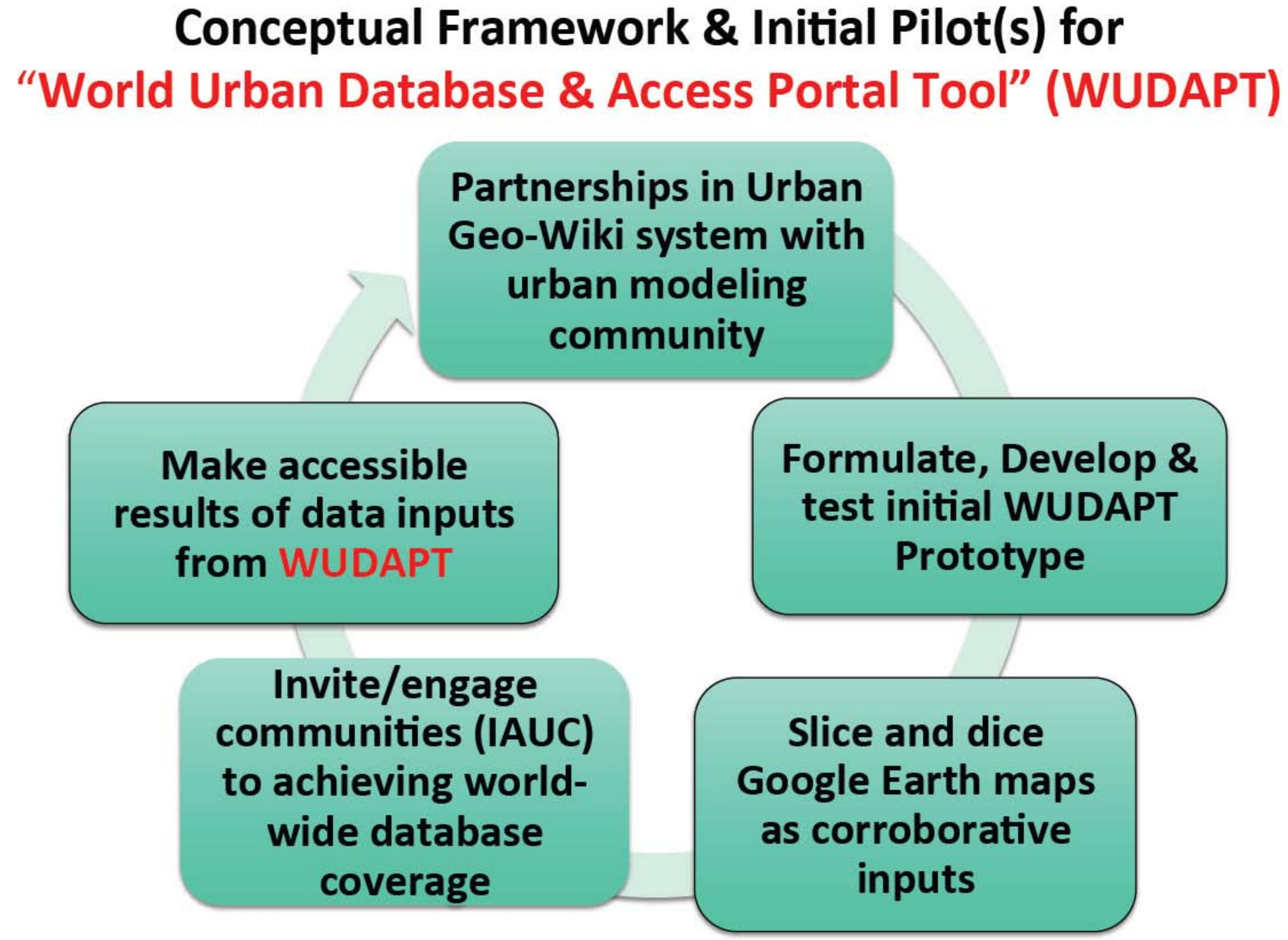
Figure 12. Proposed strategy for generating a global database to be used in urban climate modeling, based on Local Climate Zones and Geowiki crowd-sourcing technology.

- The scheme makes possible use of advanced meso-urban modeling tools in areas with little data and few resources to generate such data.
- Data generated for each city can yield significant model improvements over current lookup table schemes.

The resulting grid-by-grid data will include the desired suite of parameter information including building heights, street widths, urban content and areal extent (fraction) of urbanization. Information is relayed and downloaded to a database system and with standardization and final quality assurance; a database is created for a city. In principal, by engaging a network of international urban partners in collaboration, it is conceivable to expand this database to cities in all parts of the world, the coverage only dependent on the level and extent of community involvement (Fig 13).

4. Summary and path forward

An initial "proof of concept" implementation for Dublin, Ireland utilizing this approach is shown in Figure 14. Moving forward, we contemplate preparatory efforts (Prototype) to consist of testing the full development and deploying of the steps outlined in Figure 12 for Dublin, and if possible, one or two other cities. An important component in this activity would be setting up the database system. Subsequently, we would then invite and engage interested collaborators from IAUC for the initial prototypical implementation. We further envision the scope of this effort to expand; after an assessment of the Prototype, we invite our urban community to become engaged to achieve the desired worldwide database coverage (Fig 13). An important element in this overall scheme is to grow the acceptance and support of the Community, including users and sponsors. In this stage, we can anticipate the database to grow in coverage as more cities recognize the benefits of participation in this community system. Further, since urbanization is dynamic as current cities evolve and new ones are created, updates will be necessary, but achievable given that each city will have its initial baseline datasets.



Conceptual Framework & Initial Pilot(s) for

"World Urban Database & Access Portal Tool" (WUDAPT)

Partnerships in Urban Geo-Wiki system with urban modeling community

Formulate, Develop & test initial WUDAPT Prototype

Slice and dice Google Earth maps as corroborative inputs

Invite/engage communities (IAUC) to achieving world-wide database coverage

Make accessible results of data inputs from WUDAPT

Figure 13. Proposed scheme for the participatory development of a worldwide urban database.

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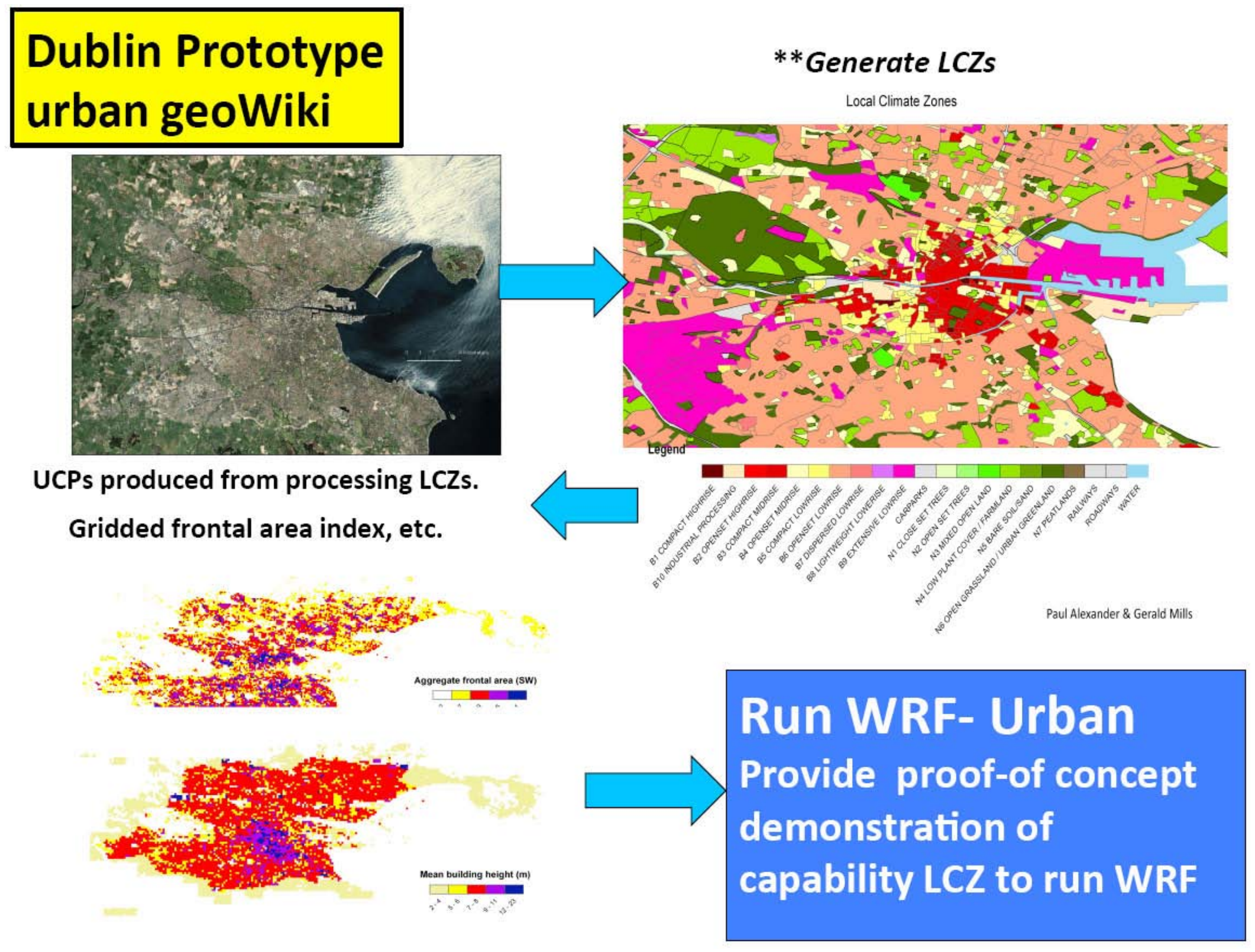

Dublin Prototype urban geoWiki

**Generate LCZs

UCPs produced from processing LCZs.

Gridded frontal area index, etc.

Run WRF- Urban

Provide proof-of concept demonstration of capability LCZ to run WRF

Figure 14. Prototype of urban geoWiki for the city of Dublin, Ireland.

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Thermal comfort comparisons at ICUC8: towards a common language

ICUC8 – the 8th International Conference on Urban Climate, held August 6-10 in Dublin – included a seven-session track on Thermal Comfort beginning on Monday and continuing Tuesday morning. Research featured a variety of thermal comfort application studies from a wide range of climates and international urban locations. Presentations fell into two basic categories: 1) assessing thermal comfort of urban areas using standard limits, using one of a number of thermal comfort indices; and 2) survey-based field studies that assessed thermal comfort thresholds of local populations.

The majority of the presentations fell into the first category and used previously-established thresholds and preferences to assess the comfort of urban design in numerous locations with a wide variety of climates. These then fell into two basic categories: those that used models such as Envi-met or RayMan to assess thermal comfort of urban design and those that used on-site micrometeorological measurements (some of which also used models in their assessments). Presentations covered a range of urban designs and locations – many in Europe, but also a number of locations that are under-represented in the literature such as Malaysia, Brazil, the Middle East and Africa.

There were several presentations that fell into the second category of survey-based thermal comfort field studies that assessed possible adaptation of local populations. Since about the turn of the 21st century, a number of survey-based thermal comfort studies have been published that documented thermal comfort preferences and acceptance levels in local populations. Unfortunately, because of differences in methodology, making comparisons across studies is often difficult, though sometimes not impossible.

One of the presentations in ICUC8 compared four survey-based field studies, separately undertaken for different applications, by four groups of researchers in locations with diverse climatic conditions: the Mediterranean climate of Adelaide, Australia (**Margaret Loughnan**); the arid Negev region of Israel (**David Pearlmutter**); the sub-tropical/tropical zone of Central Taiwan (**Tzu-Ping Lin**); and hot, arid Phoenix, Arizona in the southwestern USA (**Donna Hartz**, presenter and writer of this report). The survey questions used a seven-point scale to assess perceptions of the weather conditions that the respondents were encountering (see ICUC8 proceedings for more information and detail). A number of thermal comfort indices were used in the studies. Though not all of the locations had results in the same indices, all four locations had calculated the Physiologically Equivalent Temperature (PET) using RayMan and several had results in other indices, thus allowing for multiple comparisons for thermal comfort preferences as well as perceptions. Table 1 shows the local temperature preferences.

Thermal neutral is the temperature at which people were neither cold nor hot. Thermal neutral had a PET

Table 1: Thermal Neutral. PET is the only index available from every location. In general, thermal neutral tracked with climate – cooler climates had lower thermal neutral. Middle Western Europe values from: Lin T-P, Matzarakis A (2008). Tourism climate and thermal comfort in Sun Moon Lake, Taiwan. *International Journal of Biometeorology* 52 (4):281-290.

Thermal Neutral	**PET**	**Ambient Temp.**	**Apparent Temp.**	**UTCI**	**SET**
Adelaide	23.6	25.2	25.2	25.2	26.8
Central Taiwan	27.2	-	-	-	27.2
Israel	26.6	-	-	-	-
Phoenix	31.3	21.1	26.6	28.9	27.0
Middle Western Europe	23.0	-	-	-	-
Thermal Acceptability (using an 80% Limit)					
Adelaide	31.4	33.5	30.4	33.2	30.0
Central Taiwan	35.4	-	-	-	39.7
Israel	35.1	-	-	-	-
Phoenix	47.4	31.2	33.7	36.8	39.7

value that ranged from 24°C (Adelaide) to 31°C (Phoenix). Perceptions of thermal comfort (thermal acceptability) is the range of temperature at which 80% of the local responders found "acceptable" comfort. The methodology identifies both upper and lower temperature thresholds; however, only the upper threshold of temperature acceptability was reported. The upper limits for thermal acceptability had PET values that ranged from 31°C to 47°C – a wider range than the preference values, though both show acclimatization differences in the local populations.

The four studies' results are being used for in a range of applications: Adelaide's for improving sustainability and comfort within the city, with a target temperature of 26°C. Central Taiwan's thresholds are being used in tourism planning and seasonal tourism decision-making and in indoor and outdoor urban design applications to improve public spaces and building codes. In Israel, the findings are being used primarily in improvement of urban design. Additionally, researchers have found that new immigrants from cooler locations such as the Ukraine and Russia are much more sensitive to heat stress than native Israelis.

The Phoenix study was part of a broader climate and health study that compared heat-related emergency 911 dispatches (HRD) in Phoenix, Arizona and Chicago, Illinois, USA. The high thermal comfort adaptation level in Phoenix corresponded to the temperature thresholds at which HRD began to rapidly climb, while Chicago's thresholds were similar to thermal comfort levels of Taiwan or Middle Europe. Phoenix's study (and Israel's) demonstrate the value that survey-based thermal comfort studies could have in the field of health-climate. Bottom line finding: the thresholds of comfort generally align with climate – with higher thresholds in warmer places, thus documenting considerable capacity for human adaptation to heat. Of course, this is not a new finding – though as mentioned previously, comparisons are difficult. Much is yet unknown about local adaptation in other places and climates. What we do know is that people's actual thermal perceptions and preferences are strongly influenced by a host of additional factors, including their acclimatization to a particular environment, their experiences and expectations, and their physiology and health status, and culture.

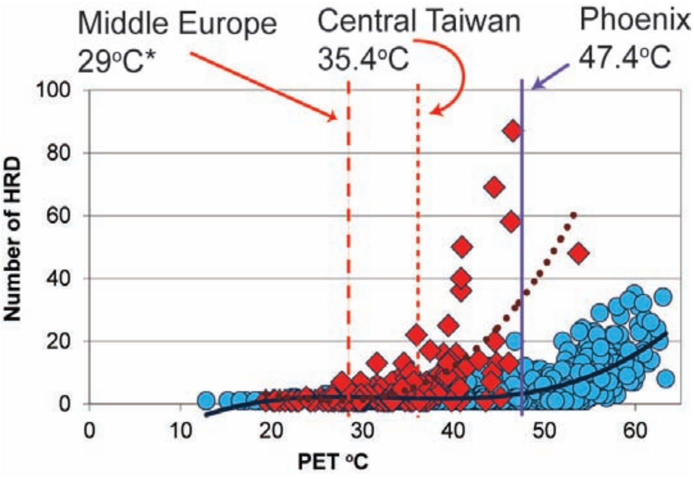

Figure 1: The number of heat-related emergency dispatches (HRD) as a function of Physiologically Equivalent Temperature (PET) in several urban locations, showing the PET threshold at which HRD begins to climb rapidly in each location.

Which brings me to the presentation in the Thermal Comfort track of ICUC8 by **Rohinton Emmanuel**, **Sofia Thorsson**, **Erik Johansson and Eduardo Krueger** – the need to develop a protocol for standardization of methodologies, to give future studies more credibility and usefulness. This issue became a discussion point at the conference and one which needs to be pursued. Thus, if you, or someone you know, is involved in this type of research – please drop me an e-mail. Let's get a dialogue going with an end goal of developing protocols – standardization of questions and measurement methods.

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ICUC8 convenes in Dublin

8th International Conference on Urban Climate / 10th Symposium on the Urban Environment in Dublin, Ireland, 6-10 August 2012

By Rohinton Emmanuel
IAUC Secretary

The **Eighth International Conference on Urban Climate and the Tenth Symposium on the Urban Environment** jointly organised by the IAUC and the Board of Urban Environment of the American Meteorological Society (AMS) was held in Dublin in August. The organisers, especially **Gerald Mills** (University College Dublin; President of the IAUC) are to be congratulated for a well organised and by far the largest ever meeting of the International Association for Urban Climate. Over 450 registered delegates – a third of whom were students – participated in the five day conference and the attendees came from several countries. The size, geographical spread and issue coverage of the ICUC-8 augur well for the vitality and relevance of the IAUC. Generous financial support from the Science Foundation of Ireland (SFI), European Space Agency (ESA) and the World Meteorological Organisation (WMO) helped to support 35 persons from developing countries to attend the meeting.

343 oral presentations and 130 poster presentations were made at the conference, necessitating up to 5 parallel sessions on many days – certainly a first for ICUC. Despite the size of the event the layout of the conference (similar themes in the same location on most days, strict observance of the 15-minutes-per-presentation rule, adequate time allocation for posters and the location of poster display area) enabled one to listen/view as many of the presentations and posters as interested, with minimal interruptions. The attention to detail was excellent: even a brown bag lunch was provided, saving participants time which they were able to use to network and or catch up on the posters!

ICUC-8 Oral presentations by themes and topics

Theme / Topic	No. of Sessions	No. of Presentations
Urban Heat Island		**82**
Measurement & modelling	2	11
Subsurface	1	5
Surface energy balance	3	13
Topoclimatology	1	5
UHI Geographies	3	16
Urban boundary layer	2	9
Urban radiation exchanges	1	5
Urban roughness sub-layer	4	18
Urban and building climate		**93**
Building climate	2	12
CO_2 flux	1	5
Pedestrians and wind	1	4
Temperature extremes	2	12
Urban air quality	5	23
Urban climate effect	2	11
Urban precipitation	2	12
Urban radiation exchanges	1	5
Urban ventilation	1	4
Urban wind effect	1	5
Mapping and modelling		**37**
Climate mapping – climatopes	1	4
LES & CFD modelling	1	4
Regional climate models and urban parameterisation	2	11
Microscale modelling	1	4
Remote sensing	1	4
Urban climate model needs	1	5
Urban weather network	1	5
Global Climate change		**11**
Global climate change and cities	2	11
Applications		**120**
Bioclimate	3	15
Knowledge transfer for urban design and planning	2	12
Linking indoor with outdoor	1	5
Local climate zones	1	5
Thermal comfort	4	19
Urban design and planning	5	29
Urban greening	4	20
Urban materials	1	3
Weather research & forecasting	3	12

The student paper/poster awards and best paper awards for presenters from the developing world will be announced in due course and a select group of presentations will be published in a special journal issue. At this point I want to draw attention to the five thought-provoking plenaries delivered during the conference. Details on some of these may be found in this issue and coming issues of *Urban Climate News*.

Michael Hebbert and **Vladimir Jankovic** (both from the University of Manchester) presented the first plenary, "Two perspectives on Applied Climatology," providing an overview of their recently concluded UK Economic and Social Research Council (ESRC)-funded project. A sobering thought was the relevance and timeliness of a 75-year old quote from the Benedictine monk Albert Kratzer (1937): "Cities, more than we generally assume, are co-partners of their own climate." The policy implication of this are yet to be fully grasped. Based on their findings, Hebbert and Jankovic urged the urban climate research community to communicate their findings more widely: "Now is the time for communication."

Stephen Belcher's (University of Reading and Head of the Met office Hadley Centre) talk on "Cities and climate change" proposed a novel division of labour between the urban and global climate researchers. Prof. Belcher pointed out the mismatch in scales and expertise between global and urban climate change research. He proposed a 'hybrid' approach to overcome this problem, as opposed to the current 'top down' (global climate change research community) and the 'bottom up' (urban climate research community) approaches. The Hybrid approach will have three steps:

a. Adopt a risk framework (RISK = Hazard x Vulnerability)

b. Assess vulnerability via case studies (e.g. 2003 summer heat wave and its effect on energy use in buildings)

c. Use ensemble climate projection to calculate changing probability of the hazard (e.g. How will frequency and return period of summer 2003 increase in time?)

Steps (a) and (b) will be the domain of the urban climate research community, while (c) is to be assigned to global climate scientists. This will benefit from the strengths of both communities.

Janet Barlow (University of Reading) provided an overview of the "Progress in measuring and modelling the urban boundary layer (UBL)." She stressed the importance of the storage term. Urban nocturnal jets (compared to the rural case) occur later, higher and are generally weaker. Prof. Barlow stated that "the Urban Canopy Layer (UCL) makes the UHI, but the UBL determines the temporal characteristics of its dissipation."

Jason Ching's (University of North Carolina) plenary talk on "Framework for an international community urban morphology database" elicited great interest. (Details of this talk are available in a separate article in this issue). He stressed the importance of accurately accounting for the urban fraction in mesoscale climate models and alluded to several initiatives in this regard including the National Urban Database and Access Portal Tool (NUDAPT), Community Land Model - Urban (CLM-U) etc. Dr. Ching proposed the widespread use of the Local Climate Zone (LCZ) scheme developed by Stewart and Oke (2012) as the basis for more accurately estimating the urban fraction. This could be done using a crowd-sourcing tool to create a new World Urban Database and Access Portal Tool (WUDAPT) for urban mesoscale modelling.

Andreas Christen (University of British Columbia) spoke on the "Progress in measuring and modelling GHG exchange in urban ecosystem." Dr. Christen presented the current status of GHG modelling and measurement and pointed to a possible role for the IAUC community – to meet challenges in instrumentation and modelling GHG fluxes in cities. He pointed out the importance of built environment-related actions to the global effort to reduce carbon emission: "Of the 630 carbon emission reduction strategies proposed by C40 cities, 135 are built- environment related." Pointing to the urban emissions, he stated that the wintertime urban CO_2 dome in developed cities is higher and this is not only a function of urban activities but also the boundary layer conditions. Dr. Christen sounded a cautionary note that might be relevant to advocates of high density cities as a low carbon option: "Although reduction in urban functions could lead to less emissions, a less dense and green city could have a net CO_2 uptake."

ICUC8 in Dublin

ICUC8 in Dublin

IAUC Board, August 2012 (from left to right): Gerald Mills, Andreas Christen, James Voogt, Aude Lemonsu, David Sailor, Jennifer Salmond, Silvana di Sabatino, Tim Oke, Sue Grimmond, Sofia Thorsson, Rohinton Emmanuel, Jason Ching, Hiroyuki Kusaka, Alberto Martilli

Recent publications in Urban Climatology

After five years of chairing the Bibliographic Committee (BibCom), Julia Hidalgo decided that it was time to pass on the torch. Hence, from now on I will take over her duties as coordinator of BibCom. So first of all I would like to take this opportunity to thank Julia for her commitment over the last several years, to provide all of us with the most recent publications in the field of Urban Climate. Thank you!

During the BibCom meeting at the ICUC8 in Dublin, some of the other volunteers indicated that they could no longer be part of this committee. Thus I call out to all of you: if you are interested in joining this committee and contributing to the collection of recent literature, please send me an email (matthias.demuzere@ees.kuleuven.be). Your help will be very much appreciated.

In this edition is a list of publications that have come out until the end of August 2012. As usual, papers published since this date are welcome for inclusion in the next newsletter and IAUC online database. Please send your references to the email address above with a header "IAUC publications" and the following format: Author, Title, Journal, Volume, Pages, Dates, Keywords, Language, Url, and Abstract.

Enjoy!

Matthias Demuzere

Department of Earth and Environmental Sciences, KU Leuven, Belgium (and presently working with the Monash University Urban Climate Group in Melbourne, Australia)

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Upcoming Conferences...

THIRD INTERNATIONAL CONFERENCE ON THE CONSTRUCTED ENVIRONMENT
Vancouver, Canada • October 25-26, 2012
http://www.ConstructedEnvironment.com

INTERNATIONAL CONFERENCE ON URBAN CLIMATE AND HISTORY OF METEOROLOGY
Florence, Italy • February 25-26, 2013
http://web.fi.ibimet.cnr.it/urbanclimate

HARMONISATION WITHIN ATMOSPHERIC DISPERSION MODELLING FOR REGULATORY PURPOSES
Madrid, Spain • May 6-9, 2013
http://www.harmo.org/harmo15

6TH INTERNATIONAL CONFERENCE ON FOG, FOG COLLECTION AND DEW
Yokohama, Japan • May 19-24, 2013
http://www.fogconference.org/

2013 AAG ANNUAL MEETING
Los Angeles, CA • April 9-13, 2013
http://www.aag.org/annualmeeting

Call for Papers: Urban Weather and Climates

Organizers: Dr. Chandana Mitra (Auburn University) and Dr. Winston Chow (Arizona State University and National University of Singapore)

Deadline: Please register and submit your abstracts (250 word maximum) at the AAG Annual Meeting website by **October 24, 2012.**

As more than half of the current global population reside in cities, the field of urban meteorology and climatology is gaining greater relevance and importance in both physical and human geographical research. With further urbanization, local and regional-scale changes to urban ecological structure, ambient pollution levels, biodiversity composition, human thermal comfort, as well as nutrient and energy flows within cities and their surrounding areas will arise. Thus, research based on observational, modeling and/or remote sensing platforms across cities would be needed to document these alterations. The challenges facing urban climate research across all spatial scales are further compounded by the influence – and impacts – of global climate change, such as with higher and more extreme temperatures, and variations to precipitation regimes. These impacts potentially increase the physical exposure of urban residents, as well as complicate the adaptive and/or mitigation responses of municipal governments. The interactions of these multi-scale impacts would thus present unique challenges related to residents, urban planners and other stakeholders in cities.

In this session (or sessions), we welcome papers related to these aforementioned issues and challenges. These papers may include, but need not be limited to, the following themes:

- Micro-, local- and/or regional scale case studies into urban climate phenomena, such as the urban heat island (UHI), urban precipitation or air pollution;
- Urban biometeorological research into the health and well-being of city residents, flora and/or fauna;
- Current assessment, or future developments in methodological techniques within urban meteorology and climatology research;
- Urban climate research based in, or originating from tropical or sub-tropical cities. As an important theme in this year's annual meeting is "Emerging Asias", we welcome papers that focus on urban climates in Asian cities;
- Analyses of adaptation or mitigation response towards urban climate hazards in cities, and;
- Communication and incorporation of academic research into planning, policy-making and urban stakeholder undertakings.

Please send your paper abstracts (250 words maximum) and your AAG program identification number (PIN) by **October 24, 2012** to Chandana Mitra (chandana@auburn.edu) and Winston Chow (wtchow@asu.edu) so that we can arrange the session(s), as well as notify participants before the final submission deadline.

IAUC Board Elections 2012

The election to select a new IAUC Board member was recently concluded.

Dr. Andreas Christen (University of British Columbia, Canada) was elected to the Board of the IAUC for a 4-year period with effect from August 2012. Andreas will replace Sofia Thorsson (University of Gothenburg, Sweden) whose term has come to an end. The Board would like to take this opportunity to thank Sofia for her many contributions to the IAUC. The Board would also like to thank all the other candidates who generously agreed to stand for this position.

Andreas is an Assistant Professor in the Department of Geography and the Atmospheric Science Program the University of British Columbia, Canada where he has a teaching and research focus on urban micrometeorology and climatology. By training, he is a Geographer who received a PhD in Meteorology at the University of Basel (2005), Switzerland, where he was working on turbulence in the urban atmosphere during the BUBBLE urban field program. He was also a post-doctoral researcher in urban climatology at the Department of Ecology at TU Berlin, Germany developing thermal remote sensing methods to visualize and track the response of turbulent exchange processes on urban fabrics. Currently, he is on sabbatical as visiting professor in the Environmental Fluid Mechanics Laboratory at the École Polytechnique Fédérale de Lausanne, Switzerland.

Andreas' current research focuses on methods to quantify, analyze and model the exchange of energy, water and greenhouse-gases between ecosystems and the atmosphere on scales from lawns to entire cities. He is using a synthesis of observational approaches as well as bottom-up and inverse models to quantify greenhouse gas emissions from cities and study the underlying exchange processes.

On behalf of the IAUC, Andreas coordinates the Urban Flux Network, which networks research groups measuring the exchange of energy, water, greenhouse-gases and aerosols in cities. The IAUC urban flux network acts as a communication and database platform and integrates our community's efforts into the global FLUXNET.

"I am pleased to work on the board of the IAUC," Andreas says. "I consider IAUC's role in communication, in sharing expertise and enthusiasm across a wide range of disciplines (atmospheric sciences, ecology, urban planning, geography, engineering, etc.) key to manage our cities in a more sustainable way – to create knowledge and tools, discuss solutions, and educate decision makers."

Board Members & Terms

- Tim Oke (University of British Columbia, Canada): President, 2000-2003; Past President, 2003-2006; Emeritus President 2007-2009*
- Sue Grimmond (King's College London, UK): 2000-2003; President, 2003-2007; Past President, 2007-2009*
- Matthias Roth (National University of Singapore, Singapore): 2000-2003; Secretary, 2003-2007; Acting-Treasurer 2006; President, 2007-2009; Past-President 2009-2011*
- Gerald Mills (UCD, Dublin, Ireland): 2007-2011; President, 2009-2011
- Jennifer Salmond (University of Auckland, NZ): 2005-2009; Secretary, 2007-2009
- James Voogt (University of Western Ontario, Canada), 2000-2006; Webmaster 2007-*; 2009-2013
- Manabu Kanda (Tokyo Institute of Technology, Japan): 2005-2009, ICUC-7 Local Organizer, 2007-2009.*
- Andreas Christen (University of British Columbia, Canada): 2012-2016
- Rohinton Emmanuel (Glasgow Caledonian University, UK): 2006-2010; Secretary, 2009-2011
- Jason Ching (EPA Atmospheric Modelling & Analysis Division, USA): 2009-2013
- David Pearlmutter (Ben-Gurion University of the Negev, Israel): Newsletter Editor, 2009-*
- Alberto Martilli (CIEMAT, Spain), 2010-2014
- Aude Lemonsu (CNRS/Meteo France), 2010-2014
- Silvana di Sabatino (Univ. of Salento, Italy), 2010-2014
- Hiroyuki Kusaka (University of Tsukuba, Japan): 2011-2015
- David Sailor (Portland State University, USA): 2011-2015

* appointed members

IAUC Committee Chairs

Editor, IAUC Newsletter: David Pearlmutter
Bibliography Committee: Julia Hidalgo
Nominating Committee: Tim Oke
Chair Teaching Resources: Gerald Mills
Interim-Chair Awards Committee: Jennifer Salmond
WebMaster: James Voogt

Newsletter Contributions

The next edition of ***Urban Climate News*** will appear in late September. Items to be considered for the upcoming issue should be received by **November 30, 2012** and may be sent to editor David Pearlmutter (davidp@bgu.ac.il) or to the relevant section editor:

News: Winston Chow (wtchow@asu.edu)
Conferences: Jamie Voogt (javoogt@uwo.ca)
Bibliography: Julia Hidalgo (julia.hidalgo@ymail.com)
Projects: Sue Grimmond (Sue.Grimmond@kcl.ac.uk)

Submissions should be concise, written in a manner that is accessible to a wide audience, and incorporate figures and photographs. The articles in this Newsletter are unrefereed, and their appearance does not constitute formal publication; they should not be used or cited otherwise.