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From the IAUC President

Colleagues, welcome to the 37th edition of *Urban Climate News*, which is now entering its 8th year as the main source of news for the urban climate community. Its continued excellence is a credit to the work of David Pearlmutter, who solicits and edits contributions and designs the publication. However, it does require a constant flow of reports on research activities, conferences and any issue that is relevant to our field. Please consider submitting a piece that would interest the wider community.

I recently had the opportunity to work with IAUC colleagues in developing materials for an Urban Climatology workshop sponsored by the WMO in Pune, India. The five-day event was an intensive course covering urban effects on temperature, precipitation and airflow. About 35 individuals attended the workshop, mostly from India itself although a number came from such diverse places as Sri Lanka, Ecuador, Georgia, Hong Kong, Russia, Mozambique, Kenya, Thailand, Sudan, Solomon Island and the UK. Most participants were meteorologists employed by WMO's National Meteorological and Hydrological Services (NMHS), though a significant number represented other professions, including architects, urban planners and academics. The inclusion of many from outside the confines of traditional NMHSs reflects a couple of broader developments, I think.

The continued growth in urban populations means that most experience weather and climate that is significantly different from that observed by conventional networks. There is considerable interest for many in observing urban effects in places where they live and there is a dearth of studies on urban climates in tropical areas. Much of this work will not be done by NMHSs but by interested parties from varying backgrounds, often with limited experience of making observations in the urban environment. The onus is on organisations such as the IAUC to provide guidance and ensure that these studies meaningfully contribute to the existing body of knowledge.

For NMHSs, urban areas pose a real challenge in terms of providing suitable observational networks and extracting information that is relevant to a group of users (urban planners/architects/designers/managers) whose needs have not been addressed previously. This concern was addressed in the third World Climate Conference, entitled "Better climate information for

a better future." At the WCC3, the IAUC presented two white papers on capabilities and on needs with regard to weather/climate information and cities. Four main recommendations were emphasized: improving urban climate observation networks; enhancing climate research for hot cities; improving urban climate modelling; and transferring knowledge in urban climatology. The workshop is evidence that these recommendations are having an effect. Moreover, they dovetail nicely with other initiatives. As an example, Dr. Tyagi (Dir. General of the Indian Meteorological Department), in his address to the Workshop participants, drew attention to a network of 35 automatic weather stations to be located in Delhi to provide weather information for the city and to aid in 'nowcasting' for the Commonwealth Games.

There is little doubt that urban climate issues will grow in significance in the coming decades, and I believe that the IAUC (acting alone or in collaboration) is well suited to meeting the challenges that are likely to arise.

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Cities lead the way in action to halt climate change

Boston has mandated the nation's first green building code for private projects. *Photo: W. van Bergen via Flickr*

September, 2010 — Humans have officially made their home in the concrete jungle. Ours is the first generation in which most of the world's population lives in cities.

With 6 billion people on the planet, and 2 billion more expected within 20 years, the race to our cities and the slums and vast sprawl surrounding some of them will only accelerate. Already, our metropolises -- 21 already have populations of 10 million or more -- consume about three-quarters of the world's energy, releasing vast quantities of the greenhouse gases (GHGs) that warm the planet.

Protecting our climate, in other words, means redefining what urban means. Yet much coverage of climate action dismisses local and state government actions in favor of splashy (or, recently, dismal) international announcements and would-be efforts.

That's a mistake, suggests the Pew Foundation, which credits cities and local governments for having cut more than 23 million tons of greenhouse gasses -- equivalent to the emissions produced by 1.8 million households -- in 2009 alone. In fact, if just local governments in the U.S. meet their emissions targets, the country will be well on its way to meeting the Obama administration's official emissions target of 17 percent below 2005 levels within a decade.

"Generally, cities are the place where it's going to happen," says K.C. Boyce, who oversees the U.S. membership program for ICLEI USA - Local Governments for Sustainability, an organization of local governments worldwide dedicated to urban sustainability and lowering GHG emissions. The group is betting that cities, including the 600 on ICLEI's rosters in the U.S., will lead their nations toward a low-carbon future. "Land use, zoning, and transportation are the nexus that has the potential to have a real impact because it's about where we live, how we live, and how we travel," says Boyce.

Cities have a unique power to drive immediate change involving issues such as public transportation, but they also can help influence prosaic long-term land use planning (think about all those interminable city council meetings) to realize truly sustainable cities. No futuristic visions of cities are needed. For now, the reality is more mundane: asphalt recycling and better insulation in buildings, timers for coffee makers and telecommuting, light sensors, and water conservation.

Local governments are tackling GHG emissions in any way they can: Boston, for instance, has mandated the nation's first green building code for private projects. In Gainesville, Fla., the city utility pays a premium for solar power from peoples' homes fed back into the grid. In Babylon, N.Y., homeowners are eligible for loans to make their homes more efficient, and those loans are entirely repaid through cost savings in their power bills.

But to create low- or zero-emission cities -- among the only ways to avoid dangerous climate change if the objective is to cut GHG emissions 80 percent below 1990 levels by 2050, the target set by the Intergovernmental Panel on Climate Change -- more revolutionary changes are needed.

At least 1,000 cities in the U.S. and around the world are adopting targets and taking action, says ICLEI. Cities are co-operating internationally, offering financial incentive programs for clean power plants and home retrofits, and planning growth and emission cuts as much as half-a-century down the road.

Groups such as the U.S. Conference of Mayors Climate Protection Center, the Global Carbon Project's Urban and Regional Carbon Management Initiative, and a constellation of universities' engineering, urban planning, and climate science and policy departments have sprung up to support these efforts. This bottom-up approach seems to be gaining steam, despite the inability of climate talks in Washington or internationally to produce a binding climate strategy.

A big question, says Professor Jim Hall, a civil engineer at the U.K.'s Newcastle University and the Tyndall Center for Climate Change Research, involves just how to manage a system as complex as a modern city.

"There are no silver bullets here," Hall emphasizes. "One needs to put together strategic portfolios of measures. We are trying to make the case by taking an integrated approach to the built environment, infrastructure, and land use, bringing those three areas together. Timely decisions now can get us on a more sustainable track."

Breakthroughs to cut emissions ever more steeply, he argues, will require demonstrations in the urban laboratory. Policies and technologies can be combined in variations across the world, and the best will show the way in the future, he says; no other forum has quite the same concentration of human wealth and talent. "Cities are centers of creativity," Hall says. "The rate of growth and change within cities provides real opportunities for innovation for climate protection."

Cities' climate honor roll

ICLEI USA has compiled a list of cities taking action to reduce their GHG emissions. Take a look:

Residential Green Building Code: Santa Fe, NM: The Santa Fe Residential Green Building Code adopted in 2009 sets a high energy efficiency standard for all new residential construction, with larger homes required to meet increasingly stringent energy use performance benchmarks (homes of more than 8,000 heated square feet are actually required to produce the same amount of energy that they expect to use).

Compressed Workweek: Asheville, NC: In 2008, Asheville cut energy demand and commuting costs for employees through a compressed work week. Instead of a traditional schedule, all staff (except senior management) work 10 hours per day, four days each week. The city cut energy use in public works buildings by 13 percent and estimated savings of 249 metric tons of CO_2 equivalent per year.

Solar Feed-In Tariff: Gainesville, FL: Gainesville Regional Utilities became the first municipally-owned and -operated utility in the U.S. to enact a solar feed-in tariff. Gainesville will pay 32 cents per kilowatt hour (kWh) for 20 years for power generated by solar electric systems installed in 2009 and 2010.

Promoting Cycling and Walking: Chicago, IL: The City of Chicago has drafted its pedestrian and bike plan, including recommendations for a 500-mile bikeway network, street safety improvements for cyclists, and 5,000 new bike racks.

Biogas to Energy: Columbia, MO: Columbia was Missouri's first city to have a voter-approved renewable energy standard requiring renewable sources for the city's energy supply. To help meet its goal, the Columbia Biogas Energy Plant came online in June 2008. By converting landfill gas to energy from its decomposing waste, the city can generate 2.1 megawatts of renewable power, enough to power 1,500 city homes.

Chicago has won praise for promoting biking and walking. *Photo: Tom Gill via Flickr*

Wastewater Treatment: Houston, TX: Since 2006, the City of Houston has tested 20 floating solar-powered reservoir circulators (SolarBees), designed to improve public drinking water quality and reduce water treatment costs by replacing energy-intensive treatment methods. Researchers point to notable improvements in water clarity and other water quality indicators such as pH, total organic carbon (TOC), and turbidity in waters entering the treatment plant.

Solar power: Santa Monica, CA: The City of Santa Monica's Community Energy Independence Initiative establishes a net zero [emissions] energy goal for the city by 2020. It aims to produce as much electricity as consumed through energy efficiency measures and solar power. Solar Santa Monica provides free-of-charge energy efficiency and solar assessments for residential and commercial property owners and pre-qualified contractors.

Source: http://www.grist.org/article/2010-09-16-cities-confront-the-global-challenge-embrace-clean-energy

Hong Kong air pollution hits record

September, 2010 — Roadside air pollution in Hong Kong hit record highs in the first six months of the year, hurting public health and economic competitiveness compared with Asian rivals, activists and lawmakers said Tuesday.

The city's air quality hit "unhealthy" levels about 10 percent of the time between January and June, the highest level in five years, said environmental group Friends of the Earth. The government advises people with heart or respiratory problems to avoid lingering in traffic-heavy places when the air pollution index goes into "unhealthy" territory.

"Think of the health cost and also the disincentives to tourists and to people investing and setting up companies in Hong Kong," said legislator Audrey Eu who joined green activists in unfurling a big black banner over a roadside monitoring station at the heart of Hong Kong's Central financial district.

Health experts estimate poor air has cost the city HK$1.18 billion (US$151 million) in healthcare bills and lost productivity, along with 3.8 million visits to the doctor, this year.

"The bad air and pollution is actually giving Hong Kong a bad name and deterring people from coming," added Eu, who was among a coalition of lawmakers urging the government to do much more to resolve the problem including accelerating the phasing out of diesel buses and imposing stiffer fines.

Hong Kong's air pollution soared off the charts to unprecedented highs in March when sandstorms from northern China cloaked the city in dust.

A survey by Mercer Consulting ranking the quality of life of 221 cities, found air pollution weighed heavily on Hong Kong, a business gateway to China, knocking its ranking to 71, far below Singapore at 28.

"Hong Kong's always been rated lower than other neighboring cities ... it's due mainly to our air quality problems," said Edwin Lau, director of Friends of the Earth.

"The government seems to have done a lot of things, but I would say they've only been tinkering on the edges," said Lau, referring to a recent law to ban idling engines.

He noted, however, that imported pollution from China's vast industrial hinterland of the Pearl River Delta, across the border from Hong Kong, had shown mild improvement over the past year given a push to phase out older, more polluting industries there and other emission-reduction measures.

Hong Kong's Environmental Protection Department noted that while roadside pollution had peaked, overall atmospheric pollution levels actually fell in the first six months.

Source: http://www.reuters.com/article/idUSTRE68719M20100908

EPA's Clean Air Act Turns 40

Agency commemorates significant health and environmental achievements

September, 2010 — As part of the activities commemorating the U.S. Environmental Protection Agency's 40th anniversary, the agency is highlighting progress made under the 40 years of the Clean Air Act (CAA) at a conference in Washington, D.C. Among the attendees are those who have helped to shape the CAA over the years, including members of Congress, state and local government officials, and leaders in public health, business and technology, environmental justice, and advocacy.

"For 40 years the Clean Air Act has protected our health and our environment, saving lives and sparking new innovations to make our economy cleaner and stronger. The common sense application of the act has made it one of the most cost-effective things the American people have done for themselves in the last half century," said EPA Administrator Lisa P. Jackson. "Since 1970 we have seen a steady trajectory of less pollution in our communities and greater economic opportunity throughout our nation. We will continue those trends as we face the clean air challenges of the next 40 years, including working to cut greenhouse gases and grow the American clean energy economy. The Clean Air Act proves the naysayers wrong – we can protect our health and environment at the same time we grow our economy."

Significant health benefits, especially for children

According to an EPA analysis, the first 20 years of Clean Air Act programs, from 1970 to 1990, prevented:

- 205,000 premature deaths
- 672,000 cases of chronic bronchitis
- 21,000 cases of heart disease
- 843,000 asthma attacks
- 10.4 million lost I.Q. points in children – mostly from reducing lead in gasoline
- 18 million child respiratory illnesses

Improved air quality and public health

In 1990, the act was revised with overwhelming bipartisan support.

• From 1990 through 2008, emissions of six common pollutants are down 41 percent, while gross domestic product has grown 64 percent.

• Lead levels in the air are 92 percent lower than in 1980, greatly reducing the number of children with IQs below 70 as a result of dirty air.

• Preliminary EPA analysis shows that in 2010, CAA fine particles and ozone programs will prevent more than 160,000 premature deaths. The economic value of air quality improvements is estimated to reach almost $2 trillion for the year 2020, a value that exceeds the costs to comply with the 1990 Clean Air Act and related programs.

Cleaner cars, trucks and transportation

New cars, light trucks, and heavy-duty diesel engines are up to 95 percent cleaner than past models thanks to technology such as the catalytic converter.

• New non-road engines used in construction and agriculture have 90 percent less particle pollution and nitrogen oxide emissions than previous models.

• When fully implemented in 2030, vehicle and fuel programs will produce $186 billion in air quality and health benefits, with only $11 billion in costs, a nearly 16-to-1 benefit/cost ratio.

Combating acid rain, cleaner power plants

The acid rain program has reduced damage to water quality in lakes and streams, and improved the health of ecosystems and forests. Acid deposition has decreased by more than 30 percent in much of the Midwest and Northeast since 1990 under a cap-and-trade program for power plants.

• Reductions in fine particle levels yielded benefits including the avoidance of about 20,000 to 50,000 premature deaths annually.

• The benefits of the acid rain program outweigh the costs by at least 40-to-1.

Reducing industrial toxic air pollution

Since 1990, toxic emissions have been reduced from industry by 1.7 million tons a year -- many times the reductions achieved in the first 20 years of the CAA.

• The air toxics rules for chemical plants, oil refineries, aerospace manufacturing and other industries also are achieving large reductions in pollutants that form smog and particulates.

• Monitoring networks are extensive enough to determine that outdoor air concentrations of benzene, a carcinogen, decreased 55 percent between 1994 and 2007.

Reducing skin cancer by protecting the ozone layer

The Clean Air Act amendments of 1990 require that EPA develop and implement regulations for the responsible management of ozone-depleting substances in the United States to help restore the ozone layer.

• The phase-out of the most harmful ozone-depleting chemicals, including CFC and halons will reduce U.S. incidences of non-melanoma skin cancer by 295 million during the period 1989 through 2075, as well as protect people from immune system suppression and eye damage leading to cataracts.

The event is being webcast live at: http://www.epa.gov/live/

More information on the Clean Air Act: http://epa.gov/oar/caa/40th.html

Source: http://yosemite.epa.gov/opa/admpress.nsf/0/f80d115e276a3c548525779e00559817?OpenDocumen

A GIS-Based Object Recognition Model for Analyzing the Morphology of Urban Form

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In order to account for local urban effects in large-scale climate modeling, it is essential to develop and maintain databases which can reliably depict the three-dimensional surface morphology of cities. While in developed countries such databases typically exist in a relatively accurate and up-to-date form, many cities in the developing world have incomplete or out-of-date databases at best. To fill this void in a timely manner, remotely-sensed data can be used either as a primary data source or for supplementing existing field data. This work presents a parametric model which was developed to enable automated recognition of urban objects and their morphological attributes, in particular open spaces, from remotely sensed data. Classification of objects is based on generic context-based relations between objects in the urban terrain, and uses the capability of GIS to recognize contextual relations. The model's application is illustrated here by a case study focusing on the recognition of courtyard spaces in a densely built urban fabric.

1. Introduction

In recent years, remote sensing has evolved in combination with advanced image processing techniques to provide powerful tools for the quantitative study of urban form. Accurate remotely-sensed data with a high spatial and spectral resolution can now facilitate large-scale and multi-temporal analysis of urban patterns without the considerable time and labor demands associated with field surveying and/or manual digitizing of existing urban data. One application of remotely sensed data is the automated recognition of urban objects, such as buildings, roads and trees. Extracted objects and their associated attributes can be readily integrated into GIS databases for further analysis, modeling and visualization (Lillesand and Kiefer, 2000; Mayer, 1999).

Automated extraction of urban objects from complex urban settings is still considered one of the most challenging tasks in the domain of object recognition and image understanding (Peng *et al*., 2004). Urban objects often do not follow the basic assumptions of automated recognition systems, such as *consistent pixel intensity*, *predictable shapes* and *well-defined edges* (Irvin and McKeown, 1989). Additional complexity is added by the high degree of spatial and spectral heterogeneity present in urban environments (Zhang, 1999), the abundance of urban details which introduce "noise" into the process, the challenge of extracting 3D information (such as building heights) from vertical images (i.e. in which the viewing angle of the remote sensing device is normal to the surface), and the raster-to-vector conversion required for using object recognition output in a vector-based GIS analysis (Fig. 1).

Figure 1. Aerial urban image, illustrating the complexity of urban objects (e.g. a high degree of spectral and spatial heterogeneity and abundance of urban details). Image © *Ofek Aerial Photography Ltd. (2005)*

To date, automated recognition of urban objects has focused mainly on the identification of buildings (Zhang, 1999; Scott Lee *et al*., 2003; Peng *et al*., 2004).

Recognition of urban open spaces has been centered primarily on the classification of road networks and ground cover types and has been used, for example, for estimating the impact of different vegetation and pavements on urban climate (Akbari *et al.*, 2003). The current model focuses on the recognition of open spaces in irregular and densely-built urban terrain that are typical to pre-industrial (i.e. *vernacular*) city centers, and on the extraction of morphological attributes needed for analyzing solar exposure.

2. Recognition of urban objects using GIS

Automated object recognition uses either *supervised classification*, which requires a set of predefined classes, or *unsupervised classification*, which is based on intrinsic groupings within the dataset. Both methods classify (recognize) objects based on (a) the *spectral* characteristics of the pixels in the image, (b) the *spatial* characteristics of the pixels or objects, and/or (c) the *contextual* relations between objects in the image.

While the first method ignores spatial characteristics such as object size and shape, the second consists of methods which categorize pixels based on the spatial relationship between them and surrounding pixels. Both extract the information required for classification from the pixels or from the objects in the image. Context-based classification employs the whole image to draw the information required for classification, thus operating at the level of *image understanding*. This approach is well suited for recognizing urban objects, as it uses generic relations between objects that are found in urban environments. In addition, it is insensitive to lighting conditions, building materials, image rotation and object scale and size. For example, a courtyard will be confined within a building or walls and a public square will intersect with the street network. A model based on one type of recognition is, in most cases, insufficient for producing satisfying results in urban environments. Pixel value, for example, might vary within one type of object, while different objects (e.g. a stone house and a stone paved road) might have the same pixel value.

The current model uses a supervised classification method. To enhance the accuracy of recognition (Mayer, 1999; Jing *et al.*, 2007) and to develop a more generic model, various techniques from spectral, spatial and context-based recognition are combined. While existing systems which combine remote sensing and GIS tend to perform the object recognition using image processing software (and only after objects have been recognized and vectorized are they integrated into a GIS database), the current methodology adopts a process in which GIS plays a major role in the recognition of objects. Only the first part of the object recognition – *segmentation* – is performed using image processing software, while the actual object recognition is performed in GIS using a *rule-based reasoning model*. After the objects are represented in GIS, morphological attributes can be extracted.

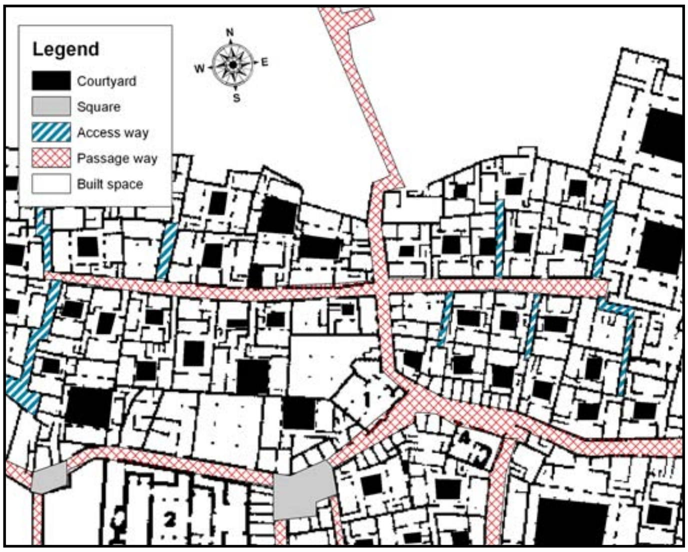

Figure 2. An example from the visual analysis illustrating the major urban elements which were identified in a residential district in Fez, Morocco. Base map from: *Urban Form in the Arab World* (Bianca, 2000)

The GIS database can be analyzed in combination with additional layers of data, such as climate-related variables, to identify trends, patterns and relationships (Longley *et al.*, 2005). Spatial analysis is used to derive information about the spatial context of the urban objects. Objects are selected and recognized based on their location in relation to other objects (for example whether they intersect with, or are completely contained within, objects of another layer).

Remotely sensed urban imagery should have a spatial resolution that is high enough to allow the recognition of important object details, i.e. location and object type (Donnay *et al.*, 2001; Mayer, 1999; Konecny and Schiewe, 1996). In order to extract morphological attributes from a compact urban fabric for GIS analysis, a relatively high spatial resolution (1 m or better) is required. The *Quickbird* satellite, with its 0.70 m spatial resolution in the standard color imagery, was therefore an ideal data source for developing and applying the current model (Toutin and Cheng, 2002).

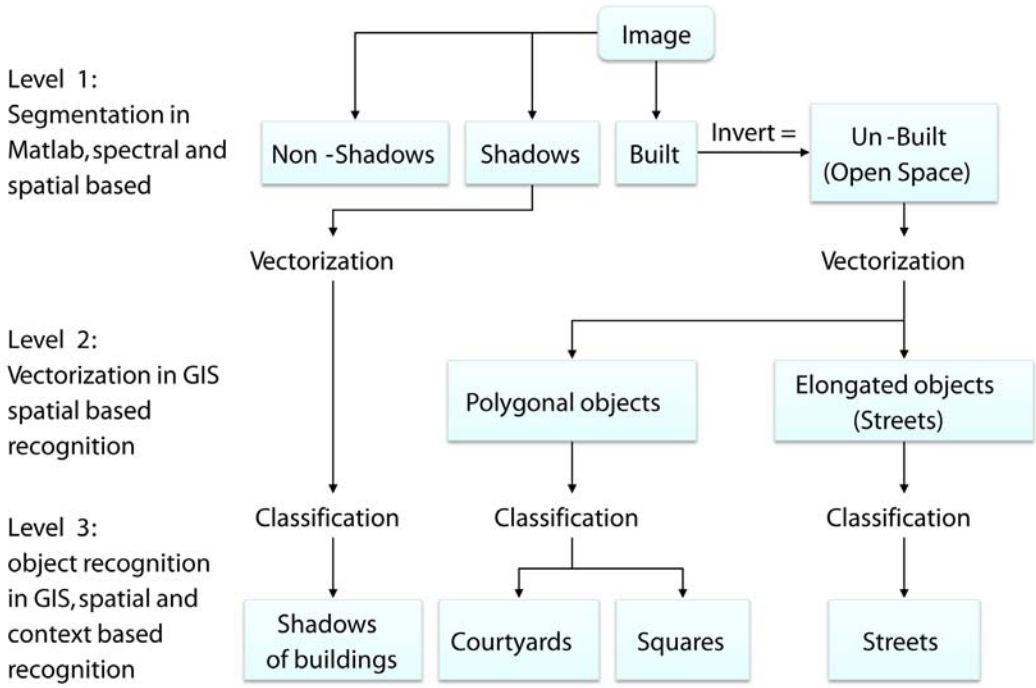

Figure 3. Hierarchy of the model's object recognition component.

3. Methodology

A Hierarchical Structure of Classification

Supervised classification is based on pre-defining a set of object classes using prior understanding and knowledge of the objects under question. To identify key components that generally characterize the morphology of vernacular urban form, a visual analysis of remotely-sensed images and figure-ground maps was carried out (Fig. 2). Locations in *arid* regions were considered especially well-suited for this analysis, since (a) open spaces generally have well-defined borders, (b) vegetation cover usually is minimal and confined, (c) images tend to be clear due to low cloud cover, and (d) large reflectance values (of typically high-albedo materials) result in a high signal-to-noise ratio.

Based on the visual analysis, four object-classes were defined: *built space*, *courtyards*, *squares* and *streets*. These classes were organized in a hierarchical pyramidal structure. Recognition is based on a top-down process which is divided into three levels of scale, from the level of the entire settlement down to the single objects. An additional class – the *shadows* class – was combined in the hierarchical structure to allow the extraction of height.

Deriving the height from shadows in the image

Object shadows provide the data required for extracting object height from a 2D image (Irvin and McKeown, 1989; Mayer, 1999). On flat terrain, the height of an object can be calculated from shadow length and solar altitude at a given latitude and time, provided that such shadows can be automatically recognized – and for this, images must contain clear shadows. However, shadows in the image may interfere with open space recognition, since objects that are partly obstructed by cast shadows cannot be considered as homogenous regions. Ideally, then, two images of the same location are required: one captured on early morning or late afternoon, when shadows are clear for recognizing shadow areas, and another captured near noon, with minimum shadows for recognizing open spaces.

Structure of the Model

The model consists of two main components: (a) object recognition and (b) attribute extraction. The approach adopted for the object recognition process (Fig. 3) is based on a three-level hierarchy as follows:

Level 1: Differentiation between *built* and *un-built* areas and between *shadows* and *non-shadow* areas.

Level 2: Differentiation between *elongated objects* (streets) and *polygonal objects* (courtyards and squares).

Level 3: Differentiation between *squares*, *courtyards*,*streets* and *shadows*.

The model consists of the following processes:

Segmentation: Images are segmented twice (following pre-processing) into regions: *shadows* and *non-shadow* areas, and *built* and *un-built* (open) areas, using Matlab® image processing tools. The main objective in the *shadows* class recognition was to find "candidates" from which the shadow length could be extracted for the calculation of the object's height. Segmentation of shadows is based on region segmentation using *morphological image processing* techniques. The segmentation of the *built* class is based on both a region-based and on an edge-based segmentation using also morphological image processing techniques.

Description and Classification: The outputs of the segmentation are introduced into the GIS and registered to enable correct spatial location. A batch vectorization is applied to the segmented outputs to represent the objects either by their boundaries as polygons, or by reducing them into a linear representation. This facilitates the morphological attribute extraction. The final step in the object recognition is the actual classification of objects. *Structural analysis* is a recognition method which describes the objects based on their spatial structure – i.e., the composition and arrangement of elements. This approach is particularly suited when objects have an obvious structure and an arrangement that can be defined by a combination of rules (Anil *et al*., 2000). A set of spatial descriptors, which define morphological attributes, and contextual descriptors, which define generic relations between objects, was used to develop the *classification rules*. The relations and classification rules were described using a *rule-based reasoning* model organized as a decision tree and consisting of a logical sequence of rules. Object candidates are evaluated using the predefined classification rules based on thresholds, and the information is extracted through queries which identify objects from one layer based on their shape properties and relations to objects in another layer.

Morphological Attribute Extraction: The database is constructed by extracting morphological attributes from the recognized object classes: *shadows*, *courtyards*, *squares* and *streets*. At this stage, only the height and the width of objects were extracted as these are essential for calculating the height-to-width ratio required for analyzing solar exposure. Calculation of building height is based on the length of the shadow and is done using a technique developed in GIS and explained in detail in Peeters and Etzion (2009): polygons that represent shadows are queried to identify all lines within a range that satisfies a specific azimuth angle (computed according to the date and the solar time at which the data was obtained, and the geographic latitude). This returns only the lines that represent the shadow length. The width of open spaces is extracted using GIS geoprocessing methods.

Figure 4. RGB image of case study. Image © 2008 DigitalGlobe © 2008 Europa Technologies © 2008 Google

4. Application of Model

A Matlab® script was developed to automate the segmentation process (Peeters and Etzion, 2009). In addition, two GIS geoprocessing models were developed: one for the classification process and the second for the attribute extraction process. All are parametric and can be modified according to the input image.

Case Study

The model was applied to a section of a satellite image downloaded from *GoogleEarth* (Google, 2005), consisting of a vernacular section of the city of Marrakesh, Morocco (Fig. 4). The vertical RGB image has a spatial resolution of 0.70 m and was captured by *Quickbird* (DigitalGlobe, 2006) on March 24, 2006. (Using images from an open source like *GoogleEarth* allows wider usability of the model.)

Figures 5-7 illustrate different stages of the model and their outputs.

Model verification: results and analysis

The object recognition component was tested for its accuracy by comparing the results to a manually digitized dataset using a *stratified random sampling*

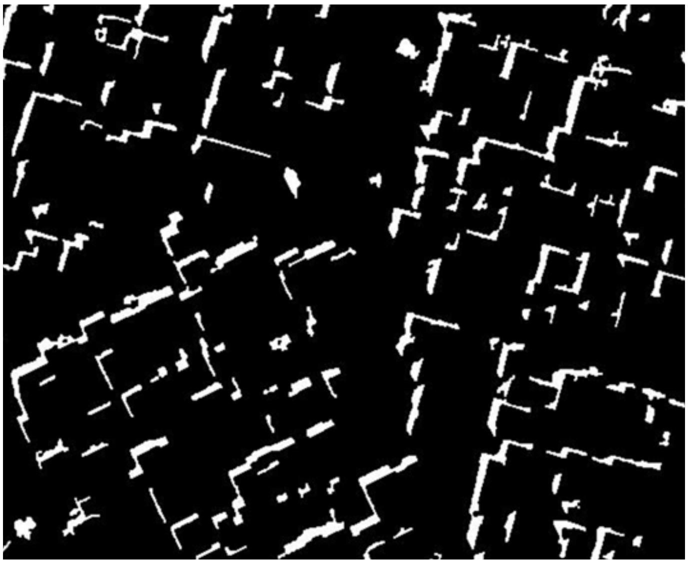

Figure 5. Segmented *shadows* and *non-shadow* areas - output of Matlab® segmentation process

Figure 6. Recognized *buildings* and *courtyards* overlaid on original image - output of GIS classification process

method and a *confusion matrix* (Lillesand and Kiefer, 1994; Jing, Qiming *et al*., 2007). In addition, the *kappa statistic* was computed. Results illustrate an overall accuracy of 80.30%. Results are satisfactory, with a rate common to those of existing recognition systems. Accuracy results of single classes can be divided into two distinctive groups: one group, including the courtyards class and the built class, has high values of *users accuracy* (87.50 % and 90.76 % respectively), and high kappa coefficients as well, with values of 0.8714 and 0.8021. The other group, which includes the *squares* class and the *streets* class, has lower values of users accuracy with 78.69 % and 66.49 % respectively and kappa coefficients of 0.7513 and 0.5239.

Confusion between classes occurs mainly among pairs of classes which share edges, for example between the streets class and the built class or between the streets and the squares. The high confusion between the built class and the street class might be due to shadows cast on buildings by adjacent buildings, which might be mistakenly recognized by the system as streets. In addition, the complexity of the image poses a challenge to manual digitizing. It might well be that shadows on buildings are confused as access ways, causing classified data to be compared with erroneous manually digitized data. This problem could be solved with images of higher spatial resolution and with minimum shadows. Another option is to compare the classified data to field data, such as city plans based on field surveys.

5. Summary and conclusions

Automatic processes offer an important alternative and support mechanism for constructing and updating databases of urban form. A significant feature of the developed model is its ability to extract and analyze urban data off-site, reducing the need for time, labor and capital-intensive processes inherent to field surveys and manual digitizing. The model presented here can be used, for example, to quantitatively characterize urban field sites according to schemes such as the "Local Climate Zones" model of Stewart (2009), by adding to the model descriptors of urban form such as sky view factor. Being a parametric model, it can be readily modified and applied on a large number of case studies.

Although future research is required to improve performance of the model, the demonstrated results are promising and highlight the potential of the model as a quantitative and systematic tool.

Acknowledgements

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DigitalGlobe, 2006. QuickBird Scene of Marrakesh

Figure 7. Querying the system to select all shadow lines within a range that satisfies the specified azimuth (highlighted in blue). These lines facilitate the calculation of shadow lengths and building heights.

ID1010010004E1EB01. © DigitalGlobe, Longmont, Colorado.

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Analysis of bioclimatic loads inside and outside the city in a long-term and an extremely hot short-term period (Szeged, Hungary)

Introduction

Characteristic climatic phenomena occurring in cities (urban climate, especially the urban heat island – UHI) generate special environments for their residents. The climatic effects of the city can exacerbate the thermal stress of residents (in summer, especially during heat waves), or attenuate it (in winter).

One of the most popular thermal stress indices in the bioclimatic research is the PET (Physiologically Equivalent Temperature) (e.g. Mayer and Höppe, 1987). The PET index ranges are shown in Table 1. Since the very cold category includes every value below 4, in order to avoid homogeneity of the values in winter we introduced a new category: below -4 °C PET is named *extreme cold* thermal sensation.

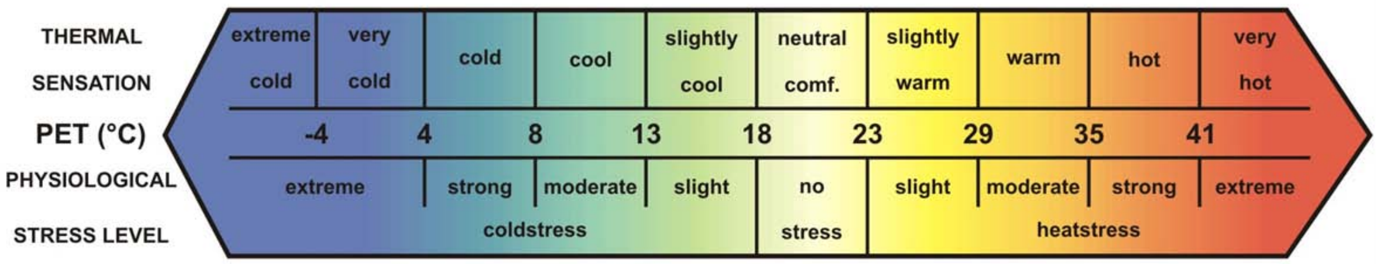

Table 1. Physiologically Equivalent Temperature (PET) for different grades of thermal sensation and physiological stress of human beings (internal heat production: 80 W, heat transfer resistance of the clothing: 0.9 clo) (Matzarakis and Mayer, 1996 modified).

The aim of this study is to compare the bioclimatic situation of a city and the surrounding rural area using the example of a Southern Hungarian city (Szeged) in a ten-year period (1999-2008). Additionally, summer averages of 10 years were compared to the summer of 2003, when successive heat waves caused high heat loads (Sch. Kriston and Schlanger, 2003). This comparison can provide data on how bioclimatic stress is modified in extremely hot periods, and how these changes are expressed in urban and rural areas.

Study area and methods

Szeged is located in the southern part of Hungary (46°N, 20°E) at 79 m above sea level on a flat plain. According to Trewartha's classification, it is in the climatic region D.1 (continental climate with a long warm season). As a result of the basin situation, continentality is relatively high (Fig. 1A, B). The annual mean temperature is 10.4°C and the amount of precipitation is 497 mm, with an annual mean sunshine duration of 2100 hours. Fig. 1C shows the basic street network (circuit-avenue system), and the main land-use types of the city.

According to a widely used practice in urban climate studies (Landsberg, 1981), the characteristics of two distinct locations were compared from bioclimatic aspects. One of them is situated in the densely built-up city center, under the modifying effect of the city (***u*** on Fig. 1C), while the other point is in area of arable land with an open horizon (***r*** on Fig. 1C), where the effect of the city is negligible.

Human biometeorological relevant data (air temperature, relative humidity, wind velocity and global radiation) were measured at both of the measuring points with the same type of *Vaisala* meteorological units. Wind speed data measured at different heights (urban station: 26 m, rural station: 10 m) were reduced to the bioclimatologically standard height, 1.1 m (Lee, 1979; Gál and Unger, 2009). Hourly average values of each meteorological parameter (collected between 1999–2008) were used to calculate PET values, using the *RayMan* model (Matzarakis *et al.*, 2010). Based on these datasets the difference in physiological stress on urban and rural residents was described. PET categories were created according to the heat sensation levels (Table 1).

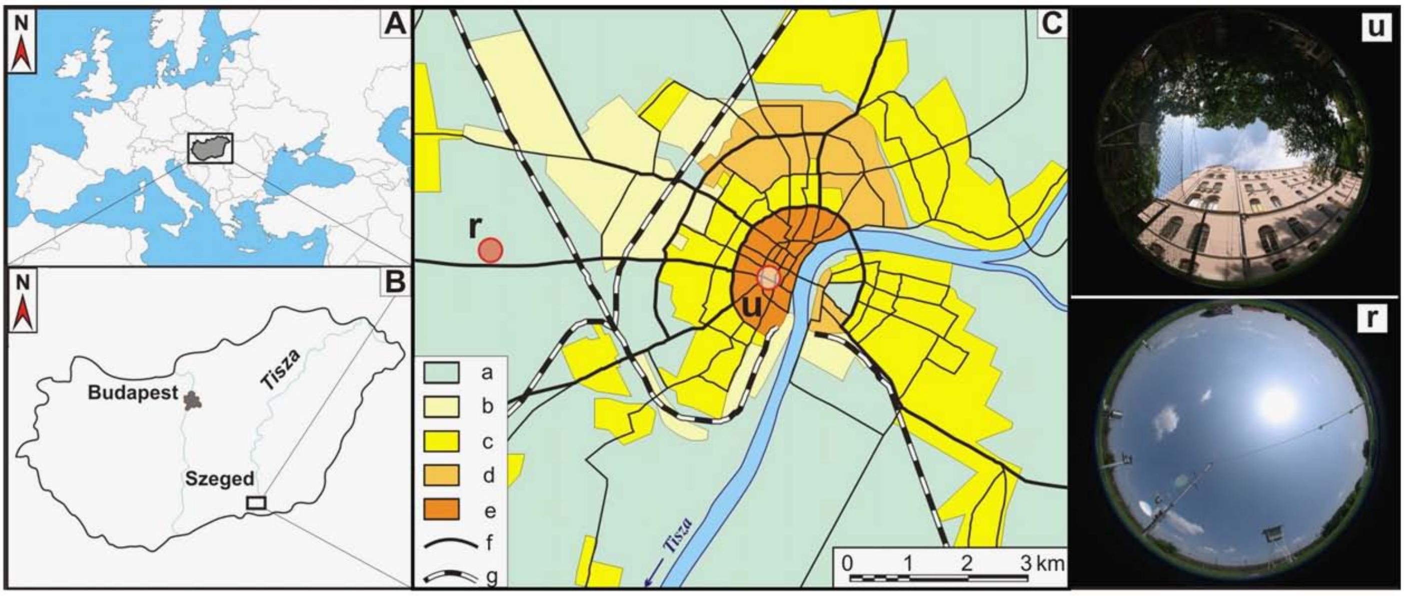

Figure 1. Geographical location of Hungary in Europe (A), of Szeged in Hungary (B), characteristic land-use types and road network of Szeged (C) a: agricultural rural area b: industrial area c: 1-2 storey detached houses d: 5-11 storey apartment buildings e: historical city core with 3-5 storey buildings f: road, g: train r: measuring point in the rural area u: measuring point in the city centre with fish eye photos.

Results

Examining the average of PET over the 10-year period, the value is 2.9ºC higher in the urban areas. While there is no considerable difference (only 0.9ºC) between the highest PET values of the two examined areas, the difference between the minimum PET values is much higher (10.6 ºC) (Fig. 2).

The frequency of strong or extreme heat stress (hot and very hot heat sensation categories) is only 0.5% higher in the city during the examined period, but in the case of the strong or extreme cold stress (between cold and extreme cold heat sensations) it is 9.5% lower. The occurrence of the periods without thermal stress is nearly two times higher in the city (10.0 %), than outside (6.1%) during the full length of the studied term.

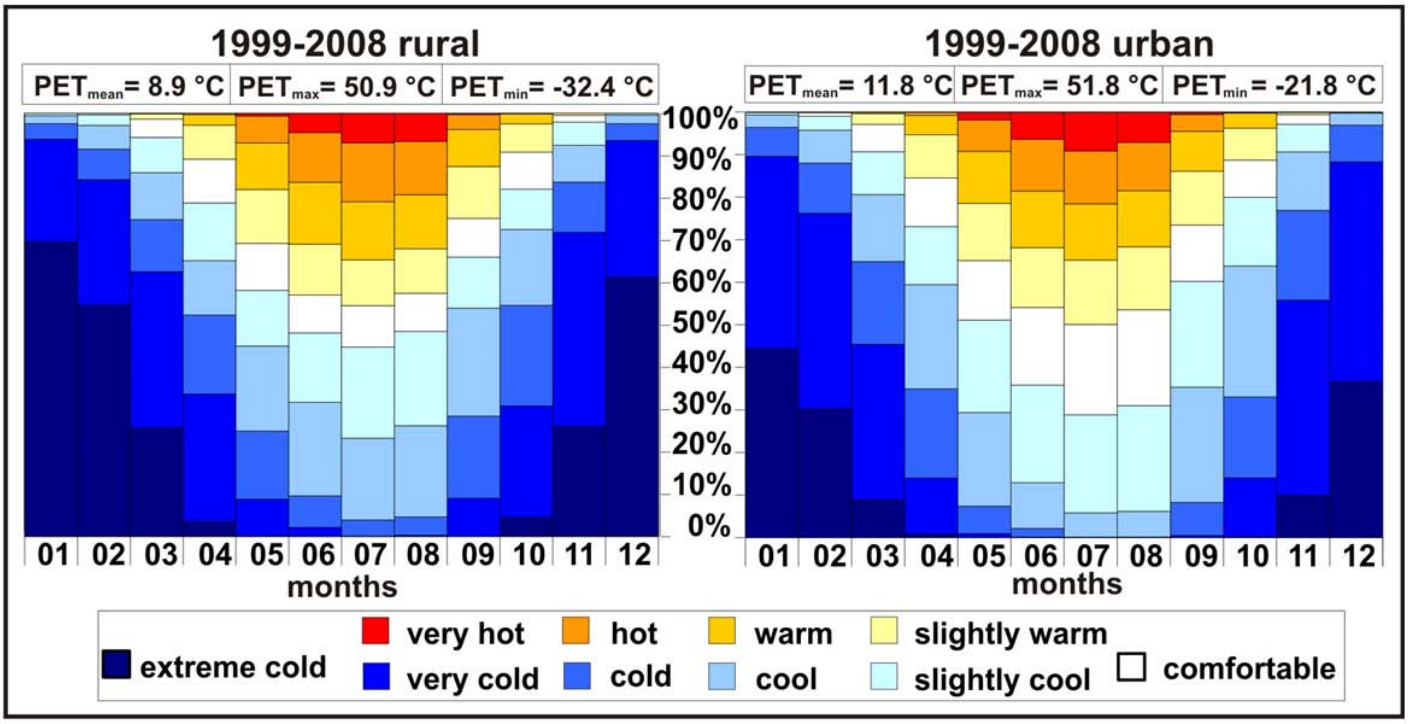

Figure 2. Frequency of the PET (hourly averages) and the different grades of thermal sensation in the rural and the urban areas between 1999-2008 in Szeged.

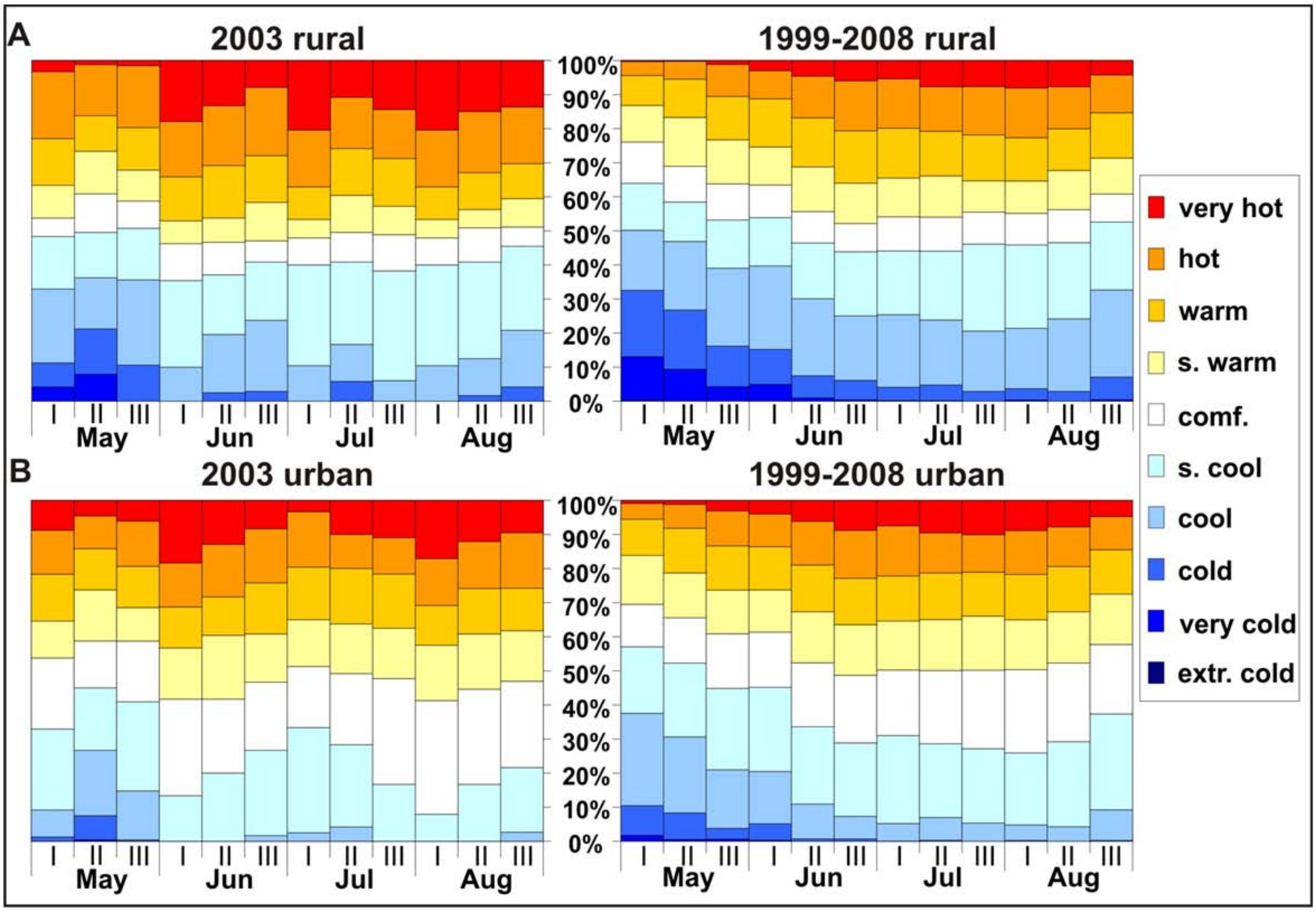

Figure 3. Frequency of the PET (hourly averages) in ten-day periods and the different grades of thermal sensation in the rural (A) and the urban (B) areas between May and August in 2003, and 1999-2008, in Szeged.

From this aspect it can be concluded that the city has some moderating effect on the thermal stress conditions. It reduces especially the cold extremities, and increases the length of the comfortable periods. Only a small increase in the extreme hot categories can be noticed (Table 2).

Additionally, summer averages of 10 years were compared to an extremely hot summer. The examined year which is significantly warmer than the average can illustrate the effect of global warming on bioclimatic situations, especially in case of the inhabitants of cities.

In 2003 there was a hot summer, with lots of long heat waves especially in Western and Central Europe, and also in Hungary. Very high daytime temperatures with mainly low wind speed dominated mostly in anticyclonic situations between May and August (Sch. Kriston and Schlanger, 2003).

During extremely hot periods the frequency of the high heat stress periods increased in both areas compared to the long-term averages and the increase was more pronounced in the rural area. It could be due to the lower shortwave radiation caused by smaller sky view factor values in the city (Fig. 3).

Table 2. Length (day) of the cold (PET < 8 °C) and warm (PET > 35 °C) extremities and the comfortable thermal sensation category in rural and urban area between 1999-2008.

	rural	urban
PET < 8 °C	1889.7	1541.2
18 °C < PET < 23 °C	224.5	364.3
35 °C < PET	207.0	223.3

The relative frequency and the intensity of the cold stress became much lower in both of the examined areas, but it is even more pronounced in the urban area.

While the comfortable PET category remained nearly unchanged outside the city, a remarkable widening of the comfort zone can be observed in the urban area. This phenomenon can be explained by the UHI at night, caused by reduced long wave radiation. These circumstances have physiologically disadvantageous effects in summer, because it can shorten the regeneration possibilities of urban inhabitants during the night.

Conclusions

The aim of this study was to compare the bioclimatic situation of a city with a continental climate and the surrounding rural area.

(i) Using the PET index, we could detect significant differences between the bioclimatic situation of a city and its surroundings in both a long-term period and a shorter extremely hot period.

(ii) During the long-term period, the reduction of the length of cold stress terms caused by urban effects was observed. In parallel, the length of comfortable and higher heat stress terms slightly increased. This may increase the comfort of the residents of the city, especially in spring, autumn and winter, because the cold stress is lower during the nights. From these aspects the city has a moderating and compensating effect on the human comfort conditions.

(iii) However, during heat waves, this heat load is not an unequivocally positive phenomenon. While in the daytime hours, due to the lower direct radiation caused by smaller sky view factor values (obstacles of the city: buildings, trees), the occurrence of the extreme high heat stress is lower, but during the night the decrease of the heat load is significantly smaller (due to the UHI) in the city than in the surrounding rural areas. This effect reduces the regeneration power of the human body before the heat stress of the next day. Thus the occurrence of the comfort thermal sensation category is higher in the city apparently, but it does not mean a better bioclimatic situation, especially during the heat waves.

(iv) Our study suggests that the extreme heat waves, occurring more frequently and at higher intensity due to global warming, will increase the heat stress on the residents of big cities, compared to their surrounding rural area.

Acknowledgements

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Urban microclimate discussed at the rural resort of Keystone, Colorado: 9th Symposium on the Urban Environment, 2-6 August 2010

By Evyatar Erell
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The 9th Symposium on the Urban Environment, convened by the American Meteorological Society at the beautiful resort of Keystone, was held in conjunction with the 29th Conference on Agricultural and Forest Meteorology and the 19th Symposium on Boundary Layers and Turbulence. The program Chairpersons for this event were **David J. Sailor**, of Portland State University; **Fei Chen**, of NCAR; and **Julie K. Lundquist** of the University of Colorado at Boulder.

The extensive program coordinated by the AMS covered a very broad range of topics, but also promoted considerable interaction between the three disciplines represented at Keystone, with several joint sessions convened between two or all three meetings. Topics covered in these joint sessions included 'Observations in complex and urban terrain and canopies,' 'Observing and modeling boundary layers over complex urban and terrain environments for energy applications' and 'Modeling in heterogeneous, complex and urban terrain.

In addition to topics covered in the joint sessions, sessions focusing on the urban climate were devoted to 'Weather forecasting for urban areas,' 'Atmospheric transport and dispersion in urban areas,' 'Global climate change and urbanization,' 'Extreme weather,' 'Urban parameterizations in mesoscale and regional models,' 'Urban canopy and roughness sublayers,' 'Biometeorology and public health in urban areas' and 'Energy and water balances.'

Poster sessions comprised papers on biometeorology and energy/water balances; on computational and fluid dynamics; on urban climate and global climate change; on the urban heat island; and on urban parameterizations. The posters were on display for the duration of the meeting in a hall that was also the venue for a formal reception and where coffee was served during breaks, providing ample opportunity to view them.

The meeting had many highlights – too many to give due credit to in this short review. Of particular interest was a session on the inter-relation between global climate change and urbanization. **Keith Oleson** suggested that a global increase in atmospheric CO_2 might reduce the intensity of the nocturnal UHI, because it would have a greater effect on rural radiant cooling than on urban heat loss. **Bob Bornstein** showed that although globally there is a warming trend, changes in circulation patterns have actually led to cooling of coastal areas in California as sea breezes penetrate deeper inland. The complexity of the relationship was highlighted by **Mark McCarthy**, who discussed probabilistic climate change projections in regional climate models modified with input from urban cells.

CO_2 was also discussed at an urban scale, as **Andreas Christen** showed that a very detailed inventory of fluxes from buildings, transport and vegetation, mapped according to source areas, was very well correlated with measurements made on a flux tower.

The meeting was an opportunity for researchers to present urban field studies based on a variety of instruments with different capabilities. **Gert-Jan Steeneveld** showed how even amateur meteorologists with simple equipment can contribute to the creation of a city-wide network in several urban areas to augment the resources of the Dutch weather service. At the other end of the scale, **Jeffrey Basara** described the extensive monitoring infrastructure installed at Oklahoma City. The network of stations allows not only detailed examination of extreme weather events, for which the city is renowned, but also provides the basis for studies of the urban climate, some of which were reported by **Petra Klein** and **Mason Rowell**.

The relatively poor performance of urban models thus far in describing latent heat flux resulted in several interesting papers. The magnitude of these fluxes is typically small compared with the radiant flux, so surface energy balance models have been able to provide fairly good results even while the relative error in latent flux has been substantial. The importance of this question, at least in some cities, was highlighted by **Dean Anderson** who noted that lawns are the largest irrigated crop in the US. **Tim Oke**, who had the honor of closing the urban climate meeting, discussed the need for a simple water balance model that could be incorporated in SEB models, and presented the SUES-2 scheme as a suitable framework.

WMO Inter-Regional CLIPS Training Workshop on Urban Climatology

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The The WMO, through its Commission for Climatology (CCl) and Climate Information and Prediction Services (CLIPS) project, organised an Inter-Regional Training Workshop on Urban Climatology that was held in **Pune, India** from the **6th-10th September**. The event was managed in collaboration with the WMO Regional Training Centre of the India Meteorological Department (IMD) and was held at the Indian Institute of Tropical Meteorology (IITM). The materials for the workshop were developed by IAUC members, five of whom attended the workshop and delivered lectures and organised exercises. As this was the first such occasion that CLIPS has included Urban Climatology, the event represents a significant milestone in the development of our field of study.

About 30 persons attended the CLIPS event. Although most were from India, there were representatives from Europe, Asia, Africa and South America. The group itself was selected from a wider group of applicants to represent different geographical backgrounds and professions. Among those attending were those that work in National Meteorological & Hydrological Services and academics, urban planners and architects.

The workshop was inaugurated by a programme that included a 'lighting of the lamp' and a brief invocation. The group was welcomed by **Dr. Mazumdar** (IMD) who stressed the need for urban observational networks. **Dr. Kolli** (WMO secretariat) outlined the context for the workshop as a capacity building exercise. He spoke of the collaboration with the IAUC and the changing needs of users of weather data (as articulated at WCC-3). **Gerald Mills** introduced the topic of the workshop on behalf of the IAUC and stressed the dramatic change in the living environment of humans in the last two hundred years as the global population has become progressively 'urbanised'. The theme of climate change and its impacts at different scales was taken up by **Prof. Goswami** (Director IITM). Finally, **Dr. Tyagi** (ITM), the Permanent Representative of India with the WMO, supported the call made at WCC-3 for urban meteorological networks to be established. He illustrated this by describing a Dehli network that is being established in preparation for the Commonwealth Games.

The workshop took place over five days and consisted of both lectures and exercises. A consistent theme throughout the workshop was urban scales and their relevance for understanding urban effects on airflow, temperature, etc. and for observing and modelling urban energy processes. These topics were linked to descriptions of urban form and function using the urban climate zone classification scheme developed by **Iain Stewart** and **Tim Oke** at UBC. Finally, the potential role for modifying urban effects by altering urban form/function was presented. These ideas were presented in a series of 15 lectures combined with some exercises that focussed on developing urban databases using *GoogleEarth*, making observations in urban environments (illustrated by visiting local meteorological stations) and biometeorological modelling (using the *Rayman* software developed by **Andreas Matzarakis**). The materials for the event were designed by **Jason Ching**, **Rohinton Emmanuel**, **Gerald Mills**, **Chandana Mitra**, **Matthias Roth and Jamie Voogt**. All but Jason were present in Pune to deliver the materials.

This was the first such occasion that a CLIPS workshop has been devoted to Urban Climatology. The feedback from the participants was very positive and I think the experience of presenting a comprehensive course on urban climatology over five days has given the presenters an insight into the inconsistencies in our field and the appropriate level of delivery to a diverse audience. The materials generated for this workshop will now be reviewed and improved based on our experiences. It is hoped that these will be completed by December this year and will be published online by the IAUC and by the WMO.

The inclusion of urban climatology in a CLIPS event highlights the growing significance of our field and the outcome a fruitful collaboration between the IAUC and the WMO, which has been fostered by Prof. **Sue Grimmond** and Dr. **Rupa Kumar Kolli**. The IAUC owes a special debt of gratitude to Dr. Kolli who has been stalwart in his support of urban climatology and substantially organised the CLIPS workshop. We also wish to express our gratitude to the Indian Meteorological Department and to the Indian Institute of Tropical Meteorology who provided the facilities and were our gracious hosts during the workshop. In this regard, Dr. **Somenath Dutta** (IMD) as local co-ordinator deserves our particular thanks for ensuring the event ran so smoothly.

Urban climate highlighted at IGU regional conference in Tel Aviv

By Davd Pearlmutter
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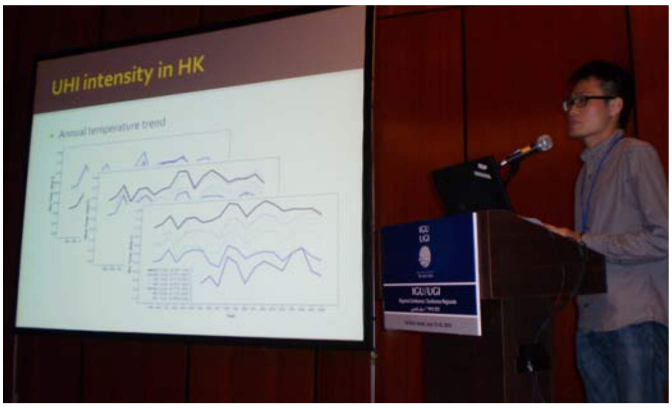
A wide range of climate-related topics – including urban climate – was covered at a recent regional conference of the International Geographical Union (IGU), held in Tel Aviv, Israel on July 12-16, 2010. Under the auspices of the IGU **Commission of Climatology**, a total of nine sessions were devoted to climatological issues, with two sessions specifically focusing on research carried out in an urban context. The sessions were organized by IAUC members **Hadas Saaroni** and **Arieh Bitan** of Tel Aviv University, whose efforts were rewarded with a diverse and stimulating program.

The opening session of the climatology series was held in honor of the 75th birthday of Professor Bitan, who was the recipient of the IAUC's 2006 Luke Howard Award for lifetime achievement. A special presentation was made by **Zbigniew Ustrunul**, Head of the Commission of Climatology, and a birthday tribute was given by **Bob Bornstein** – also a recent Luke Howard Award honoree – highlighting Prof. Bitan's dedication over the years and characterizing him as "an old-world gentleman who is always willing to share his time and knowledge with younger scientists."

In a session titled "Urban Climate and Environmental Impacts," issues of air quality and heat island formation were examined in a variety of world cities. In Kigali, Rwanda, a growing urban heat island intensity was found alongside high PM_{10} concentrations by **Sasha Henninger** of Kaiserlautern University in Germany, and the correlation between air and surface temperatures in Szeged, Hungary was presented by **Janos Unger**. The nocturnal UHI of Hong Kong was contrasted with a distinct daytime cool island in a study presented by **Leong Wai Su**, who employed the urban landscape classifications of Stewart and Oke to evaluate urban and rural stations. A journey into urban climate history was led by **Mikhail Lokoshchenko**, who traced 200 years of local climate change in Moscow, including a pronounced heat island and decreasing humidity over the last half century. Finally, **Emmanouil Tranos** of Newcastle University in the UK mapped out the complex interactions between climate change and the functioning of urban economies.



The field of biometeorology took center stage in the following session, on "Urban Climate and Thermal Comfort." A comparison of PET in an urban canyon and grassy park was presented by **Jutta Holst**, and **Sigal Berkovic** of the Technion in Israel used Envi-MET simulations to compare courtyard geometries in a hot-arid setting. An experimental study of the effects of urban landscape treatments on thermal stress and water use was presented by **David Pearlmutter** (yours truly), and Israeli colleague **Oded Potchter** reported on a case study from Beer-Sheva looking at the modifying influence of street trees. As shown on page 11, the conclusion that thermal stress may be *moderated* as well as aggravated by a growing urban heat island was reached in a Hungarian study presented by **Agnes Gulyas**, who wrapped up the urban climate portion of the conference.

In addition to the regular sessions on climatology, a plenary session was devoted to "The impact of climate change on physical and bio diversity," and included an invited lecture by **Bob Bornstien** on the "Mutual effects of global warming and urban climate in different climate zones." In his plenary talk, Bob emphasized that global climate change is far from homogenous, varying by region, season and time of day – and that it may be expressed very differently in urban as opposed to rural areas. An important recommendation mentioned was that the National Weather Service "urbanize" its heat wave forecast, since heat waves may be expected to increase with urban heat island intensity as well as with global warming.

In this edition a compilation of papers published until September 2010 are listed. Thanks to everyone for their contribution. All readers are invited to send any peer-reviewed references published since October 1st 2010 for inclusion in the next newsletter and the online database. **Please note that my email address has changed**: please send me your references to julia.hidalgo@ymail.com with a header "IAUC publications" and the following format: Author, Title, Journal, Volume, Pages, Dates, Keywords, Language and Abstract.

We are currently formatting the bibliographic compilation from 1996-2008 for inclusion into the online database at http://www.urban-climate.com/bibliography/. The task is quite time consuming, as we need to process a very large amount of references. If you want to give a punctual helping hand for this task please contact the committee. Your help will be much appreciated.

Happy reading,

Julia Hidalgo

Recent publications in Urban Climatology

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Upcoming Conferences...

CONFERENCE ON URBANIZATION AND GLOBAL ENVIRONMENTAL CHANGE: Opportunities and Challenges for Sustainability in an Urbanizing World
Tempe, Arizona, USA • October 15-17, 2010
www.ugec2010.org • ugec2010@asu.edu

"URBAN AREAS AND GLOBAL CHANGE"
AGU Fall meeting
San Francisco, December 13-17, 2010
http://www.agu.org/meetings/fm10/

EXTREME ENVIRONMENTAL EVENTS (ESF/COST)
Cambridge, UK, 13-17 December 2010
http://www.esf.org/index.php?id=7048

"WEATHER, GEOGRAPHICAL CONTEXTS AND SPATIAL BEHAVIOUR" at Association of American Geographers (AAG) Annual Meeting
Seattle, USA, April 12-16, 2011
http://www.aag.org/cs/annualmeeting

CITY WEATHERS: METEOROLOGY AND URBAN DESIGN 1950-2010
Manchester, UK, 23-24 June 2011
http://www.sed.manchester.ac.uk/architecture/research/csud

New Members Elected to IAUC Board for 2010

The IAUC Board elections for this year concluded on August 15, 2010 with 218 members taking part in the on-line poll. Our thanks to Board member Dr. James Voogt for setting up and running a trouble-free polling process and to all those who took part in the poll. Based on the results, the following are declared elected to the Board. They will serve a four-year term starting August 2010:

Dr. Alberto Martilli
CIEMAT, Spain

Dr. Aude Lemonsu
CNRS/Meteo France

Dr. Silvana di Sabatino
Univ. of Salento, Italy

The new members will replace Drs. Benedicte Dousset (Hawai'I Inst. of Geophysics and Planetology, USA) and Kevin Gallo (National Oceanic and Atmospheric Administration, NOAA, USA). Although my term too has come to an end I remain on the Board as the Secretary of IAUC.

The Board wishes to thank Benedicte and Kevin for their many services to the IAUC community and expresses its gratitude to all candidates who generously gave their time to stand for election during this time.

Pen portraits of the newly elected Board members are given below.

Rohinton Emmanuel
Secretary, IAUC

Alberto Martilli

Alberto Martilli graduated in Physics in 1995 (University of Milan, Italy) with a dissertation on numerical modelling of mesoscale circulations over complex terrains. In 1996, he moved to the Swiss Federal Institute of Technology (EPFL, Lausanne), where, in 2001, obtained his PhD with a dissertation on the development of a new urban surface exchange parameterisation for mesoscale models. From 2001 to 2004 he worked as a Post-doctoral fellow at the University of British Columbia (Vancouver, Canada), on mesoscale air pollution modelling. Since 2005 he is researcher at CIEMAT (Spain), where he works on micro and mesoscale atmospheric modelling over urban areas.

His research is driven by an interest in the complex interactions between urban air quality, urban climate, and climate-related energy consumption (air conditioning and heating). He studies these topics by developing and using numerical models, focusing in particular on turbulence and surface exchanges at micro and meso-scale. The aim is to prepare these models so they can be used by urban planners to evaluate integrated strategies to improve air quality and climate in urban areas, and reduce energy consumption. Alberto is author of more than thirty publications and several conference contributions on these topics.

Aude Lemonsu

Aude Lemonsu graduated from Paul Sabatier University (France). After a master's degree in Meteorology at the research center of Meteo France, she did her PhD from 2000 to 2003 (supervised by Dr. Valery Masson). Her field of research encompassed urban canopy modeling (radiative, energetic and hydrological processes) and interactions with the atmospheric boundary layer. During her PhD she was involved in the ESCOMPTE-UBL field campaign, held in Marseille in 2003. This campaign was the starting point for several fruitful collaborations with international research groups (University of Indiana, British Columbia, Western Ontario).

From 2004 to 2007 Aude worked as a research assistant and then research scientist for Environment Canada. She participated in the development of a new urban modeling system for research and forecast applications. She implemented the coupling of an urban-canopy parameterization in the Canadian meteorological model, and developed a general methodology for producing land-use/land-cover classification including urban areas over Canadian cities. During her stay she was also involved in the organization of field campaigns focusing on radiation and energy exchanges in dense urban areas of Montreal, more particularly under snow condition. Today, she is keeping privileged links with Canadian research on urban climate.

Aude is now a permanent researcher at the French Center for Scientific Research (CNRS) and is physically located at the research center of Meteo France. Her fields of interest include the evolution of urban climate within the context of climate change, and strategies of mitigation and adaptation for cities. She is currently working on the modeling of vegetation.

Silvana di Sabatino

It is a great pleasure for me to introduce myself to the IAUC community. I hold a PhD from Cambridge University with a thesis entitled "Flow and Pollutant Dispersion in Urban Areas" (2005), having completed the MPhil (2000, Cambridge University) and a MSc in physics (1995, Bologna University). Since 2001 I have been a lecturer at the University of Salento, Lecce (Italy), where I am currently also the head of the Micrometeorology Lab.

My research is devoted to understanding the combined effects of buildings and urban vegetation on ventilation at different scales (city to street scale) as well as to studying the urban heat island in Mediterranean cities through experimental and modelling studies. My interest in urban climatology dates back a decade or so, having been given an opportunity to work with Prof. Rex Britter on developing simple urban flow and dispersion models. This included model development and validation, and for the latter I contributed by designing and conducting the Birmingham tracer experiments in 1999 and 2000. These were among the first experiments performed in a real city, which helped to clarify the crucial role of the urban canopy layer in trapping pollutants/scalars within it.

Since 2005 I have been working with Prof. J. Fernando on fluid mechanics aspects of urban flows. This included my leading role in the Phoenix Heat Island Experiment. I hope that my experience and expertise can contribute to the success of IAUC and to its future development, and that I could organise an IAUC conference in Italy. I am planning to do more urban studies in Mediterranean cities.

Newsletter Contributions

The next edition of ***Urban Climate News*** will appear in late December. Items to be considered for the upcoming issue should be received by **November 30, 2010** 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)

General submissions should be short (1-2 A4 pages of text), written in a manner that is accessible to a wide audience, and incorporate figures and photographs. Images you think would be of interest to the IAUC community are welcome.