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From the IAUC President

As I write this column the solstice now is three days past, so we in the Southern Hemisphere mid-latitudes look forward to gradually lengthening days, while many of you in the Northern Hemisphere begin to look forward to a break from work and your summer holidays. This week I depart for field work in Southern Africa where I am helping colleagues with the task of establishing an eddy co-variance flux tower in Chobe National Park, Botswana. I'm told no security issues for this equipment – guarded by lions! From there it will be to Nepal, for the Second AR6 WG2 (Impacts, Adaptation and Vulnerability) Lead Authors Meeting. It is great to see the commitment to climate impacts and adaptation in cities, with two of the WG2 chapters having an urban focus and most of the regional chapters having dedicated urban sections.

Importantly for this issue of our Newsletter, I want to alert members to the new sponsorship policy of the IAUC that was approved by the Board in April. While the IAUC does not levy membership fees, we have accumulated some funds, mainly as a result of several highly successful conferences. The Board wishes to use those funds wisely in support of relevant urban climate-related events/activities. The maximum amount of sponsorship funding for any one event will be 2500 EUR. Details of our sponsorship policy and procedures for applying can be found at https://www.urban-climate.org/awards/sponsorships-by-the-iauc/ under the **Awards** tab of the IAUC website. The first sponsorship under the new policy will be of the Bucharest Urban Climate Summer School (BUCSS) 2019, running from 2 - 6 September, which aims to provide structured information and skill-building capabilities related to urban climate monitoring, modelling, ecology and bio-meteorology for doctoral students and post-doctoral researchers.

Once again, this IAUC Newsletter is full of material that is both interesting and useful, contributed by members and brought together by an excellent editorial team. I hope that you will enjoy reading the reports and feature articles on new research directions as much as I have.

– Nigel Tapper,
IAUC President
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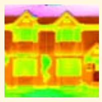

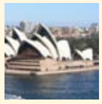

Heatwave grips Europe

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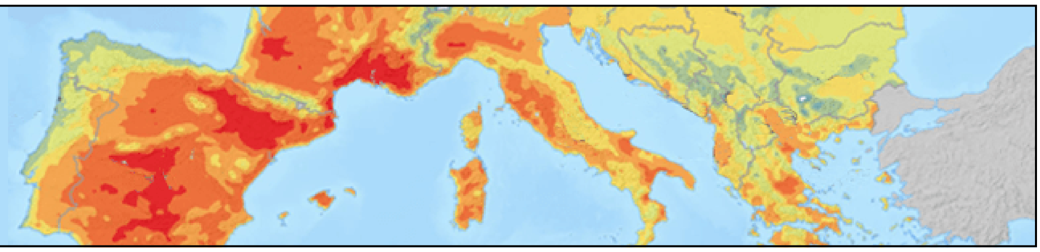


How can city dwellers help with climate change? Buy less stuff.

The things we buy, eat, and use have a big impact on the climate—so it's time to learn to consume a whole lot less

June 2019 — Cities can play a major role in the global effort to curb climate change, a new report says – and a major step they can take is helping their inhabitants consume a whole lot less stuff by making changes in the way cities are run.

Even the most forward-thinking cities have a long way to go to neutralize their carbon emissions, the report says. That's partly because for years, cities have been doing carbon math wrong, adding up only the carbon costs that occur within city limits. But much of city dwellers' climate impact actually comes from the things they eat, use, or buy that originate far outside the city – from food to clothes to electronics and more.

To keep emissions in check, the report suggests, cities should aim to trim their carbon emissions by 50 percent in the next 11 years, and then by a total of 80 percent by 2050. And because, as the researchers found, a hefty portion of those emissions can be traced back to consumer goods, food, and energy produced outside city limits, one of the best things cities can do is help their residents pull back on consumption.

That's a big challenge but also a big opportunity, says Mark Watts, the lead author of the report and executive director of the C40 city network, an international network of cities committed to addressing climate issues.

"Halving emissions in the next 10 years – that's what needs to happen, and cities see that," he says. "Now, it's time to move onto the next stage, because we're already in a climate emergency, and figure out how does government have to change in order to hit that target?"

The true cost — Today, some 55 percent of all humans live in urban areas, where they account for about 70 percent of all annual carbon emissions. In the future, demographers predict, even more of Earth's population will likely congregate in cities, hitting about 70 percent by 2050. If nothing changes, carbon emissions from cities is on track to almost double by 2050, the report says. And as cities' carbon emissions go up, so do the planet's.

For years, many cities sold themselves as bastions of efficient, low-carbon living. To some extent, that's true. Densely packed neighborhoods, good public transit systems, and green buildings all help to keep their inhabitants' carbon impacts in check.

But city dwellers – especially those in wealthy cities in developed countries – tend to buy more, fly more, and use a lot more energy than people who live in rural areas. All the things they buy – from the clothes to the food to the electronics and more – have their own complicated and often substantial planetary costs that aren't always immediately obvious.

Cities around the world, like New York, can be part of the solution to the climate crisis. A new report suggests that part of the solution is for city dwellers to consume less.

A t-shirt, for example, might get made of cotton grown in India; be manufactured in China using coal energy to power the sewing machines; packed up in yet another country with oil-based plastic packaging; shipped across oceans in fossil-fuel-fired container ships; and delivered by diesel truck to the store in which they're sold.

A real assessment of someone's carbon footprint takes the carbon footprint of these "consumed" products into account. And when city dwellers' consumption habits are added up, it turns out that urbanites have a carbon toll about 60 percent higher than previous calculations suggested. City dwellers in 96 of the world's biggest cities alone make up a hefty 10 percent of all global carbon emissions each year.

"People tend to forget that most of the products we consume and our personal carbon footprints are imported from elsewhere to give us a great life in the modern cities we live in," says Jeroen van der Heijden, an expert on climate and government at Victoria University in New Zealand.

"If we truly want to make a meaningful contribution to cutting carbon emissions, we must do much better than building green houses. We have to rethink how we live and what we consume."

The road ahead is paved with less stuff — National governments and international communities have struggled to take meaningful steps toward addressing carbon emissions. In many cases, cities have stepped in to fill that role, developing ambitious climate action plans that seek to curb emissions.

The C40 network cities have collectively pledged to limit their carbon emissions to levels that will help keep the planet from warming more than 1.5 degrees Celsius (2.7 degrees Fahrenheit), the upper limit of warming the

Intergovernmental Panel on Climate Change recently warned against exceeding.

To get there, the report suggests cities can nudge behaviors in six key areas: food, construction and building, clothing, vehicles and transportation, aviation, and consumer electronics from washing machines to computers to phones.

For example, cities are often already major food purchasers; they buy for schools, city organizations, and more. That means that they can influence emissions by changing their buying practices.

New York schools are starting a "Meatless Mondays" program in 2019 that the city says will reduce its citizens' carbon footprint and make kids healthier. Other cities, like Milan, have put programs in place to help local agriculture thrive, reducing the carbon costs from transporting foods long distances.

It turns out that city dwellers also buy a lot of clothes, and the carbon impact of those jeans and sweaters piles up. If people bought only eight new clothing items each year, the report says, they could cut that impact in half.

Cities can also take action to reduce the amount of energy their denizens use by doing things like tweaking building codes to encourage retrofits of buildings rather than new construction; prioritizing low-carbon transportation options that keep people from buying new cars or motorbikes; and setting up programs that help people extend the lifetime of their electronics and appliances rather than constantly replacing them. Every intervention that helps people buy less new stuff adds up, pushing a city's emissions down.

The transformations have to happen in a way that cuts from the individual consumer all the way up to the big players like the utilities who serve a city, says Patricia Romero-Lankao, an expert on cities and the environment at the National Renewable Energy Laboratory in Colorado.

"Yes indeed we need to change the way we use energy, heat houses, think of our sense of comfort—which is a cultural thing—buy clothes, all that," she says. "But we really also need to work with the utilities, the corporations, the big players whose products we're using."

But the biggest transformation is about a mindset, says Watts, of C40. "We're talking about a really radical change in consumption patterns," he says, moving toward a world where there is much less buying, less building, and less waste. "But the benefits really are huge. Avoiding the climate crisis really does mean building a much better life."

—BY ALEJANDRA BORUNDA. *Source*: https://www.nationalgeographic.com/environment/2019/06/cities-climate-impact-consume-less/

Freak summer hailstorm buries Mexico's Guadalajara city in 1.5 m of ice

Governor blames climate change for extreme weather

June 2019 — A freak summer hailstorm has hit one of Mexico's most populous cities, burying cars and covering the streets with ice up to 1.5 metres thick.

More than 200 homes and businesses were damaged in Guadalajara, Jalisco, and at least 50 vehicles were reportedly swept away by the storm, according to local newspaper El Informador. Army and emergency services personnel were drafted in to work on clearing the streets overnight and to support citizens who suffered damage to their homes. Although hailstorms have hit the city of more than five million people before, they have rarely been this heavy. Guadalajara had seen temperatures of 30C less than 24 hours before the storm.

Enrique Alfaro Ramírez, Jalisco's governor, suggested that the extreme weather had been caused by climate change after evaluating the damage yesterday. "I witnessed scenes that I had never seen before: the hail more than a metre high, and then we ask ourselves if climate change is real," he wrote on Twitter. Mr Ramírez added there were no recorded injuries or deaths from the incident.While children enjoyed the freak storm and hurled ice balls at each other, Civil Protection personnel and soldiers were brought in with heavy machinery to clear the roads.

Vehicles buried in hail are seen in the streets of Guadalajara. *Source:* www. independent.co.uk

Early this morning, more extreme weather was predicted off Mexico's southern coast, as the US National Hurricane Centre said a newly formed tropical storm had gained strength. The organisation said it was expected to reach hurricane strength but was unlikely to threaten land.

Source: https://www.independent.co.uk/news/world/americas/mexico-hail-storm-today-ice-weather-guadalajara-climate-change-a8982091.html

No Drips, No Drops: A City Of 10 Million Is Running Out Of Water

June 2019 — In India's sixth-largest city, lines for water snake around city blocks, restaurants are turning away customers and a man was killed in a brawl over water. Chennai, with a population of almost 10 million, is nearly out of water.

In much of India, municipal water, drawn from reservoirs or groundwater, typically runs for only a couple of hours each day. That's the norm year-round. The affluent fill tanks on their roofs; the poor fill jerrycans and buckets.

But in Chennai this summer, the water is barely flowing at all. The government has dispatched water tankers to residential areas to fill the void. Still, some people in especially hard-hit areas have vacated their homes and moved in with relatives or friends.

Satellite images of the city's largest reservoir, Puzhal Lake, taken one year apart, reveal a chilling picture. Since June 2018, the lake has shrunk significantly. Puzhal is one of the four rain-fed reservoirs that supply water to most parts of Chennai.

Another picture shows the parched bed of Chembarambakkam Lake, another major reservoir. Its cracked surface is covered with dead fish.

"It's shocking but not surprising," says Tarun Gopalakrishnan, a climate change expert at the New Delhi-based Centre for Science and Environment. He says the crisis in Chennai is the result of "a toxic mix of bad governance and climate change."

Rains have become more erratic because of climate change. That, coupled with a delayed arrival of the seasonal monsoon, which usually comes in June, has all but dried up the city's water supply. Government data show that the storage level in the four lakes combined is less than one-hundredth of what it was at this time last year. A severe heat wave gripping most of India, including Chennai, has aggravated conditions.

What's happening in Chennai could easily happen anywhere across India, Gopalakrishnan says.

A 2018 government think tank report projected that 21 major Indian cities, including the capital, New Delhi, and India's IT hub, Bengaluru, will "run out of groundwater as soon as 2020." Approximately 100 million people would be affected, the report predicts.

In Chennai, residents are scrambling to conserve water.

"We stopped using showers for bathing. We use buckets so that we can ration the amount of water," says 33-year-old university professor Nivash Shanmugkam. His family also avoids using a washing machine for its laundry and washes clothes by hand as much as possible.

Public institutions are suffering. Hospitals and nursing homes are charging more for services to cover the increased cost of water, according to the local press. There are also reports that toilets at schools are dirty due to a lack of water. A scuffle over water turned deadly for a 33-year-old man when he tried to stop another man and his sons from siphoning large amounts of water from a public tank this month.

These satellite images from June 15, 2018, (left) and June 15, 2019, show the diminishing size of the Puzhal Lake reservoir in Chennai, India. *Source:* www.npr.org

Businesses and offices have been affected too. Amit Agarwal, a 28-year-old IT professional in Chennai, has been working from home for the past few days because there is no water in the bathrooms in his office. Many tech companies have been advising employees to do the same.

In Chennai's shopping malls, restrooms are operational only on some floors.

The rich can buy additional deliveries of water from private tankers, sometimes at exorbitant rates. Poor people living in slums simply can't afford to pay.

The response of the government of Tamil Nadu, the state whose capital is Chennai, has ranged from downplaying the extent of the crisis to praying to the rain gods.

"There has been a water shortage in several areas due to monsoon deficit. The government is taking several steps," Tamil Nadu Chief Minister Edappadi Palaniswami told reporters on Friday.

Those steps include a special train that will soon begin transporting 10 million liters of water per day – that's about 2.6 million gallons – to Chennai from another part of the state. After initially turning down donations, Tamil Nadu has accepted an offer of aid of 2 million liters of drinking water from a neighboring state, Kerala.

Opposition politicians in Tamil Nadu are staging protests. Dozens of women carrying colorful plastic water pots with slogans written on them gathered in Chennai this week to criticize the government for its handling of the water crisis.

One thing that could have possibly averted this acute water shortage? Rainwater harvesting.

In 2002, the government of Tamil Nadu passed legislation that mandated rainwater-harvesting structures on all buildings, including private homes, in the city. The goal: to capture rainwater and store it for later use. It was a revolutionary idea. When the city got hit with heavy monsoon rains a few years later, rainwater harvesting raised the water table enough to last the city until 2016, says Sekhar Raghavan, director of the Chennai-based nonprofit The Rain Centre.

But the government failed to monitor the rainwater-harvesting structures, which meant a lot of them didn't work properly. "This is a wake-up call for the government and citizens," he says.

Raghavan says he's now getting calls from people asking about how they can properly harvest every drop of rainwater.

Anticipating inadequate rainfall and planning for acute water shortages are further complicated by climate change.

"The fear associated with climate change is not the fear of knowing that everything is going to be worse," says Gopalakrishnan. "It's the fear of not knowing."

While they may not necessarily light ceremonial fires for rain like their elected leaders, Chennai residents will nevertheless be praying for a downpour soon.

Source: https://www.npr.org/sections/goatsandsoda/2019/06/25/734534821/no-drips-no-drops-a-city-of-10-million-is-running-out-of-water?t=1561973937596

Floating cities - fantasy or the future?

April 2019 — Floating cities have long seemed like a utopian pipedream based on little more than fantasy.

But this week the concept appeared to take a step closer to reality through a UN-backed partnership.

UN-Habitat, which works on sustainable urban development, will team up with private firm Oceanix, the Massachusetts Institute of Technology (MIT) and The Explorers Club, a professional society that promotes scientific exploration around the world, to further the idea.

As climate change advances at an alarming rate and huge numbers of people cram into city slums, "floating cities is one of the possible solutions", UN-Habitat's executive director, Maimunah Mohd Sharif, says.

This floating city would be home to 10,000 residents. *Source:* www.bbc.com

How would it work?

Oceanix City, or the world's first sustainable floating city, would essentially be groups of hexagonal platforms – anchored to the seabed – that could each house around 300 people, effectively creating a community for 10,000 residents.

Cages under the city could harvest scallops, kelp, or other forms of seafood.

Marc Collins Chen, the chief executive of Oceanix, said the technology to build large floating infrastructure or housing already exists.

"The biggest question in people's minds is if these cities can actually float," Mr Collins Chen told the BBC.

"There are thousands of such houses in the Netherlands and other communities around the world. It is now a question of scale and creating integrated systems and communities."

Concerns have been raised that floating cities could be perceived as a quick fix to dealing with the dangers of climate change and rising sea levels.

"The caution I have is that sometimes people advance futuristic ideas of this sort as a way of saying climate change isn't so bad because if it happens we'll find a way around it," Michael Gerrard, director of the Sabin Center for Climate Change Law at Columbia University, told the Thomson Reuters Foundation in 2017.

But Mr Collins Chen said Oceanix was working with a "solid team" of experts in waste management, water engineering, marine regeneration and energy efficiency.

The cities could also be a defence against natural disasters, he said.

"Floating cities will be located specifically in sites where they will have sufficient water depth to not be impacted by tsunamis," he said, adding that the platforms could also withstand floods and hurricanes.

Are the plans realistic?

"The main obstacles at this point are psychological and are not technological," Richard Wiese, president of The Explorers Club, told the BBC.

"People psychologically get nervous at the term 'floating city'. I used this term to my wife, and her immediate

As climate change advances at an alarming rate and huge numbers of people cram into city slums, "floating cities" are one of the possible solutions. UN-Habitat, which works on sustainable urban development, will team up with private firm Oceanix, MIT and The Explorers Club to further the idea. *Source:* www.bbc.com

response was not technological but rather visceral, she didn't like the idea of something that could drift away."

To gain the confidence of the general masses and politicians, Mr Wiese said the creation of small extensions to existing cities could be necessary to start with, picking out Hong Kong, New York or Boston as potential testing grounds.

Beyond housing solutions, Mr Wiese said floating hospitals being towed to disaster areas was another idea being floated.

One of the obvious issues facing Oceanix City is that it lacks funding. "[Those] that fund infrastructure tend to be very conservative," said Steve Lewis, founder of Living PlanIT, a group that focuses on new approaches to urban planning and development.

"They tend to invest in things they understand well and then you come along and say you're building a town floating on the ocean and they go 'really?'"

However Mr Lewis, who now focuses on investing in smart cities, pointed to the boom in wind farms over the past 20 years as evidence that attitudes can change.

Although a floating settlement on such a scale would be unprecedented and would throw up plenty of technical challenges, Mr Lewis said the structures would actually be relatively straightforward to put together.

"Proof is in the pudding and we'll see how it actually turns out," he said.

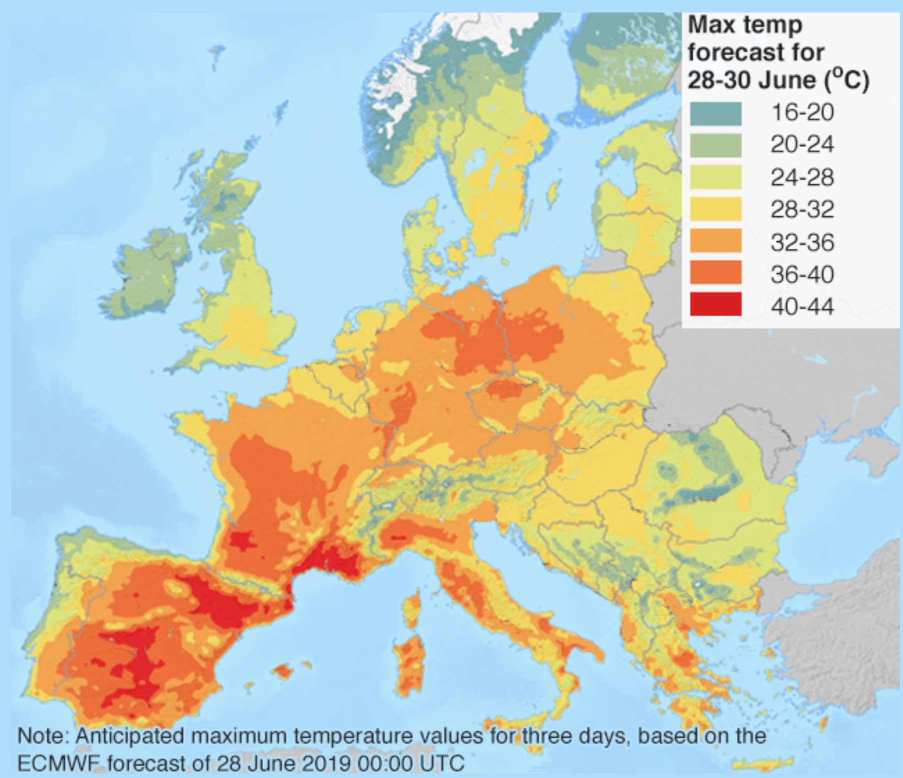
"But I think we need to push the boundaries of what new life looks like in different environments. Even if it doesn't house 10,000 people, I think communities of a few thousand would benefit."

Mr Wiese of The Explorers Club said that selling the idea to investors and the public need not be a "doomsday bunker scenario".

"We need to demonstrate that it is an enjoyable, sustainable and economic advancement that will apply to all portions of the population and not just wealthy enclaves," he said.

"If you look at Apollo 11, you have to remember that there were many small steps to create a moon launch," he added.

Source: https://www.bbc.com/news/world-47827136



Heatwave gripping Europe
Source: EU

The southern town of Carpentras recorded temperatures of 44°C.
***Source*: www.newscientist.com**

France hits highest recorded temperature of 45.1°C

June 28, 2019 — Schools are dousing pupils with water and nursing homes are equipping people with hydration sensors as Europe battles a record-setting heatwave. Several people have died around the continent in incidents authorities are linking to the exceptional weather.

A major wildfire is raging in Spain, sparked after a pile of chicken dung caught fire in the heat.

Several countries have reported record temperatures this week, and France hit its highest temperature on record at 45.1°C in the southern town of Villevieille. Earlier in the day, the southern town of Carpentras recorded temperatures of 44°C, which held the record for a few hours.

The French national weather service activated its highest level heat danger alert for the first time, putting four regions around Marseille and Montpellier in the south of the country under special watch.

About 4000 schools closed because they couldn't ensure safe conditions, and local authorities cancelled many end-of-school-year carnivals.

Some criticised the government for going overboard, but prime minister Edouard Philippe defended the efforts, referencing the 15,000 people who died in a heatwave in 2003.

"This heatwave is exceptional by its intensity and its earliness," he told reporters.

"Measures have been taken for the most vulnerable people. But given the intensity of the heatwave, it's the entire population who must be careful today … both for oneself and for loved ones and neighbours."

Italy put 16 cities under alerts for high temperatures, and civil security services distributed water to tourists visiting famed sites around Rome under a scorching sun.

Heat was blamed for the deaths of two people in Spain, private news agency Europa Press reported. An 80-year-old man collapsed and died in the street in Valladolid, in north-west Spain, the agency said, and a 17-year-old boy died in the southern city of Cordoba after diving into a swimming pool and losing consciousness.

Four people have drowned so far in France this week. The health minister warned people to swim only in authorised areas. France has also seen a rise in so-called street-pooling, or illegally opening fire hydrants. A 6-year-old child is in a life-threatening condition after being hit by water shooting from a hydrant in the Paris suburb of Saint-Denis, broadcaster France-Info reported.

More than 600 firefighters and six water-dropping aircraft are battling the worst fire in two decades in the Catalonia region as Spain is forecast to endure the peak of its heatwave, with temperatures expected to exceed 40°C.

In Berlin, a police unit turned water cannons – usually used against rioters – onto city trees to cool them down.
Source: https://www.newscientist.com/article/2208082-european-heatwave-france-hits-highest-recorded-temperature-of-45-1c/

The Effect of Micro-Scale Self-Shading Building Geometries on Wall Surface Temperatures


By Rainer V.J. Hilland[1] and James A. Voogt[2]

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Context

A key contributor to the complex urban climate is the unique built geometries of urban environments (Oke et al. 2017). The conceptual central urban unit of mosaicked buildings and streets and the resulting urban street canyons create, through their materials and geometries, complex patterns of shading and surface temperature that influence, among other things, human health and comfort, building energy use and internal temperature, and urban wind flow.

Of the complete urban surface area, a significant portion is comprised of walls (Voogt & Oke 1997; Grimmond & Oke 1999). Walls themselves often contain their own micro-scale geometries such as balconies, awnings, porch overhangs, even material textures that have the ability to self-shade the wall and may serve to reduce surface temperature. These sub-facet scale geometries of building walls are not captured by surface energy balance models, which may lead to an over-estimation of modelled wall temperatures. In observational studies, (near-nadir) remote sensing methods will tend to under-sample vertical surfaces such as walls.

Here, we combine infrared thermography and visible light imagery acquired from a ground-based mobile sensing platform to explicitly capture high-resolution urban wall temperatures from two neighbourhoods with differing degrees of micro-scale geometric complexity at a series of solar angles. We then apply a detailed manual classification scheme to the imagery to create a database of surface temperatures that can be interrogated to examine wall temperatures and distributions across spatial scales. The objective of this research is to take the first steps in investigating whether, and the extent to which, micro-scale wall geometries impact surface temperature at sub-facet to neighbourhood scales.

Methods

Two sites with differing facet-scale geometries were selected for observation in London, Ontario, Canada. Each site was comprised of residential one- to two-storey fully- and semi-detached houses. The first site (S1, 42°59'40.84" N, 81°13'12.06" W) is characterised by houses with large covered porches, which cast significant shade at most times of day. The second site (S2, 43°01'02.85" N, 81°11'44.31" W) is characterised by houses with minimal micro-scale wall structures. Both sites contain houses that face each of the cardinal directions: the actual street grid is rotated approximately 20° counter-clockwise, however this rotation is the same at both sites. For simplicity, houses are referred to as facing north, east, south, or west. In total, 125 houses are considered in the data set from a total number of 182, some being discarded due to obstructions, missing LiDAR data, or non-orthogonal angles. The dimensions of the buildings were determined via backpack mounted kinematic LiDAR scans (Galofre et al. 2018; Kukko et al. 2012) of the neighbourhoods, resulting in cm-scale accuracy of the complex 3d structures.

Observations at the study sites were conducted using a pickup truck as an instrumented platform, minimizing the time needed to sample the full extent of the sites. The primary instruments used were a FLIR T650 thermal imager and a GoPro digital action camera. The thermal imager was sampled at 5 Hz and allows for high-resolution thermal imagery of the houses that resolves sub-facet scale details. The GoPro was configured as a time lapse camera and sampled visible imagery at 1 Hz. When the thermal and visible imagery is combined, precise attribution of surface characteristics can be applied to individual pixels of the thermal imagery.

Eight 20-minute traverses were conducted within a 24-hour period, each encompassing both S1 and S2. Six traverses during the day beginning at 8:12, 10:07, 11:43, 14:13, 16:35, and 18:41 EDT captured a variety of solar azimuth and zenith angles that force different shading patterns in the canyons. Two night-time traverses beginning at 23:35 and 5:05 EDT the following morning were performed to consider differences in cooling processes between the neighbourhoods.

Using measurements obtained from the LiDAR point cloud, the thermal and visible imagery for each house were co-registered to a cm-scale local coordinate system. The (x,y) coordinates of the local coordinate system correspond to (x,z) spatial coordinates, with constant (y) distance from the imager. Most houses were comprised of a mosaic of more than one thermal image, which were combined without a blending function. The thermal images were then re-sampled to 1 x 1 pixels (1 x 1 cm). The result is a paired set of visible and thermal images for each house and traverse with the exception of night-time traverses 7 and 8.

The resultant image pairs were manually classified in a GIS. To classify each image, polygons were drawn on homogenous surfaces on the visible image and an attribute table was populated. Each table contained 9 variables: *traverse number*, an integer 1 – 8; *house number*, an integer 1 – 182; *orientation*, 'N' 'S' 'E' or 'W"; *shaded*, a binary number describing if the pixels in the polygon are shaded or not; *shade source*, a string describing what is casting the shade, e.g. 'self', 'tree', or 'NA' if sunlit; *covered*, a binary number that indicates if the polygon is under a porch or awning; *type*, a string describing the kind of surface, e.g. 'wall', 'window', 'door'; *material*, a string describing a visually determined first-order descriptor of the surface material, e.g. 'brick', 'vinyl', 'glass'; and *colour*, a string describing the colour of the material to allow first-order estimations of albedo.

Each individual thermal image was manually assessed for all unique combinations of the above-mentioned variables. The resulting classified homogenous polygons were then complemented by a series of *residual* polygons that contain all the other pixels that

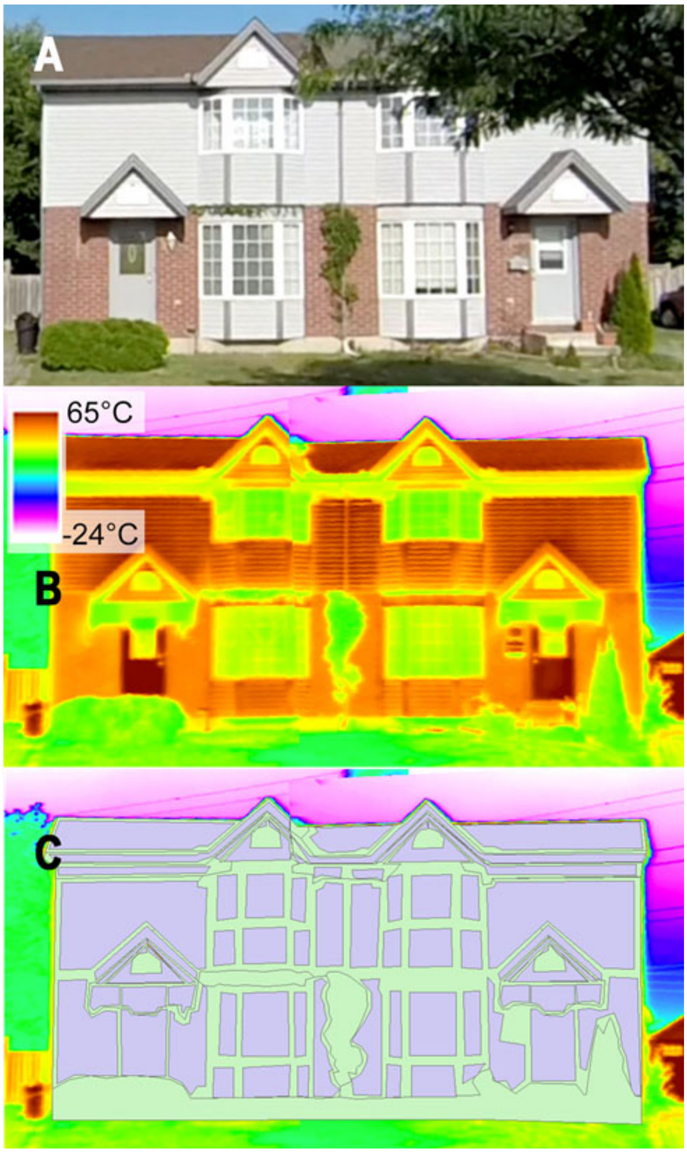

Figure 1. A) visible image, B) thermal image and C) classified image of house 169 (west-facing) during traverse 5 (16:35 EDT). Purple polygons are primary classes and green polygons are residual classes.

were not themselves classified due to boundaries between materials, obstruction, temperature artifacts that appear at strong boundaries, etc. An example of these polygons is shown in Figure 1, with the visible image in panel A, the thermal image in panel B, and the drawn polygons shown in panel C. The purple polygons are the homogenous classified group, and the green polygons are the residuals.

Each pixel in the thermal image was then assigned the attributes of the overlaying polygon and the complete table was exported for processing. After repeating this process for all imagery, a final data set containing approximately 400,000,000 rows and 11,000 unique variable combinations was assembled.

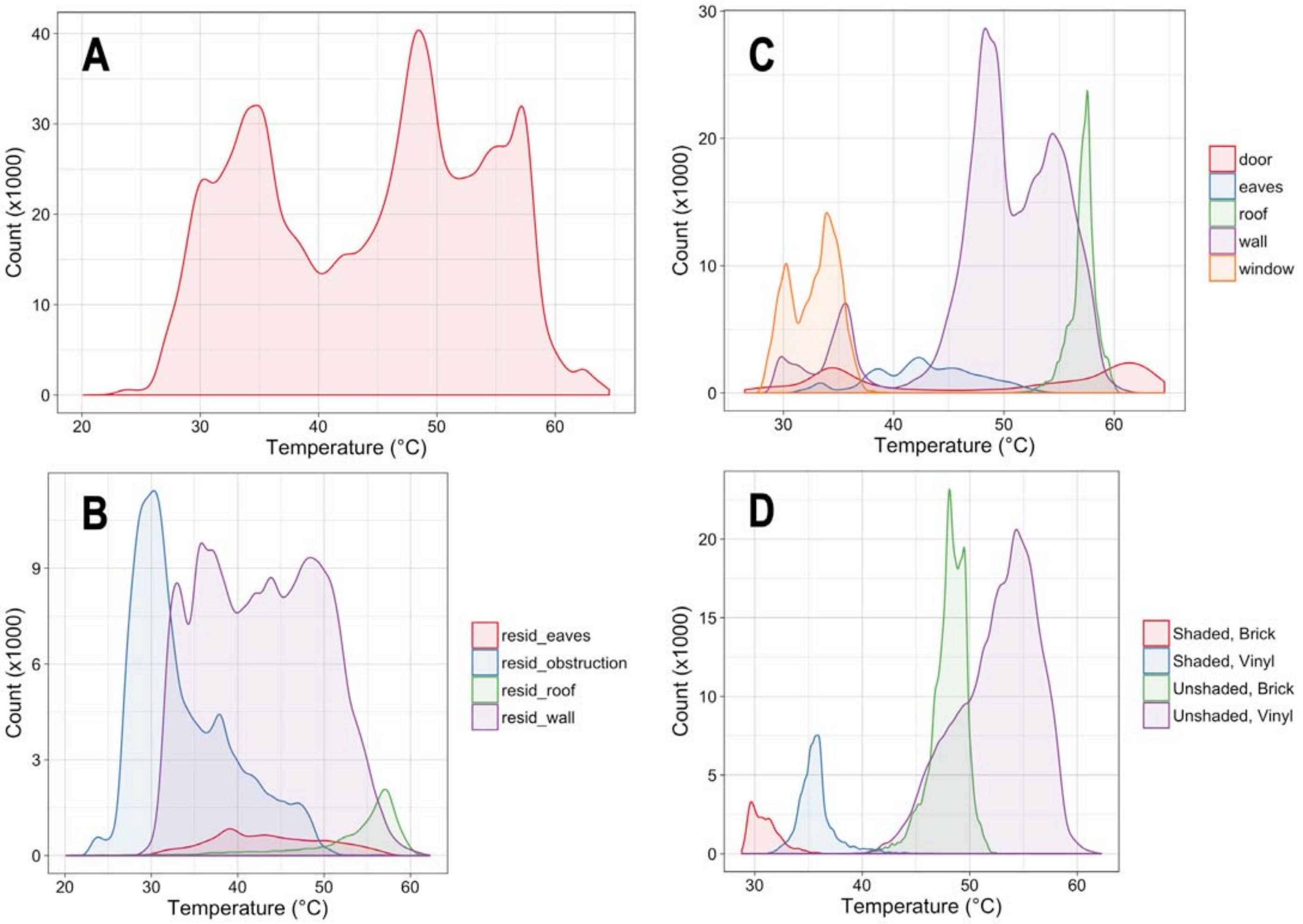

Figure 2. Brightness temperature distributions created from the polygons illustrated in Figure 1. A) complete distribution of all polygons, B) the residual classes coloured by type, C) the primary classes coloured by type, D) the type = wall polygons coloured by their shaded and material variables. Note different x and y axes for each panel. Windows appear anomalously cool due to their low emissivity.

Data & Analysis

To demonstrate the output at the facet scale, the classified temperature distributions from the house pictured in Figure 1 are shown in Figure 2. In panel A the complete distribution is shown. This distribution is then decomposed into the residual classes (panel B) from the green polygons in Figure 1, and the primary classes (panel C) from the purple polygons in Figure 1, coloured according to their *type* variable. We see that surfaces that are partly shaded and partly sunlit, such as the walls and doors, show distinct bi-modality as might be expected. The wall component however shows four distinct modes, which may be teased apart by further separating the wall component by both its *Material* and *Shaded* variables as displayed in panel D. Here we see that at the smallest scale distributions are relatively normal, and the effect of self-shading on the wall temperatures becomes clearer. At this scale we can see that the mean temperatures of the self-shaded surfaces are each approximately 17 °C cooler than their sunlit counterparts. Each of the 125 houses contains eight such individual data sets; one for each traverse.

The individual houses can be integrated to the canyon scale, and the distributions across an entire street canyon considered. An example is provided in Figure 3, where all east-facing facets from S1, traverse 3 are displayed. In this example we consider the differences in sunlit and shaded temperatures across the canyon. Panel A again displays the complete distribution of the entire set of houses, subset to *type* = wall. In panel B we distinguish between shaded and sunlit surfaces, in which we can see clearly that the shaded surfaces are much cooler on average, and with a smaller range of temperatures. In panel C we further separate the distribution by considering covered vs. uncovered surfaces, or those under a large porch and those not. Here we can see the concentration of surface tem-

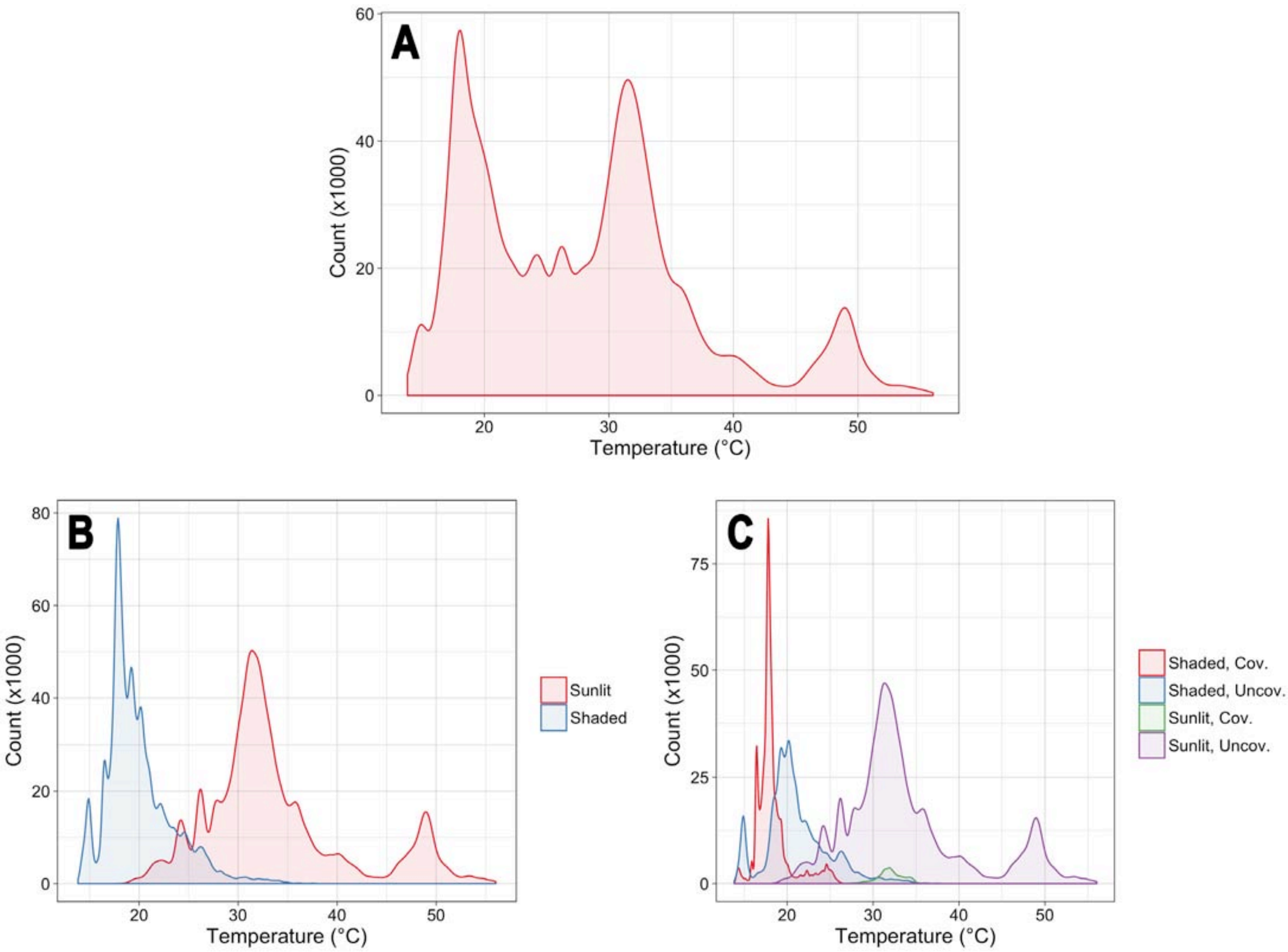

Figure 3. Brightness temperature distributions for east-facing facets from S1 during traverse 3 (11:43 EDT). A) complete distribution of type = wall, B) the same distribution coloured by the shaded variable, C) the same distribution coloured by both shaded and covered variables.

peratures near to the ambient air temperature that characterises the wall surfaces that have not been exposed to sunlight at all during the morning due to their protected location under a large porch.

By aggregating the individual facets to the canyon scale and considering the diurnal progression of the traverses we can also make inter-neighbourhood comparisons between the larger micro-scale geometries of S1 and the relatively open facets of S2. Figure 4 displays the wall brightness temperatures of west-facing facets as boxplots with in-canyon air temperature plotted as lines. During the morning traverses (1 to 3) all the west-facing facets are completely shaded due to surface-sun geometry, and as such the range of wall temperatures is quite small, rises with in-canyon air temperature, and the difference between the two neighbourhoods is slight. Through the afternoon traverses (4 to 6) when the west-facing facets are sunlit, we see that the median temperatures of S1 are significantly lower than those of S2. These lower median temperatures during sunlit periods can be linked to the greater degree of shading provided by the micro-scale geometries of the houses in S1.

During the night-time traverses there is an interesting inverse pattern, where the S1 temperatures are warmer than S2. The same features that blocked sunlight and kept temperatures relatively cooler during the day also serve to decrease the covered wall's sky view factor during the night, which leads to slower rates of cooling and generally warmer surface temperatures through the night.

In traverses 5 and 6 we see that S1 has higher maximum temperatures than S2. This is hypothesised to be due to a secondary effect caused by the same features that lower the median temperature of the site: the large porches that shade surfaces below them both reflect shortwave radiation and emit longwave radiation above them. The two-storey houses in S1

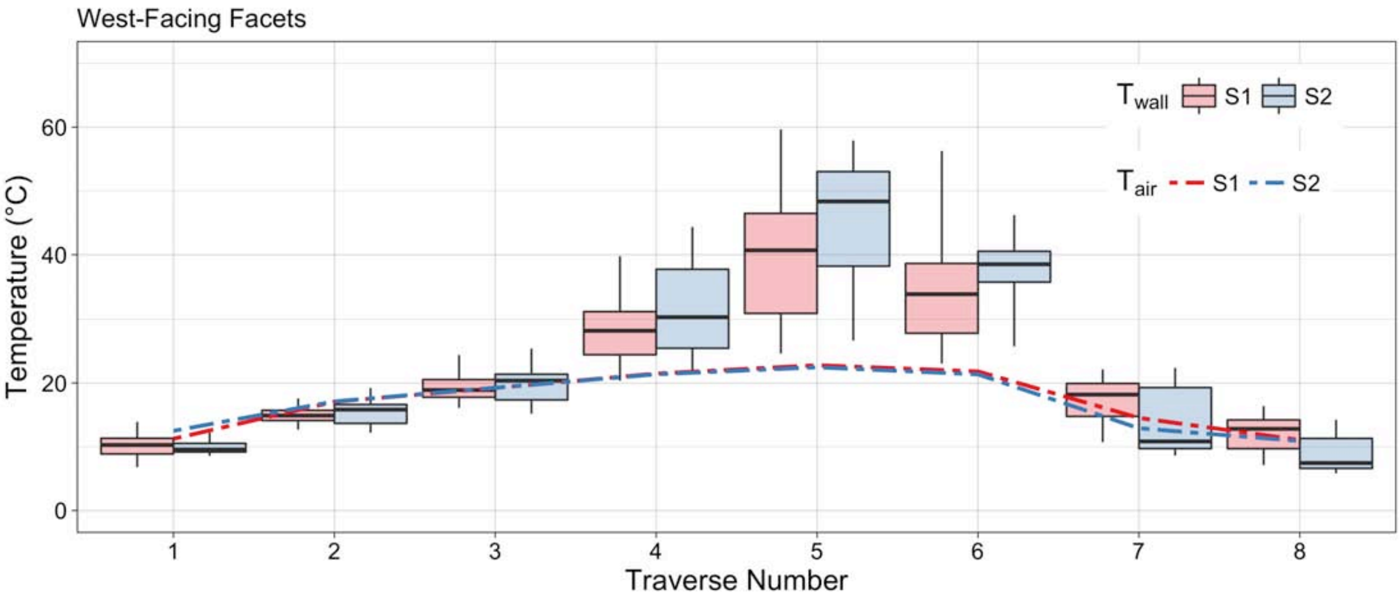

Figure 4. Comparison of west-facing wall surface brightness temperatures between sites 1 and 2 (boxplots) overlaid with mean air temperature at each site (lines). Boxplot whiskers show 98th and 2nd percentiles, the extent of the box shows the inter-quartile range, and the bold black line shows the median.

have large porches that shade the first storey, but which increase the temperature of the uncovered second storey. The result suggests that while median temperature is reduced, maximum temperatures may be increased.

Summary

The assembled data set provides a highly detailed breakdown of urban wall temperatures at the micro-scale. It shows that at the micro-scale, self-shading of walls can significantly reduce wall temperatures, and that these effects aggregate to the canyon and neighbourhood scales. Neighbourhoods such as the sites examined here that are similar in a macro-perspective, i.e. similar canyon height to width ratios, building sizes, impervious surface area fractions, etc., may exhibit large temperature variations due to their micro-scale structures. A failure to account for such effects when modelling may lead to over-estimation of urban wall temperatures. Remote sensing of urban temperatures from aerial or satellite platforms may also be affected, as vertical wall surfaces tend to be under-sampled already and if micro-scale structures obscure large portions of the walls, their temperatures may not be sampled at all.

The data set has only lightly been touched on here. A more detailed description of the method and more thorough analysis has been submitted for publication. This research is the subject of a 2018 MSc thesis (Hilland, 2018).

Acknowledgements

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On the use of local weather types classification to improve climate understanding: an application on the urban climate of Toulouse

This article summarizes a recently published paper and related work:

Hidalgo, J. and Jougla, R. (2018) On the use of local weather types classification to improve climate understanding: An application on the urban climate of Toulouse. *PLoS ONE* 13 12p. E0208138.

Abstract

This paper proposes a method based on a local weather type (LWT) classification approach to facilitate analysis and communication of climate information in local climate studies. The potential of this approach is presented here through an application to urban climatology in Toulouse, France, but the method can be used in other applied fields of climatology for which a fine description of the local climatic conditions is necessary (as in climate change impact studies or hydrology, for example).

In this study, to describe the climatic context of this urbanized area, the local weather types that explain the plurality of weather situations Toulouse faces are presented in depth. This information is used in three types of applications:

- to show the benefit of basing climate analyses on approaches based on local weather types and not only on conventional climate indicators such as monthly, seasonal or annual averages that erase the specificities of individual situations;
- to explore the impact of future climate projections in terms of frequency and intensity of these weather situations;
- to facilitate the consideration of local climate issues as a communication support in urban planning practices.

Context of the study

This study was developed as part of the French national funded ANR-MapUCE project (Applied Modeling and Planning Law: Climate and Energy) which has just finished last March. In terms of methodology, it builds on the classification method that we had previously proposed in 2014. The aim at that time, was to circumvent computing power limits in modeling studies of climate change impact at fine spatial scales and which had been published under Hidalgo et al. (2014).

In terms of new results, the method is remobilized here to show its potential for use in climate studies at the local level and in particular in communication with local stakeholders. This type of approach allows to produce climate information that is more easily appropriated and intuitive and makes possible to identify the types of meteorological situations at stake (for example those favouring the formation of a strong urban heat island at night) and to follow them on future climate projections in order to implement the appropriate adaptation measures.

The local weather type classification method has been applied to fifty cities in France (Jougla, Hidalgo and Pouponneau (submitted); Figure 1) as part of a newest research project, the PAENDORA project. Summary sheets describing the local weather situations on these urbanized territories present a valuable tool for studies in urban climatology and collaborations with French stakeholders in the coming years.

Method availability

The proposed classification method has been coded in an R script. The code source was made available for free use and as recommended by Añel (2011) also for review. A test case is available on request from the authors or directly downloadable from the journal website as a supporting information file.

Conclusions

Like other applied fields of meteorology and climatology, urban climate studies require a good description and understanding of the climatological context of the urbanized area. Authors sometimes decide to base scientific analysis on monthly or annual based indicators, but in urban climatology, studies most often focus on a specific weather situation and the analysis is based on shorter periods. Systematic methodological problems have been alluded to by several researchers in the last decades and the choice of the weather situation, and its duration and frequency characterization are mentioned as the most problematic points.

In this paper a Local Weather Type classification approach is proposed as a good practice to be developed when a climatic contextualization is sought for local climate studies applications. The statistical classification method proposed in Hidalgo et al. (2014) is widely presented and some methodological improvements are commented upon.

Different types of applications serve to show how this approach is used in urban climate studies in Toulouse, France. We present the study of changing local weather types in a series of future climate projections and that of a classic urban canopy and a series of atmospheric boundary layer analyses, as well as an illustration of how LWTs are used as a support for communication to work with the local municipality and the local Urban Planning Agency.

These analyses allow us to comment on the usefulness of evolving from a mean climate state typically driven by classic climate indicators, to a more intuitive discourse based on shorter meteorological time-scales, both for the description of local climate context and for the impact of the LWT approach on the calculation of indicators and analysis of phenomena.

This method is relatively straightforward, as it mobilizes easily available atmospheric data and statistical methods. Despite this simplicity, meteorological situations are well identified when near-ground atmospheric parameters are analyzed. The LWT presents consistent three-dimensional features when the meteorological situation is well-established, but the results cannot be generalized to every LWT and/or time-slot. The LWT chronology seems to be important, as LWTs impact the whole UBL and the residual layer in upper levels of the atmosphere a good part of the day. To improve the consistency of 3D characterization, the classification method could be enriched including indicators that characterize the UBL height or the chronological sequence, but this would make for a loss of the method's universality due to the difficulty of obtaining these data. Some future work is already planned concerning other applications of this LWT classification. For example several Urban Climate Analysis Maps are being developed from numerical simulations to inform the Urban Climatic map of Toulouse. New methodological developments will be for example needed in order to improve the LWT identification for very big cities or for cities with complex terrain where the use of one single weather station is not enough to satisfactorily describe the atmospheric situation.

Table 1 on the following page lists cities with an available LWT classification along with the number of local weather types that were identified.

Acknowledgments

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Table 1: Cities with an available LWT classification: UU – name of the urban unit; ID_obs – identifier of the meteorological reference observation station used in the classification; name – name of the meteorological reference observation station used; nb_LWT – total number of LWT identified.

UU	ID_obs	Name	Nb_LWT
Amiens	80379002	AMIENS-GLISY	9
Angers	49176001	LE LION D'ANG.	11
Arras	62873001	ARRAS	7
Avignon	84007005	AVIGNON	8
Bayonne	64102005	BAYONNE	10
Beauvais	60639001	BEAUVAIS-TILLE	11
Belfort	90010001	BELFORT	12
Besançon	25056001	BESANCON	9
Béthune	62119002	BETHUNE	11
Bordeaux	33281001	BORDEAUX-MERIGNAC	9
Boulogne-sur-Mer	62160001	BOULOGNE-SEM	10
Caen	14137001	CAEN-CARPIQUET	10
Calais	62548002	CALAIS-MARCK	8
Chalon-sur-Saône	71081001	CHALON-P ET C	9
Clermont-Ferrand	63113001	CLERMONT-FD	10
Colmar	68066001	COLMAR-INRA	7
Compiègne	60382001	MARGNY-LES-COMPIEGNE	10
Creil	60175001	CREIL	10
Dijon	21473001	DIJON TOISON	11
Douai Lens	59178001	DOUAI	10
Dunkerque	59183001	DUNKERQUE	8
Grenoble	38384001	GRENOBLE	9
La Rochelle	17300009	LA ROCHELLE AERODROME	12
Le Havre	76481001	OCTEVILLE	9
Lille	59343001	LILLE-LESQUIN	11
Lorient	56185001	LORIENT-LANN BIHOUE	11
Lyon	69029001	LYON-BRON	8
Marseille	13055025	MARSEILLE-OBS	12
Montbéliard	25388002	MONTBELIARD	12
Montpellier	34154001	MONTPELLIER	9
Metz	57039001	METZ-FRESCATY	11
Mulhouse	68224006	MULHOUSE	8
Nantes	44020001	NANTES-BOUGUENAIS	8
Nancy	54405001	NANCY-OCHEY	9
Nice	6088001	NICE	8
Nîmes	30189001	NIMES	10
Orléans	45055001	ORLEANS - LA S.	8
Paris	28070001	CHARTRES	12
Pau	64549001	PAU-UZEIN	10
Rennes	35281001	RENNES GALLET	10
Reims	51183001	REIMS-PRUNAY	11
Rouen	76116001	ROUEN-BOOS	9
Saint-Étienne	42005001	GRAND CLOS	12
Saint-Nazaire	44184001	PTE DE CHEMOULIN	12
Strasbourg	67124001	STRASBOURG-ENTZHEIM	9
Tarbes	65344001	TARBES-OSSUN	10
Thionville	91613001	CONGERVILLE-TH.	9
Toulouse	31069001	BLAGNAC	12
Toulon	83153001	CAP CEPET	11
Tours	37179001	TOURS	10
Valenciennes	59606004	VALCIENNES	10

Call for Contributions to an Outdoor Thermal Comfort Database

Studies of subjective thermal comfort in outdoor spaces have been widely conducted worldwide in the last two decades and generally include two components, namely questionnaire surveys and micrometeorological measurements. Different assessment scales of thermal sensation were adopted by the questionnaire surveys, such as the ASHRAE 7-point scale of thermal sensation (ASHRAE, 2017; Spagnolo and de Dear, 2003), 5-point (Tseliou et al., 2010) or 9-point Likert scale (Middel et al., 2016). Meanwhile, the instrumental setup for micrometeorological measurements considerably varies across studies due to constraints at field sites and the availability of instruments. Johansson et al. (2014) pointed out the need for standardisation of methodology and guidance for conducting field surveys in outdoor settings in order to facilitate comparison between different studies and achieve more comprehensive understanding of human thermal comfort in outdoor environments.

As such, we are inviting researchers in the field of outdoor thermal comfort to participate in this effort of establishing an online data repository for the following objectives:

• To facilitate the standardization of methodology of conducting questionnaire surveys and micrometeorological measurements for outdoor thermal comfort studies;

• To compare and identify the characteristics of outdoor thermal comfort in different urban and climatic settings; and

• To determine appropriate analytical approaches for defining an adequate level of outdoor thermal comfort for bioclimatic design of outdoor spaces.

Benefits of participation

This study provides the following benefits or opportunities to data contributors in order to facilitate more collaborations between research teams in the world.

• To be part of first-ever exercise to gather outdoor comfort data in one place

• To access to a quality-controlled, world-wide database

• To potentially contribute to joint publications

• To identify research teams for potential collaborations.

Motivation and Objectives

Outdoor thermal comfort is one of the important aspects of bioclimatic design and it is associated with users' satisfaction and hence their usage of outdoor spaces. Nikolopoulou et al. (2001) examined the microclimatic conditions in outdoor urban spaces and their implications for people's behaviour and usage of such spaces.

Figure 1. Meteorological stations for measurement and questionnaire survey in urban sites (top) and survey locations in Hong Kong (bottom).

Höppe (2002) and Givoni et al. (2003) also discussed the methodological issues in outdoor comfort research. It was suggested that an understanding of human parameters is essential for designing outdoor spaces and psychological adaptation is also important in such spaces. Further topics of relevance include human adaptation to increasingly frequent heat stress, mitigation of rising urbanization trends, human health research, weather forecast and risk prevention etc.

Research Questions

The research questions of this study include:

• What are the differences between various subjective assessment scales of the thermal environment, i.e. thermal sensation, thermal comfort, thermal preference, personal acceptability and personal tolerance (ISO 10551, 2001)? How are these scales relevant to outdoor settings?

• What are the meteorological variables that are the most relevant to subjective assessment of the thermal environment? What are appropriate instrumental settings of micrometeorological measurements?

• How do different analytical approaches address the

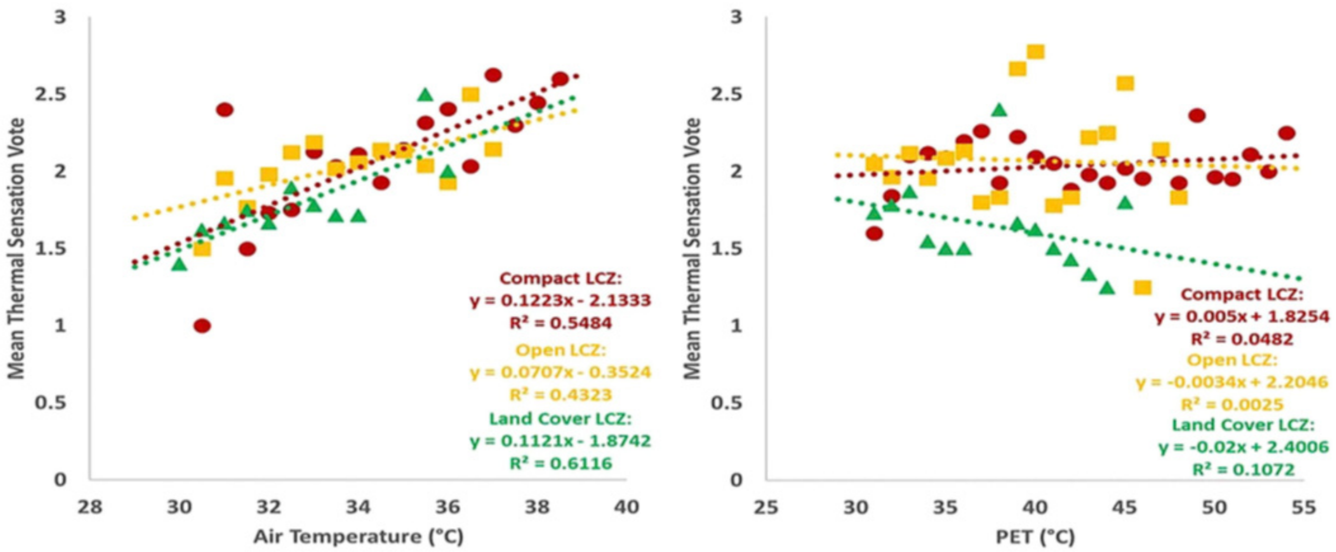

Figure 2. Regression analysis using binned values of air temperature and physiological equivalent temperature (PET) for different urban settings (Lau et al., 2019).

relationship between subjective assessment of the thermal environment and measured micrometeorological conditions?

• Are there any systematic and significant differences in this relationship across climatic regions and contextual settings?

Requirements of Data Contribution

The questionnaire surveys and micrometeorological measurements should comply with the following requirements. Figure 1 shows the pictures of instruments, surveys and surveys sites.

1. Data should be collected from field surveys and experiments

2. Both instrumental (measurements) and subjective data (questionnaire) are required

• They should be simultaneously collected to obtain the right-here-right-now response from the respondents

3. The questionnaire surveys should consist of the following items:

• Subjective assessment of thermal sensation/perception, thermal comfort/pleasure, thermal preference, personal acceptability and personal tolerance (ISO 10551, 2001)

• Metabolic activity and clothing level of the respondents at the time of the survey, immediate thermal history, e.g. time spent outdoor prior to the survey, last exposure to HVAC environment prior to the survey

• Demographic background of the respondents, e.g. age, sex, place of origin, time of residency

• Surveys in other languages than English should provide an original version

4. The micrometeorological measurements should consist of the following items:

• Four fundamental parameters for calculating thermal comfort indices, namely air temperature, humidity, air movement, globe temperature (for calculating mean radiant temperature)

• Types of instruments/sensors and detailed instrumental settings, e.g. instrument height, environmental settings

5. Raw data are required, i.e. not from processed or published data

• However, data must have been published in peer-reviewed journals or conference papers (Publication metadata – bibliography, should be provided).

6. Coding of the data should be clearly defined by data contributors

Data Harmonisation and Quality Check

Data acquired will be checked for quality in terms of the following aspects.

• Acceptable level of accuracy of instruments, e.g. measurement range, error range or precision level, and different instrumental set-up

• Accuracy and reliability of data, i.e. using a standard method for calculation of thermal comfort indices and comparing to the results in the publications

Analytical Approach

Data acquired from contributors will be used to examine the relationship between subjective perception of the thermal environment and measured meteorological conditions. Several statistical techniques commonly used in outdoor thermal comfort studies will be adopted in this project. The primary objective is to compare how different approaches can be used to define such a relationship for different climatic regions. Figure 2 and 3 show the examples of the statistical analyses commonly used in outdoor thermal comfort studies.

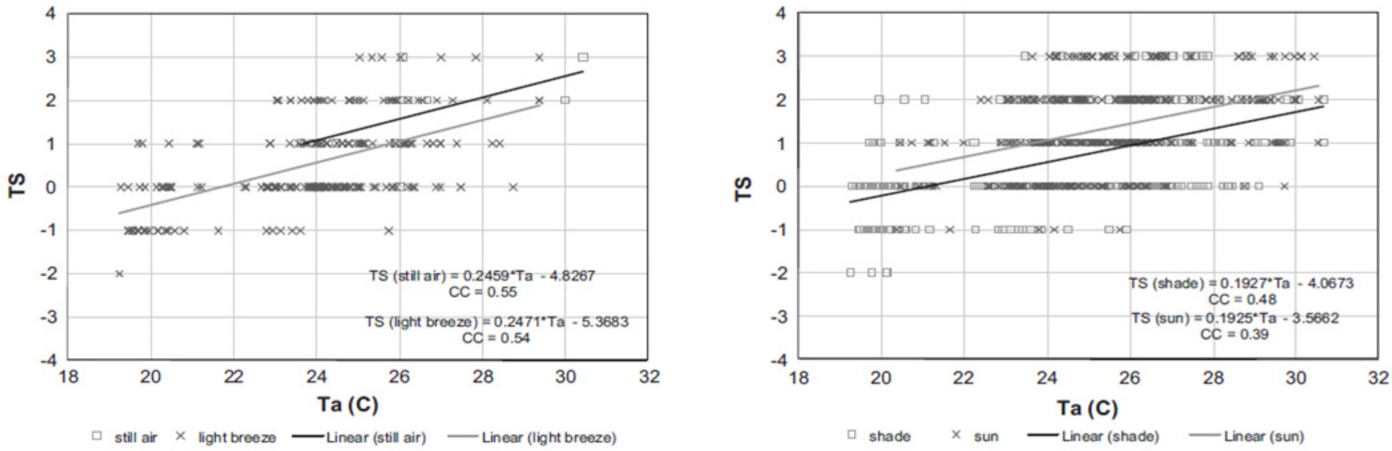

Figure 3. Linear regression analysis of air temperature and thermal sensation for different meteorological conditions (Krüger et al., 2011).

Real-time Communication

During the process of development, a website with online forum will be established to provide an online platform for communication between researchers and contributors. We will share the questions or issues encountered during the process and contributors can answer or raise any questions they concern.

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Urban climate sessions held at European Geosciences Union (EGU) 2019 General Assembly

On 7-12 April 2019, the European Geosciences Union (EGU) General Assembly was held in Vienna, Austria. The well-known yearly event hosted in the capital of Austria gathered geoscientists from all around the world: 16,273 scientists from 113 different countries participated, attending 5,531 oral, 9,432 poster, and 1,287 "PICO" interactive content presentations. There were 683 unique scientific sessions, together with 87 short courses and 338 side events, creating an interesting yet very dense programme. With the urban environment being of increasing scientific concern, one of the EGU sessions was dedicated to "Urban climate, urban biometeorology, and science tools for cities". Hosts this year were **Matthias Demuzere**, **Sorin Cheval**, and **Natalie Theeuwes**, who joined the convenor's team for the first time. Co-conveners **Hendrik Wouters** and **Matei Georgescu** could not be present, yet supported the preparation of the session.

In recent years, this session has been regularly included in EGU's programme and has attracted broad participation from the scientific community. In 2018 the session received 49 abstracts; this year this number increased to 72, resulting in 28 oral presentations and 44 posters. For the first time in the history of this session we were able to secure four oral blocks (a full day of urban climate) in one of the largest conference rooms, followed by a 2-hour poster session the next day.

In order to provide structure for this large session, the oral blocks were clustered along four major topics: thermal environment; modelling and process understanding; experimental monitoring; and adaptation, planning, and policy. The content of the oral presentations was just as broad as the geographical spread of the speakers and their region of interests. There was also an impressive range of spatial scales involved, from global projections of climate change over 4800 m^2 outdoor scale models to 1 m spatial resolution heat maps for a city in the Netherlands. The experimental monitoring session also hosted one invited presentation delivered by **Prof. Ariane Middel** (Arizona State University, Arizona, USA) entitled "Urban climate informatics: An emerging research field".

Session co-conveners (from left) Sorin Cheval, Matthias Demuzere (main convener) and Natalie Theeuwes.

Prof. Ariane Middel pitching the idea of 'Urban Climate Informatics' as an emerging research field during her invited talk.

Spontaneous social dinner with some of the Urban Climate session attendees.

The poster session the next day equally offered a good opportunity to share knowledge and experience between the academic community and practitioners around the globe. Again, the geographic coverage of the contributions (e.g., case studies from South-East Asia, all parts of Europe, Sub-Saharan Africa, and the eastern Arctic) demonstrated the considerable interest in integrated urban climate systems, processes, and impacts. The vibrant interaction among researchers offered a unique opportunity for disseminating novel approaches and techniques, opportunities for collaboration among new colleagues, and development of strategic engagement between existing colleagues.

Amidst all the science conversations there was also room for a social event. Some session attendees gathered for a social dinner on Monday evening in Stadgasthaus Eisvogel, a Viennese restaurant in Pratern, one of Vienna's largest public parks. Great people, good food and a relaxing atmosphere, the perfect ingredients for a good night out.

Building on the success of this 2019 edition, we are strongly committed to organize this session next year (EGU2020, 3-8 May 2020, Vienna (Austria)), and we welcome interest from the wider urban climate community in contributing and sharing your research results. Hope to see you all next year.

Matthias Demuzere

Ruhr University Bochum, Germany / Ghent University, Belgium

Sorin Cheval

National Meteorological Administration, Bucharest, Romania / Air Force Academy, Brașov, Romania

Natalie Theeuwes

University of Reading, UK

Matei Georgescu (Arizona State University, USA)

Hendrik Wouters (Ghent University, Belgium)

Recent Urban Climate Publications

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As of this month, **Chenghao Wang** (School of Sustainable Engineering and the Built Environment Arizona State University) joined the BibCom team. Welcome! At the same time, Dr **Abel Tablada** and Dr. **Qunshan Zhao** are leaving the committee. I would like to warmly thank both for their contributions.

Note that we are nevertheless 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,

Matthias Demuzere
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Ruhr University Bochum (Germany)
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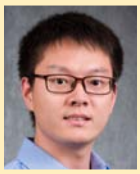
Chenghao Wang


Hendrik Wouters

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Upcoming Conferences...

OCEANIA GEOSCIENCES SOCIETY (AOGS) SESSION ON "ROLE OF URBANIZATION ON WEATHER AND CLIMATE OF CITIES"
Singapore • July 28-August 2, 2019
http://www.asiaoceania.org/society/index.asp

BUCHAREST URBAN CLIMATE SUMMER SCHOOL (BUCSS)
Bucharest, Romania • September 2-6, 2019
https://unibuc.ro/conferences/bucss2019/

EUROPEAN METEOROLOGICAL SOCIETY SESSION ON "INTERACTIONS OF AIR POLLUTANTS, GREENHOUSE GASES, WEATHER AND CLIMATE FROM LOCAL/URBAN TO GLOBAL SCALES"
Copenhagen, Denmark • September 9-13, 2019
https://meetingorganizer.copernicus.org/EMS2019/session/33616

AMERICAN GEOPHYSICAL UNION (AGU) URBAN CLIMATE SESSIONS

- Urban Areas and Global Change (Session GC090)
- Urban Climate Informatics (Session A136)
- Interdisciplinary Sustainable Solutions for Urban Areas (Session A083)
- Fluxes of Greenhouse Gases and Related Pollutants on Urban Scales (Session A071)

ABSTRACT DEADLINE: July 31, 2019

San Francisco, USA • December 9-13, 2019
https://www2.agu.org/Fall-Meeting/Pages/Submit-an-abstract

SYMPOSIUM ON CHALLENGES FOR APPLIED HUMAN BIOMETEOROLOGY, ALBERT-LUDWIGS-UNIV.
Freiburg, Germany • March 2-3, 2020
https://www.medizin-meteorologie.de/index.php/16-register

Sydney to host ICUC-11

The next International Conference on Urban Climate **(ICUC-11)** will take place in **Sydney, Australia from August 30 to September 3, 2021**. The Board of the IAUC selected the team in Sydney with its proposal "Cities as Living Labs: Climate, Vulnerability, and Multidisciplinary Solutions."

The University of New South Wales (UNSW), who will host ICUC-11, has also received support from the American Meteorological Society (AMS) Board on the Urban Environment (BUE) to run ICUC-11 together with the Symposium on the Urban Environment (AMS-BUE). UNSW will collaborate with other Australian Universities and Research Institutes in hosting this conference. Dr. Negin Nazzarin, who leads the organising committee, welcomes the IAUC community to Sydney: "We greatly appreciate the vote of confidence from the IAUC members. We truly believe that Sydney is an ideal venue for bringing in the diverse and international Urban Climate community, and look forward to welcoming all members in Sydney, Australia, for the 11th International Conference on Urban Climate (ICUC-11) in 2021."

ICUC-11 will be hosted on the campus of UNSW. The Sir John Clancy auditorium offers tiered seating for up to 945 participants in plenary sessions. The adjacent Matthews Pavillions will provide a contemporary semi-enclosed space for exhibitions, poster display and catering. A number of nearby theatres and lecture rooms will offer spaces for concurrent sessions and workshops.

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

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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, 2019 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.

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