IAUC Co-sponsor of Upcoming Conferences

IAUC will be a co-sponsor for two upcoming conferences:

a. 17th International Congress of Biometeorology (ICB2005), 5-9 September 2005 Garmisch-Partenkirchen, Bavaria, Germany. Congress Theme: Adaptation to Weather, Climate and Climate Change.

b. American Meteorological Society’s 6th Symposium on the Urban Environment, to be held in conjunction with the AMS Annual Meeting: 29 January - 2 February 2006, Atlanta, Georgia. For more details about each of these conferences, please go to the meeting page of the IAUC website.

WMO BIBLIOGRAPHY OF URBAN CLIMATOLOGY

In collaboration with the World Meteorological Organization’s (WMO) Expert Team 3.9 on Urban Climatology including training, Dr. Jennifer Salmond (University of Birmingham, England) on behalf of the IAUC is preparing the next two editions of the World Meteorological Organisation’s ‘Bibliography of urban climatology’. These will cover the periods 1996 – 1999 and 2000 – 2004, following on from the earlier work by Timothy Oke and Ernesto Jauregui (Oke, 1974, 1979, 1983, 1990; Jauregui 1993, 1996). The two new bibliographies have been prepared largely using search engines such as the ‘Web of Science’. The bibliography for the latter period, 2000 – 2004, also incorporates the papers that have been highlighted in the IAUC Newsletters. These bibliographies represent a significant contribution and I want to commend Jenny for all her work to date.

We know that we are still missing key references, particularly those that have not been published in the English-language literature. In order to try and ensure as complete coverage as possible from around the world, drafts of both manuscripts are on the IAUC website (www.urban-climate.org) for review. Please provide suggestions on additional key papers to be added. These do not have to have been published in English, but ideally an abstract will be provided in English and at a minimum the title and key words must be provided in English (so the papers can be entered in the searchable database). Any other comments regarding the content of the bibliographies would be greatly appreciated. The bibliographies will be available until February 28 2005 for comment. Thank you in advance for your time and suggestions.

Sue Grimmond
President of the IAUC

References


IAUC NEWSLETTER
INTERNATIONAL ASSOCIATION FOR URBAN CLIMATE

www.urban-climate.org

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Conferences

Call for papers
10th conference on Harmonisation within Atmospheric Dispersion Modelling for Regulatory Purposes

17-20 October, 2005
Sissi (Malia), Crete, Greece

Note: A leaflet on the conference is available at the conference website www.harmo.org/harmo10

The 10th Conference is addressed towards model developers, model users, environmental protection agencies, and environmental legislation experts.

Abstracts of contributions fitting into the scope of the conference are invited. There will be both oral presentations and poster sessions. The deadline for short abstracts (no more than 350 words) with indication of the preferred topic is 14 March, 2005. The abstract should preferably be sent via the abstract submission form of the conference home page: www.harmo.org/harmo10/abstracts

This conference will cover the following topics
• Environmental impact assessment: Air pollution management and decision support systems
• Regulatory models: country review
• Experiences using models when implementing national or international directives
• Short distance dispersion modelling
• Meso-scale meteorology and air quality modelling
• Urban scale and street canyon modelling: Meteorology and air quality
• Exposure modelling
• Interaction of indoor and outdoor air and modelling
• Validation and inter-comparison of models

What distinguishes this conference from many others is its focus on common tools and methodologies. The basic criteria for selecting papers for oral presentation will be whether they fit in with the philosophy of developing an improved modelling culture where modellers as well as regulators and users make effective use of each other’s experience.

Important dates
• Short abstracts (less than 350 words) should be received by 14 March, 2005.
• Confirmation for acceptance of contributions will be made by the end of May, 2005.
• Five-page extended abstracts should be submitted by the end of August, 2005.

2005 RCCAE
The 16th Regional Conference of Clean Air and Environment in Asian Pacific Area

2-4 August 2005
Kogakuin University Shinjuku, Tokyo, Japan.

The special topic of the conference is “Urban Environment and Heat Island, its Control by Technologies and by Policies”. Also, the conference focuses on wide range of atmospheric pollution and Environment.

Themes
• Urban Air Pollution and Modeling
• Emission Control Technology for Urban Air Pollution
• Advanced Clean Automobile Technologies
• Urban Heat Island and its Control
• Global Warming Strategies
• Energy System as Environmental Protection
• Long Range Transport of Atmospheric Pollutants
• Miscellaneous

Important Dates
Submission of abstracts 31 March 2005
Early registrations 15 June 2005
Late registrations 30 July 2005

Information available at www.nta-mach.com/2005rccae

Become involved in IAUC.
We will soon be opening up for nominations (or self-nominations) for the Board and a number of IAUC committees. Please consider standing for one of these positions and/or encouraging others to.
This article reports the initial results of an ongoing initiative to gather information on flux measurements in urban environments. The goal is to provide information, through a database and web site, with details of the sites, the instrumentation, the measurement period(s), those involved, and related publications. The database and the web site are managed by Sue Grimmond and Danilo Dragoni at Indiana University at www.indiana.edu/~muhd/.

To date, more than twenty research groups, working at more than thirty sites, have reported initiatives (see table opposite). Based on a subset of these data, an overview of CO2 urban fluxes measurements was presented at the 2004 FLUXNET Workshop held in Florence, Italy December 13-15. A PDF version of the poster presented is now available at www.indiana.edu/~muhd/UrbanFluxNet/Florence04_Poster.pdf

As of December 10, information on twenty sites measuring CO2 fluxes had been entered into the database. Twelve of these sites remain active, or will be active, in 2005. The geographical distribution is strongly biased toward Europe and North America. Australia and Asia are represented by only a few urban sites. Currently we have no documented sites in Africa or South America. The information about the site land use/cover and morphometric characteristics is incomplete, but most studies have been conducted in the Central Business District (CBD) and residential land uses of cities. Given the notable differences in the morphometric properties of cities around the world a number of methods are used to describe these characteristics, This includes the Urban Climate Zone (UCZ) classification of Oke (2004) (www.wmo.ch/web/www/IMOP/publications/IOM-81/IOM-81-UrbanMetObs.pdf).

The impact of the wide range of land uses/covers and human activities of the sites is evident in terms of the CO2 fluxes reported. The most dense urban areas act as strong sources of CO2; sites with presence of extensive area of vegetation (like the suburban area of Baltimore) have negative fluxes (i.e. uptake) during the summer.

We plan to expand our web site by posting more information (e.g. on water and energy fluxes). We would like to thank all those groups who promptly responded to our questions and extend the invitation to submit more information regarding previously and currently operational sites as well as new or planned sites.

Danilo Dragoni

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Introduction
UNEP (2002) reports that the fastest rates of urbanization are to be found in tropical-developing countries. In the Asia-Pacific region, for instance, the urban population was 35% of the total population and it grew by 3.2% a year between 1990 and 1995. Urbanization produces radical changes in land use and changes in emissions of heat, gases, particulates and water. These changes can modify climate at scales from the local to meso-scales and creates cumulative impacts that contribute to global climate change.

While the urban influence on temperature is well documented, their effects on rainfall are less well known. Some previous studies have found increases in rainfall, which have been attributed to both increased convection and numbers of condensation nuclei due to urban-induced warming and air pollution, respectively. However, most of these studies have been conducted in mid-latitude, developed, cities.

This article reports on a one-year urban climate research projects conducted in a tropical city located in Indonesia. The aims of the project are threefold:
(1) documenting the urbanization of the city;
(2) documenting the Urban Heat and Humidity Islands; and
(3) exploring urban influence on rainfall. As a case study, the researchers chose Yogyakarta city, which is located on Java island (Fig 1).

Indonesia is an archipelagic country with more than 13,000 island located across the equatorial region. The current population is close to 200 million of which more than 100 million live on Java island. The proportion of the population living in urban areas rose from 17% to 31% nationally from 1971 to 1990. With regard to Yogyakarta city, its current registered population is close to 400,000 and its population density is about 12,206 person per km².

As to the climate, the temperature in Indonesia is relatively stable all the year around (i.e. 27° to 30°C approximately). One of important factors governing the season in Indonesia is the monsoon. During the Northern hemisphere winter the predominant wind is westerly, bringing moist air from the Asian mainland whereas during the Northern hemisphere summer the predominant wind is easterly, bringing dry air from Australian continent. The monsoon is associated with two distinct seasons, i.e. wet season (around November-February) and dry season (around June-September) with transition periods in between.

Method
Since the beginning of project proposal formulation, the researchers realized that, due to many obvious reasons, examining urban effect on rainfall is not an easy task. Therefore, the researchers consider this project as a first attempt dealing with this difficult area that should be followed by more complete and comprehensive studies in the future. Here, the researchers developed a framework that integrates several existing approaches commonly used for examining the urban impact on rainfall. It is believed that these several approaches may complement each other in distinguishing urban effect on rainfall. These include: analysis of a long time series data for comparing rainfall “before and after” urban development, comparison between urban and rural rainfall, spatial analysis of rainfall amount and rainfall chemistry obtained from a dense and evenly distributed rainfall stations (Fig 2).
Field measurements for detecting Urban Heat Island (UHI) and Humidity Island phenomena have also been performed in both wet and dry seasons. The measurements were conducted at 30 locations at 14 h, 16 h, 18 h, and 20 h. At the same time, we also derived surface temperature information from LANDSAT ETM+ image for the whole study area.

Rainfall water samples were collected from 9 raingauges representing each compass point. For capturing both wet season and dry season condition, the samples were taken from late February to early April 2004. Overall, there are 87 rainfall water samples that have been collected and analyzed. In this case, the properties that are analyzed are electrical conductivity, pH, Mg, Ca, Cl, NO₃, SO₄, CO₂, Na and Pb.

Some preliminary results
With respect to urban vs. non-urban rainfall comparison, we selected two non-urban stations (one located to the west, and the other to the east, of the city) to be compared with an urban station (see Fig 2). These east and west stations were selected after considering the nature of the prevailing wind associated with the monsoon. The three stations are located at a similar altitude, that is around 100m above the mean sea level, therefore the topographical influence on the rainfall may be assumed to be negligible. Adisucipto Airport is located on the downwind side of the city during the wet season and is on the upwind during the dry season. Patukan station, on the other hand, is located on the upwind during the wet season and is on the downwind during the dry season. Fig 4 shows the difference between number of rainy days at urban and at non-urban stations. The urban station tends to experience more frequent rainfall compared to those located at the upwind side of the city.

The researchers have also produced maps of rainfall distribution over the city and its surround for each month based on the data from 1978 to 2003. To give an example, Fig 5 shows the January (wet season) rainfall pattern overlaid on a topographical map over the region. We can see that there is relatively clear pattern of high rainfall amount on the downwind side of the city particularly during this month. Considering the location of this high rainfall center, the researchers think that this pattern demonstrates urban induced rainfall rather than topographically enhanced rainfall.

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Acknowledgement
This is a Project of the Advanced Institute on Urbanization funded by START-International Secretariat and Packard Foundation, USA.

References

Urban Project Report

Acknowledgement
This is a Project of the Advanced Institute on Urbanization funded by START-International Secretariat and Packard Foundation, USA.

References

Urban Climatologists Honored by AMS
Congratulations to three IAUC members who became Fellows of the American Meteorological Society this January:
Walt Dabberdt (Vaisala, USA), (Photo by Robert Bumpas.)
Steve Hanna (Harvard University, USA and Hanna Consultants) and
Tim Oke (University of British Columbia).

Please let us know of other honors that our members have received for their contributions to urban climatology.

Conference

ENCAC - ELACAC 2005
5th - 7th October 2005
Maceió, Alagoas - Brazil

The ENCAC and ELACAC series of meetings are the main forum in Brazil and in Latin-American for architects, engineers, academics and other professionals and researchers dealing with environmental comfort (thermal comfort, acoustics, lighting, ergonomics) and sustainable subjects regarding building and urban places (energy uses and other aspects related to those human comfort and health issues). The Meetings objective is to encourage the multidisciplinary approach in architecture, urban planning, physics, engineering, bioclimatology, etc.. The Meetings also promote a valuable exchange amongst academics, professionals and practitioners as well as amongst universities and the productive and governmental sectors.

Main Topic: "Environmental Comfort and Energy Efficiency in Tropics"
Topics:
4. Climate and Micro-Climate related to Environmental Comfort.
7. Physiology and Psychology in Environmental Comfort Perception.
8. Instrumentation and Environmental Monitoring.
10. Active Systems in Air Conditioning and Energy Efficiency.
14. Other related topics.

Important Dates
- Complete paper (see instructions and format in the site): March, the 31st
- Preliminary accept: April, the 30th
- Final paper submission: May, the 16th
- Final accept: June, the 13th

For further information please see: www.encac2005.ufal.br/ or e-mail to: encac2005@ufal.br
The surface temperature of an inner-city river is lower relative to other urban surfaces as energy is expended on evaporation rather than heating. Although the area occupied by these water bodies is small compared to the whole urban area, they can produce an air temperature difference that is comparable to that which exists between city center and suburbs. So, our research question is whether a large restoration of an inner-city stream as a component of an environmentally aware urban design strategy, is an effective means of urban thermal mitigation? An ideal opportunity to evaluate this question was provided in Seoul, South Korea where an extensive section of the Cheong-Gye Stream has been restored.

The Cheong-Gye, which flows from west to east in the city center of Seoul, was an inner-city river with the length of 10.92 km joining to the Han-Gang River (Fig. 1). The Cheong-Gye Stream has had a character of natural ‘sewer’ drainage system since the dates of the Lee dynasty “Joseon” when large engineering works were carried out to reduce the risk of flooding. The growth of Seoul at the beginning of the 20th century turned the area around Cheong-Gye Stream into a populated area with severe sanitary problems. In the late 1950’s the river was placed into an underground channel as a solution. Since then, a double decked road has been built along its course. Continued urbanization along this new road resulted in the construction of the Cheong-Gye Double-Decked Road (4 lanes) with the length of around 6 km in the beginning of 1970s. This goes through built-up areas like the Dong-daemun Market and, nowadays the Cheong-Gye Stream is hidden from view.

More recently, an examination of urban infrastructure has revealed serious structural problems with the double-decked road. This has occurred at a time when there is greater emphasis on environmental-friendly urban design. There is now an impetus driven by citizens to restore the river environment and provide a large amenity space that provides ecological functions and a natural landscape within the city-center. The Seoul Metropolitan Government, therefore, has decided to remove this road for several kilometers and restore the Cheong-Gye Stream (Fig. 2).

The restoration process started on July 1, 2003, with the removal of the double-decked road excluding side lanes (Fig. 3). Once completed, the underground channel will be opened and, finally, a green-rich amenity space with a large water surface will be realized.
In many cities there is considerable interest in re-designing the urban environment, especially where there is a potential for mitigation to protect or revive “biotopes” with a high-grade of nature. However, such a large-scale restoration of inner-city stream has not been attempted elsewhere. In addition to its impact on air quality (by reducing traffic flow), its potential role in reducing summertime thermal stress in the vicinity of the stream has been discussed. While this impact has been evaluated using a numerical simulation model (Kim and Kim, 2001), this is the first opportunity to verify the impact of river restoration on both air pollution and thermal stress.

The authors have started a total monitoring on thermal environment meteorological observation around the restoration zone from before the restoration process to establish the mitigation effect of restoring an inner-city stream (Fig. 4). Simple stations for measuring temperature and humidity were placed at 11 locations around the restoration zone, and data has been recorded every 10 minutes since the middle of June, 2003, before the close of double-decked road. In the middle of August, 2003 (during the primary stage of the restoration process), mobile observations on wind speed, radiation, surface temperature (thermal image) were performed for computing physiological indicators. The impact of the changing urban surface was measured using a thermoviewer and a scintillometer. Additionally, vertical observations (temperature, humidity, and wind profile) were made using radiosondes.

Around the Dongdaemun Market, upward sensible heat flux on fine days (12-14 August, 2003) was measured with a scintillometer on an optical path crossing the Cheong-Gye Cheon Street with the length of 75 m. It was around 600 W m\(^{-2}\) at the maximum. During the observation term, solar radiation reached to 900 W m\(^{-2}\) at the maximum in every day. Vertical observation data showed that development of mixing height reached to 500 m above the ground at 18LST.

If river restoration in urban areas is shown to have an important effect in reducing thermal stress, it will have major implications for urban planning. The results of this study could be applied effectively to other Asian mega-cities facing to severe heat island problems.

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National Institute for Environmental Studies, Tsukuba, Ibaraki, Japan

REFERENCES
In the seventeenth century Italy made an important contribution to the birth of meteorological science, with Galileo and his school inventing instruments like the thermometer, the hygrometer and the barometer (Evangelista Torricelli was a follower of Galileo). In the latter half of the same century, the “Scuola Medicea” and “Accademia del Cimento” launched the idea for the first European meteorological network (Fig. 1). In spite of these illustrious beginnings, today Italy is seriously behind in the growth of this discipline, with a shortage of personnel in both the research and operative fields.

This situation is mainly due to the fact that until 25 years ago, meteorology was the exclusive terrain of the Italian Air Force, which was chiefly concerned with aspects linked to aircraft flight. It was not until 1981 that the first civil meteorological office was founded in Bologna, as the meteorological service of the Emilia-Romagna region (one of Italy’s administrative regions). This fact constituted an obstacle to the academic development of the discipline. Up until the 1980’s, Italy had no professorships in either meteorology or atmospheric physics, and even now, there continues to be an insufficient availability of university training. In fact, there are no degree courses in meteorology, and only very recently have three-yearly courses been instituted by some universities. It is principally physicists, like the present author, who work in the area of meteorology.

In Italy meteorology did not develop in the universities, but at the Italian National Research Council (CNR). Between the late 1960’s and early 70’s, the Institute of Atmospheric Physics of the CNR in Rome and, in particular the Microphysics section of Bologna constituted the principal research nucleus in atmospheric physics and meteorology, undertaking joint projects with the Air Force and some university departments that were taking the first steps within the sector. The Microphysics Session later became an independent institute, first called FISBAT, latter re-christened ISAO and now ISAC (Institute of Atmospheric Sciences and Climate), which today counts 109 researchers and technicians (about 300 people if students and temporary staff are considered) and has sections throughout Italy (www.isac.cnr.it/).

Considerable impetus to the growth of meteorological studies, especially with reference to urban areas, has been given by the increasing interest, both nationally and internationally, in aspects relating to air pollution. This has led to an increase in courses in meteorology following the creation in 1980 of new degrees in Environmental Sciences (since 2000, the author himself has taught a course in Climatology and Meteorology in the degree programme in Environmental Sciences at the University of Parma). However, despite this research impetus, a major problem continues to exist. It concerns the relationship with the international centres of which Italy is a member, which continues to be officially entrusted to the Italian Air Force (Italy does not have a national civil meteorological centre), whose main concern is not to promote and broaden national research in the meteorological field. This and other institutional inadequacies mean that overall activity in applicable and basic research remains somewhat stifled in Italy, compared to other major European counterparts.

A stimulus to urban meteorology was generated by several laws which aimed to contain traffic pollution in large cities. In response to the growing number of problems caused in cities by the increase in automobile traffic, the Italian legislator introduced some very strict laws to prevent circulation in large urban centres (e.g. Rome, Milan, Naples, Genoa, Bologna etc.) in critical situations. According to this legislation, in cases where 50% of air pollution monitors in an urban network exceeded an hourly concentration level defined as the alarm threshold (for example, for NO$_2$, it is 400 µg m$^{-3}$), the following day the city centre had to be closed to traffic. In cases where they exceeded a lower concentration level, defined as the warning threshold (for NO$_2$, it is 200 µg m$^{-3}$), a meeting of an expert committee had to be held.
to decide, on the basis of the meteorological forecast, whether to close the city centre to traffic, if the alarm threshold was likely to be reached on the following day. The law stated that "in the case of simultaneous availability of data for each pollutant ... the relevant technical committee must consider the possibility of the declaration of a state of warning or alarm on the basis ... of general meteorological conditions."

The effects of the above regulations had a direct impact on the life of citizens, and generated an increased interest in the debate on urban air pollution; in particular, there was a call for a better understanding of transport and diffusion processes in urban areas and their correlation with urban meteorology. Moreover, air pollution networks were installed in many Italian cities and air pollution models were developed to understand and interpret the data obtained, as well as to establish the alarm thresholds. In 1993 the Italian Health Institute published the first official report, which emphasised the benefits of coupling models with motoring networks (Bassanino et al., 1993), and the need for meteorological measurements alongside those of air pollution. The same period witnessed a proliferation of measurement campaigns in urban environments, with the aim of increasing knowledge on urban diffusion and developing the ability of applying air pollution models. Research institutes also received increased funding to enable them to perform studies on urban air pollution.

The biggest measurement campaign in an urban environment (in terms of cost, human resources and commitment of instrumentation) was carried out in Milan in 1993, as part of the CNR project Urban Area and Environment (Ciccioli, 1993). The campaign involved the use of both radiosoundings and ground-based remote sensing systems, such as SODAR and RASS, as well as ground measurements performed with conventional instrumentation and sonic anemometers to study the interaction of the urban canopy with the structure of the atmospheric boundary layer, and the daily evolution of the urban boundary layer height. Moreover, the circulation of mountain-valley breezes over Milan was observed, as well as the occurrence of foehn wind events (Milan is about 30 km. from the Alps). Similar studies were carried out in Rome (albeit with a smaller amount of instrumentation) to assess the local sea breeze circulation (Mastrantonio et al., 1994; Ferretti et al., 2003). Historic series of temperatures sampled in urban and rural environments were reconstructed and analysed in order to gain insight on the urban heat island.

More recently, a meteorological campaign was organised in Bologna (Deserti et al., 2003), during summer and winter of 2001/02. The main objectives were the determination of horizontal temperature gradients in the rural and urban areas, along with the turbulent fluxes of momentum and heat: hourly fields of mixing height, Monin Obukhov length, friction velocity and vertical convective velocity were calculated daily.

Over the last ten years, various models have been applied in several Italian cities, including box models, Gaussian models, numerical photochemical models and Lagrangian particle models (Angelino et al., 1993; Bellasio et al., 1994; De Martini et al, 1998; Tirabassi et al., 1998; Tirabassi et al., 2003). Their use has brought the need to know and study the wind circulation over and inside towns, and urban meteorology in general. For example, in Bologna use has been made of a cascade assembly of meteorological and mesoscale dispersion models, such as the RAMS-CALMET-CALGRID sequence and the PBM photochemical box model (Tirabassi et al., 2001). The RAMS-CALMET-CALGRID model sequence (Rizza et al., 2000) has also been employed to study urban and industrial pollution in Puglia (a region in southern Italy) and an example of the results obtained is shown in Fig 2.

Currently, an increasing number of air pollution dispersion studies are being undertaken in many towns, promoted by local air pollution agencies and city mayors (in Italy, the mayor is responsible for health in towns). However, there is little coordination at the central level.

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REFERENCES


This article briefly introduces recent research activity on urban climate in Korea. The topics of urban related research being conducted in Korea are very diverse, ranging from fluid dynamics of mechanically and thermally forced urban flow to urban planning and architecture. Here we will limit our introduction to meteorological and climatological research activity, focusing on recently published papers and ongoing research. Two groups, Convection and Urban Meteorology Group of Seoul National University and Applied Meteorology Research Laboratory of Meteorological Research Institute/Korea Meteorological Administration (KMA), have been actively involved in urban climate research.

### Urban flow and dispersion

Urban flow and scalar transport research is an important topic in Korea both because of academic interest and its wide range of practical applications. Computational fluid dynamics (CFD) models, namely large-eddy simulation (LES) and Reynolds-averaged Navier-Stokes (RANS) models, have been developed to understand flow and dispersion around simple arrays of obstacles and apply the CFD models to real urban areas (Fig. 1) [1]. Results from recent CFD modeling studies can be summarized as follows:

1. Pollutants escape from the street canyon mainly by turbulent process and the net effect of mean flow is to make some escaped pollutants reenter the street canyon [2].
3. As the inflow turbulence intensity increases, the street-canyon vortex strengthens and more pollutants escape from the street canyon [5].
4. Ambient wind direction plays important roles in characterizing flow and dispersion in urban street canyons (Fig. 2) [6].

Simulations with developed CFD models have been so far performed with specified inflow boundary conditions. A larger-scale model can be used to provide time-dependent boundary conditions for a CFD model. With this approach realistic simulation and quasi-operational prediction of mean flow, turbulence statistics, and pollutant dispersion in an urban area are possible. A project that will couple a CFD model with a meso-scale numerical model is underway. Urban obstacles such as buildings can greatly influence wind speed and direction measured at urban observatories/sites. A CFD modeling study can help to evaluate obstacle effects and find representative and optimal urban measurement sites. The Meteorological Research Institute is interested in this research.

### Urban heat islands

Urban heat islands (UHIs) in large cities of Korea have been documented using various kinds of temperature data. Long-term temperature data at meteorological observatories are available. To characterize UHIs and examine the effects of meteorological variables (wind speed, cloudiness, relative humidity, etc.) on UHIs, data at an urban observatory and a nearby rural observatory are traditionally utilized. With this dataset the maximum UHI intensity in Seoul has been characterized and regression and neural network models developed for its prediction [7]. More generally, it has been found that the UHI intensity is weaker for coastal compared to inland cities [8]. Currently KMA operates about 500 automatic weather stations (AWSs) over the country to provide real-time near-surface weather information and also improve accuracy of weather forecasts by assimilating AWS data in the KMA operational weather prediction system. The spatial density of AWSs is particularly high in the
Seoul metropolitan area (Fig. 3), enabling us to detect the fine structure of the UHI. One-year AWS data in 1-hour intervals are analyzed using various statistical techniques to examine the spatial and temporal structure of the Seoul UHI (Fig. 4) [9]. The availability of high quality data has stimulated much research, including that on the causes of inter-annual variations of the Seoul UHI.

Most meteorological observatories with long-term data records in Korea are located in urban areas. Accordingly, recorded temperatures are inevitably affected by the UHI effect. To estimate the degree of global/regional warming or employ ecological models at regional scales, the UHI effect should be reliably quantified. With this in mind, some in-depth studies have been performed in the past years.

These include:
a. estimation of urban warming amounts due to urbanization using the empirical orthogonal function (EOF) analysis method and population data [10],
b. urban-effect correction to improve accuracy of spatially interpolated temperature estimates with a digital population model [11], and
c. urbanization effect on the observed change in temperature between the past and current normal periods [12].

Interesting ongoing research by geographic information system (GIS) specialists of Kyungil University is analyzing thermal environment in urban areas using Landsat TM data. This is expected to give detailed UHI information in connection with land-use changes in the last decade.

Urban induced thunderstorms

There is observational evidence of more frequent convection and lightning and greater precipitation downwind of urban areas. Several causes for these features have been proposed, including...
increased cloud condensation nuclei (CCN), increased surface roughness, and urban heat islands. In the atmosphere, abundant CCN are present, so increased CCN due to urban air pollution may not be a dominant cause. In addition, too many CCN can produce too many cloud droplets, hence prohibiting the formation of precipitation-sized drops. Increased surface roughness can result in low-level convergence, but a recent modeling study indicates that surface roughness may weaken surface convergence associated with an urban heat island. A numerical modeling study emphasizes urban heat islands as a paramount mechanism by showing that an urban heat island can dynamically induce downwind updraft cell, which can initiate moist convection under favorable thermodynamic conditions (Fig. 5) [13].

Currently, theoretical and numerical modeling studies are underway to demonstrate that boundary-layer stability is an important factor in determining the intensity of moist convection induced by an urban heat island and hence precipitation. Also a work is planned to observationally document precipitation anomalies due to urban heat islands in large cities of Korea.

Urban parameterization in numerical models

Numerical models (global climate models, regional climate models, mesoscale models) have been extensively used for weather and climate research in Korea. In those models, urban effects are not included or very roughly parameterized. Cities are known to influence weather and climate and the degree of influence will increase as urbanization continues. Hence, to simulate weather and climate accurately, urban effects (mechanical plus thermal) should be properly parameterized in numerical models. These efforts will be made with a high-resolution mesoscale model and then a coarse-resolution global model.

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References
Call for papers

ICUC-6 welcomes papers seeking to understand the nature of the atmosphere in urban environments or to the application of such knowledge to the better design and operation of settlements. Scales of interest range from individual built elements (roofs, walls, roads) through whole buildings, streets, factories, parks, clusters of buildings and neighborhoods, to whole cities and urban regions and their impacts on weather and climate at scales up to those of global change. The focus can be original research into the physical, biological and chemical atmospheric processes operating in built areas; the weather, climates and surface hydrology experienced in built areas; the design and testing of scale, statistical and numerical models of urban climates; or reports on the application of climatic understanding in architectural design or urban planning. Papers may relate to new concepts, methods, instruments, observations, applications, forecasting operations, scenario testing, projections of future climates, etc. Sessions that focus on major field studies or other projects or topics may be proposed. For further information please visit the website or email Professor Sven Lindqvist, chair of the local organizing committee (sven@gvc.gu.se) or Prof. Sue Grimmond (grimmon@indiana.edu), President IAUC.

The deadline for submission of abstracts is 10th November, 2005. Abstracts will be submitted via the web. Appropriate topics include, but are not restricted to:

- Airflow over cities, including turbulence, urban roughness and drag, changes of wind speed and direction, urban circulation systems, and wind engineering
- Anthropogenic Heat
- Building climates (interior and exterior) and the climatic performance of built features
- Carbon exchanges in urban areas
- Cities and global change
- Climate-sensitive urban design and planning
- Climates of paved surfaces such as roads, streets, highways, runways and parking lots
- Climatic performance of urban trees, lawns, gardens, parks, green roofs, irrigation, rivers, lakes and reservoirs
- Emergency response planning
- Exchanges of heat, mass and momentum between the urban surface and its boundary layer
- Forecasting urban weather, comfort, hazards, and air quality
- Interactions between urban climate and the emission, dispersion, transport, transformation and removal of air pollutants
- Models, and their evaluation, of the urban atmosphere at all scales and urban surface-atmosphere exchanges
- Remote sensing of cities and urban climate
- Road climatology in cities, including influence from traffic and other city related-objects
- Short- and long-wave radiation in polluted air and urban visibility
- Topoclimatology of cities, including the effects of coasts, valleys and other landforms
- Urban biometeorology relevant to the functioning of plants, wildlife and humans
- Urban climates in high latitude settings
- Urban heat islands, their nature, genesis and mitigation
- Urban impacts on surface moisture, dew, evaporation, humidity, fog, cloud and precipitation
This has been a great year for urban climate publications. We have seen a wide range of interesting papers spanning the breadth of the subject from cities around the world. Thanks to everyone who has collected and sent in references. Look out for the complete 2003 and 2004 bibliographies on the IAUC website in the near future!

Please send any further papers published since January 1 2004 for inclusion in the next newsletter to j.salmond@bham.ac.uk. As before, please mark the header of your email with 'IAUC Publications 2004'. In order to facilitate entering the information into the data base please use the following format:

Author:
Title:
Journal:
Volume:
Pages:
Dates:
Keywords:
Language:

We look forward to hearing from you soon!

Jennifer Salmond
University of Birmingham
j.salmond@bham.ac.uk

Recent publications in Urban Climatology
(Languages are specified where the publication is known to be in a language other than in English.)


Can't spot your paper from 2004? It is not too late to send me the reference for inclusion in the next issue!
Board Information

Board renewal

According to the IAUC Board Procedures and Terms, two board member will rotate off in August 2005 and need to be replaced. An official announcement regarding the nomination of candidates will follow in March. The objective of this note is to alert any members who are thinking about standing for the Board or would like to nominate a candidate about this upcoming opportunity. Please note that only persons who are members of IAUC can stand for the Board and only IAUC members at the time of nomination will be eligible to vote. The membership database will therefore be closed at the start of the nomination period for the duration of the nomination and voting periods. If you would like to be part of this process please ensure that you are an IAUC member before the nomination period begins (sometime in March).

Please also remember the following rules:

- The person nominating a candidate should name two other members who also support the nomination. In the case of self-nomination three other members need to support the nomination. All persons should e-mail the Secretary to confirm their support within the nomination period.
- At the completion of the nomination period, if the number of nominations exceeds the number of available positions, an election is held. If not, the nominees are considered to have been elected.

IAUC Board Procedures and Terms and composition of current board can be viewed at: www.urban-climate.org

In an effort to have wide geographical representation on the Board we welcome in particular nominations from Asia, Austral-Asia and Africa.

IAUC Information

Newsletter Contributions

The IAUC Newsletter is published bi-monthly. The next publication will occur in early February. Any items to be considered for the December edition should be received by March 31, 2005.

The following individuals compile submissions in various categories. Contributions should be sent to the relevant editor:

Conferences: Jamie Voogt (javoogt@uwo.ca)
Websites: Gerald Mills (gerald.mills@ucd.ie)
Bibliography: Jennifer Salmond (j.salmond@bham.ac.uk)
Urban Projects: Sue Grimmond (grimmmon@indiana.edu)

We would like to add an 'Urban Climatology in the News' section to this list. Please contact Sue Grimmond if you would like to be editor of this section. General submissions should be relatively short (1-2 A4 pages of text), written in a manner that is accessible to a wide audience and incorporate figures and photographs where appropriate.

Non-Voting members of the Board:
Past Secretary: John Arnfield, USA.
Past President: Tim Oke, Canada.
Local Organizer ICUC5: Kazimierz Klysik Poland.
Local Organizer ICUC6: Sven Lindqvist, Sweden.

IAUC Committee Chairs

Editor IAUC Newsletter: Gerald Mills
Chair Bibliography Committee: Jennifer Salmond
Chair Membership Committee: Janet Barlow
Chair Teaching Resources: Gerald Mills
Chair Awards Committee: Bob Bornstein
WebMasters: James Voogt

Board Members & Terms

President: Sue Grimmond (USA), 2007
Secretary: Matthias Roth (Singapore), 2007
Janet Barlow (UK), 2007
Ariel Bitan (Israel), 2006
Bob Bornstein (USA), 2005
Krzysztof Fortuniak (Poland), 2007
Wilhelm Kuttler (Germany), 2008
Gerald Mills (Ireland), 2007
Yasuto Nakamura (Japan), 2005
James Voogt (Canada), 2006