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From the IAUC President

This column and the IAUC Newsletter have been delayed so that I can report back on the major item considered in our IAUC Board Meeting of last week, **the scheduling of ICUC-11 in Sydney**.

ICUC-11 was originally scheduled to be held in Sydney, Australia, in August 2021. One year ago, the conference organisers and the IAUC Board, because of the impact of COVID-19 and because a full year is required to organise a conference, made the decision to postpone the conference for one year until August 2022. It is with heavy hearts that the organisers and the IAUC Board have made the decision to **postpone ICUC-11 for a further year until August 2023**.

The key reasons for this delay are the uncertainty about the opening up of international borders including Australia's borders, and the slow roll-out of COVID-19 vaccine worldwide, particularly in the face of more highly infectious strains of COVID. In Australia, international travel and the routine issuance of entry visas are unlikely before mid-2022, and possibly later. Currently Australia's borders are virtually closed to everyone, including Australian citizens, for both entry and exit.

The IAUC Board recognises the impact that this postponement will have on our community, but we know from a member survey taken last year, that our membership prefers in-person compared with on-line conferences. For this reason, we did not take the decision to run ICUC-11 as an on-line event in 2022. However, in recognition of the need to maintain our strong sense of community and engagement, the IAUC Board is supporting a number of new initiatives, including the highly successful **IAUC Webinars** organised by Melissa Hart, Negin Nazarian, Dev Nyogi and Natalie Theeuwes. So far four webinars have been held (details on the most recent are elsewhere in this newsletter), and **James Voogt and Benjamin Bechtel will talk on "Thermal Remote Sensing of Urban Environments" in the next webinar on September 8, 2021**. There are plans to further expand the community reach of the webinars in 2022 with more regionally-focused webinars in languages other than English.

Other activities to be financially supported by the IAUC will include a **IAUC Virtual Poster Conference to be held in August 2022** (in place of the August 2022 ICUC), particularly focusing on the graduate students and early career researchers in our community. This will be a joint collaboration with the AMS Board on Urban Environment. Poster-oriented activities such as this have proven to be much more satisfactory and popular than regular virtual conferences. Please note that **we are currently looking for people to join the organising committee for this activity; if you are interested in joining, please contact me in the first instance**. Finally, the IAUC Board is also very keen to receive proposals from the IAUC community for smaller regional meetings and summer schools, especially for calendar year 2022. Please see the IAUC website for details on how to apply for financial support for such activities.

Best Wishes

– Nigel Tapper,
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Inside the June issue...

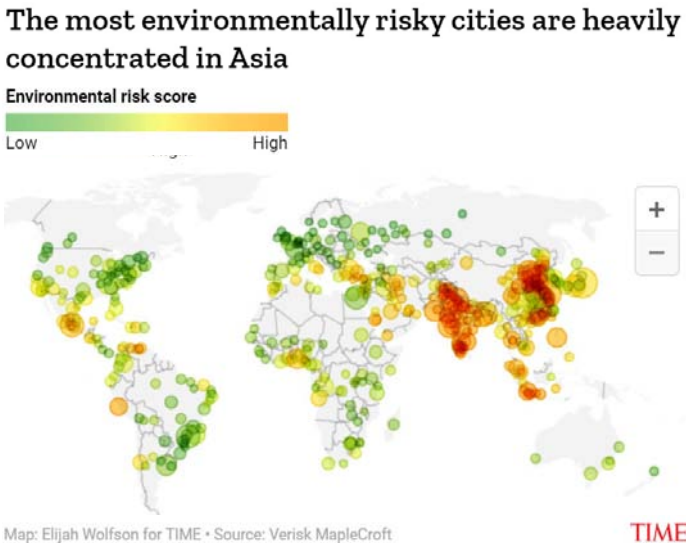
Asia Is Home to 99 of the World's 100 Cities Facing the Greatest Environmental Challenges

May 2021 — The many environmental challenges facing the world are far from evenly shared across regions. Of the 100 cities facing the greatest environmental risks, 99 are in Asia, according to a report published today by risk consultancy Verisk Maplecroft. Meanwhile, Europe is home to 14 of the 20 safest cities. Researchers scored the world's 576 largest cities on air and water quality, heat stress, water scarcity, vulnerability to climate change and exposure of their landscapes, populations, economies and infrastructure to natural hazards like earthquakes, tsunamis and landslides. Around 1.5 billion people live in cities facing "high or extreme risk," the report says.

Many of those live in Asia. The region is not only the world's most densely-populated–which puts pressure on water sources and compounds pollution from the widespread burning of coal and biomass fuels–but also has a large number of so-called "natural hazards" built into its geography. For example, there are a number of cities in Japan at risk of earthquakes, and many of the towns in Vietnam's Mekong Delta are especially vulnerable to flooding.

The report ranks Jakarta, Indonesia's sprawling capital of 10 million people, as the most vulnerable city in the world to environmental risks. Rising sea levels and land subsidence—due to the depletion of the natural aquifers under the city as people pump water out of the ground for drinking and washing—have made Jakarta the world's fastest-sinking city, with flooding already a regular occurrence, and parts of the metropolis expected to be underwater by 2050. The city also suffers from air pollution due to nearby coal-fired power stations. The situation is so bad that the Indonesian government is planning to move its capital.

India fares the worst as a country, accounting for 13 of the 20 riskiest cities and 43 of the top 100 identified by the report, with Delhi, Chennand Chandigarh dealing with the greatest threats. India's poor air quality is largely to blame for its high level of environmental risk. A study published in the *Lancet* last year found that air pollution contributed to 1.7 million premature deaths in India in 2019, and scientists say air pollution is driving up the death toll in the devastating COVID-19 outbreak unfolding in India this spring.



Source: https://time.com/6048106/asia-environment-risk-cities/

China has 37 of the 100 cities considered most at risk, with air pollution again the largest factor. President Xi Jinping has made cleaning up China's air a priority since he took office in 2013, establishing programs that encourage the replacement of coal-powered stoves in homes with gas and electric ones and disciplining factories that exceed pollution limits, through fines and shut-downs. But the government remains behind schedule to meet its own targets, according to Bloomberg, especially as China has ramped up plans to build new coal plants as it recovers from the economic lull of the pandemic.

Cities in Africa overall have "vastly" lower levels of air pollution compared to their Asian counterparts, says Will Nichols, Head of Environment and Climate Change Research at Verisk Maplecroft, who led the report, and they also tend to face fewer threats from natural hazards.

But researchers said African cities were by far the most at risk from climate change—accounting for 38 of the 40 most vulnerable in an index focused solely on climate risks. That stems from the region's poorly funded public services and infrastructure, as well as the extreme heat and weather events that climate change is already disproportionately making more common there.

Lagos, Nigeria's largest city, faces Africa's greatest environmental risks, ranking 144th out of 576 in total, due to problems with air quality, water pollution and heat stress. But it is the fourth most vulnerable to climate change in the world.

Researchers identified Glasgow–which is due to host a crucial U.N. climate conference in November–as the least vulnerable city to climate change in the world, and fourth safest for environmental risks overall. Though the Scottish city experiences some "natural flooding," Nichols says. "It is low-risk for pretty much everything else."

The outlook for U.S. cities is mixed. Most urban centers in the country have comparatively lower air pollution than cities in Asia and Europe, thanks to historic policy decisions on polluting fuels. Cities in the southwest face greater heat stress and a higher number of natural hazards, like earthquakes, than those in the northeast. Of the cities included in this report, Los Angeles has the greatest level of environmental risk, ranking 257th overall, driven largely by poor air quality, as well as California's high number of natural hazards and the state's severe water stress.

Verisk Maplecroft put this report together to guide companies making business decisions. But the takeaways may be equally important for communities and policymakers looking to the future of their cities. "These environmental threats are not going away and in many cases will get worse as a result of climate change," Nichols says. "You need to start factoring them into your decision making today. Really, it's not something that can kind of be left for tomorrow." *Source*: https://time.com/6048106/asia-environment-risk-cities/

Are cities and regions helping nations to gain steam on stronger climate goals?

Yunus Arikan from ICLEI – Local Governments for Sustainability, explains how all levels of government play a role in international climate negotiations

June 2021 — When the Conference of the Parties meets in Scotland this November for COP26 – assuming that they will, in some form or fashion – all eyes will be on the ambition levels of the revised national climate plans that are a part of the Paris Agreement.

This meeting of the annual climate conference is where countries are being asked to bring forward ambitious 2030 emissions reduction targets (known as Nationally Determined Contributions or NDCs) that will lead to net-zero emissions by the middle of the century. The Paris Agreement, which will turn six years old this year, was the moment that aimed to put us on a global trajectory towards limiting the world to 1.5 degrees of warming. It also was the place where local and regional governments — cities, towns and regions — were also delivered into the global climate movement.

Before the Paris Agreement, everything for non-national governments was voluntary. Climate action at the local level was, in some sense, a bonus. With the Paris Agreement, everything changed. The Paris Agreement specifically calls out the role of all levels of government, making it a duty for local governments to participate in the goal to reach climate neutrality by 2050. This means that the success in achieving the Paris Agreement — which we must, for the sake of humanity and the planet — lies with all levels of government. This must be a true multilevel success.

The most successful national governments engage with local & regional governments

Multilevel engagement to advance climate ambition can happen in a number of ways.

The case of Japan is steeped in a deeply-held practice of multi-level and collaborative climate action. Since before the Kyoto Protocol was first introduced to the world, cities and prefectures in Japan have been reporting climate actions and deepening relationships between the federal environmental leadership and subnational leaders.

Over the last two years, hundreds of local and regional governments in Japan have committed to net-zero emissions by 2050. Led by Japan's Minister of the Environment and Climate, H.E. Shinjiro Koizumi, this past April, at the U.S.-hosted Climate Summit, Japan announced it would be cutting emissions 46-50% be-

low 2013 levels by 2030, with strong efforts toward achieving a 50% reduction. Just a week before this summit, the U.S. and Japan together "recognize(d) the critical importance of subnational government action in achieving our climate goals" and agreed to "collaborate to promote action globally to recognize, support, and accelerate subnational climate action."

But the contributions of cities alone should be enough to inspire national governments to act. Susan Aitken, Leader of the Glasgow City Council, speaking with ICLEI's CityTalk blog in April 2021, points out that "the Scottish government has a goal of reducing carbon emissions by 75% by 2030 and 100% by 2045."

Complementing these goals, she says "we in Glasgow want to get to net-zero by 2030. And the reality is that Scotland isn't going to reach its targets if they're not delivered in Glasgow first. So we need to be the vanguard of change."

This past April, the United States submitted their second NDC. The NDC was created with significant inputs from stakeholders across all levels of government, recognising that "local governments contribute substantially under the United States federal system to national efforts to reduce emissions." It looks to be the most ambitious, advanced and comprehensive commitment in relation to multilevel and collaborative climate action that has been submitted so far.

Elsewhere in the world, cities are collectively levelling up national ambitions. In Korea, collective action by local governments are inspiring national commitment. In June 2020, 226 local governments collectively declared a climate emergency. A month later, 17 provincial and 63 local governments launched an alliance for carbon neutrality and urged nationwide action for carbon neutrality by 2050. In September, 98% of national assembly members adopted a resolution urging action on the climate emergency. One month later, President Moon Jae-in officially announced Korea's intention to achieve carbon neutrality by 2050. On 24 May 2021, all local governments in Korea committed to climate neutrality by 2050, which increases expectations for their engagement in the upcoming South Korean NDC over the next couple of months.

The Global South also has a role to play in emissions reductions, especially when it comes to local and regional government collaboration.

In 2019, ICLEI joined forces with NDC Partnership to support the Climate Action Enhancement Package (CAEP) which delivers targeted, fast-track support to countries to enhance the quality, increase the ambition, and implement their NDCs. Seven countries – the Dominican Republic, Peru, Uganda, Zimbabwe, Malawi, Gambia and Mozambique – are working with ICLEI to actively engage at the local and regional level through training of public servants on climate policies, climate assessment and climate reporting and in dialogue with national governments.

Source: https://www.openaccessgovernment.org/stronger-climate-goals/112294/

In the Dominican Republic, nine municipalities developed in-house capacity on climate finance and policies to design ambitious climate projects. Local governments are now able to better attract and access financial resources for their low-emission and climate-resilient projects, as well as contribute to the goals of their federal NDC. The federal government of the Dominican Republic has designated their approach to the NDC as "shared leadership" on climate action amongst all levels of stakeholders.

The CAEP currently works with more than 50 national governments in the Global South, with more than half having reported that they are incorporating an engagement element for subnational governments.

Multilevel action is the new normal

As countries have made new commitments or discussed the commitments they will make in advance of COP26, it has become clear that the engagement of subnational stakeholders is the new normal for building both an ambitious national commitment, but also one that is achievable. The commitments and actions that local and regional governments have already taken, make the commitments of national governments realistic and the achievement of those commitments, possible. *Source:* https://www.openaccessgovernment.org/stronger-climate-goals/112294/

How to reimagine our cities as hubs for biodiversity conservation and climate resilience

June 2021 — Biodiversity – all living organisms, including plants, animals and microorganisms – is essential for human existence. Yet when we think about biodiversity, we rarely picture a city in our minds. Nature has often been associated as purely a feature of rural landscapes, when in fact urban areas are home to a myriad of ecosystems and natural wealth, harbouring rich biodiversity. We are embedded in nature and yet we know very little about it.

Today marks the launch of the UN Decade on Ecosystem Restoration, which serves as a reminder that we must mobilize urban decision-makers and citizens to put nature at the heart of urban life. We have a unique opportunity to ensure that cities become true drivers of growth, resilience and well-being that operate within healthy social and planetary boundaries.

Cities play a unique role in today's world. COVID-19 has placed them, once again, at the forefront of dealing with some of the most pressing global issues putting well-being and prosperity at risk, including climate change and biodiversity loss. But imagine a city where buying your favorite products leads to more nature, not less, and where your job can withstand environmental and economic shocks; where the air you breathe is pure and fresh, and where birdsong no longer has to compete with the roar of traffic.

Most cities in the world are ill-equipped to address the threats urbanization poses to natural habitats. In 1800, only 3% of the global population lived in urban areas. Today, we hit 55%, and the figure is projected to reach over two-thirds by 2050. While cities continue to expand at unprecedented rates, so does the pressure that they put on natural resources, ecosystems and the climate. If left unchecked, this puts our livelihoods, sustenance and the very air we breathe under real threat. Thankfully, solutions exist to allow cities to minimize these risks and reinvent themselves for the benefit of nature, the economy and society.

Some cities have understood the opportunities that addressing biodiversity loss and climate change present and have shown leadership in developing innovative solutions. Despite its small territory, Singapore is home to 4% of the world's bird species, signalling clearly how rich urban biodiversity can be. In response to increasing urbanization and the effects of climate change, Singapore transformed itself from a Garden City into A City in a Garden, and then took a bold step to further evolve into a City in Nature.

Singapore has applied nature-based solutions to achieve climate, ecological and social resilience with innovative modern technology. This paradigm shift focuses on restoring nature in the city to make it both more liveable and sustainable.

Green spaces in cities help offset climate changes and provide physical and mental well-being for their citizens. ***Source:*** https://www.weforum.org/agenda/2021/06/cities-ecosystems-biodiversity-climate-change/

Such inspiring examples can no longer be isolated success stories. COVID-19 has taught us how vulnerable we are to unpredictable events and the consequent need to protect ourselves from future shocks. Conserving urban biodiversity is an important component of such efforts, as well as for ensuring people's overall well-being. It can be achieved by conserving, creating, restoring and enhancing a diverse spectrum of ecosystems within the city and connecting them with ecological corridors.

Regulations, policies and actions in a city can effectively tackle the issue. For example, cities can contribute significantly to reduce biodiversity loss through land-use policies, while providing a healthier and more resilient lifestyle to its inhabitants. Natural reserves, urban parks and green areas by definition contribute to maintaining natural wildlife within cities' borders as well as providing physical and mental health benefits for city dwellers.

Similarly, policies that establish watersheds and restrict construction on wetlands not only maintain natural ecosystems and conserve biodiversity, but also prevent natural risks. Cape Town, for example, prevented a major water shortage by investing in protecting its watershed using nature-based solutions that restore vegetation and degraded land. Urban agriculture is another approach that could simultaneously address social and environmental concerns. Sustainable urban agriculture has the potential to conserve soil, enhance food security and reduces the impact of long-distance supply chains on the climate and biodiversity loss.

In order to improve the quality of life of city-dwellers, urban decision-makers must become champions of urban biodiversity and move away from viewing biodiversity loss as a rural concern. Beyond the implementation

Singapore has led the way in preserving and extending urban ecosystems. ***Source:*** https://www.weforum.org

of innovative technologies, financial mechanisms that foster public and private investments in urban biodiversity-related projects are a central resource for the transition to net-zero, nature-positive cities.

Strong and diverse partnerships are also a requisite foundation to give decision-makers the confidence to act based on best practices and make impactful investments at scale. Contributions from national government, international organizations, the private sector, civil society and academia are needed to drive the much-needed change. Adequately addressing biodiversity conservation and restoration in cities demands a comprehensive multistakeholder approach to align ambitions towards accountable steps and solutions.

Safeguarding urban ecosystems should not only be seen as a part of a green agenda, but more broadly as a driver of human prosperity and job creation. According to the World Economic Forum's *The Future of Nature and Business* Report, a nature-positive pathway in the infrastructure and built environment could create over $3 trillion in business opportunities and create 117 million jobs by 2030. Therefore, there is great potential for the economy to grow and become more resilient by protecting biodiversity in urban areas.

With this goal in mind, the Global Commission on BiodiverCities by 2030 was launched last month, as part of the BiodiverCities by 2030 initiative. The commission is made up of a diverse group of city experts and practitioners from the public and private sectors, civil society and academia whose passion for and expertise in biodiversity conservation and climate change will steer its objectives to make cities safer, more fulfilling and cleaner places to live. The commission is chaired by Lena Chan, Senior Director of the International Biodiversity Conservation Division at the National Parks Board of Singapore, and Mauricio Rodas Espinel, former Mayor of Quito and Visiting Scholar at University of Pennsylvania.

The BiodiverCities by 2030 initiative will develop a framework for a "BiodiverCity" and provides a platform for this group of committed leaders to synthesize new knowledge and explore innovative ways to develop net-zero, nature-positive cities. This is the moment. This is the place. Both the public and the private sector must jointly take the lead.

Citizens of all ages must be empowered to be stewards of nature. We must all work in synchrony towards encouraging cities to work for both people and the planet to ensure their long-term viability. *Source:* https://www.weforum.org/agenda/2021/06/cities-ecosystems-biodiversity-climate-change/

A story of an international research collaboration on urban climate between PhD graduates of three Australian universities



By Inji Kenawy[1], Salman Shooshtarian[2], Cho Kwong Charlie Lam[3]

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We are three motivated early career academics who completed their doctorate studies in three leading Australian research institutes – Deakin University, RMIT University, and Monash University (Kenawy, 2013; Shooshtarian, 2017; Lam, 2017). In 2019, we formed a research group intending to foster a collaboration to further analyse the aggregated comfort data gathered during our PhD studies. The focus of our research was on the assessment of outdoor thermal comfort in Melbourne's urban environments. After the completion of our doctorate degrees in Australia, Inji and Charlie moved to the United Kingdom and China respectively to pursue their academic careers.

About us

Inji is currently a lecturer at the School of Science, Engineering and Environment, University of Salford, UK. She was awarded her PhD in December 2013 from the School of Architecture and Built Environment, Deakin University. Her PhD thesis focused on the effect of cultural diversity on outdoor thermal comfort in urban places (Figure 1, left). In 2012, she was awarded the Graham Treloar prize for the best Higher Degree by Research student with a published paper on sustainability. This was followed by the publication of more than thirty peer-reviewed journal articles and refereed conference papers. Dr Kenawy has participated in different national and international conferences, workshops and research projects. She's currently part of the research team in the EU funded "Urban Innovative Action" IGNITION project being led by the Greater Manchester Combined Authority (GMCA, 2020), and the AHRC funded project entitled "Monitoring Object and Visitor Environments" led by the University of Salford (UKRI, 2018).

Salman is a Research Fellow at the School of Property, Construction and Project Management, RMIT University and currently researching sustainability in the built environment. He received his PhD from RMIT University in 2017, in which he investigated the educational urban precincts' users' thermal comfort requirements (Shooshtarian, 2017) (Figure 1, center). In addition to his work in the broad field of the built environment, Dr Shooshtarian has a history of collaboration in several research projects assessing thermal comfort with international researchers from Brazil (Balneário Camboriú Climate Project - BCC Project 2020), Germany (Energy in Buildings and Communities Program, 2018), Iran (Tehran University, Iran, 2017), and Ecuador (El grupo de Investigación en Ciudades Sustentables - LlactaLAB, 2017).

Charlie is an Associate Researcher at the School of Atmospheric Sciences, Sun Yat-Sen University, China. He was awarded his PhD in 2017 from Monash University. Charlie's PhD project examined the landscape variability of Melbourne botanic gardens and visitors' outdoor thermal comfort (Figure 1, right). Dr Lam is currently working on several collaborative research projects

Figure 1. Field surveys conducted by the three studies at Federation Square (left), RMIT University City Campus (center), and Melbourne Gardens (right).

studying urban microclimate, multi-sensory influence on outdoor thermal comfort, as well as physiological and psychological adaptation to heat.

The story of our collaboration: Challenges and opportunities

In 2019, we kicked off our collaboration with the intention to improve outdoor thermal comfort research in Australia through data aggregation and to provide information assisting in developing policies that are relevant to Melbourne urban sustainability. The main driver of this collaboration has been our common interest in exploring the role of thermal comfort assessment in urban sustainability, hard work and commitment to achieving the planned deadlines, and our belief in the power of aggregated data interpreted as big data these days.

The main focus of our PhD studies was to assess thermal perceptions of various outdoor environments in Melbourne. Being the second most populated city in Australia after Sydney, Melbourne is known as the Australian capital of art, culture, and sport. Since the mid-1990s, this city has maintained substantial population and employment growth. The city is a sought-after migration target for many domestic and international migrants. In December 2019, migration data showed that about 61.4% of annual population growth was attributed to net migration (7.6% interstate, 53.8% overseas). Melbourne is also a popular tourist destination for many travel makers featuring several attractions. Despite the mass urbanisation in Melbourne's city centre, this city has retained its historical character that is known as Victorian heritage. Victorian heritage is of cultural significance to the State of Victoria and its residents. The city is also the home to several internationally recognised educational and research institutions that annually admit several thousand international students. In December 2019, Australia hosted 758,154 international students of which about 35% belonged to the state of Victoria and mostly Melbourne. The sustainable economy in Melbourne is equal to the sustainable influx of migrants, tourists, and prospective international students. In efforts to reclaim its title, Melbourne has now set out to do what it takes to firstly remain competitive and secondly improve its living standards. By doing so, the city has developed several policies, initiatives, and developments. Among others, outdoor urban quality is deemed to be a determining factor in enhancing living standards. Thermal conditions are among the top factors that individuals consider when deciding on migration, holiday making, and studying. Melbourne has a temperate oceanic climate (Cfb) with highly variable weather conditions. However, in recent years Melburnians have witnessed undesirable weather conditions throughout summer that are typically exacerbated with heatwaves. These weather conditions cause indoor and outdoor thermal discomfort. According to the climate change projections in Australia, urban heat stress conditions are going to be more frequent and extended in future in Melbourne (Bettio et al., 2019).

Despite being conducted in different time period ranges, our studies share the same themes on outdoor thermal comfort. A review of extant literature made us realise that there are limited studies that compare thermal perceptions in various urban configurations and by different outdoor users within the same city. Therefore, our collaboration provides a fresh perspective on the above issues. Additionally, by combining our survey data, the sample size of our studies was increased and subsequently, greater statistical power in explaining our results.

This collaboration, however, has been accompanied by several challenges of different sorts. For instance, one difficulty is concerned with organising meetings whose times suit everyone given our different time zones (GMT, GMT +8, and GMT +11). Another challenge is to squeeze in this collaboration within our busy schedule filled with various research and teaching responsibili-

ties; hence, effective time management has been vital to addressing these issues. The commitment to make time for our online meetings and committing to deadlines in a timely manner was essential for a successful collaboration. Besides, we have faced technical challenges due to nuance in the methodologies adopted. For instance, our survey data are coded and stored in different formats with various metadata. To make our three case studies comparable and consistent, we had to conduct some data pre-processing so that our data are in the same format for analysis. Data aggregation is one of the main aspects that is to be taken into consideration in the collaboration. As there are some differences in our survey questions, it is necessary to provide a standardized approach to analysing the survey data. For example, our three case studies used different questions to assess thermal acceptability in outdoor spaces. Conventionally, acceptable thermal range (ATR) is determined by the 80% acceptability in a quadratic polynomial regression between the acceptability percentages and thermal index (e.g. Physiological Equivalent Temperature: PET). This approach requires the survey to include a question of thermal acceptability (i.e. thermally acceptable or unacceptable). Since the botanic garden study does not have the thermal acceptability question, we chose other indirect methods to determine ATR. One such method determines an acceptable vote as people reporting a thermal sensation vote (7-point scale) between slightly cool to slightly warm and a thermal preference vote (3-point scale) of no change in the weather conditions. We also used different meteorological instruments for environmental monitoring and the calculation of thermal indices. Therefore, we have to use the same equations and approach to calculate parameters such as the mean radiant temperature and PET.

Collaboration outputs

Our collaboration experience sheds light on the IAUC effort to establish a global database for outdoor thermal comfort surveys (Lau and Krüger 2020), which requires standardisation of meteorological measurements and conducting field surveys. At the time of writing this article, our team has published two joint publications in the Journal *Building and Environment* (2020-2021). Our first paper provides an overview of outdoor thermal comfort research in Australia (Shooshtarian et al., 2020). Next, we aggregated our summer thermal comfort data to establish an outdoor thermal benchmark for Melbourne; our work resulted in a second paper outlining the application of different techniques to determine the summer thermal benchmark (Kenawy et al., 2021). We are looking forward to continuing this collaboration and producing more distinguished studies. Finally, we would like to express our gratitude to our PhD supervisors and acknowledge their continuous support and guidance, which have enabled us to contribute to the field of urban climate.

Professor Hisham Elkadi (University of Salford, UK)

Dr Aillie Gallant (Monash University, Australia)

Dr Margaret Loghnan (Monash University, Australia)

Professor Priyadarsini Rajagopalan (RMIT University, Australia)

Professor Nigel Tapper (Monash University, Australia)

Professor Ron Wakefield (RMIT University, Australia)

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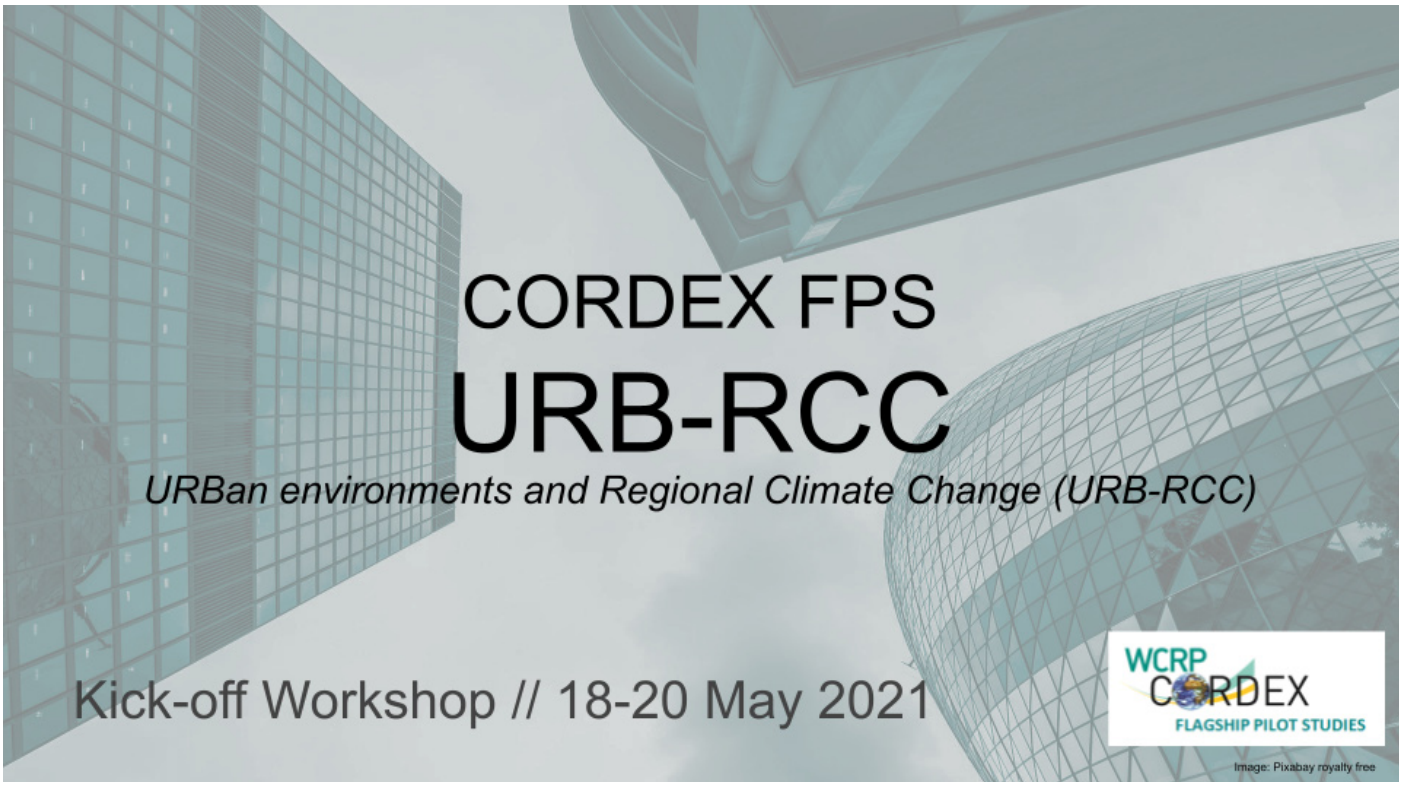
Towards better understanding the urban environment and its interactions with regional climate change

A new WCRP CORDEX Flagship Pilot Study

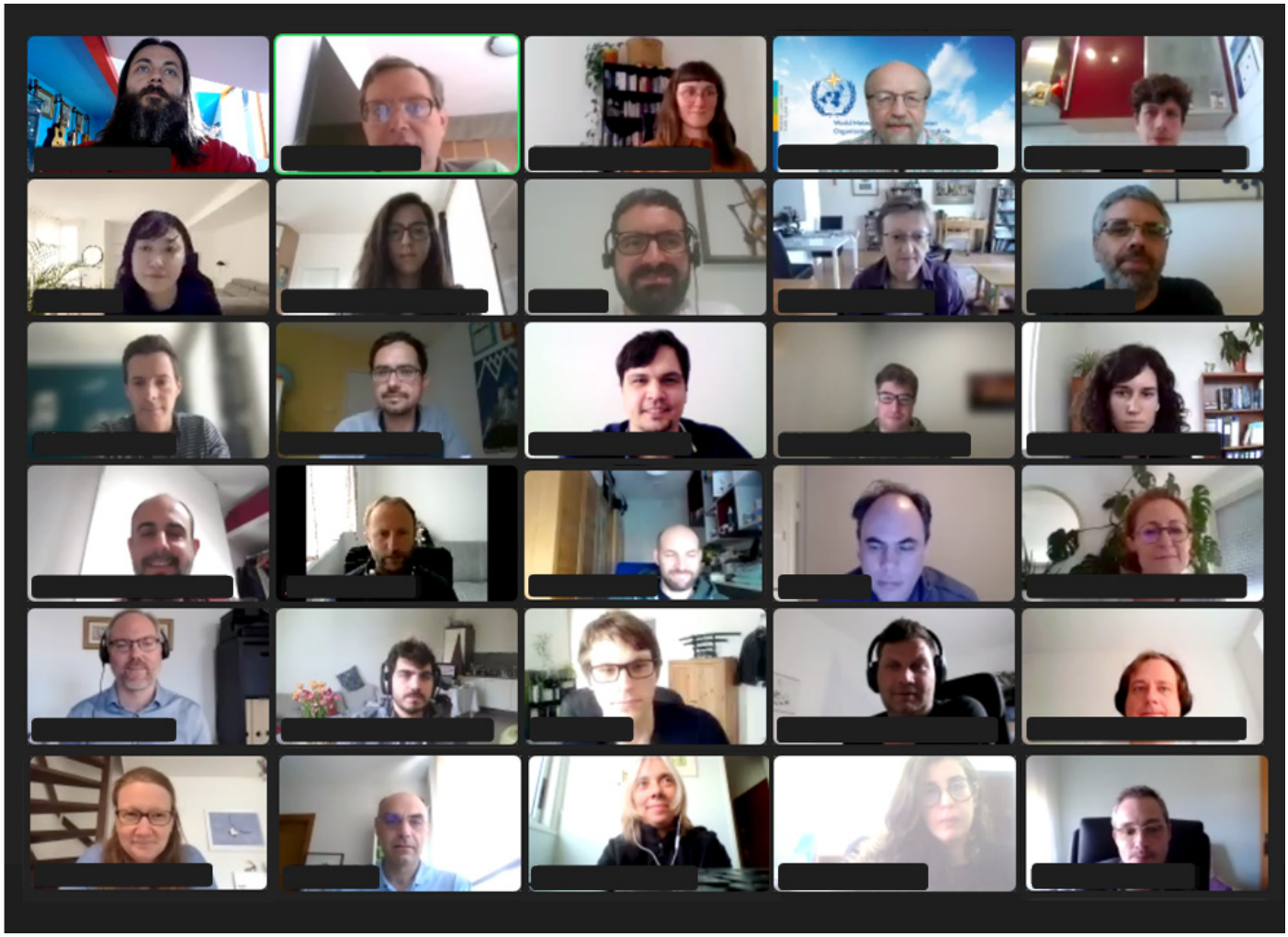
The urban climate, with all the complex processes, has been studied for decades. Nevertheless, there is a significant gap to incorporate this knowledge into regional climate models to downscale climate change up to the urban environment and to simulate its interactions with the regional climate. A new Flagship Pilot Study (FPS) "URBan environments and Regional Climate Change (URB-RCC)" was launched on 1 May 2021 under the umbrella of the Coordinated Regional Climate Downscaling Experiment (CORDEX) project of the World Climate Research Programme (WCRP). The main goal of the URB-RCC project is to understand the effect of urban areas on the regional climate, as well as the impact of regional climate change on cities, with the help of coordinated experiments with urbanized regional climate models ensemble.

From the perspective of recent regional climate model developments moving towards increasing grid resolutions down to convection permitting scales (1-3 km grid resolution), and therewith the city scale, proper parameterization of urban processes is starting to play an important role to understand local-to-regional interactions, particularly also under climate change. The inclusion of the individual urban processes affecting energy balance and transport (i.e. radiation, heat, humidity, momentum fluxes) via special urban land-use parameterization of distinct local processes becomes critical to simulate the urban effects properly and to capture its interactions with the regional climate. This will enable improved assessment of climate change impacts in the cities and inform adaptation and/or mitigation options by urban decision-makers, as well as adequately prepare for climate related risks (e.g. heat waves, smog conditions etc.). It would also contribute to the developments towards regional earth system models (RESMs). The main objectives of the CORDEX FPS URB-RCC are:

- Investigating interactions of urban environment with local-to-regional climate for (mega)cities based on coordinated ensembles using urbanized regional climate models.
- Understanding and assessing urban climate change impacts, across local-to-regional scales.
- Assessing options for urban parameterization schemes in high-res regional climate model simulations for further use in CORDEX.



Flyer from the CORDEX Flagship Pilot Study virtual Kick-off Workshop, held from 19-21 May 2021.



Group shot of CORDEX Flagship Pilot Study virtual Kick-off Workshop, held from 19-21 May 2021.

• Better understanding the urban environment's vulnerability under CC and providing the urban CC science to underpin climate services for cities.

To get up to speed, a virtual Kick-off Workshop was held from 19-21 May 2021. Over 50 participants from across the globe participated in the three-day event. The workshop was focussed on getting to know the partners, sharing the science conducted within the different groups, and primarily discussed the initial steps of the first phase of the project. The latter aims to 1) gain an overview on the different urban parameterizations, models, and urban studies from the different partners; 2) conduct research on urban areas under climate change using existing simulations, primarily stemming from the CORDEX activities, and; 3) to draft a protocol for the coordinated simulations. These are expected on a convection permitting scale, and will be conducted in the second phase of the project, starting approximately from summer 2022 onwards.

Currently the URB-RCC project encompasses approximately 30 partners, across the globe, coming from the CORDEX community, as well as the urban climate / IAUC community. We are honoured that Sue Grimmond, Alexander Baklanov, and Bob Bornstein agreed to be part of the advisory board to guide the project.

The project remains open to interested groups and new partners. In case you want to know more about the project and/or are interested to collaborate, please reach out to Tomas Halenka (tomas.halenka@mff.cuni.cz) and Gaby Langendijk (gaby.langendijk@hereon.de).

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How to bring urban climate studies to application – A meteorological view from five decades of urban climate research and results from a current study

Related study: Fallmann, J. and Emeis, S. (2020) How to Bring Urban and Global Climate Studies together with Urban Planning and Architecture? *Developments in the Built Environment*, 4, 100023.

Atmospheric sciences have dealt with the special features of urban climate for about 200 years, starting with the seminal book of Howard. It therefore has been long understood that urban areas govern the dynamics and air chemistry of the atmospheric boundary layer, they are key drivers for the development of local circulation patterns and can modify local and regional weather and climate. On the other hand, local meteorological conditions and large-scale weather patterns drive the formation of the urban heat island, can modify microclimate conditions and affect air quality regionally and locally. As such, holistic models have to be developed in order to properly represent interactions along both time and spatial scales and preferably have to incorporate both dynamics and air chemistry. A large amount of studies exist already, which highlight the importance of properly representing urban areas within mesoscale models via urban canopy parametrizations. Current coordinated model activities try to assess these parametrizations to be included e.g. in regional climate models as being considered within Cordex FPS URB-RCC. More information on that activity can be found in the contribution of Gaby Langendijk and Tomas Halenka within this issue.

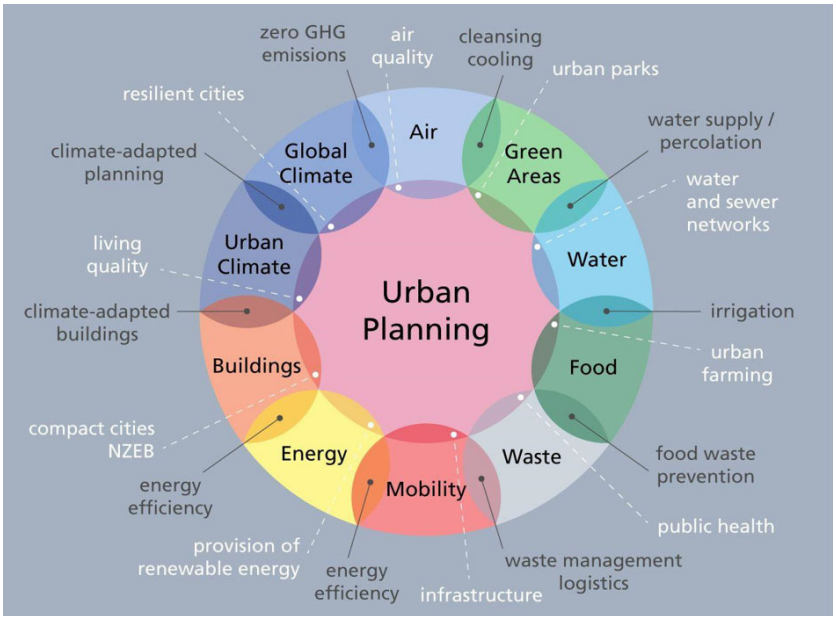

Figure 1. Interrelations among urban issues towards sustainability. The bubbles depict mutual overlaps among the urban issues and one example for each overlap is provided (white dashed lines point to overlaps with the central bubble and black full lines to overlaps between neighbouring outer bubbles). NZEB = "nearly zero-energy building". (Copyright: IMK-IFU of KIT, Petra Guppenberger)

For properly incorporating the findings and perspectives from meteorological and urban climate studies into dedicated urban planning actions, scientific information has to be condensed to a level that can be understood and used by local stakeholders. In addition, the broad amount of urban climate literature has to be summarized in a way that provides an applicable hands-on for urban practitioners allowing them to select measures which best fit their specific city regarding its morphological, social, political and legal framework. Transferring scientific and often theoretical knowledge into actual urban planning, however, necessarily involves an interdisciplinary dialogue, which links urban and global climate to e.g. urban planning and building design.

In our recent literature review (Fallmann and Emeis, 2020) we aim to provide suggestions for sustainable urban planning under present and future climate conditions. By this, we display and offer a pool of efforts and ideas summarizing results from five decades of scientific research in the field of urban planning with regard to local air quality and to local and global climate. As such, the term 'Smart' often appears in the context of city design, with regard to better information and communication infrastructure. In our perspective, however, that term does not necessarily incorporate all facets of sustainability. Based on that review, we propose a new way of thinking towards the Smart-City term, with urban planning being embedded in an interconnected framework of specific fields and their effect on urban sustainability (Figure 1).

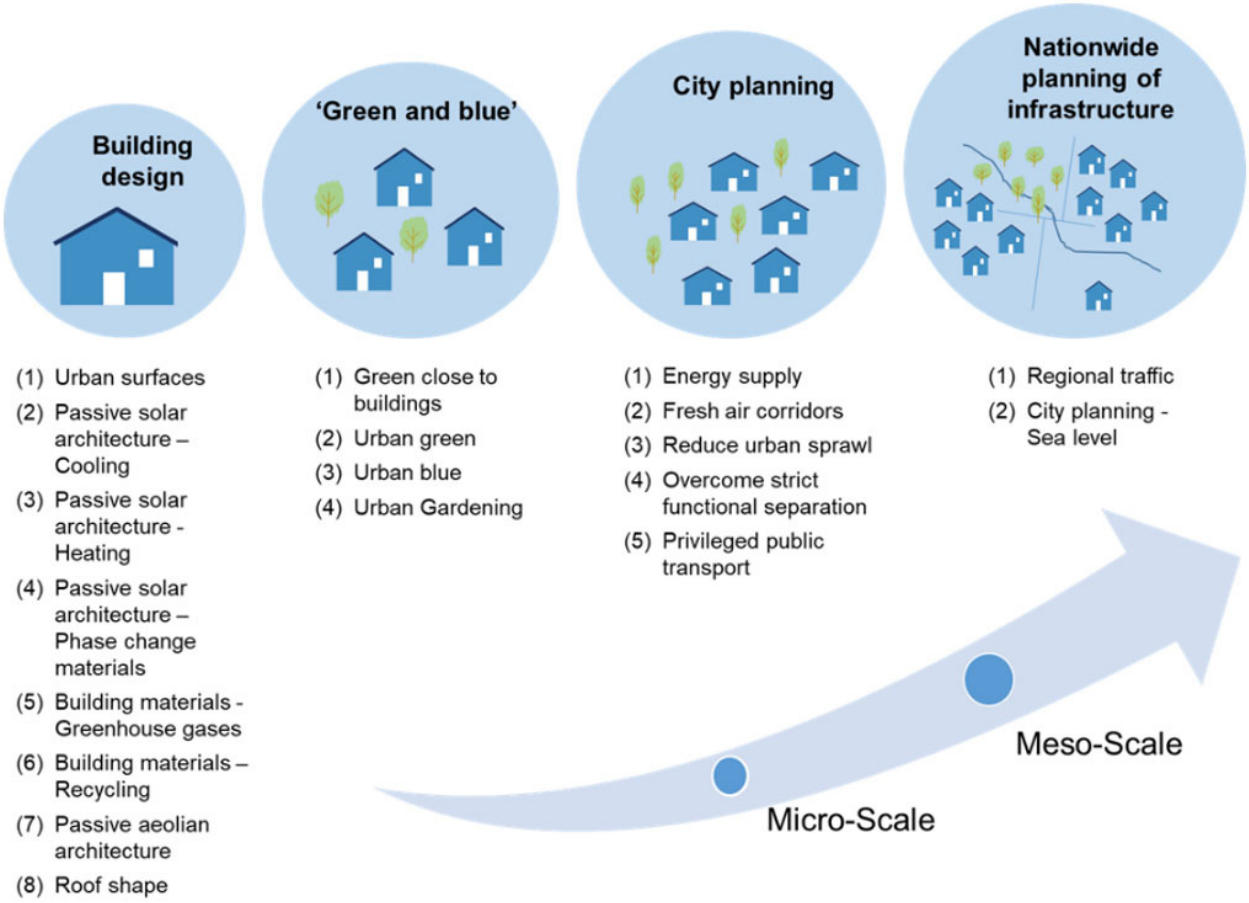

Figure 2. Action fields in ascending order according to the spatial scale. Within each field, activities are ranked due to the amount of studies found in the literature review.

Figure1 links planning and building requirements (clockwise from "Green areas" (upper right) to "Buildings" (left)) with atmospheric and climatic issues ("Urban Climate" to "Air"). The outer bubbles are linked with the central bubble "Urban Planning" by exemplary action fields given in white letters, while selected action fields connecting neighbouring outer bubbles are given in black. There are definitely further action fields, also between non-neighbouring bubbles, which have been skipped from the graph for the sake of simplicity. The legacy to be conveyed by Figure 1 is that urban and global climate issues and air quality are equally ranking issues in smart planning processes for sustainable cities.

There seems to be consensus amongst existing literature, that only a small number of previous urban climate studies had considerable influence on actual city planning and/or building design so far (Eliasson 2000; Mills et al. 2010; Parsaee et al. 2019). Some progressive ideas however found widespread interest for instance in the field of biophilic designs (e.g. Bosco Verticale in Milan or Kö-Bogen in Düsseldorf). Another trend mirroring sustainable building design is using wood as a building material (Tupėnaitė et al. 2020), which involves less concrete and eventually stores biologically extracted carbon from the atmosphere for a long time (Churkina et al. 2020).

As a result of the literature review, we defined four action fields from the building to the national scale:

a) measures to modify building design
b) measures to enhance urban green and blue
c) measures to re-plan cities
d) measures to secure the overall resilience of urban areas.

These points intend to provide a guideline for both resilient building and city design but also should set a basis for the definition of dedicated urban climate studies within both meso- and microscale resolution. Figure 2 summarizes the four action fields and ranks the subtopics in each field according to their importance from an atmospheric scientist point of view (according to the amount of studies found in the review). More details can be found in Fallmann and Emeis (2020).

From a scientific point of view, the first action point necessarily has to be addressed by dedicated micro-climate modelling studies or focused observation campaigns. Action points two to four however include city wide to regional effects, which can be assessed already with convective scale atmospheric, or chemical transport models. These models in turn have to be developed towards earth system models and necessarily have to involve a proper representation of urban geometries, anthropogenic heating and emissions. Getting these larger scale meteorological and air chemical conditions right, sets the basis for the coupling to highly resolved street scale models.

Towards application – Impact of urban imperviousness on dynamic and chemistry at a regional scale (Fallmann et al. 2021)

As one example in the atmospheric modelling community, the COSMO-CLM model, coupled to the urban canopy model (UCM) TERRA-URB (Wouters et al. 2015; Wouters et al. 2016), has been proven to be suitable for meso-scale urban studies. Studies with that regard exist for e.g. Berlin (Trusilova et al. 2016) or Moscow (Ginzburg und Dokukin 2019) for the meteorological perspective only. Here, we present a current study assessing that UCM being implemented in the regional climate air chemistry model system MECO(n) (Kerkweg und Jöckel 2012). The way urban areas are incorporated within these kinds of model systems governs exchange processes in the urban boundary layer, thus effecting both dynamics and air chemistry. In this work, we compare both 2-m temperature and near surface NO_2 concentrations against urban background observations at six different cities within the model domain (Figure 3). Receiving global boundary conditions from the ECHAM5 global model at T106 resolution, we come up with a 3-domain model chain from ~200 km to 40 km down to 3 km. The emissions are retrieved from TNO-MACCIII dataset with 7 km horizontal resolution. The presence of urban areas within a grid cell is translated to the land surface model via the variables impervious surface area fraction (ISA) and anthropogenic heating factor (AHF). Figure 3 shows the variable ISA for the 3 km model domain embedded in the underlying 40 km Central European domain.

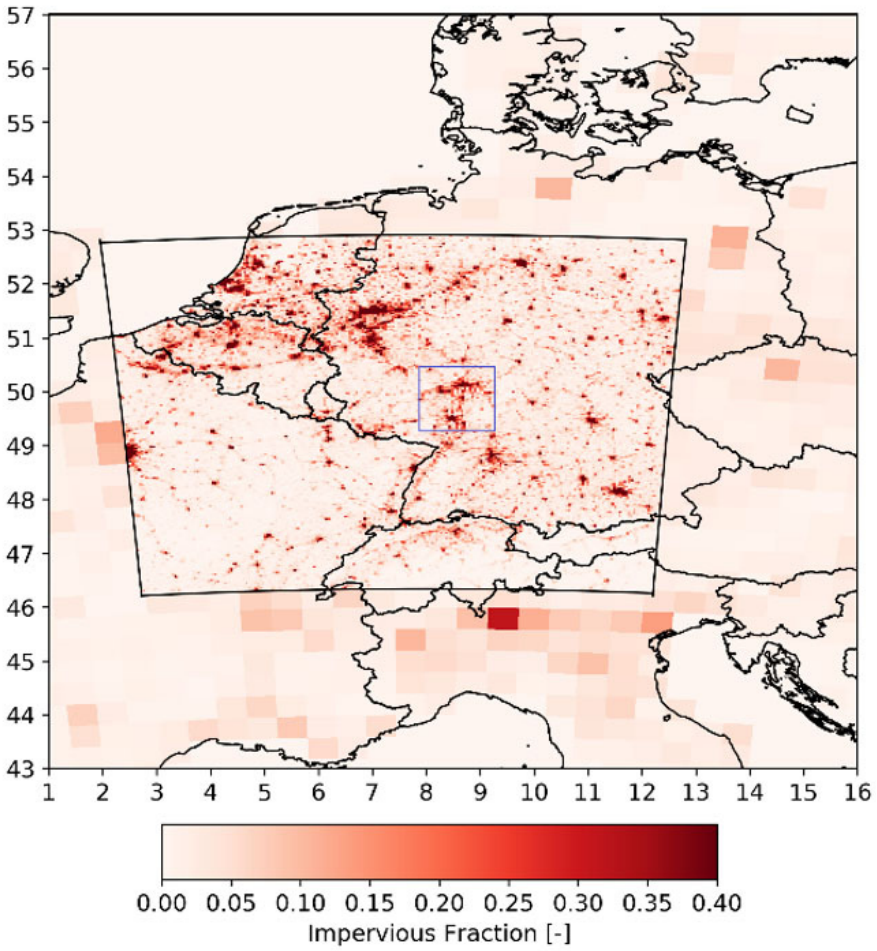

Figure 3. MECO(n) model domain CM40 (40 km) and CM3 (2.8 km) embedded. Colour shading indicates impervious surface area fraction per grid cell.

Focusing on an extreme climate scenario, rather than a full 30-year climate run, this study analyzes 10 days in July 2018 (1.7.-10.7.2018) centred around the metropolitan area Rhine-Main in Germany, with its main cities Frankfurt, Mainz, Mannheim and Heidelberg. In order to assess the model sensitivity we compare a default configuration (BASE) with TERRA_URB and a version with TERRA_URB switched off (NO_URB) with observations from satellite and urban background stations. Urban parameters have been set according to Wouters et al. (2015). Compared to MODIS TERRA land surface temperature (LST) (for 1 July 2018 21:15 UTC), we find a bias reduction for mean surface temperature averaged over the urban grid cells within the vicinity of the borders of the metropolitan area Rhine Main. Hence, BASE underestimates MODIS LST by -0.5 K and NO_URB by -1.4 K respectively. Averaged over 6 selected urban areas and model period, 2-m

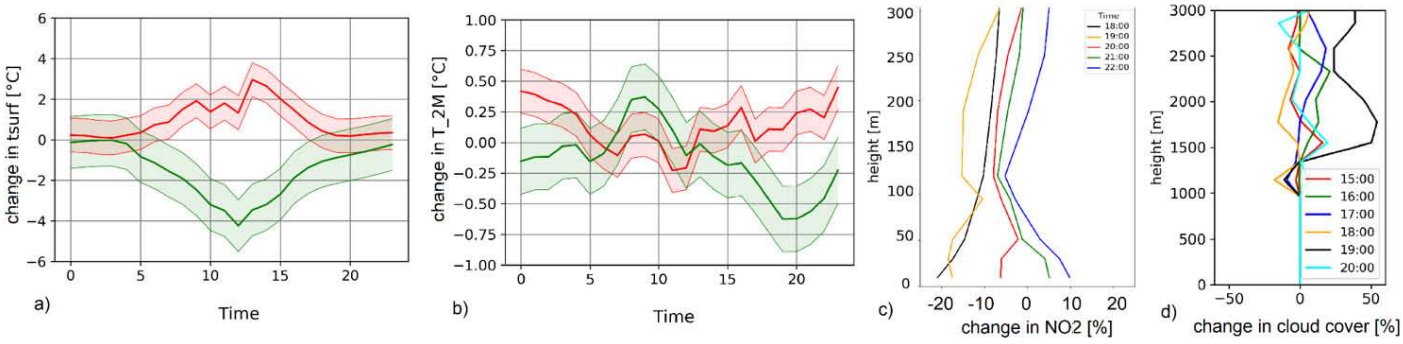

Figure 4: Diurnal difference ISA_plus-BASE (red) and ISA_minus-BASE (green) averaged over model period and urban area as marked in Figure 3 for (a) surface temperature and (b) air temperature. Relative change ISA_plus-BASE in (c) NO_2 concentration and (d) cloud fraction averaged over the urban area.

air temperature bias is reduced from -1.6 K (NO_URB) to -0.8 K (BASE). For gaseous pollutants such as NO_2, bias reduction is mainly found for the 95th percentile of concentrations (traffic peaks in the morning and evening), with a relative bias of +31% (NO_URB) and +23% (BASE). Using data from a passive microwave radiometer in the urban centre, we found a noticeable effect of the urban canopy on air temperature up to a height of approximately 120 above roof level. Detailed results can be found in Fallmann et al. (2021).

The existing model configuration allows for case study experiments of two scenarios of urban development, a re-densification of the urban centre or a push towards the close vicinity, symbolizing an urban sprawl. The latter scenario necessarily has to happen at the cost of natural land in the vicinity of the city borders. Both experiments are controlled via the variables 'ISA' and 'URBAN', representing the fraction of impervious surface and the fraction of urban classified area in a 3x3 km grid cell. For highly impervious urban grid cells (ISA>0.4), ISA_plus considers an increase of impervious surface area fraction per grid cell by 50%, which is equivalent to a 50% decrease of natural land cover in the same cell. ISA_minus considers a decentralization of urban space with an increase in the closest rural surrounding at the simultaneous decrease in the urban centre. The experiment is realized, decreasing the impervious fraction in the core urban grid cells by 30% and increasing the impervious fraction by 80% for the grid cells in close vicinity where ISA is in the range of [0.1,0.3] in the BASE simulation.

Considering the relatively coarse resolution within an urban context, the model results however allow for following first and second order conclusions.

1st order:

• City-wide densification of urban areas results in an increase of surface temperature. This aspect is most pronounced in the daytime. Equivalent temperature reduction is simulated when impervious surface is replaced by vegetation (Figure 4a)

2nd order

• 2-m air temperature is increased for denser – and decreased for 'greener' – grid cells. There is an exemption however in the morning hours, when flat incoming radiation can penetrate deeper into the urban canopy due to increased sky view factor in ISA_minus. For about two hours, we find a relative increase of air temperature compared to BASE, which is not seen in ISA_plus (4b)

• Using the urban heat island intensity does not seem to be a proper indicator for evaluating the mitigation potential of the selected measures, as model results indicate the rate of change in urban 2-m temperature being larger than the change in UHI intensity (see also Martilli et al. 2020)

• Increased mixing over warmer urban surfaces in ISA_plus reduces the near surface NO_2 concentration by up to 20%. This assumption however is not true at nighttime hours, when a denser urban canopy blocks natural ventilation, once convective mixing is dying back. Surface levels of NO_2 increase by up to 10% (4c - blue, green)

• Increased convection from a warmer surface into the urban boundary layer triggers the formation of shallow clouds over the denser area (4d). This is well in line with other studies e.g. Theeuwes et al. (2019)

Referring back to the beginning, these model studies could help to get a first impression of potential (unwanted) consequences, which can succeed a specific measure to reduce urban heat levels. Aside from that, they can assist coordinated modelling exercises, such as Cordex FPS URB-RCC as mentioned above.

Linking results of these kinds of models to microscale modelling systems such as ENVI-met, either

via direct coupling or using selected modules only, envisage the transfer to the applied scale considering e.g. street levels. Simon et al (2019), who analyzed the impact of certain tree species on local air quality, have done the latter. Combining MECO(n) and ENVI-met, they found certain tree species to emit a large amount of biogenic volatile organic compounds (BVOCs), which accelerate near surface ozone formation in selected street canyons due to both high temperatures and the presence of vehicle emissions (NO_2).

First steps towards a holistic street-scale and building-resolving urban climate model covering spatial scales from metres to many kilometres and temporal scales from seconds to years have recently been made in Germany (Scherer et al. 2019; Maronga et al. 2019). This microscale model, PALM4U, can be coupled to mesoscale models, such as COSMO or WRF and hence can be used for simulating the impact of realistic weather events on the city at the street-scale (Kadasch et al. 2020; Lin et al. 2020; Resler et al. 2020). Also including air chemistry, such a model can simulate the interactions between buildings and the atmospheric flow, the urban radiation and heat budget, and the urban air quality (Khan et al. 2021).

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Fourth IAUC Webinar – Local Climate Zones

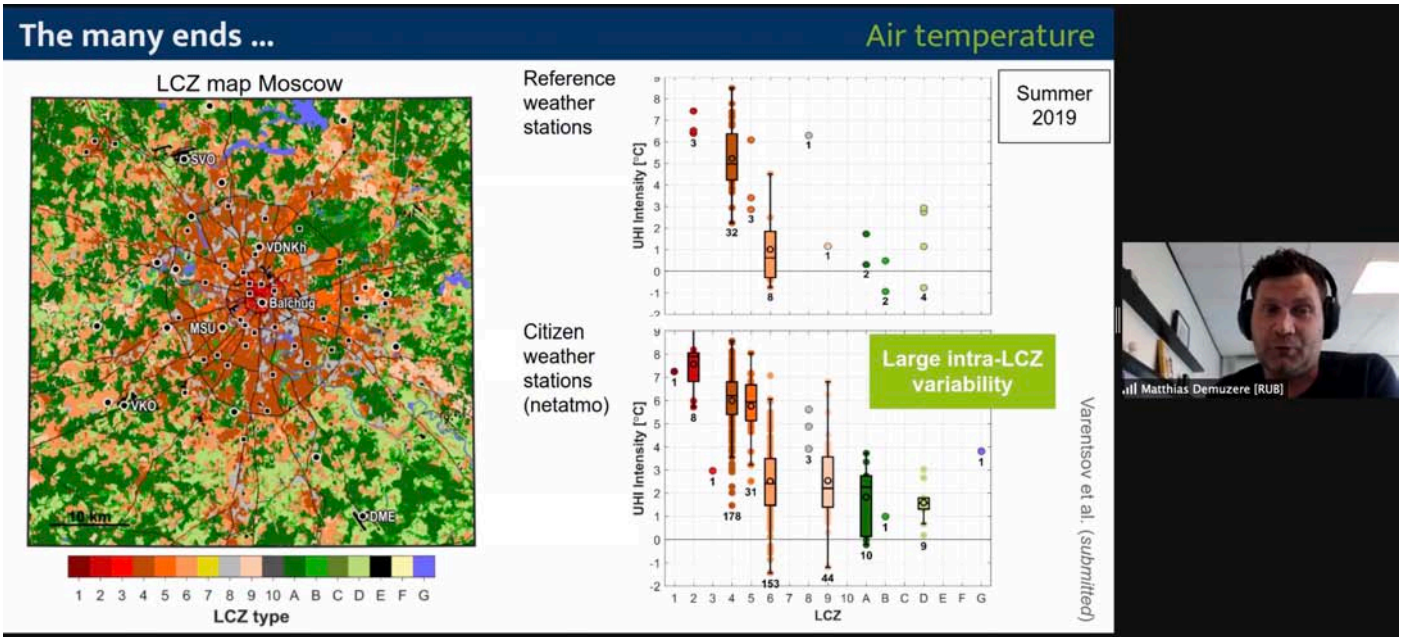
The International Association for Urban Climate hosted its fourth IAUC webinar on May 27, 2021. A discussion with world experts was held on past, current, and future research related to **Local Climate Zones** (LCZs).

Nowadays, the LCZ classification system is used in many studies, ranging from measurement site classification, urban planning, to numerical weather prediction.

In this webinar the following presenters explored how the LCZ's came into being and how they can be used.

- **Dr Iain Stewart** (University of Toronto, Canada) "Personal reflections on the LCZ classification system"
- **Dr Matthias Demuzere** (Ruhr University in Bochum, Germany) "LCZ mapping, a means to many ends"

The next IAUC Webinar will be on September 8th, 2021, 1300 UTC on the theme: **Thermal remote sensing of urban climates**. Speakers will include Prof. **James Voogt** (University of Western Ontario) and Prof. **Benjamin Bechtel** (Ruhr-University Bochum).



Pioneering urban meteorologist is the first female recipient of the Symons Gold Medal

Professor Sue Grimmond

Professor **Sue Grimmond** has become the first female recipient of the Royal Meteorological Society's prestigious Symons Gold Medal.

The Symons Gold Medal is awarded every two years to recognise notable work in connection with meteorological science. The medal was established in 1901 in memory of British meteorologist George James Symons FRS, who founded the British Rainfall Organisation. Previous recipients include Sir William Napier Shaw, Tor Bergeron and Sir John Houghton.

Professor Grimmond's nomination recognises her research excellence in understanding urban climates, her outstanding contribution to improving the environment in cities around the world, and the selfless fostering of young researchers. Her long-term observations and unique datasets have had a significant impact on weather and climate predictions and understanding the effects of air pollution, which has influenced long-term urban planning and policy. Through her work with leading organisations such as the World Meteorological Organization, Met Office and International Association for Urban Climate, she has ensured that cutting edge science can be translated into operational services for the built environment.

Originally from New Zealand, Professor Grimmond's expert advice is respected across the globe and she has served on numerous advisory boards and steering committees. Through her curiosity and enthusiasm for environmental sciences, she is a mentor for many young urban climate researchers who have gone on to hold academic, research, and leadership positions in major research organisations and universities around the world.

Professor Grimmond said:

"I am very honoured to receive the 2020 Symons Gold Medal. Almost exactly two hundred years ago, Luke Howard wrote about the differences in air temperature observed in and around London. His seminal book, 'The Climate of London', is widely cited as founding the field of urban climatology. Urban climatology is now a vibrant field, addressing pressing scientific issues with profound implications for human health and wellbeing and sustainable global futures.

… My research, both in measurement and modelling, would not have been possible without all those I have had the privilege to work with – undergraduate and postgraduate students, post-docs, technicians, administrative support staff, academics, and research colleagues in multiple cities around the world. To all of them, to those that have funded and enabled this work, to my family, and to the Royal Meteorological Society for recognising urban climatology with this award, thank you."

The Symons Gold Medal is just one of the Awards and Prizes for 2020 announced by the Royal Meteorological Society (RMetS) to recognise people and teams who have made exceptional contributions to weather, climate and associated disciplines.

This year's awards received some outstanding entries across the international community, with some strong female recipients and pioneering climate scientists. As with last year's winners, it will sadly not be possible to have a physical presentation ceremony due to the pandemic. However, RMetS is highlighting each of the 19 category winners on their website, outlining their achievements alongside a winner's acceptance message. They were also showcased on social media channels throughout the week of 7 June 2021.

Thank you to all members, colleagues and associates who nominated individuals for the awards this year.

You can read about the Awards and winners for 2020, along with the citations and acceptance messages, on the Society's website at rmets.org/awards2020.

Source: https://www.rmets.org/news/pioneering-urban-meteorologist-first-female-recipient-symons-gold-medal

Recent Urban Climate Publications

2020

Apreda C, Reder A, Mercogliano P (2020) Urban morphology parameterization for assessing the effects of housing blocks layouts on air temperature in the Euro-Mediterranean context. *Energy and Buildings* 223 110171.

Boccalatte A, Fossa M, Gaillard L, Menezo C (2020) Microclimate and urban morphology effects on building energy demand in different European cities. *Energy and Buildings* 224 110129.

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De Jaeger I, Reynders G, Callebaut C, Saelens D (2020) A building clustering approach for urban energy simulations. *Energy and Buildings* 208 109671.

Desert A, Naboni E, Garcia D (2020) The spatial comfort and thermal delight of outdoor misting installations in hot and humid extreme environments. *Energy and Buildings* 224 110202.

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Evola G, Costanzo V, Magrì C, Margani G, Marletta L, Naboni E (2020) A novel comprehensive workflow for modelling outdoor thermal comfort and energy demand in urban canyons: Results and critical issues. *Energy and Buildings* 216 109946.

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Leng H, Chen X, Ma Y, Wong NH, Ming T (2020) Urban mor-

In this edition is a list of publications that have mainly come out between **February and May 2021**. If you believe your articles are missing, please send your references to the email address below with a header "IAUC publications" and the following format: Author, Title, Journal, Year, Volume, Issue, Pages, Dates, Keywords, URL, and Abstract. Important: do so **in a .bib format.**

As of this month, we would like to warmly welcome Ahmed Eldesoky (Università Iuav di Venezia, Italy), who joined the committee in April 2021.

Note that we are always looking for (young) researchers to join and contribute to the Committee. If you are interested to join or would like to receive more information, please let me know via the email address below.

Happy reading,

Chenghao Wang

Chair IAUC Bibliography Committee

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Upcoming Conferences...

The information in this list is current as of the publication date of the newsletter, but readers should check for updated information online in the event of schedule changes due to the COVID-19 pandemic.

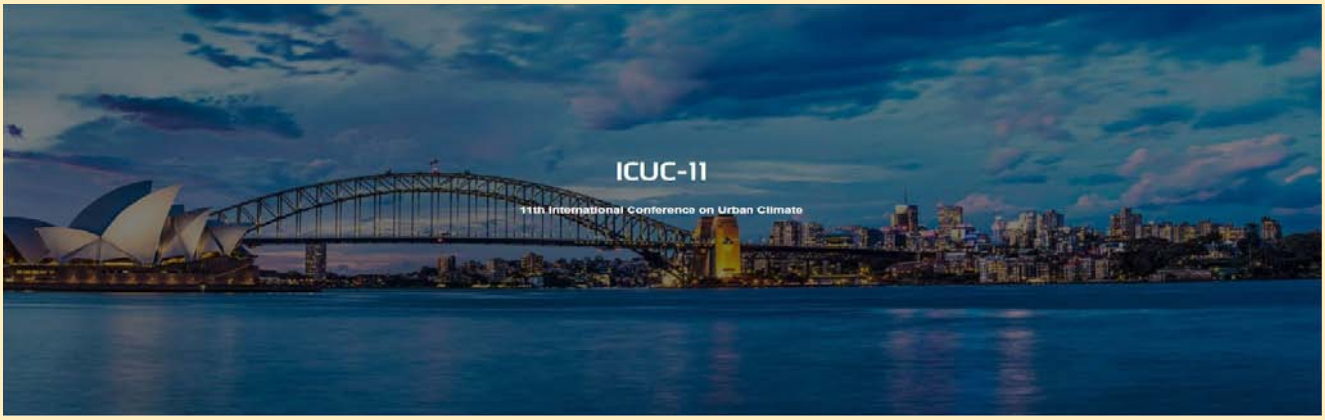
BOCHUM URBAN CLIMATE SUMMER SCHOOL: URBAN CLIMATE INFORMATICS
Bochum, Germany • September 13-17, 2021
https://www.climate.rub.de/bucss

AMERICAN GEOPHYSICAL UNION FALL MEETING
New Orleans, USA and Online • December 13-17, 2021
https://www.agu.org/Fall-Meeting/
Abstract deadline: August 4, 2021

102ND AMERICAN METEOROLOGICAL SOCIETY ANNUAL MEETING & 22ND JOINT CONFERENCE ON THE APPLICATIONS OF AIR POLLUTION METEOROLOGY, Session on "Urban Air Pollution under a Changing Climate and Changing Emission Profiles"
Houston, USA • January 23-27, 2022
Aiming to share experiences and propose new paths to investigate the current physical and chemical factors preventing air quality improvements in urban areas, we invite to the IAUC community to submit abstracts of studies based on measurements or numerical simulations trying to answer how the urban expansion experienced in recent years has affected the urban micrometeorology and air quality under a changing climate. Abstract deadline: August 3, 2021
https://annual.ametsoc.org/index.cfm/2022/call-for-papers/

36TH PLEA CONFERENCE ON SUSTAINABLE ARCHITECTURE AND URBAN DESIGN
Santiago, Chile • November 23-25, 2022
https://www.plea2022.org/
Abstract deadline: August 30, 2021

INTERNATIONAL CONFERENCE ON URBAN CLIMATE (ICUC-11)
Sydney, Australia • August 2023
https://conference.unsw.edu.au/en/icuc11



Calls for Papers...

"URBAN MICROCLIMATE AND AIR QUALITY AS DRIVERS OF URBAN DESIGN"

Special Issue of Sustainability

This Special Issue aims to collect works that improve on our knowledge and enrich our common understanding of how urban design can positively or negatively affect the quality of the urban environment. The focus is on outdoor thermal comfort and air quality, with emphasis placed on studies showing how research can be integrated into the design process and how policies can enhance the environmental effectiveness of concrete urban interventions.

Guest Editors: Luciano Massetti & David Pearlmutter

Updated Deadline: September 21, 2021
https://www.mdpi.com/journal/sustainability/special_issues/Urban_Microclimate_Air_Quality

"EFFECTS OF THE COVID-19 PANDEMIC ON THE USE AND PERCEPTION OF URBAN GREEN SPACE"

Special issue of Land

The aim of this Special Issue is to collect studies on the access and perception of green spaces (urban and non-urban) and the natural landscape in general during the time of pandemic, in order to provide governance actors with scientific evidence on which they can base policies for facing and coexisting with dramatic situations such as a pandemic—and for increasing the long-term resilience of the urban and rural landscape.

Guest Editors: Francesca Ugolini & David Pearlmutter

Submission deadline: 30 September 2021
https://www.mdpi.com/journal/land/special_issues/pandemic_ugs

Call for nominations of two IAUC Board members

We are calling for nominations for **two new members of the Board of the International Association for Urban Climate** (IAUC) for the term 2022 – 2025. This is to replace Benjamin Bechtel (Ruhr-University Bochum) and Chao Ren (The University of Hong Kong) whose terms on the Board expire in 2021. The Board is seeking new members eager to play an active role in the development of the society and who reflect the diversity of our membership. The deadline for nominations is **August 31 2021, 11:59 pm** (UTC).

We thank Benjamin Bechtel and Chao Ren for their commitment and contributions to IAUC while serving on the Board.

IAUC is committed to and promotes inclusive and equitable participation of a diverse community in its membership. Based on our diversity statement, we strongly encourage nomination of candidates who diversify the board in terms of fields of study, geographical location, gender, etc. We further encourage nominations from young scholars, including graduate students and postdoctoral fellows.

The nomination process will be conducted as described below.

(1) If you are nominating another person, proceed as follows:

1. Email the IAUC Secretary indicating the name and affiliation of your nominee.

2. Also name two other persons who support the nomination. They must also email the Secretary indicating their support of the nominee within the nomination period.

3. The nominee should also email the Secretary indicating their willingness to stand. The nominee should also provide their affiliation, country and supply a short statement containing a reference to their link to IAUC and urban climate which will be shared with the membership at the election (if there is one). That statement must not exceed 250 words, a limit that will be rigorously applied (longer statements will be truncated after the 250th word).

(2) If you are nominating yourself, proceed as follows:

1. Email the IAUC Secretary indicating that you are nominating yourself.

2. Also name three other persons who support your nomination. They must also email the Secretary indicating their support for your nomination within the nomination period.

3. You should also provide your affiliation and country. Please also supply a short statement that will be shared with the membership at the election. That statement must not exceed 250 words, a limit that will be rigorously applied (longer statements will be truncated after the 250th word).

Also please note the following:

- All nominees, nominators and persons supporting a nomination must be members of the IAUC as of this moment. New members will not be eligible to vote or be nominated in this round of elections.
- All required information, as outlined in (1) or (2) above, must be received by the Secretary by **Tuesday, August 31 2021, 11:59 pm** (UTC).
- E-mails should be sent to the Secretary at email address andreas.christen [at] meteo.uni-freiburg.de. Receipt of nomination e-mails will be confirmed. No other method of communication will be accepted.
- It is the responsibility of the nominator and/or nominee to ensure that all necessary e-mails are sent to the Secretary within the nomination period. No reminders will be sent in the case of incomplete nominations.
- If more than two nominations are received, an election will be conducted via email and the web, with the two candidates receiving the highest vote counts being deemed to have been elected. If an election is necessary, the exact procedure will be described in an email to the current membership.

Membership statistics and diversity of the IAUC

As of 30 June 2021, the IAUC had a total of 1272 verified members from 79 nations. Table 1 shows all countries with more than 10 IAUC members in decreasing order. Most of our members are based in the Unites States (13.4%), followed by India (8.8%), the UK (7.1%), China (6.9%), Japan (6.7%), Germany (6.4%) and Brazil (4.5%). Note that the country of work, not the nationality of the researchers are reflected in our statistics.

Table 1: Countries with more than ten active IAUC members as of June 30, 2021.

United States	171	Italy	30	Spain	13
India	112	Sweden	21	Finland	12
United Kingdom	90	Canada	18	Israel	12
China	88	Nigeria	18	Hungary	11
Japan	85	The Netherlands	17	Iran	11
Germany	82	South Korea	16	Malaysia	11
Brazil	57	Switzerland	16	Turkey	11
Australia	45	Greece	15	Austria	10
France	43	Portugal	15	Belgium	10
Singapore	32	Ireland	14	50 others	186

Figure 1 shows our membership share by world regions (left) and their representation on the IAUC Board (right). The proportionally higher number of Board members from North America and Oceania is in part due to the fact that hosts of the last ICUC-10 in New York and of the upcoming ICUC-11 in Sydney have been appointed to the Board according to our Terms. For the two upcoming vacant board seats for the 2022 – 2025 period, we encourage in particular nominations from to-date not or underrepresented regions, ideally that also diversify the board in terms of fields of study, gender, etc.

32% of all IAUC members indicated that they were students at the time of sign-up (undergraduate, masters or PhD students), 61% indicated they were not students, 7% did not answer the question. There is no specific data available on age, so we cannot identify the share of early career to established researchers nor can we track whether members that indicated "student" at sign-up are no longer students. In terms of gender, 34% of our members selected female, 61% male, and 5% diverse / provided no gender information in their profile. On the IAUC Board, 59% are male, and 41% female.

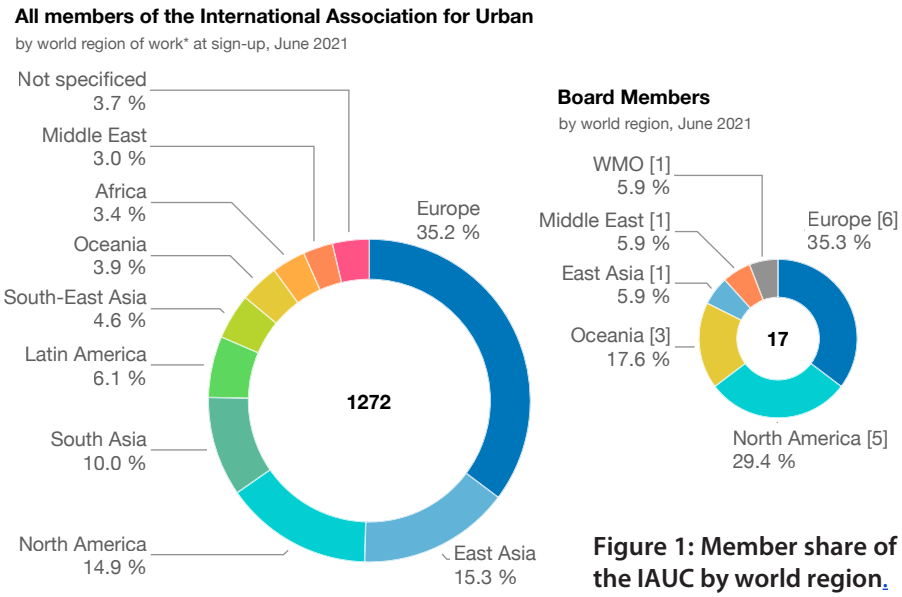


Figure 1: Member share of the IAUC by world region.

You become an IAUC member by creating an account under www.urban-climate.org. The membership steadily increased over the last years from 516 validated users by the end of 2015 (year of ICUC-9 in Toulouse), to 799 in 2018 (year of ICUC-10 in New York) to 1272 by June 30, 2021. Some numbers reported before 2018 may have included automatic robot sign-ups that have been removed. In order to prevent robot-sign-ups, all membership applications are now manually validated.

July 11, 2021 – Andreas Christen, IAUC Secretary

IAUC Board member and Arizona State University professor Ariane Middel was featured in *National Geographic* magazine discussing her heat research and work with MaRTy, described in the article as "a biometeorological robot that records temperature, solar radiation, wind speed, and humidity." The full article can be found at: https://www.nationalgeographic.com/magazine/article/too-hot-to-live-millions-worldwide-will-face-unbearable-temperatures-feature

Would you like your work featured in *Urban Climate News*?

If you would like to write an article for the IAUC newsletter, please contact the Projects Editor **Helen Ward** (helen.ward@uibk.ac.at). Our Project articles usually provide a short summary of recent work and can be a good way to advertise a recent journal publication to a wide audience, perhaps including additional information, figures or photographs. Our Feature articles offer the opportunity to highlight results from a particular project or collection of projects, often bringing together findings from a series of complementary publications in a concise overview. We are always happy to receive suggestions for future issues of the newsletter – please get in touch!

IAUC Board Members & Terms

- **President**: Nigel Tapper (Monash University, Australia), 2018-22
- **Secretary**: Andreas Christen (Albert-Ludwigs Universität Freiburg, Germany), 2018-22
- **Treasurer**: Ariane Middel (Arizona State University, USA), 2019-22
- Alexander Baklanov (WMO, Switzerland), *WMO Representative*, 2018-22**
- Benjamin Bechtel (Ruhr-University Bochum, Germany), 2017-21
- Matthias Demuzere (Ruhr-University Bochum, Germany and CEO and Founder Kode), 2018-22
- Jorge Gonzalez (CUNY, USA): *ICUC10 Local Organizer*, 2016-21
- Melissa Hart (University of New South Wales, Australia), 2020-24
- Simone Kotthaus (Institut Pierre Simon Laplace, France), 2020-24
- Dev Niyogi (Purdue University, USA): *ICUC10 Local Organizer*, 2016-21
- Negin Nazarian (University of New South Wales, Australia): *ICUC-11 Local Organizer,* 2020-24
- David Pearlmutter (Ben-Gurion University, Israel), *Newsletter Editor*, 2008-*
- Chao Ren (University of Hong Kong, Hong Kong), 2017-21
- David Sailor (Arizona State University, USA), *Past Secretary* 2014-2018*
- James Voogt (University of Western Ontario, Canada), *Past President*: 2014-2018*
- Helen Ward (University of Innsbruck, Austria), 2019-22

** non-voting, ** non-voting appointed member*

IAUC Committee Chairs

- **Editor, IAUC Newsletter**: David Pearlmutter
  - News Editor: Dragan Milosevic
  - Urban Projects Editor: Helen Ward
  - Conferences Editor: Joe McFadden
- **Bibliography Committee**: Chenghao Wang
- **Teaching Resources**: Gerald Mills
- **Awards Committee**: Helen Ward

Urban Climate News – The Quarterly Newsletter of the International Association for Urban Climate

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Conferences: Joe McFadden
mcfadden@ucsb.edu

The next edition of ***Urban Climate News*** will appear in late September. Contributions for the upcoming issue are welcome, and should be submitted by August 31, 2021 to the relevant editor.

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

Bibliography: Chenghao Wang and BibCom members
chenghao.wang@stanford.edu