Urban Climate News

Quarterly Newsletter of the IAUC

ISSUE NO. 78 DECEMBER 2020 • www.urban-climate.org • INTERNATIONAL ASSOCIATION FOR URBAN CLIMATE

From the IAUC President

Inside the December issue...

Dear colleagues in the IAUC community,

I sense that 2020 has been a wake-up call for all of us. It has shown us just how vulnerable we are as a species on this planet, that we are not as much in control as we would like to believe we are, and that we should all show more respect for our planetary home. Of course, COVID has dominated our lives this year, but climate concerns have also continued largely unabated, with new records established and some unprecedented events. Exactly one year ago as I wrote this column, catastrophic fires with links to a changing climate were burning across large swathes of eastern Australia, producing smoke that circumnavigated the globe. These fires were followed by similar catastrophic fires in the US that also had substantial air quality and health impacts on urban populations in both countries.

But I want to close 2020 and open 2021 on a more positive note. Despite the trials and tribulations of the past year, it has been a very positive one for the IAUC. We have seen the IAUC Board refreshed and invigorated with new, young members. We saw a consultation with the wider IAUC membership on the unfortunate postponement of the ICUC in Sydney by one year, but the very positive outcome from this of an IAUC online seminar series that has attracted almost 100 online participants for each of the events to date. We also saw the introduction of the Timothy Oke Award, a new IAUC award for early-to-mid career researchers, that is in addition to our flagship Luke Howard Award. Additionally, a new Outreach Committee is in the process of being established that will consult with the IAUC membership on a range of initiatives in the New Year.

The IAUC Newsletter goes from strength-to-strength thanks to David Pearlmutter. In this quarter's edition, we thank and farewell Matthias Demuzere as Chair of the Bibliography Committee, to be replaced by Chenghao Wang. Also in this edition, we are seeking a replacement for Paul Alexander as our «In the News» editor. It would be great if a member of the IAUC community could take on this role. It's not a huge commitment, as it basically involves scanning the media and flagging 3-4 timely articles for each issue that are of interest to the urban climate readership. Please contact me or David (davidp@bgu.ac.il) if you are interested.

For me personally, 2020 has been a momentous year. After almost 40 years as a university academic I took retirement in December, but will continue with my interests in all things climate as an Emeritus Professor. I'm hoping that this will allow more time to pursue some key interests, including continued support of the IAUC. One part of retirement that has not been easy has been the sifting through 40 years accumulation of material in my university office, to decide what to keep and transfer to my home office!

With my very best wishes for a safe, productive and happy 2021.

– Nigel Tapper,
IAUC President
nigel.tapper@monash.edu

Climate crisis: 2020 was joint hottest year ever recorded

Global heating continued unabated despite Covid lockdowns, with record Arctic wildfires and Atlantic tropical storms

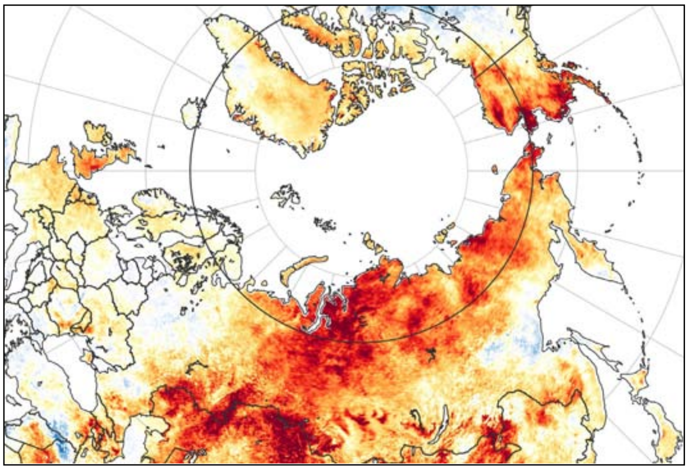
December 2020 — The climate crisis continued unabated in 2020, with the joint highest global temperatures on record, alarming heat and record wildfires in the Arctic, and a record 29 tropical storms in the Atlantic.

Despite a 7% fall in fossil fuel burning due to coronavirus lockdowns, heat-trapping carbon dioxide continued to build up in the atmosphere, also setting a new record. The average surface temperature across the planet in 2020 was 1.25C higher than in the pre-industrial period of 1850-1900, dangerously close to the 1.5C target set by the world's nations to avoid the worst impacts.

Only 2016 matched the heat in 2020, but that year saw a natural El Niño climate event which boosts temperatures. Without that it is likely 2020 would have been the outright hottest year. Scientists have warned that without urgent action the future for many millions of people "looks black".

The temperature data released by the European Union's Copernicus Climate Change Service (C3S) showed that the past six years have been the hottest six on record. They also showed that Europe saw its hottest year on record, 1.6C above the long-term average, with a searing heatwave hitting western Europe in late July and early August.

The Arctic and northern Siberia saw particularly extreme average temperatures in 2020, with a large region 3C higher than the long-term average and some locations more than 6C higher. This resulted in extensive wildfires, with a record 244m tonnes of CO_2 released within the Arctic Circle. Arctic sea ice was also significantly lower, with July and October seeing the smallest extent on record for those months.



The Arctic and northern Siberia saw particularly extreme average temperatures in 2020, with a large region 3C higher than the long-term average. *Source:* www.theguardian.com

"[The year] 2020 stands out for its exceptional warmth in the Arctic," said Carlo Buontempo, director of C3S. "It is no surprise that the last decade was the warmest on record, and is yet another reminder of the urgency of ambitious emissions reductions to prevent adverse climate impacts."

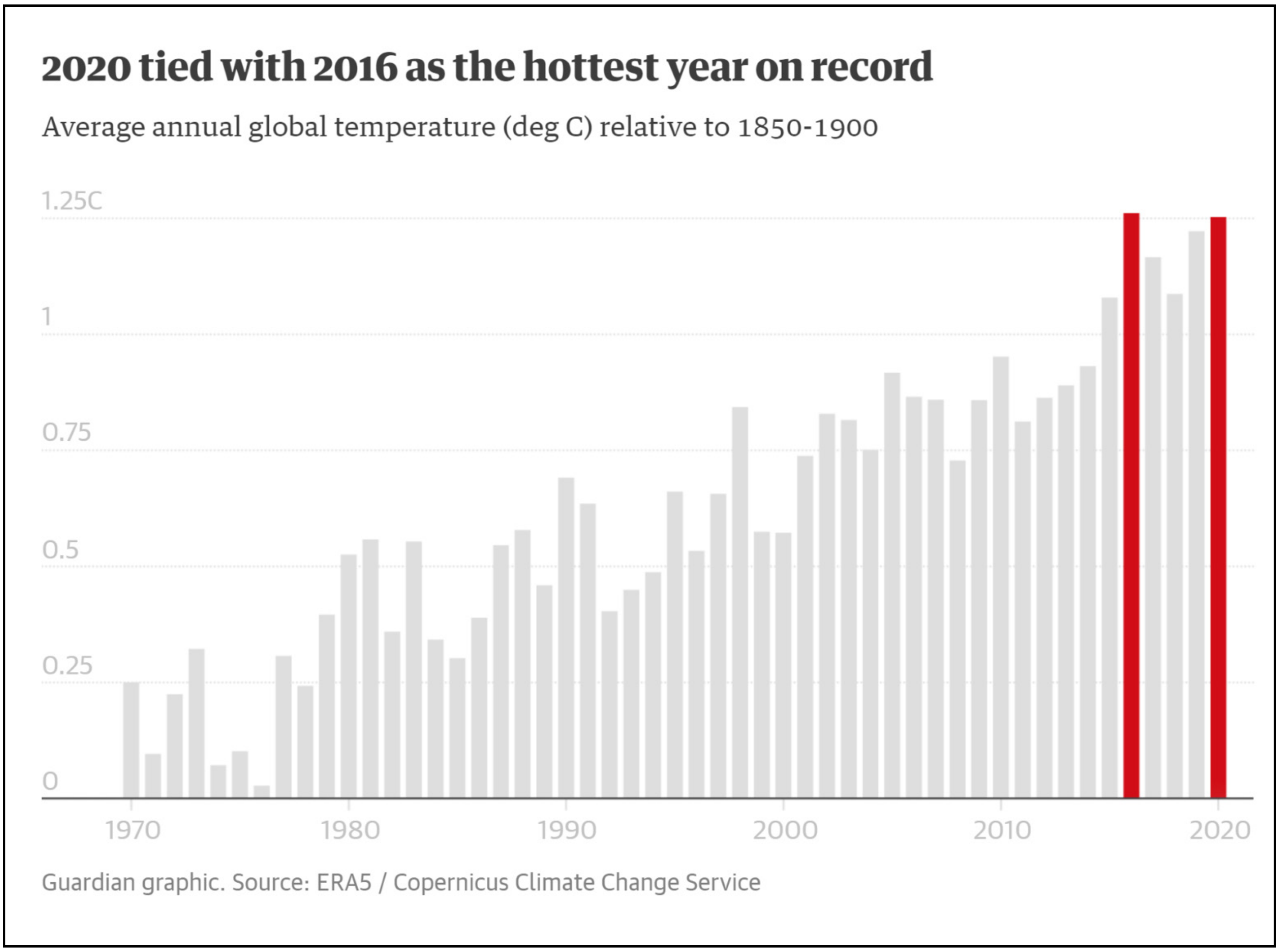
"The extraordinary climate events of 2020 show us we have no time to lose," said Matthias Petschke, at the European commission. "It will be difficult, but the cost of inaction is too great."

"Despite the absence of the cyclical boost of El Niño to global temperatures [we are] getting dangerously close to the 1.5C limit," said Prof Dave Reay, at the University of Edinburgh. "Covid lockdowns around the world may have caused a slight dip in emissions, but the CO_2 accumulating in the atmosphere is still going up fast. Unless the global economic recovery from the nightmares of 2020 is a green one, the future of many millions of people around the world looks black indeed."

HELP WANTED! Expressions of interest are sought for the role of **News items Editor**. The role involves trawling periodically (four times a year) through ~1,209,600 news items that are created across the globe daily, for stories that fit the urban climate community's eclectic interests.

For more information or to put yourself forward, please contact David Pearlmutter (davidp@bgu.ac.il).

A great debt of appreciation goes to our outgoing News Editor, **Paul Alexander**. Many thanks, Paul for your years of service!



The level of CO_2 in the atmosphere reached a new record in 2020, with the cut in emissions due to Covid lockdowns described as a “tiny blip” by the UN’s World Meteorological Organisation. Vincent-Henri Peuch, director of the Copernicus Atmosphere Monitoring Service, said: “Until the net global emissions reduce to zero, CO_2 will continue to accumulate in the atmosphere and drive further climate change.”

The UK Met Office issued a forecast on Friday that CO_2 levels will pass a new milestone in 2021 – being 50% higher than before the Industrial Revolution. Its scientists said CO_2 will exceed 417 parts per million (ppm) for several weeks from April to June, which is 50% higher than the 278 ppm in the late 18th century when industrial activity began.

This is despite the expectation that weather conditions brought by the counterpart of El Niño, La Niña, will see higher natural growth in tropical forests that will soak up some of humanity’s emissions.

“The human-caused buildup of CO2 in the atmosphere is accelerating,” said Prof Richard Betts at the Met Office. “It took over 200 years for levels to increase by 25%, but now just over 30 years later we are approaching a 50% increase. Global emissions will need to be brought down to net zero within about the next 30 years if global warming is to be limited to 1.5C.” — *Damian Carrington, The Guardian Environment editor. Source:* https://www.theguardian.com/environment/2021/jan/08/climate-crisis-experts-2020-joint-hottest-year-ever-recorded

A record 29 tropical storms formed in the Atlantic Ocean in 2020. *Source:* www.theguardian.com

Trump rolled back 100+ environmental rules – Biden may focus on restoring five of the biggest ones

Together, the five rollbacks, if not reversed, would release an additional 1.8 billion to 2.1 billion metric tons of greenhouse gases into the atmosphere by 2035

November 2020 — Even if US President-elect Joe Biden can reassemble the pieces of climate policy shattered by President Donald Trump, it is not likely to be adequate to tackle the challenge of global warming, which has grown substantially after four years of inaction.

Biden faces science that paints a more alarming picture than it did four years ago and federal courts that, with Trump appointees, will be more skeptical of presidential power to act than when President Barack Obama put in place the first U.S. regulations to cut greenhouse gas emissions.

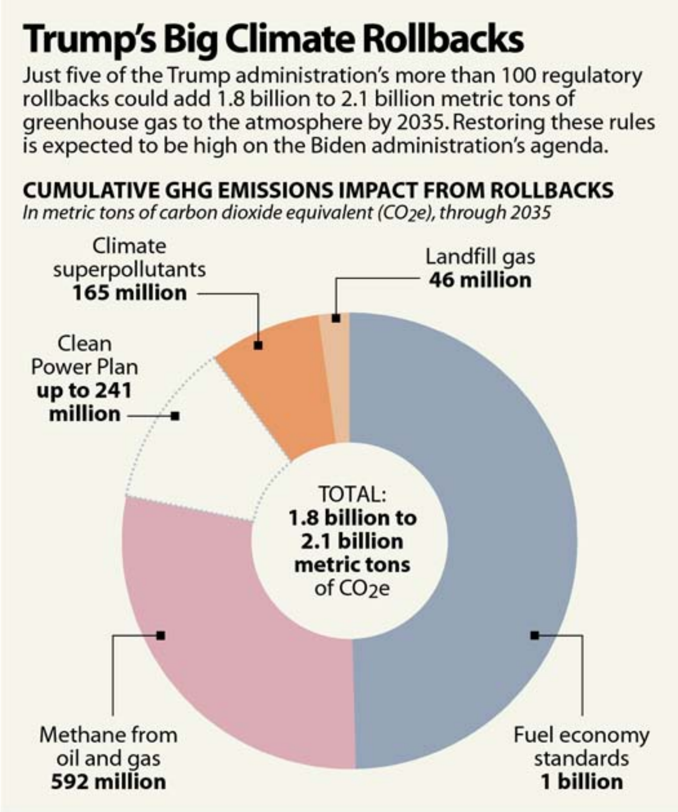
For Biden to bring the United States back into the Paris climate accord and achieve his ambitious goal of setting the United States on a path to net-zero carbon emissions by mid-century, his team will have to attain deeper cuts in pollution than Obama sought, while having to work harder to bulletproof their actions against legal challenge.

The Trump administration has rolled back more than 100 environmental regulations in the last four years – including rules on offshore drilling, management of water pollution at coal power plants, monitoring air pollution at oil refineries, and permits for pipeline construction.

"President Biden will have his work cut out for him to reverse the damage done," said Dan Lashof, US director of the World Resources Institute. "To be successful, he's going to need to focus on a smaller number of very high-impact actions."

Climate policy experts say they expect Biden's team to focus on five Trump rollbacks in particular that have set back the nation's progress in cutting emissions: rollbacks on clean cars, clean power, climate super-pollutants, methane leaks from oil and gas operations and gas from landfills. Taken together, those will result in the release of at least an additional 1.8 billion to 2.1 billion metric tons of greenhouse gases into the atmosphere by 2035 if they are not reversed, according to a recent analysis by the consulting firm, The Rhodium Group. That's equivalent to more than one year's emissions from Russia.

The Trump administration currently is in court facing multiple legal challenges over all five deregulatory actions – cases that the Biden administration now will inherit, and almost certainly will ask the courts to hold in abeyance while it reviews and revises the regulations. (The Trump administration did exactly that with litigation over the Obama rules when it took over in January 2017.)



SOURCE: Rhodium Climate Science PAUL HORN / InsideClimate News

Although the Biden administration will want to move quickly, there are few viable shortcuts in the process of writing new regulations, a process that can take two to three years. In fact, the Trump administration faced numerous setbacks in the courts, mainly because it did not adequately justify its actions or skipped the needed notice and comment procedures. The Institute for Policy Integrity at New York University Law School tallied some 80 adverse rulings for the Trump administration in lawsuits over its weakening of environmental rules.

"Whether you're building the building up, or you're tearing the building down, or rebuilding it up again, you have to go through the same steps," said David Doniger, director of the climate and clean energy program at the Natural Resources Defense Council, an environmental group that has led many of the legal challenges to Trump's regulatory rollbacks.

Some had hoped that Biden would be able to rely on Congress to help repeal some of the Trump deregulatory actions. Using a Newt Gingrich-era law called the Congressional Review Act, Congress repealed 17 Obama administration rules after Trump took office.

But unless the Democrats gain control of the Senate by winning Georgia's two runoff races in January, the party will not be able to bring such measures to the floor without the approval of Republican Senate Majority Leader Mitch McConnell. *[Note: Democrats did win both races.]*

Still, Doniger believes that Biden has an advantage that Obama lacked when he embarked on climate policy – a groundswell of public support and attention. Climate change was a focus throughout the 2020 campaign, with Biden repeatedly framing it as one of the four great crises he faces, along with the coronavirus, the economy and racial justice.

"We have enormous challenges ahead of us, but we have a new opportunity for forward motion, and for action and for hope," Doniger said.

Even those who believe that Biden's authority to use the regulatory process on climate is limited think the atmosphere is favorable for progress. Jeff Holmstead, a partner in the law and lobbying firm Bracewell, who represents industry clients on clean air matters, argues that, even with a Republican-led Senate, the Biden White House should make its case to Congress instead of relying too heavily on new regulations. "There are many people in the business community who would like to see climate legislation," Holmstead said. "They would like the business certainty."

Here are the big climate regulations that environmental law experts believe will be high on the Biden team's agenda, as well as the challenges they will face.

Clean Cars

Biden talked about his vision for an electric vehicle future in a campaign ad that featured his vintage 1967 Corvette Stingray, a wedding gift from his father, a car salesman. The message: He is seeking a transformational move away from the internal combustion engine that doesn't leave behind the American love of the automobile.

Biden will have a chance early on to show if he can bring the auto industry aboard. One of the highest priority items for his climate agenda will be to undo the largest of the Trump administration's regulatory rollbacks – eliminating the Obama program to boost the fuel economy of cars and SUVs to 54.5 miles per gallon by Model Year 2025.

The Trump plan, which ratcheted down the goal to 40 mpg by 2026 – a mark automakers were expected to hit with or without a rule – has the potential to release 1 gigaton of additional greenhouse gas pollution into the atmosphere by 2035, according to the consulting firm, the Rhodium Group. That's close to one year's emissions

Then U.S. Vice-President, Joe Biden sits in a Corvette at the North American International Auto Show industry preview on January 16, 2014, in Detroit, Michigan. In an ad for his presidential campaign, Biden talked about his vision for an electric vehicle future. The ad featured his vintage 1967 Corvette Stingray, a wedding gift from his father, a car salesman. *Source:* insideclimatenews.org

from Japan, and equal to the impact of the four other big climate rollbacks put together.

Biden can't tackle climate without action on passenger vehicles, which have driven transportation to surpass electric power as the No. 1 source of greenhouse gas emissions.

A key will be California, which has for 50 years had the leeway to set its own tough standards under the Clean Air Act, because it acted on pollution before the rest of the nation. As part of its rollback, Trump revoked California's authority to act on greenhouse gas emissions. The result has been exactly what the carmakers said they didn't want: the uncertainty of litigation, with 14 states supporting California's battle against the Trump administration.

There's already one compromise solution that might provide a template for Biden. Five automakers (Ford, Honda, BMW, Volkswagen and Volvo), accounting for 30 percent of the US market, have cut a deal with California, agreeing to improve fuel economy from 38 mpg today to 51 mpg by 2026, a slightly less ambitious timetable than the Obama plan.

"That may well become the foundation for a new federal regulation," said Michael Gerrard, founder and faculty director of the Sabin Center for Climate Change Law at Columbia University. The result would be the kind of nationwide uniform standard that carmakers had under the Obama plan, and that all agree they prefer. The trick will be mapping out a US auto future beyond 2026; California Gov. Gavin Newsom in September pledged to ban all sales of gasoline-powered vehicles in the state by 2035.

General Motors, the largest carmaker and manufacturer of Biden's beloved Corvette, has not signed on to the California deal. Like the other American carmakers, General Motors is dependent on sales of highly profitable, gas guzzling pick-up trucks and large SUVs. But it recently has sent signals in sync with the Biden plan, announcing a $2.2 billion investment in EV production in the United States, with factories in Michigan and Tennessee. GM also rolled out an all-electric Hummer that will be available next year.

"As soon as soon as it became apparent that Biden was going to win the election, that was a signal to all the automobile manufacturers that these new, stricter standards are coming," said Gerrard. "And I don't think that they're waiting for the conclusion of the rulemaking process. That work is probably already underway."

In addition to regulation, Biden plans other moves to hasten an EV transition, including consumer incentives or rebates, the deployment of 500,000 charging stations across the United States and federal fleet purchases of electric vehicles.

Clean Power And Beyond?

One of the toughest legal strategy challenges the Biden administration will face in addressing climate change is what to do about electric power plants and other industrial sources of greenhouse gases. Obama's signature climate policy, the Clean Power Plan, was never implemented because of a stay issued by Supreme Court Justice Antonin Scalia days before his death in 2016.

And last year, the Trump administration put in place a weak replacement, the Affordable Clean Energy rule, which would reduce carbon emissions less than 1 percent when fully implemented in 2030. Even though half the states are on track to meet their goals under the Obama plan anyway, the rollback could mean 241 million metric additional tons of greenhouse gas in the atmosphere by 2035, according to Rhodium.

The Trump administration, supported by some industry groups and coal-dependent states led by West Virginia, has maintained that the Environmental Protection Agency had no authority to put in place a sweeping program like the Clean Power Plan.

Under the Obama administration, the EPA treated electric power plants as part of an interconnected system, and gave states the flexibility to allow utilities to meet pollution reduction goals by switching the power plants they relied on, moving from coal to natural gas and renewable energy. But the Trump administration argued that the Clean Air Act only gave EPA authority to require efficiency improvements within each individual power plant.

Even with the Trump administration gone, any attempt by the Biden team to simply reinstate the Obama approach will meet with a legal challenge from industry and from some states, which are confident that the Supreme Court, as now remade by Trump, will see things their way.

"The Clean Air Act contains very circumscribed regulatory programs that the EPA can use when it comes to industrial sources, including power plants," said Holmstead, who served as a top official in President George W. Bush's EPA. "All they can do is require existing facilities to improve their operations or to install emission controls. And neither of those things is going to accomplish very much in terms of reducing CO_2 emissions."

Flames from a methane flaring pit near a well in the Bakken Oil Field. *Source:* insideclimatenews.org

Although Biden's environmental law advisers disagree with that legal interpretation, the team is looking for ways to make progress without getting mired for years in a legal battle. Some legal scholars have proposed that the administration consider shifting to the use of another provision of the Clean Air Act: one that gives the EPA power to require states to address emissions that contribute to air pollution that endangers public health or welfare in other countries, as long as those countries provide reciprocal protections. Another approach would be to focus on tightening the U.S. air quality standards for other pollutants from burning fossil fuels – like smog-causing pollutants and particulate matter – which would have the effect of reducing carbon emissions.

Doniger said that approach might especially make sense for the Biden administration, which will be trying to meet environmental justice goals at the same time as it tackles climate change.

"This is hard, but worth doing," said Doniger. "You would envision that the Biden EPA would not only focus on power plant carbon but power plant emissions of other pollutants that especially burden people living in those communities which are over-polluted."

To meet Biden's goal of carbon-free electricity by 2035, whatever plan his team develops will have to go well beyond the Obama Clean Power Plan, which sought a 32 percent drop in carbon emissions by 2030. And the Biden administration can be expected to begin looking at regulating greenhouse gas emissions from industrial facilities beyond power plants, analysts say.

"Refineries, cement plants, other facilities—their greenhouse gas emissions are not being regulated," said Richard

Revesz, director of the Institute for Policy Integrity at New York University Law School. "In order to meet his ambitious goals, he'll have to look at the potential for reductions economy-wide. And I assume that other significant categories of polluters will come under the EPA's regulatory reach. Strengthening, extending and regulating new areas will have to be undertaken."

Methane From Oil and Gas

The Biden administration should have at least some industry support in its effort to restore the Obama administration regulation on methane emissions from oil and gas operations.

Some leading oil and gas companies opposed the Trump administration's rollback of the rules. Detecting and capturing methane, the main component of natural gas, is something the companies know how to do, and they would prefer a level playing field, where all companies are doing their part. The methane that they capture is natural gas that can be sold, although the payback for the investment in controls may be slow with natural gas prices low. The largest industry group, the American Petroleum Institute, supported Trump's loosening of the regulations.

Because methane is 86 times more potent in warming the atmosphere over a 20-year period than carbon dioxide, the Biden administration will be able to make large progress in a short time by acting on the super-pollutant. And there is new outside pressure to do so: The European Union is working toward adopting a methane strategy that may result in tariffs or border adjustments on the United States if the nation leaves methane from oil and gas unregulated.

Expect the Biden administration to do more than reinstate the Obama rules, which only covered new oil and gas operations. In order to get a handle on methane from the oil and gas industry, the EPA will have to tackle the much larger problem of methane leaking from existing operations. "That's where the big reduction potentials are," said Revesz.

One of the first steps the Trump EPA took was to halt an effort begun under the Obama administration to gather information and measure just how large the methane problem from existing facilities was. Recent studies, using state-of-the-art monitoring techniques, have indicated that methane releases from the industry are twice as high as the federal government previously estimated.

Climate Super-Pollutants

Earlier this year, the Trump administration repealed rules designed to curb the leaking and venting of a powerful group of greenhouse gases known as hydrofluorocarbons (HFCs) from refrigeration and air conditioning systems. The greenhouse gas impact of the move was equivalent to adding at least 625,000 new cars to the nation's highways.

The Trump EPA said its goal was to save businesses $24 million a year, and a group of industry players including BP, Boeing and Koch Industries pushed hard for the repeal. But the manufacturers of alternative refrigerants, including Honeywell and Chemours, a DuPont spinoff, support a global phase-out of HFCs, as nations had agreed to in 2016 in an international pact reached in Kigali, Rwanda.

Biden's effort to reinstate HFC regulation may get a boost from Congress, where bipartisan legislation to phase out the super-pollutants, co-sponsored by Sens. Tom Carper (D-Del.), and John Kennedy (R-La.) has 31 co-sponsors, including 16 Republicans. One provision of the bill is designed to make clear that EPA has the authority to regulate HFCs.

Landfill Gas

The Trump administration hasn't disputed that there is a need to address air pollution from landfills. It has simply delayed doing anything about it.

Municipal waste landfills not only are the nation's third-largest source of methane pollution (behind the energy and agriculture industries), the landfills also emit hazardous pollutants like benzene and volatile organic compounds that lead to the formation of smog.

In its final year, the Obama administration approved a rule that required states to submit their plans for controlling landfill gas within nine months. But the Trump administration put off enforcement of the requirement, and after lawsuits by states and environmental groups, the administration last year approved a new rule that gave states three years to act. Late last year, US District Judge Haywood Gilliam, an Obama-appointed federal judge in Northern California, accused the Trump administration of attempting to sidestep its previous orders and the law.

"This scenario presents a serious concern that in cases where a judgment is premised on an agency's failure to meet deadlines, that agency can perpetually evade judicial review through amendment, even after a violation has been found," Gilliam wrote.

But in October, the Trump administration got a reprieve, when a three-judge panel of the Ninth US Circuit Court of Appeals, including two of Trump's own appointees, reversed that ruling and said that the EPA could take more time to act on landfill gas.

By reinstating the Obama rules, the Biden administration could cut greenhouse gas emissions by the equivalent of 46 million metric tons of carbon dioxide through 2035 – the equivalent of closing down a dozen coal-fired power plants. But among the obstacles the Biden administration may face are courts like the Ninth Circuit and the US Supreme Court, which may be inclined to extend the deregulatory legacy of Trump long after he leaves office.

— By MARIANNE LAVELLE. *Source:* https://insideclimatenews.org/news/17112020/trump-rollbacks-biden-clean-cars-power-methane/

Six-year deluge linked to Spanish flu, World War I deaths

Study offers clues to how weather affected the world's deadliest disease outbreak

October 2020 — A new collaborative study by a group of scientists and historians finds a connection between the Spanish flu's European outbreaks, including its most deadly one at the end of World War I, and a six-year period of atrocious weather taking place at the time, which blew in cold temperatures and torrential rain from the North Atlantic.

The findings by a team led by Alexander More, a research associate in the Initiative for the Science of the Human Past at Harvard, combines ice-core data from a European glacier with epidemiological and historical records, as well as instrumental readings in order to map temperature, precipitation, and mortality levels from what they term a "once-in-a-century climate anomaly." They find the most miserable weather overlapped or just preceded peaks in Spanish flu mortality. The crests also coincide with some of the war's most notable battles in the years before the flu's arrival – the Somme, Verdun, Gallipoli. Historical accounts of those actions detail bloody warring between combatants additionally plagued by frostbite, water-filled trenches, and unending mud.

More, who is also an associate professor of environmental health at Long Island University and an assistant research professor at the University of Maine's Climate Change Institute, said though many other factors doubtless played roles in the outbreak's deadliness – not least the virus' natural virulence in a population whose immune systems had never seen it before – the unusual environmental conditions likely also played a role, causing crop failures, physically stressing millions of men living in precarious conditions, and potentially interrupting migratory patterns of waterfowl that are known to carry the disease.

While the rain and mud of the battlefields have been heavily chronicled, "the thing that we didn't know was what anomaly caused that," More said. "We also didn't know how that anomaly functioned, that it was a six-year anomaly. We didn't know the close pattern between the precipitation record and the pandemic. Basically, we saw a spike in cold, wet marine air from the northwest Atlantic that came down into Europe and lingered."

The work was published in the journal GeoHealth and supported by a grant from Arcadia, a charitable foundation of Lisbet Rausing and Peter Baldwin. It came about through a collaboration between researchers at Harvard, the University of Maine's Climate Change Institute,

Rain and mud in WWI battlefields have long been chronicled. In August 1917, a team of stretcher bearers struggle through deep mud to carry a wounded man to safety during the Battle of Boesinghe in Belgium. ***Source:*** **news.harvard.edu/**

the University of Nottingham — including archaeologist and historian Christopher Loveluck — and Long Island University. The findings are the latest to stem from an ongoing partnership between Harvard's Initiative for the Science of the Human Past and the University of Maine's Climate Change Institute. The project pairs Harvard historians and University of Maine climate scientists who've drilled and analyzed a 72-meter ice core from the Colle Gnifetti glacier on the Swiss/Italian border.

"The fact of the matter is that the ice core has been full of surprises … when we applied for the grant we did not expect to shed light on the flu pandemic of 1918 and weather conditions in the trenches of World War I," said Michael McCormick, Harvard's Francis Goelet Professor of Medieval History, chair of the Initiative on the Science of the Human Past, and a senior author on the paper. "With the ice core – over 100 years – you can see what you can't with the historical record, that this was an extraordinary anomaly."

Climate Change Institute Director Paul Mayewski, another senior author, said their analysis included chemical proxies for 60 different variables and is able to detect changes in the ice column that relate to specific storms. The most meaningful find was elevated concentrations of sodium and chloride – a marker of the anomaly's origin in the salty waters of the North Atlantic – between 1914 and 1919 that were unmatched in 100 years.

Alex More, research associate in the Initiative for the Science of the Human Past at Harvard.

"…it was the combination of a pandemic and climate change, and we all know that that's exactly what's happening right now."

"The environment is a complex system. We can't account for all variables of how climate affects the outbreak of disease, but we know for a fact that it does."

Senior author Michael McCormick. — *The Harvard Gazette* *Source:* news.harvard.edu

Mayewski said an important factor in enabling the findings was the central European location of the glacier from which the core was taken.

"The closer the ice core is to the action, the more relevant it is," Mayewski said. "I think the most interesting thing [is] that, in a bad sense, a perfect storm occurs. … In this particular case it was the combination of a pandemic and climate change and we all know that that's exactly what's happening right now. In the case of World War I, the people who were impacted by this – up to 500 million – were even less likely to get through it because of all the stresses that were already in existence, everything from the battlefield to malnutrition."

Historical accounts of conditions at the front commonly mention torrential rains that filled trenches with water, keeping troops continually soaked, and creating seas of churned mud that swallowed horses, machines, even men. More cited poet Mary Borden, a war nurse and suffragette, who after The Somme wrote "The Song of the Mud," in which she refers to the muck as "the vast liquid grave of our armies" whose "monstrous, distended belly reeks with the undigested dead."

The study picked up three peaks of heavy rains followed by spikes in mortality in 1915 and 1916, which led to crop failures and hardship during what was called the "turnip winter" in Germany. The final leap in 1918 preceded the Spanish flu's most deadly wave in autumn as the war was drawing to a close.

Though debate remains over the Spanish flu's origins, there seems little doubt about the deadly impact of waves that began in the spring of 1918 and its connection to wartime troop movements. Though estimates vary, it is thought to have infected 500 million and killed 30 million to 50 million.

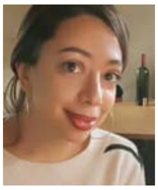
"The environment is a complex system," More said. "We can't account for all variables of how climate affects the outbreak of disease, but we know for a fact that it does." —By Alvin Powell *Source:* https://news.harvard.edu/gazette/story/2020/10/study-offers-clues-to-how-climate-affected-1918-pandemic/

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!

Air quality assessment during COVID-19 and ongoing activities by CNR IBE – Institute of BioEconomy







By Giovanni Gualtieri (giovanni.gualtieri@ibe.cnr.it), Lorenzo Brilli, Alice Cavaliere, Federico Carotenuto, Beniamino Gioli, Carolina Vagnoli and Alessandro Zaldei

National Research Council–Institute of BioEconomy (CNR-IBE), Firenze, Italy

This article summarizes the following recently published papers:

- Gualtieri G, et al. (2020) Quantifying road traffic impact on air quality in urban areas: a Covid19-induced lockdown analysis in Italy. *Environmental Pollution* (https://doi.org/10.1016/j.envpol.2020.115682)
- Carotenuto F, et al. (2019). Long-Term Performance Assessment of Low-Cost Atmospheric Sensors in the Arctic Environment. *Sensors* (https://doi.org/10.3390/s20071919)
- Cavaliere A, et al. (2018). Development of low-cost air quality stations for next generation monitoring networks: Calibration and validation of $PM_{2.5}$ and PM_{10} sensors. *Sensors* (https://doi.org/10.3390/s18092843)
- Zaldei A, et al. (2017). An integrated low-cost road traffic and air pollution monitoring platform for next citizen observatories. *Transportation Research Procedia* (https://doi.org/10.1016/j.trpro.2017.06.002)

Quantifying the impact of road traffic on air quality in urban areas: a Covid19-induced lockdown analysis in Italy

Following the coronavirus (Covid-19) outbreak and its spread worldwide in 2020, several restrictive measures have been taken by governments. Many of these measures have had great impact on the transportation sector and offer an unprecedented opportunity to assess how a substantial abatement of road traffic results in air quality changes in urban areas. This study aimed at assessing how urban air quality changed in Italy following the Covid-19 lockdown measures and quantifying the contribution of road traffic emissions to urban atmospheric pollution. Two temporal scenarios have been defined: a "lockdown" scenario in 2020 (24/02/2020 – 30/04/2020), when the restrictive measures greatly affected traffic mobility, and a baseline scenario (25/02/2019 to 02/05/2019), corresponding to basically undisturbed traffic mobility conditions during the same period of the year in 2019. The analysis focused on six out of the eight most populated urban areas in Italy, affected by very different climatic conditions: Milan, Bologna, Florence, Rome, Naples, and Palermo (Fig. 1).

Figure 1. Location of the six selected urban areas in Italy.

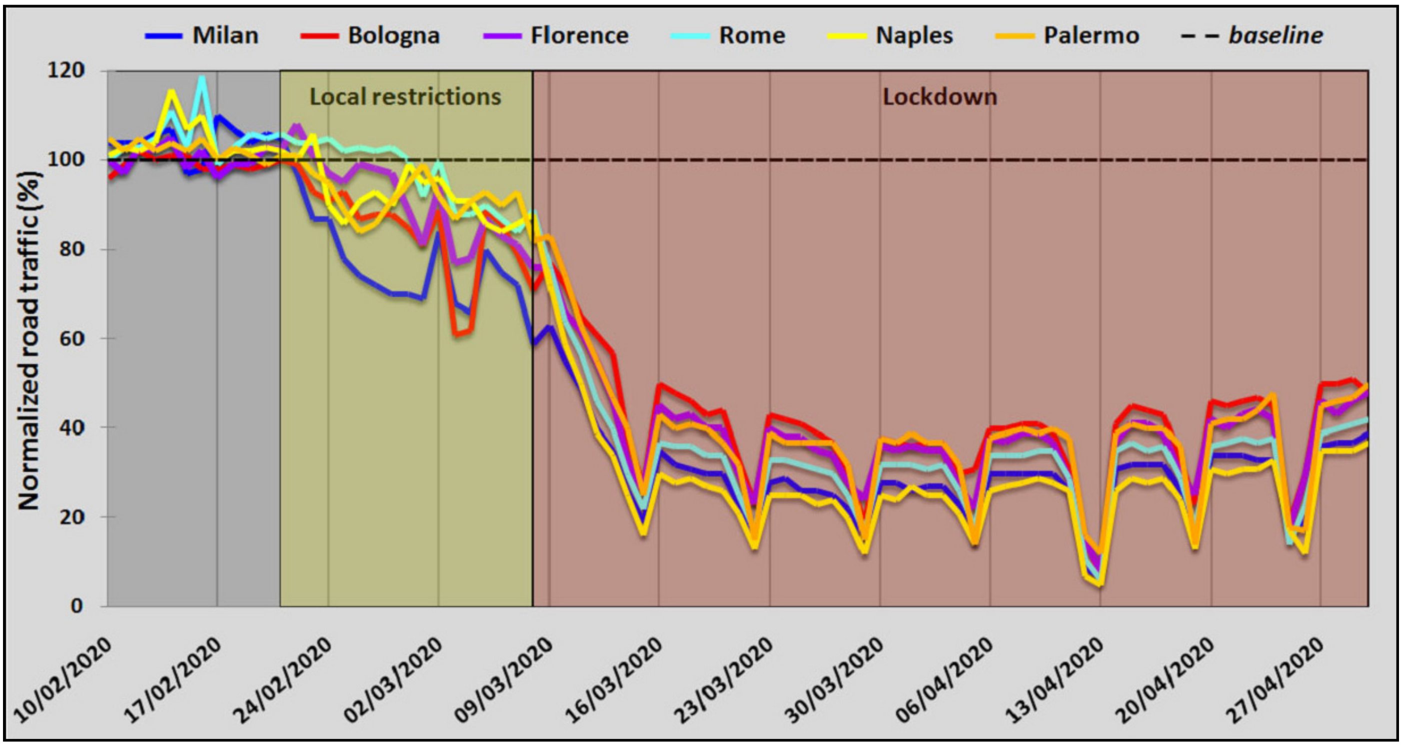


Figure 2. Time series of daily road traffic mobility observed over the selected urban areas (10/02/2020 – 30/04/2020). Values are normalized by day of week to those observed during the period 13/01/2020 – 02/02/2020 taken as a baseline scenario. The periods of local restrictions (21/02/2020 – 07/03/2020) and lockdown measures (08/03/2020 – 30/04/2020) are also shown. Mobility data source: EnelX & HERE (2020).

Air quality, meteorological and road mobility daily observations were used. Air pollutants including NO_2, O_3, $PM_{2.5}$ and PM_{10} were considered. NO_2, $PM_{2.5}$ and PM_{10} data were obtained from urban traffic (UT) and urban background (UB) air quality stations, while O_3 data were obtained from suburban background (SB) and UB stations. Meteorological data included air temperature (*T*), relative humidity (*RH*), wind speed (*WS*), wind direction (*WD*), rainfall (*Rain*), and global solar radiation (*Rad*). Road mobility data have been derived in terms of daily normalized variations with respect to a baseline scenario, using the online platform by EnelX & HERE (https://enelx-mobilityflowanalysis.here.com/dashboard/ITA/info.html).

Traffic mobility time series observed between 10/02/2020 and 30/04/2020 over all the municipalities expressed as values by day of week normalized to the baseline scenario (13/01/2020 – 02/02/2020, considered as representative of mobility conditions across the 2019 baseline period), are presented in Fig. 2. After the start of the nationwide lockdown (11/03/2020), mobility trends were very similar across all cities.

For each urban area, the boxplots of 2020-to-2019 change rates have been plotted for all pollutants, main meteorological parameters (*T* and *WS*) and road traffic mobility. As a sample, the boxplot in the city of Milan is presented herein (Fig. 3).

NO_2 concentrations significantly dropped over all urban areas in 2020 with respect to 2019 (from –24.9% in Milan to –59.1% in Naples). This NO_2 reduction (Fig. 3) was lower than total traffic reduction (Fig. 2) likely as heavy-duty traffic – emitting higher NO_x emissions than passenger cars – reduced by a lower amount than the latter. According to statistics by ANAS (https://www.stradeanas.it/en), heavy-duty traffic reduced by 24.8% in March 2020 and 39% in April 2020, while total traffic reduced by 55% and 75%, respectively. O_3 concentrations slightly decreased in Naples, remained basically unchanged in Bologna and Florence, and increased in Milan, Rome, and Palermo. The main cause of this O_3 increase could be the reduction of NO emitted from road vehicles, leading to a lower O_3 consumption (or titration, $NO+O_3=NO_2+O_2$). This phenomenon is exacerbated by the fact that urban areas are typically VOC-limited environments. Herein a NO_x

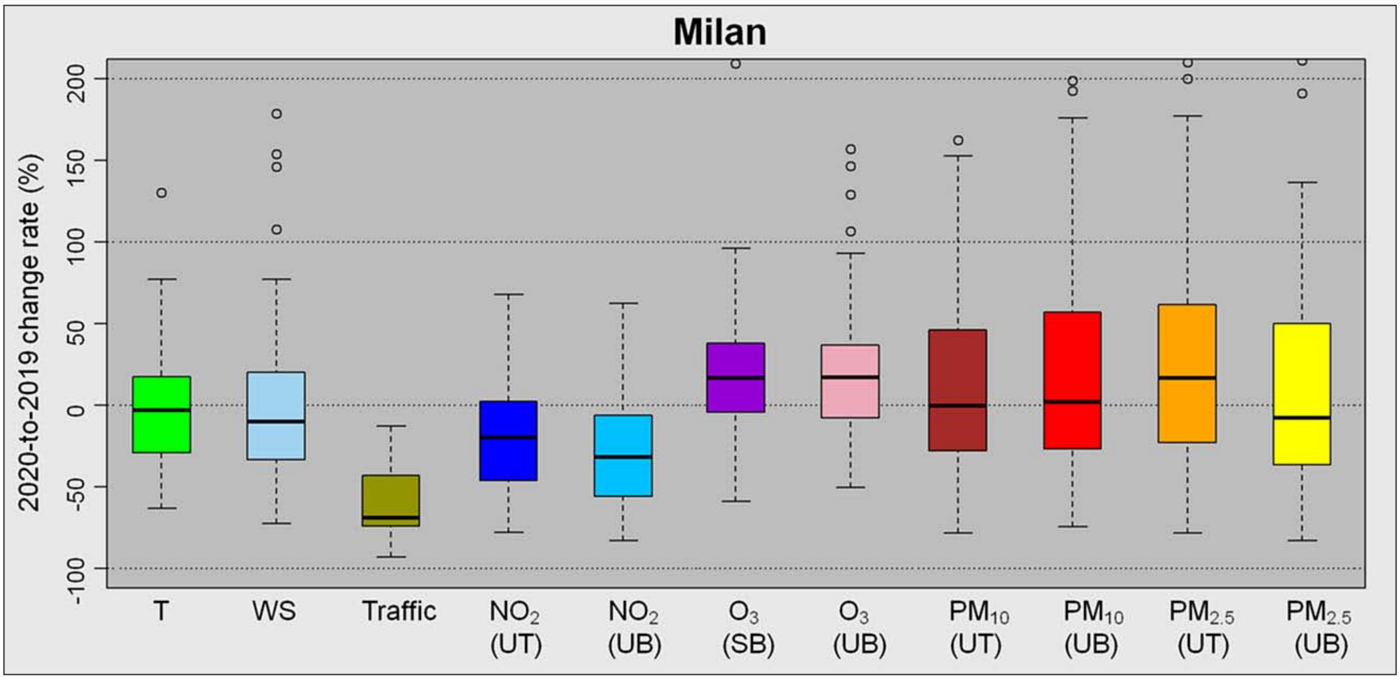


Figure 3. Boxplots of 2020-to-2019 change rates of daily observations in the city of Milan. Concentrations by station type of NO_2, O_3, PM_{10} and $PM_{2.5}$, air temperature (T), wind speed (WS), and road traffic are presented.

reduction may worsen O_3 pollution if not coupled with a concurrent VOC reduction. PM_{10} levels decreased to a lesser extent than expected during the lockdown, with reductions up to 31.5% in Palermo as well as increases up to 7.3% in Naples. A larger population fraction forced to remain at home, and colder weather than in 2019 (as *T* decreased on average by 0.2 °C in Rome to 0.8 °C in Bologna) led to higher fuel consumption for heating, including gas and biomass fuels, which are well-known large emitters of $PM_{2.5}$ and particularly $PM_{2.5}$ primary emissions. According to the INEMAR emission inventory in the Lombardy region (http://www.inemar.eu/xwiki/bin/view/InemarDatiWeb/Fonti+dei+dati), in Milan, for example, the weight of PM_{10} emissions from heating may reach 45% in February and 37% in March, while for $PM_{2.5}$ these shares increase up to 51% and 43%, respectively. A significant role was also played by the increase in emissions of NH_3, which is a recognised precursor of secondary aerosol. NH_3 emissions mostly result from agriculture activities that increased during the lockdown with respect to the corresponding months in 2019. $PM_{2.5}$ decreased to a lesser extent than $PM_{2.5}$ (Fig. 3). Among UT stations, $PM_{2.5}$ only reduced in Florence (–17%), while among UB stations, $PM_{2.5}$ only reduced in Milan; elsewhere, $PM_{2.5}$ concentrations matched or exceeded the 2019 amounts.

In conclusion, this study confirmed the complex nature of atmospheric pollution. Even when a major driver of pollutant emissions is clearly isolated and controlled, the strong non-linearity of atmospheric processes and the prominent role played by meteorological conditions in pollution formation and removal should be taken into account. This study demonstrated that, at least in economically developed countries, a radical traffic ban extended to the whole country for about 2 months significantly reduced only NO_2 levels. $PM_{2.5}$ and PM_{10} concentrations, whose containment is generally enforced adopting traffic restriction measures in urban areas, were affected to a minor extent. Stable and permanent rather than temporary actions, such as the 2020 lockdown, are needed to reduce emissions to the atmosphere across all relevant categories and species in a true decarbonisation effort, to obtain significant benefits for air quality and public health.

AIRQino: a low-cost air quality station for next generation monitoring networks

During the last few years, CNR-IBE developed a low-cost air quality station – named AIRQino – for real-time monitoring of main atmospheric pollutants. A set of industrial sensors for air temperature, relative humidity, CO, CO_2, NO_2, O_3, VOC, $PM_{2.5}$ and

Figure 4. Pictures of the AIRQino monitoring station: (left) closed; (right) open.

PM_{10} were integrated on an Arduino Shield compatible board (Fig. 4). Collected readings are archived on a spatial data infrastructure composed of a central GeoDatabase, a GIS engine, and a web interface.

The $PM_{2.5}$ and PM_{10} sensors underwent a laboratory calibration and later a field validation. Laboratory calibration was carried out at the headquarters of CNR-IBE in Florence (Italy) against a TSI DustTrak reference instrument. A Matlab procedure, implementing advanced mathematical techniques to detect possible complex non-linear relationships between sensor signals and reference data, was developed and implemented to accomplish the laboratory calibration. Field validation was performed across a full "heating season" (1 Nov 2016 to 15 Apr 2017) by co-locating the station at a road site in Florence where an official fixed air quality station was in operation. Both calibration and validation processes returned fine scores. During field validation, for $PM_{2.5}$ and PM_{10} mean biases of 0.036 and 0.598 μg/m^3, RMSE of 4.056 and 6.084 μg/m^3, and R^2 of 0.909 and 0.957 were achieved, respectively. Robustness of the station, successfully deployed for a five-and-a-half-month outdoor campaign without registering sensor failures or drifts, was a further key point.

Reliability and endurance of AIRQino was also checked during a long-term deployment over an extreme environment. AIRQino was deployed for one year in the Svalbard archipelago (Arctic region) and its outputs compared with reference sensors (Fig. 5).

Results showed good agreement with the reference meteorological parameters (air temperature and relative humidity) with correlation coefficients above 0.8 and small absolute errors (≈1 °C for temperature and ≈6% for humidity). Particulate matter low-cost sensors showed a good linearity ($r^2 \approx 0.8$) and small absolute errors for both $PM_{2.5}$ and PM_{10} (≈1 μg/m^3 for $PM_{2.5}$ and ≈3 μg/m^3 for PM_{10}), while overall accuracy was impacted both by the unknown composition of the local aerosol, and by high humidity conditions likely generating hygroscopic effects. CO_2 exhibited a satisfying agreement with r^2 around 0.70 and an absolute error of ≈23 mg/m^3. Overall, these results, coupled with an excellent data coverage and little need for maintenance, made the AIRQino or similar devices interesting tools for future extended sensor networks in the Arctic environment. The AirQino is currently being used in a range of other projects, including the Prato Urban Jungle project and the TRAFAIR project.

In the framework of the Urban Innovative Actions (UIA) launched by the UE, the "Prato Urban Jungle" project (http://www.pratourbanjungle.it) implements various scales of Urban Forestry interventions to radically improve the social and environmental quality of the urban context. This is accomplished by combining Nature-Based Solutions developed through innovative and sustainable technologies

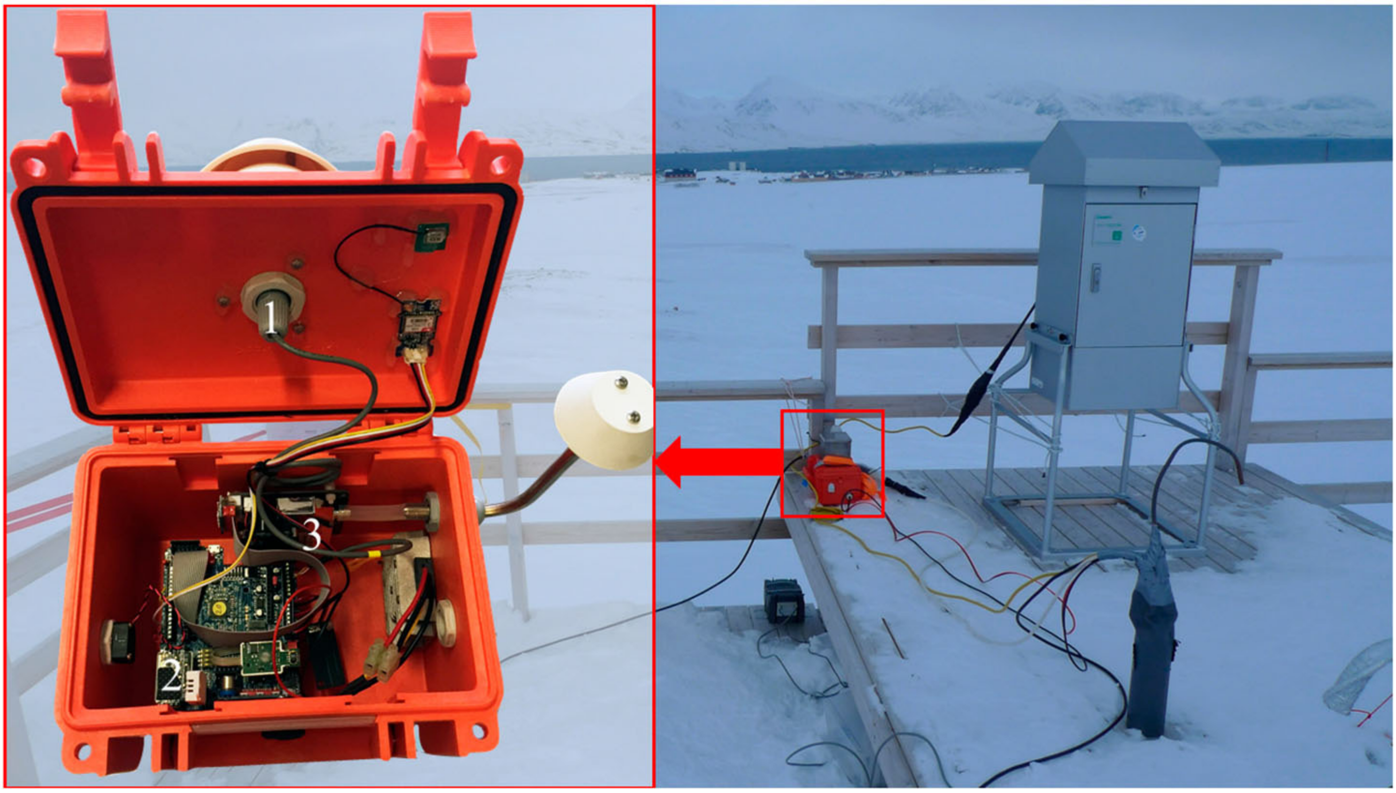


Figure 5. Positioning of AIRQino on the roof of the Gruvebadet Atmospheric Laboratory (GAL) and interiors of the rugged enclosure highlighting the temperature and relative humidity sensors (1), the CO_2 sensor (2), and the particulate matter sensor (3). The snow protection cage is visible in the small red box on the right.

specially designed and applied to green facades and roofs. CNR-IBE contributes to the project by deploying a network of AIRQino stations in order to assess the state of the environment and air quality before, during and after reforestation interventions, with *ex-ante* and *ex-post* approaches allowing to quantify the benefits of the interventions.

The "Understanding traffic flows to improve air quality" (TRAFAIR) project (http://trafair.eu), funded by the EU, aims at developing a service that combines data on air quality, weather conditions, and traffic flows in order to allow citizens and municipalities to estimate the level of air pollution resulting from varying traffic flow conditions.

The service is deployed over six European cities: Zaragoza and Santiago de Compostela (Spain); and Modena, Florence, Livorno, and Pisa (Italy). CNR-IBE contributes to the project by deploying a number of AIRQino stations over the cities of Florence, Livorno, and Pisa.

Balneário Camboriú: The "Brazilian Dubai" – and the greatest verticalization process in the southern hemisphere

Figure 1. Balneário Camboriú/SC, seen from the Cristo da Barra viewpoint, located northwest of the urban area, at 110 meters altitude. ***Photo: Cássio Arthur Wollmann, fieldwork (March 2020).***

Located on the northern coast of the state of Santa Catarina, in southern Brazil, at a subtropical latitude of 27º 00′ South, and longitude 48º 30′ West, the municipality of Balneário Camboriú population is estimated to have reached 146,000 people, according the Brazilian Institute of Geography and Statistics (IBGE, 2020) and a demographic density of 2,334 inhab/km². It is on this shoreline, less than 6 kilometers long, that the most pronounced verticalization process in Brazil – and also in the entire Southern Hemisphere - is observed (Figure 1).

This verticalization process is not new to this city; it actually dates back to the 1950s, when then Brazilian vice-president Mr. Goulart chose to build his summer house here, so that the city became known as "the President's beach". Since then, Balneário Camboriú and verticalization have become synonymous. However, skyscrapers with more than 50 floors are a novelty introduced to the city in the last decade.

Balneário Camboriú was developed on a road network typical of a Brazilian fishing village from the early 20th century – with the result that the skyscrapers are too close to each other. The closer to the shore, the taller the buildings. These high-rise buildings create a specific intra-urban climate that is unique in the world and deserves urgent attention. Verticalization can have a dramatic effect on outdoor users' thermal perception. These can be positive and negative, for example, depending on the orientation of the coastline, the time of day and time of year, the buildings can provide shade on the beaches (Figure 2).

The relationship between the atmosphere and human activities has been studied for centuries. One of the most relevant environmental aspects related to the daily lives of urban populations is the well-being of an individual, which from the climatic point of view is directly linked to the particular environmental characteristics of each region (Gobo et al., 2018).

Thermal comfort is defined as the feeling of well-being experienced by a person as a result of the satisfactory combination of climatic variables in a given environment (Auliciems, 1976). The American Society of Heating, Refrigerating and Air-Conditioning Engineers (ANSI/ASHRAE, 1992) conceptualizes thermal comfort as *"a state of mind that reflects satisfaction with the thermal environment that surrounds the person"* (ASHRAE 2010, p.7).

Thus, knowing the relationships between regional and local climatic variables, as well as the physical characteristics of an urban area, their influence on the occurrence of heat and freshness islands, on the dispersion of pollutants and on the areas most affected by extreme precipitation events is of vital importance for understanding the spatial distribution of human thermal comfort and its possible relationship with the morphology and urban density of cities (Gobo et. al., 2019), including those located in coastal regions of oceanic temperate climates (Shooshtarian and Rajagopalan, 2019; Shooshtarian, 2015), which are also subject to the expected changes in future climate scenarios.

In an attempt to understand urban microclimates subject to a high verticalization rate and intense landscape diversity, Stewart (2011; 2018) developed the Local Climate Zones (LCZ) method to characterize the urban environment. LCZ are a contemporary perspective very useful for investigating microclimate variability and can inform about potential mitigation of microclimatic problems, mainly related to the (dis)comfort of the population and the cleaning (ventilation) of the urban atmosphere.

The research in Balneário Camboriú follows Stewart's theoretical and methodological line of investigation. It is assumed that the sharp and uninterrupted urban morphology evolution in Balneário Camboriú promotes changes in the dynamics of the city's thermo-hygrometric field, also influencing the human comfort of the population in open spaces, as well as in the concentration of suspended particulate matter, and in areas at risk from extreme precipitation events. Such changes can even be investigated within the scope of future climate scenarios.

Verticalization in subtropical climatic environments can have enhanced effects when compared to tropical and equatorial environments, given the available solar energy and its varying distribution throughout the day, especially in the summer. Studies in large coastal metropolises, such as New York, Los Angeles, Tokyo, Nicosia, Athens, Singapore and Hong Kong serve as a reference, but, although they are coastal, they are not in the same subtropical latitude as Balneário Camboriú and they do not bring the same geourban conditions.

To this end, we seek to investigate this particular urban microclimate through six research objectives as follows:

1) determination of local climatic zones;

2) exploring the genesis, intensity, frequency, duration and spatialization of UHI;

3) evaluation of human thermal comfort in open spaces in Balneário Camboriú;

4) monitoring of particulate matter suspended in the urban atmosphere;

5) occurrence of extreme precipitation events that occurred and urban vulnerability;

6) projection of future microclimatic scenarios in possession of the biometeorological results of the surveyed population.

In the recognition that it is impossible to carry out an investigation of such magnitude alone, and in the perspective of creating research networks at the national and international levels, a group called "BCC Project" (Balneário Camboriú Climate Project) was created drawing on the knowledge and expertise of the following academics:

- Prof. Dr. Cássio Arthur Wollmann[1], Federal University of Santa Maria (UFSM), and linked to the Post-Graduate Program in Geography.
- Prof. Dr. João Paulo Assis Gobo[2], the Federal University of Rondônia (UNIR), and linked to the Post-Graduate Program in Geography.
- Prof. Dr. Júlio Barboza Chiquetto[3], PhD in Geography and PhD candidate at the Institute for Advanced Studies (IEA-USP), in the USP Global Cities Program.
- Dr. Salman Shooshtarian[4], Research Fellow School of Property, Construction and Project Management, RMIT University, Melbourne, Australia.
- Davi Hanel Rotilli Junior[5], the Federal University of Santa Catarina, Civil Engineer.

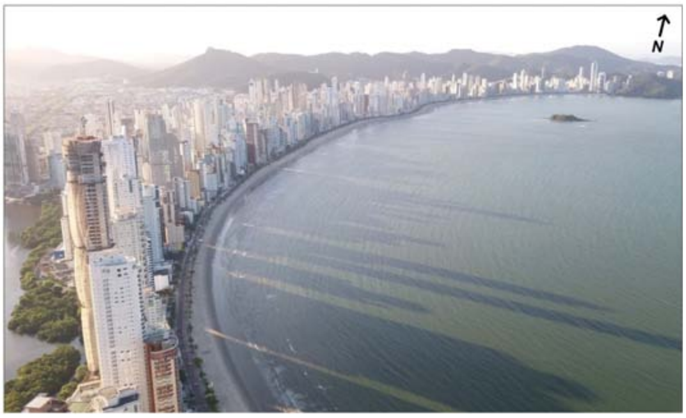


Figure 2. Shading of Central beach in the afternoon. Photo taken from the top of Pasqualotto & GT YACHTHOUSE by Pininfarina (81 floors), which does not cast its shadow over the beach. ***Photo: Cássio Arthur Wollmann (Nov. 2019).***

We acknowledge our collaboration with Dr. Salman Shooshtarian as an active researcher in the field of human thermal comfort in outdoor spaces. He has researched thermal comfort in Australian coastal cities (Southern Hemisphere). Given that Melbourne is 30º south latitude (Shooshtarian et al., 2020), only 3º south of Balneário Camboriú, there is a lot of information and knowledge to be shared between Brazil and Australia.

Carrying out a project of this magnitude required, beforehand, the creation of a network of collaboration and cooperation between institutions in Balneário Camboriú and the Federal University of Santa Maria. Equipment will be installed at almost 30 different points throughout the municipal territory. In addition to private and public companies, active partners include the City Council, the Firefighters and the Municipal Sanitation Company (EMASA[6]), with which UFSM signed a technical cooperation agreement at the end of 2019.

An unprecedented collaboration was made with Pasqualotto & GT YACHTHOUSE by Pininfarina[7], the builder of the tallest residential building in Brazil, with 81 floors and almost 300 meters high (Figure 3a). Equipment will be installed on top of the building as well as at ground level. Another unprecedented collaboration made for this research was with Austrian multinational Metos (Figure 3b), which will provide rain gauges and anemometers for the research, being, therefore, one of the main private partners of the research.

The official installation of the equipment was scheduled for May 2020, but with the COVID-19 related restrictions, the researchers postponed the installation of the equipment for one year.

[1] https://orcid.org/0000-0003-1932-3398
[2] https://orcid.org/0000-0003-4461-2570
[3] https://orcid.org/0000-0002-4013-7947
[4] https://orcid.org/0000-0002-6991-8931
[5] http://lattes.cnpq.br/1276061750762974
[6] http://www.emasa.com.br/
[7] https://www.pasqualottoegt.com.br~pininfarina
[8] www.ufsm.br/ppggeo

In addition to the human resources training in Brazilian graduate programs, with emphasis on the Graduate Program in Geography (PPGGEO[8]) of the Federal University of Santa Maria, which houses the Laboratory of Climatology in Subtropical Environments (LaCAS), the production of knowledge based on research of natural and anthropogenic sources of atmospheric pollution, combined with the seasonal dynamics and the exposure of the population determined by the comparison between the different urban microenvironments, is a key part of the research. It is also fundamental for informing environmental public policies to address air quality issues, which must be considered from an environmental governance perspective integrated with other sectors of society and other governmental spheres.

In this context, the research also concerns the Sustainable Development Goals (SDGs) of the UN 2030 Agenda, especially in the fields of thermal comfort issues and respiratory diseases caused by urban pollution (SDG 03). The scientific publications will aim at policies and ideas for an efficient, intelligent and sustainable city (SDG 11); and provide theoretical foundations for resilience studies and adaptation to climate-related risks can be built, with active contributions to public policies (SDG 13). The results obtained can be expected to generate unprecedented analyses in Brazilian urban climatology and be of great interest to the international community.

References

ANSI/ASHRAE (1992) ANSI/ASHRAE Standard 55: Thermal Environmental Conditions for Human Occupancy. Atlanta: American Society of Heating, Refrigerating and Air-conditioning Engineers.

Auliciems, A. (1976) Weather Perception: a subtropical study. In: Weather. Toronto: Royal Meteorogical Society, .

Gobo, J. P. A.; Faria, M. R.; Galvani, E.; Amorim, M. C. C. T.; Celuppi, M. C. Wollmann, C. A. (2019) Empirical Model of Thermal Comfort for Medium-Sized Cities in Subtropical Climate. *Atmosphere* 10: 576-593.

Figure 3. (A) Collaboration with Pasqualotto GT (Yachthouse by Pininfarina building); and (B) Metos Brasil weather stations. ***Photo: Cássio Arthur Wollmann (2020). Metos:*** [***https://www.metos.com.br/estacoes-meteorologicas/***](https://www.metos.com.br/estacoes-meteorologicas/)

Gobo, J. P. A.; Galvani, E.; Wollmann, C. A. (2018) Subjective Human Perception Of Open Urban Spaces In The Brazilian Subtropical Climate: A First Approach. *Climate* 6: 1–12.

Shooshtarian, S.; Lam, C. K. C.; Kenawy, I. (2020) Outdoor thermal comfort assessment: A review on thermal comfort research in Australia. *Building and Environment* 177 (15). 1-13. 2020.

Shooshtarian, S.; Rajagopalan, P. (2019) Perception of Wind in Open Spaces. *Climate* 7 (106): 1-17.

Shooshtarian, S. (2015) Socio-economic Factors for the Perception of Outdoor Thermal Environments: Towards Climate-sensitive Urban Design. *Global Built Environment Review* 9 (3). 39-53.

Stewart I. D. (2018) Developing a field guide to identify 'local climate zones' in cities. In: 10th International Conference on Urban Climate & 14th Symposium on the Urban Environment, New York City, USA. .

Stewart, I. D. (2011) A systematic review and scientific critique of methodology in modern urban heat island literature. *International Journal of Climatology* 31: 200–217.





Dr. Cassio Arthur Wollmann - Federal University of Santa Maria (cassio_geo@yahoo.com.br)

Dr. João Paulo Assis Gobo - Federal University of Rondônia

Dr. Júlio Barboza Chiquetto - University of São Paulo

Dr. Salman Shooshtarian - RMIT University

Eng. Davi Hanel Rotilli Junior - Federal University of Santa Catarina

Amidst a global pandemic, daylight shines on urban rivers

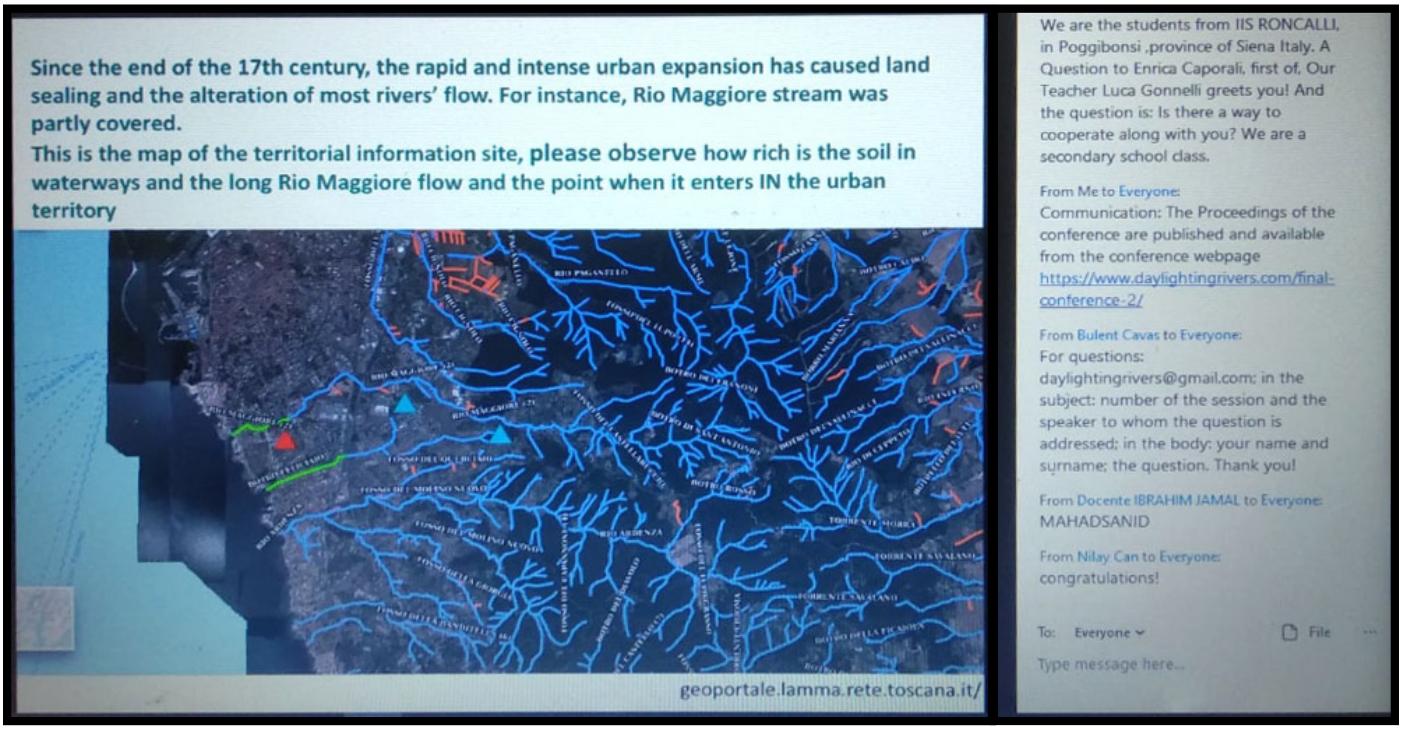
"Daylighting Rivers" international conference looks at the future of urban waterways in a changing climate

As the world's attention focuses on the ongoing public health crisis, catastrophic heat waves and flooding around the world continue to remind us of the parallel crisis of global climate change. Cities, meanwhile, are also forced to consider the challenges of ***local*** climate change – and the fact that urbanization has compounded the threat of both rising temperatures and destructive flood events by sealing more and more terrain underneath concrete and asphalt. This includes watercourses that once flowed freely through the city: to give but one example, Florence has some 30 "hidden" rivers flowing under its surface, all of which form an essential part of the urban drainage system but are visually and functionally disconnected from the landscape of the city.

It is precisely in facing the environmental and health challenges of our time, however, that exposed urban rivers have a crucial role to play. This is not just because of their cooling effects and water absorption capacity, but also because of the many other ecosystem services that urban streams and water bodies can offer – from enhancing the biodiversity of flora and fauna, to providing recreation and respite from the hard confines of the city, to bolstering the actual resource of clean and fresh water.

On 1-2 December 2020 these issues came into sharp focus at an international online conference entitled "Daylighting Rivers: Inquiry Based Learning for Civic Ecology," which also marked the culmination of the Daylighting Rivers project carried out in the framework of the European Erasmus+ Programme. Over the course of the project (2017-2020), the concept of "daylighting" took on a dual significance: envisioning the liberation of underground rivers by exposing them to the open air, and at the same time shedding light on the problems of urban ecosystems by engaging the inquisitive young minds of future decision-makers.

The Daylighting Rivers project engaged secondary school students in inquiry-based and interdisciplinary learning, focusing on urban land and river use and transformations, with an emphasis on the ways in which urban growth impacts local river ecosystems. Three pilot schools in European countries (Italy, Greece and Spain) successfully implemented this approach, through learning units which investigated different aspects of the local rivers, from their biodiversity to the environmental threats they face. In the framework of the project, the international competition "Schools in Action for Daylighting Rivers" brought together groups of students eager to discover the rivers of their area and to inspire global action for sustainability. The winners of the competition were announced on the second day of the conference, which despite the constraints of a global pandemic attracted nearly 200 enthusiastic online attendees.



River management in a changing climate

The conference showcased scientific and professional case studies on innovative education methodologies, "gamification" and the use of digital technologies, citizen science and public participation, and river management and restoration. Among the sessions of the conference, one in particular focused on the connection between urban rivers and climate. Entitled "River management in a changing climate," this series of five presentations offered a range of perspectives on the crucial functions fulfilled by water in cities.

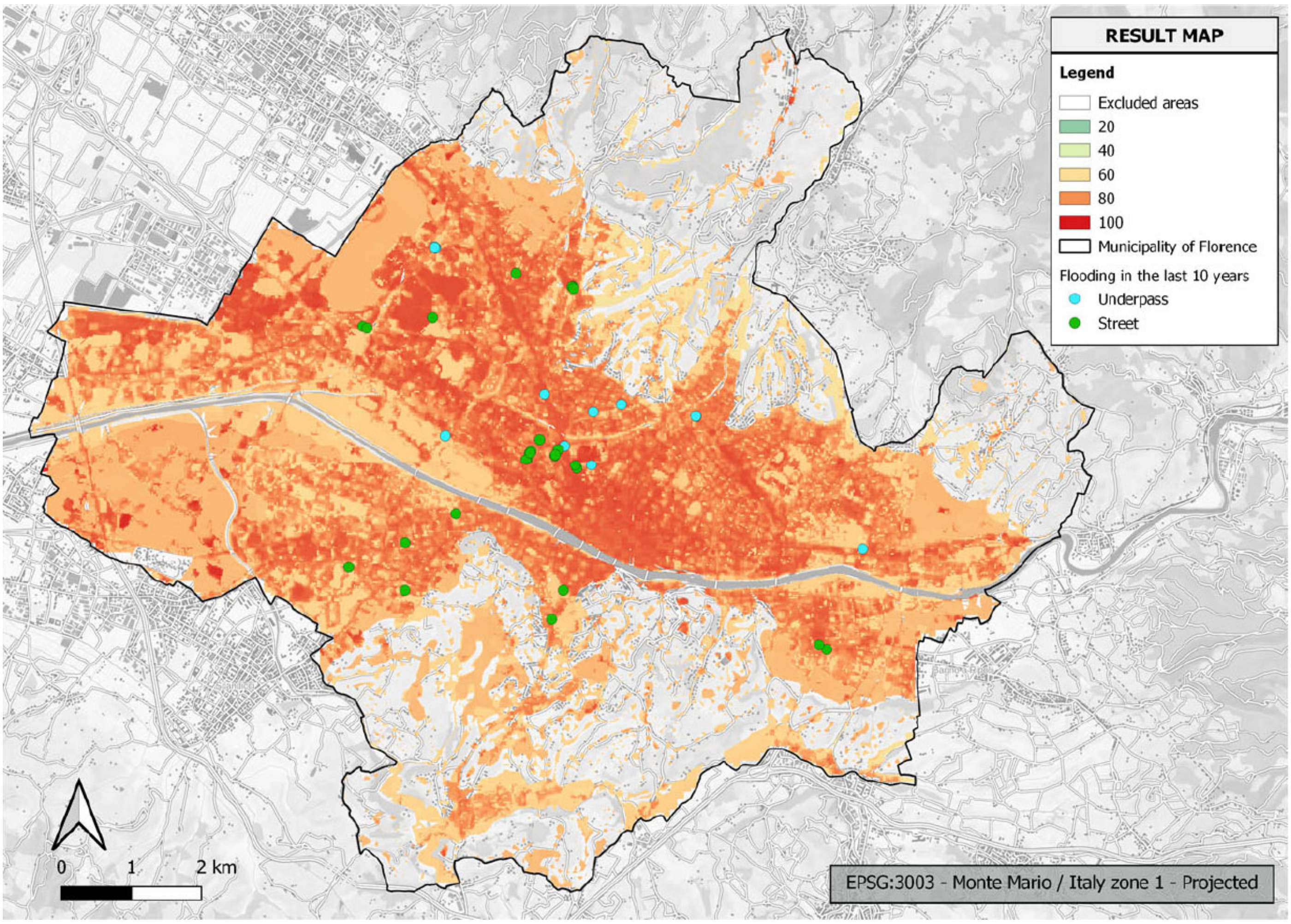
The first speaker was **Bernardo Gozzini**, a researcher at the Italian National Research Council's Institute of Bioeconomy (IBE-CNR) and Director of the Lamma Consortium, which combines research and innovation in the fields of climatology, geology and GIS with service to the community. His presentation addressed the economic and social effects of the climate crisis, and stressed that in terms of impacts on human health, heat waves were the deadliest extreme climate event over the past several decades. Other extreme events such as heavy rainfall and drought, which continue to cause economic damage and have significant consequences for society, were also analyzed in order to identify signs of climate change at both the global and local level.

Andrea Sbandati from Confservizi Toscana in Florence addressed urban rivers as sources of water, and emphasized that companies which provide water services should consider local resources in a more holistic way – since these water providers are typically not involved in managing the natural cycle of rivers, lakes, or underground sources from which water is withdrawn and to which wastewater is released. He gave an intriguing virtual tour of the historical aqueducts of Florence, from Roman times through the Renaissance, which are highlighted in a new public outreach program by the Publiacqua company whose goal is to educate citizens in Florence and engender a strong local identification with the city's hydraulic heritage.

The next speaker, **Gonzalo Barberá** from the Department of Soil and Water Conservation of CSIC-CEBAS in Murcia Spain, laid out the complex and contradictory dynamics that come into play in a water-related ecological crisis. His narrative described the eutrophication of the Mar Menor lagoon in the southeastern Iberian peninsula, and the ways that civil society and economic interest groups related to science in the advancement of policy positions. This picture is conditioned by the culture of science and youth education in particular, and thus raises the possibility that Inquiry-Based Learning can serve as a tool for positively changing the social dynamic in the long-term.

River restoration in the context of climate change was the topic of **Pier Mario Chiarabaglio**, a forest ecologist at the Research Centre of Forestry and Wood in Casale Monferrato (Italy). He pointed out that urbanization, together with agriculture and structural river modifications, have degraded the vast majority of European floodplains – and that climate change is expected to exacerbate the situation by increasing the risks of both flooding and drought. His presentation showed how European black poplar, which is one of the most important tree species of the natural floodplain forests and which is on the verge of extinction in several countries, has been targeted in conservation activities on the Po river basin in northern Italy – leading already to the restoration of more than 150 hectares.

Finally **Enrica Caporali**, a professor of hydrology at the University of Florence, capped the session with her presentation entitled "Planning nature-based-solutions through geographic information tools to manage flood risk in Florence's urban environment." She showed how innovative nature-based flood control strategies can make urban and peri-urban environments more resilient and sustainable, and provide integrated responses to future environmental, social and economic challenges. The possibilities were illustrated by the FLORENCE project, which employs a quantitative evaluation methodology supported by GIS tools in order to clarify the benefits and limitations of such strategies and to explore the possible synergies with existing infrastructures.

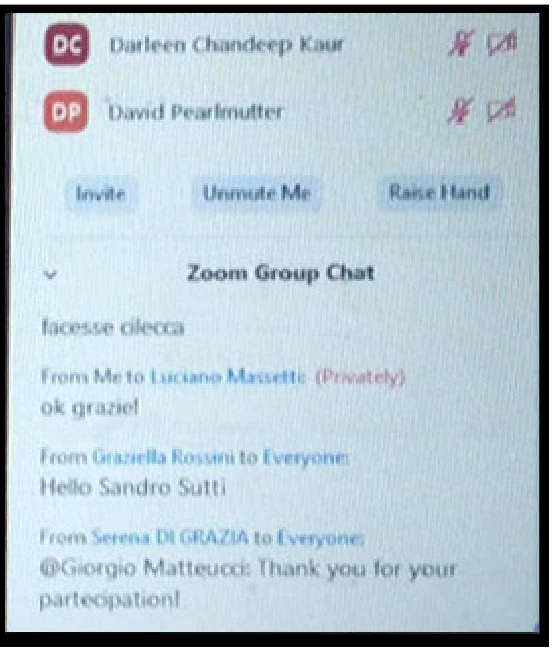


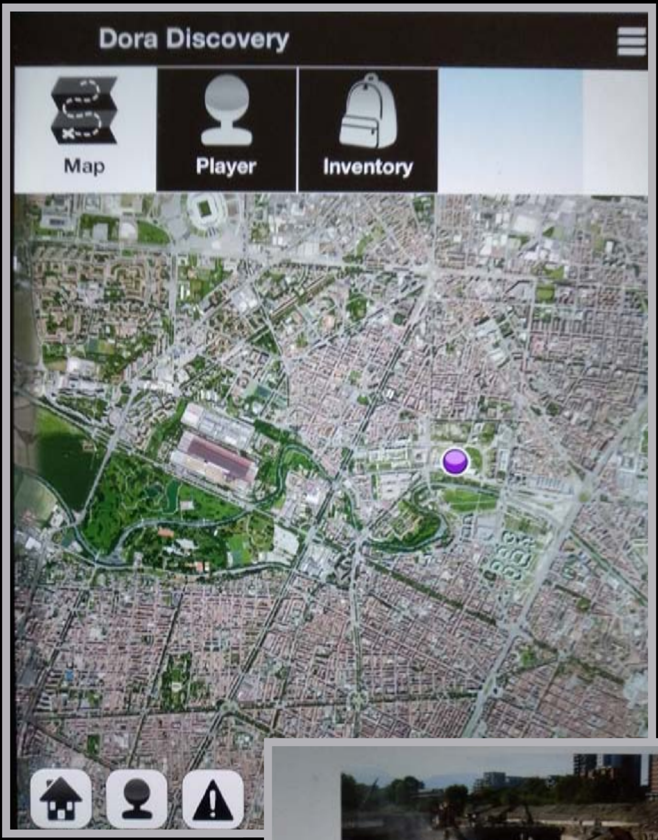
Map of potentially floodable areas in Florence presented by Enrica Caporali: the higher the value, the greater the exposure of the area to floods. First, a GIS based analysis was made in order to map Ecosystem Services (ES) priority areas, analysing the main ES supply and demand. This analysis was coupled with the identification of the constraints (regulatory, urban planning, economic, environmental, social) to realize a multicriteria zoning of Florence's urban environment, highlighting the potential areas for NBS implementation. Lastly, the selection of suitable NBS and their hydraulic modelling was carried out in the identified areas. This allowed the evaluation of NBS performance and the identification of scenarios that best respond to the city's green development needs.

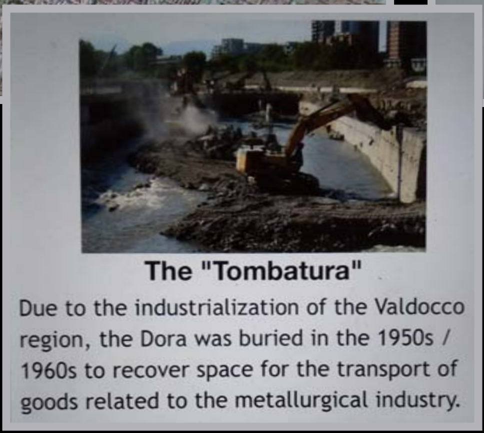
DAYLIGHTING RIVERS — SCIENCE EDUCATION FOR CIVIC ECOLOGY

The *Daylighting Rivers* project and final conference were coordinated by the Water Right Foundation and CNR Institute of BioEconomy in Florence, together with partner institutions from Italy, Greece, Spain, Turkey and the UK.

More information is available on the project website (www.daylightingrivers.com) or by contacting daylightingrivers@gmail.com.







As part of their entry in the Daylighting Rivers international competition, students from the **Santorre di Santarosa** school in Turin, Italy researched the transformation of the Dora river into a major park and "green lung" for their city. The students developed a "Location Based Game" to engage the public in their local heritage and build a sense of civic ecology.

Recent Urban Climate Publications

Adachi Y, Ikegaya N, Satonaka H, Hagishima A (2020) Numerical simulation for cross-ventilation flow of generic block sheltered by urban-like block array. *Building and Environment* 185 107174.

Agathangelidis I, Cartalis C, Santamouris M (2020) Urban Morphological Controls on Surface Thermal Dynamics: A Comparative Assessment of Major European Cities with a Focus on Athens, Greece. *Climate* 8 131.

Alrashoud K, Tokimatsu K (2020) An exploratory study of the public's views on residential solar photovoltaic systems in oil-rich Saudi Arabia. *Environmental Development* 100526.

Anjos M, Targino AC, Krecl P, Oukawa GY, Braga RF (2020) Analysis of the urban heat island under different synoptic patterns using local climate zones. *Building Environment* 185 107268.

Ascione F, Bianco N, Iovane T, Mastellone M, Mauro GM (2020) Is it fundamental to model the inter-building effect for reliable building energy simulations? Interaction with shading systems. *Building and Environment* 183 107161.

Bartesaghi-Koc C, Osmond P, Peters A (2020) Quantifying the seasonal cooling capacity of 'green infrastructure types' (GITs): An approach to assess and mitigate surface urban heat island in Sydney, Australia. *Landscape and Urban Planning* 203 103893.

Bie W, Fei T, Liu X, Liu H, Wu G (2020) Small water bodies mapped from Sentinel-2 MSI (MultiSpectral Imager) imagery with higher accuracy. *International Journal of Remote Sensing* 41 7912-7930.

Brambilla M, Ronchi S (2020) Cool species in tedious landscapes: Ecosystem services and disservices affect nature-based recreation in cultural landscapes. *Ecological Indicators* 116 106485.

Cai J, Chu B, Yao L, Yan C, Heikkinen LM, Zheng F, Li C, Fan X, Zhang S, Yang D, Wang Y, Kokkonen TV, Chan T, Zhou Y, Dada L, Liu Y, He H, Paasonen P, Kujansuu JT, Petaja T, Mohr C, Kangasluoma J, Bianchi F, Sun Y, Croteau PL, Worsnop DR, Kerminen V-M, Du W, Kulmala M, Daellenbach KR (2020) Size-segregated particle number and mass concentrations from different emission sources in urban Beijing. *Atmospheric Chemistry and Physics* 20 12721-12740.

Capel-Timms I, Smith ST, Sun T, Grimmond S (2020) Dynamic Anthropogenic activitieS impacting Heat emissions (DASH v1.0): development and evaluation. *Geoscientific Model Development* 13 4891-4924.

Caro C, Marques JC, Cunha PP, Teixeira Z (2020) Ecosystem services as a resilience descriptor in habitat risk as-

In this edition is a list of publications that have generally come out between **August and November 2020**. 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, the former chair of the BibCom, Dr. Matthias Demuzere, and Dr. Kathrin Feige decided to leave after contributing for over 8 years. Thank you, Matthias and Kathrin, for your enthusiasm and contribution to the community. Meanwhile, Dr. Huidong Li (Uppsala University, Sweden) joined the committee. Welcome!

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.

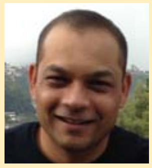
Happy reading,

Chenghao Wang
Chair IAUC Bibliography Committee
Stanford University (USA)
chenghao.wang@stanford.edu

The Bibliography Committee


Lilly Rose Amirtham


Anurag Bagade


Pravin Bhiwapurkar


Peter Crank


Rohinton Emmanuel


Lech Gawuc


Rafiq Hamdi


Julia Hidalgo


Huidong Li


Mathew Lipson


Martina Petralli


Aditya Rahul


Iara Santos

sessment using the InVEST model. Ecological Indicators 115 106426.

Cassidy-Bushrow AE, Burmeister C, Lamerato L, Lemke LD, Mathieu M, O'Leary BF, Sperone FG, Straughen JK, Reiners Jr. JJ (2020) Prenatal airshed pollutants and preterm birth in an observational birth cohort study in Detroit, Michigan, USA. *Environmental Research* 189 109845.

Chauhan A, Singh RP (2020) Decline in PM2.5 concentrations over major cities around the world associated with COVID-19. *Environmental Research* 187 109634.

Chen GW, Yang X, Yang HY, Hang J, Lin YY, Wang XM, Wang Q, Liu YL (2020) The influence of aspect ratios and solar heating on flow and ventilation in 2D street canyons by scaled outdoor experiments. *Building and Environment* 185 107159.

Chen JL, Quan Y, Gu M (2020) Aerodynamic interference effects of a proposed super high-rise building on the aerodynamic forces and responses of an existing building. *Journal of Wind Engineering and Industrial Aerodynamics* 206 104312.

Chen SS, Zhang W, Wong NH, Ignatius M (2020) Combining CityGML files and data-driven models for microclimate simulations in a tropical city. *Building and Environment* 185 107314.

Cheng X, Ma J, Jin J, Guo J, Liu Y, Peng J, Ma X, Qian M, Xia Q, Yan P (2020) Retrieving tropospheric NO2 vertical column densities around the city of Beijing and estimating NOx emissions based on car MAX-DOAS measurements. *Atmospheric Chemistry and Physics* 20 10757-10774.

Chew LW, Liu X, Li X-X, Norford LK (2021) Interaction between heat wave and urban heat island: A case study in a tropical coastal city, Singapore. *Atmospheric Research* 247 105134.

Chimani B, Matulla C, Hiebl J, Schellander-Gorgas T, Maraun D, Mendlik T, Eitzinger J, Kubu G, Thaler S (2020) Compilation of a guideline providing comprehensive information on freely available climate change data and facilitating their efficient retrieval. *Climate Services* 19 100179.

Collins RM, Spake R, Brown KA, Ogutu BO, Smith D, Eigenbrod F (2020) A systematic map of research exploring the effect of greenspace on mental health. *Landscape and Urban Planning* 201 103823.

Cortinovis C, Geneletti D (2020) A performance-based planning approach integrating supply and demand of urban ecosystem services. *Landscape and Urban Planning* 201 103842.

Cowan T, Stone R, Wheeler MC, Griffiths M (2020) Improving the seasonal prediction of Northern Australian rainfall onset to help with grazing management decisions. *Climate Services* 19 100182.

Cristiano E, Urru S, Farris S, Ruggiu D, Deidda R, Viola F (2020) Analysis of potential benefits on flood mitigation of a CAM green roof in Mediterranean urban areas. *Building and Environment* 183 107179.

Csomos G, Vida ZV, Lengyel B (2020) Connections put science cities on the map. *Nature* 585 S58-S59

Daniels E, Bharwani S, Swartling ÃG, Vulturius G, Brandon K (2020) Refocusing the climate services lens: introducing a framework for co-designing "transdisciplinary knowledge integration processes" to build climate resilience. *Climate Services* 19 100181.

de-Jesus A-L, Thompson H, Knibbs LD, Hanigan I, De-Torres L, Fisher G, Berko H, Morawska L (2020) Two decades of trends in urban particulate matter concentrations across Australia. *Environmental Research* 190 110021.

De-Troeyer K, Bauwelinck M, Aerts R, Profer D, Berckmans J, Delcloo A, Hamdi R, Van Schaeybroeck B, Hooyberghs H, Lauwaet D, Demoury C, Van-Nieuwenhuyse A (2020) Heat related mortality in the two largest Belgian urban areas: A time series analysis. *Environmental Research* 188 109848.

Dirksen M, Knap WH, Steeneveld G-J, Holtslag AAM, Tank AMGK (2020) Downscaling daily air-temperature measurements in the Netherlands. *Theoretical and Applied Climatology* 142 751–767.

Dong JQ, Peng J, He XR, Corcoran J, Qiu SJ, Wang XY (2020) Heatwave-induced human health risk assessment in megacities based on heat stress-social vulnerability-human exposure framework. *Landscape and Urban Planning* 203 103907.

Droste AM, Heusinkveld BG, Fenner D, Steeneveld G-J (2020) Assessing the potential and application of crowdsourced urban wind data. Quarterly *Journal of the Royal Meteorological Society* 146 2671-2688.

Du J, Liu L, Chen X, Liu J (2020) Field Assessment of Neighboring Building and Tree Shading Effects on the 3D Radiant Environment and Human Thermal Comfort in Summer within Urban Settlements in Northeast China. *Advances in Meteorology* 2020 8843676.

Elia M, D'Este M, Ascoli D, Giannico V, Spano G, Ganga A, Colangelo G, Lafortezza R, Sanesi G (2020) Estimating the probability of wildfire occurrence in Mediterranean landscapes using Artificial Neural Networks. *Environmental Impact Assessment Review* 85 106474.

Feng Z, Peng J, Wu J (2020) Using DMSP/OLS nighttime light data and K-means method to identify urban-rural fringe of megacities. *Habitat International* 103 102227.

Galal OM, Sailor DJ, Mahmoud H (2020) The impact of urban form on outdoor thermal comfort in hot arid environments during daylight hours, case study: New As-wan. *Building and Environment* 184 107222.

Gao L, Yue X, Meng XY, Du L, Lei YD, Tian CG, Qiu L (2020) Comparison of Ozone and PM2.5 Concentrations over Urban, Suburban, and Background Sites in China. *Advances in Atmospheric Sciences* 37 1297-1309.

Grigulis K, Lavorel S (2020) Simple field-based surveys reveal climate-related anomalies in mountain grassland production. *Ecological Indicators* 116 106519.

Grunwald L, Schneider AK, Schroder B, Weber S (2020) Predicting urban cold-air paths using boosted regression trees. *Landscape and Urban Planning* 201 103843.

Guo J, Wu X, Wei G (2020) A new economic loss assessment system for urban severe rainfall and flooding disasters based on big data fusion. *Environmental Research* 188 109822.

Hamer PD, Walker S-E, Sousa-Santos G, Vogt M, Vo-Thanh D, Lopez-Aparicio S, Schneider P, Ramacher MOP, Karl M (2020) The urban dispersion model EPISODE v10.0-Part 1: An Eulerian and sub-grid-scale air quality model and its application in Nordic winter conditions. *Geoscientific Model Development* 13 4323-4353.

Hartigan J, MacNamara S, Leslie LM, Speer M (2020) Attribution and Prediction of Precipitation and Temperature Trends within the Sydney Catchment Using Machine Learning. *Climate* 8 120.

Heikinheimo V, Tenkanen H, Bergroth C, Jarv O, Hiippala T, Toivonen T (2020) Understanding the use of urban green spaces from user-generated geographic information. *Landscape and Urban Planning* 201 103845.

Heris MP, Middel A, Muller B (2020) Impacts of form and design policies on urban microclimate: Assessment of zoning and design guideline choices in urban redevelopment projects. *Landscape and Urban Planning* 202 103870.

Hoang HG (2020) Vietnamese smallholders' perspectives on causes, indicators and determinants of climate change: implication for adaptation strategies. *Climatic Change* 162 1127–1142.

Huang J, Wang L, Wang D, Lei H (2020) Decreasing China's carbon intensity through research and development activities. *Environmental Research* 190 109947.

Hurri K (2020) Rethinking climate leadership: Annex I countries' expectations for China's leadership role in the post-Paris UN climate negotiations. *Environmental Development* 35 100544.

Huszar P, Karlicky J, Doubalova J, Novakova T, Sindelarova K, Svabik F, Belda M, Halenka T, Zak M (2020) The impact of urban land-surface on extreme air pollution over central Europe. *Atmospheric Chemistry and Physics* 20 11655-11681.

Ishihara T, Qian GW, Qi YH (2020) Numerical study of turbulent flow fields in urban areas using modified k- epsilon model and large eddy simulation. *Journal of Wind Engineering and Industrial Aerodynamics* 206 104333.

Jagarnath M, Thambiran T, Gebreslasie M (2020) Heat stress risk and vulnerability under climate change in Durban metropolitan, South Africa-identifying urban planning priorities for adaptation. *Climatic Change* 1-23.

Jia Q, Li Y, Liu Y (2020) Modeling urban eco-environmental sustainability under uncertainty: Interval double-sided chance-constrained programming with spatial analysis. *Ecological Indicators* 115 106438.

Jin LX, Schubert S, Fenner D, Meier F, Schneider C (2020) Integration of a Building Energy Model in an Urban Climate Model and its Application. *Boundary-Layer Meteorology* 1-33.

Kaseb Z, Hafezi M, Tahbaz M, Delfani S (2020) A framework for pedestrian-level wind conditions improvement in urban areas: CFD simulation and optimization. *Building and Environment* 184 107191.

Kataoka H, Ono Y, Enoki K (2020) Applications and prospects of CFD for wind engineering fields. *Journal of Wind Engineering and Industrial Aerodynamics* 205 104310.

Kholmatjanov BM, Petrov YV, Khujanazarov T, Sulaymonova NN, Abdikulov FI, Tanaka K (2020) Analysis of Temperature Change in Uzbekistan and the Regional Atmospheric Circulation of Middle Asia during 1961?2016. *Climate* 8 101.

Kiki G, Kouchade C, Houngan A, Zannou-Tchoko S, Andre P (2020) Evaluation of thermal comfort in an office building in the humid tropical climate of Benin. *Building and Environment* 185 107277.

Kim N, Yum SS, Park M, Park JS, Shin HJ, Ahn JY (2020) Hygroscopicity of urban aerosols and its link to size-resolved chemical composition during spring and summer in Seoul, Korea. *Atmospheric Chemistry and Physics* 20 11245-11262.

Kong D, Gu X, Li J, Ren G, Liu J (2020) Contributions of Global Warming and Urbanization to the Intensification of Human-Perceived Heatwaves Over China. Journal of Geophysical *Research-Atmospheres* 125 e2019JD032175.

Koopmans S, Heusinkveld B, Steeneveld G (2020) A standardized Physical Equivalent Temperature urban heat map at 1-m spatial resolution to facilitate climate stress tests in the Netherlands. *Building and Environment* 181 106984.

Korhonen A, Siitonen J, Kotze DJ, Immonen A, Hamberg L (2020) Stand characteristics and dead wood in urban forests: Potential biodiversity hotspots in managed boreal landscapes. *Landscape and Urban Planning* 201 103855.

Kørnøv L, Lyhne I, Davila JG (2020) Linking the UN SDGs and environmental assessment: towards a conceptual framework. *Environmental Impact Assessment Review* 85 106463.

Kuchcik M (2020) Mortality and thermal environment (UTCI) in Poland-long-term, multi-city study. *International Journal of Biometeorology* 1-13.

Kumar A, Sinha V, Shabin M, Hakkim H, Bonsang B, Gros V (2020) Non-methane hydrocarbon (NMHC) fingerprints of major urban and agricultural emission sources for use in source apportionment studies. *Atmospheric Chemistry and Physics* 20 12133-12152.

Lama S, Houweling S, Boersma KF, Eskes H, Aben I, van der Gon HACD, Krol MC, Dolman H, Borsdorff T, Lorente A (2020) Quantifying burning efficiency in megacities using the NO2/CO ratio from the Tropospheric Monitoring Instrument (TROPOMI). *Atmospheric Chemistry and Physics* 20 10295-10310.

Landman WA, Sweijd N, Masedi N, Minakawa N (2020) The development and prudent application of climate-based forecasts of seasonal malaria in the Limpopo province in South Africa. *Environmental Development* 100522.

Landry F, Dupras J, Messier C (2020) Convergence of urban forest and socio-economic indicators of resilience: A study of environmental inequality in four major cities in eastern Canada. *Landscape and Urban Planning* 202 103856.

Lehnert M, Tokar V, Jurek M, Geletic J (2020) Summer thermal comfort in Czech cities: measured effects of blue and green features in city centres. *International Journal of Biometeorology* 1-13.

Li C, Wang JH, Hu G, Li LX, Xiao YQ (2020) RANS simulation of horizontal homogeneous atmospheric boundary layer over rough terrains by an enriched canopy drag model. *Journal of Wind Engineering and Industrial Aerodynamics* 206 104281.

Li J, Chen H, Zhang C (2020) Impacts of climate change on key soil ecosystem services and interactions in Central Asia. *Ecological Indicators* 116 106490.

Li L, Zha Y, Zhang J (2020) Spatially non-stationary effect of underlying driving factors on surface urban heat islands in global major cities. *International Journal of Applied Earth Observation and Geoinformation* 90 102131.

Li LH, Mullan AF, Clements N (2020) Exposure to air pollution in indoor walkways of a suburban city. *Building and Environment* 183 107171.

Li M, Stein A, de-Beurs KM (2020) A Bayesian characterization of urban land use configurations from VHR remote sensing images. *International Journal of Applied Earth Observation and Geoinformation* 92 102175.

Li PY, Wang ZH (2020) Modeling carbon dioxide exchange in a single-layer urban canopy model. *Building and Environment* 184 107243.

Li R, Wang Q, He X, Zhu S, Zhang K, Duan Y, Fu Q, Qiao L, Wang Y, Huang L, Li L, Yu JZ (2020) Source apportionment of PM2.5 in Shanghai based on hourly organic molecular markers and other source tracers. *Atmospheric Chemistry and Physics* 20 12047-12061.

Li ZT, Zhang H, Wen CY, Yang AS, Juan YH (2020) Effects of height-asymmetric street canyon configurations on outdoor air temperature and air quality. *Building and Environment* 183 107195.

Lin MM, Van Stan JT (2020) Impacts of urban landscapes on students' academic performance. *Landscape and Urban Planning* 201 103840.

Lin XL, Chamecki M, Yu XP (2020) Aerodynamic and deposition effects of street trees on $PM_{2.5}$ concentration: From street to neighborhood scale. *Building and Environment* 185 107291.

Liu L, Liu J, Jin L, Liu LR, Gao YF, Pan XP (2020) Climate-conscious spatial morphology optimization strategy using a method combining local climate zone parameterization concept and urban canopy layer model. *Building and Environment* 185 107301.

Liu SJ, Nazarian N, Niu JL, Hart MA, de Dear R (2020) From thermal sensation to thermal affect: A multi-dimensional semantic space to assess outdoor thermal comfort. *Building and Environment* 182 107112.

Longo R, Bellemans A, Derudi M, Parente A (2020) A multi-fidelity framework for the estimation of the turbulent Schmidt number in the simulation of atmospheric dispersion. *Building and Environment* 185 107066.

Lopez-Bueno JA, Diaz J, Sanchez-Guevara C, Sanchez-Martinez G, Franco M, Gullon P, Nunez-Peiro M, Valero I, Linares C (2020) The impact of heat waves on daily mortality in districts in Madrid: The effect of sociodemographic factors. *Environmental Research* 190 109993.

Lu W, Ye X, Huang J, Horlu GSA (2020) Effect of climate change induced agricultural risk on land use in Chinese small farms: Implications for adaptation strategy. *Ecological Indicators* 115 106414.

Machiwal D, Jha MK, Gupta A (2020) Development of a rainfall Stability Index using probabilistic indicators. *Ecological Indicators* 115 106406.

Mahato S, Ghosh K-G (2020) Short-term exposure to ambient air quality of the most polluted Indian cities due to lockdown amid SARS-CoV-2. *Environmental Research* 188 109835.

Maniatis S, Nastos PT, Moustris K, Polychroni ID, Kamoutsis A (2020) Human thermal sensation over a mountainous area, revealed by the application of ANNs: the case of Ainos Mt., Kefalonia Island, Greece. *International Journal of Biometeorology* 64 2033–2045.

Mao F, Du H, Li X, Ge H, Cui L, Zhou G (2020) Spatiotemporal dynamics of bamboo forest net primary productivity with climate variations in Southeast China. *Ecological Indicators* 116 106505.

McRae I, Freedman F, Rivera A, Li XW, Dou JJ, Cruz I, Ren C, Dronova I, Fraker H, Bornstein R (2020) Integration of the WUDAPT, WRF, and ENVI-met models to simulate extreme daytime temperature mitigation strategies in San Jose, California. *Building and Environment* 184 107180.

Miao YL, Ding Y (2020) Indoor environmental quality in existing public buildings in China: Measurement results and retrofitting priorities. *Building and Environment* 185 107216.

Mikkonen S, Nemeth Z, Varga V, Weidinger T, Leinonen V, Yli-Juuti T, Salma I (2020) Decennial time trends and diurnal patterns of particle number concentrations in a central European city between 2008 and 2018. *Atmospheric Chemistry and Physics* 20 12247-12263.

Morelli F, Benedetti Y, Jerzak L, Kubecka J, Delgado JD (2020) Combining the potential resilience of avian communities with climate change scenarios to identify areas of conservation concern. *Ecological Indicators* 116 106509.

Murtyas S, Hagishima A, Kusumaningdyah NH (2020) On-site measurement and evaluations of indoor thermal environment in low-cost dwellings of urban Kampung district. *Building and Environment* 184 107239.

Nakajima K, Yamanaka T, Ooka R, Kikumoto H, Sugawara H (2020) Observational assessment of applicability of Pasquill stability class in urban areas for detection of neutrally stratified wind profiles. *Journal of Wind Engineering and Industrial Aerodynamics* 206 104337.

Nedel AS, Alonso MF, de Freitas RAP, Trassante FD, da Silva HN, De Bortolli E, de Medeiros MAF, Hallal PC, Vianna JCT (2020) Analysis of indoor human thermal comfort in Pelotas municipality, extreme southern Brazil. *International Journal of Biometeorology* 1-10.

Norman M, Shafri H-Z-M, Mansor S, Yusuf B, Radzali N-A-W-M (2020) Fusion of multispectral imagery and LiDAR data for roofing materials and roofing surface conditions assessment. *International Journal of Remote Sensing* 41 1-22.

O'Meara S, Tsun A, Leung YY, Zong N, Yang J, Yang T (2020) SCIENCE IN CHINA'S NEW MEGACITY. *Nature* 587 S1-S5.

Onofrio M, Spataro R, Botta S (2020) A review on the use of air dispersion models for odour assessment. *International Journal of Environment and Pollution* 67 1-21.

Osada K (2020) Measurement report: Short-term variation in ammonia concentrations in an urban area increased by mist evaporation and emissions from a forest canopy with bird droppings. *Atmospheric Chemistry and Physics* 20 11941-11954.

Pace R, De Fino F, Rahman MA, Pauleit S, Nowak DJ, Grote R (2020) A single tree model to consistently simulate cooling, shading, and pollution uptake of urban trees. *International Journal of Biometeorology* 1-13.

Padro R, La Rota-Aguilera MJ, Giocoli A, Cirera J, Coll F, Pons M, Pino J, Pili S, Serrano T, Villalba G, Marull J (2020) Assessing the sustainability of contrasting land use scenarios through the Socioecological Integrated Analysis (SIA) of the metropolitan green infrastructure in Barcelona. *Landscape and Urban Planning* 203 103905.

Pan A, Wang Q, Yang Q (2020) Assessment on the coordinated development oriented to Green City in China. *Ecological Indicators* 116 106486.

Peng J, Liu QY, Xu ZH, Lyu DN, Du YY, Qiao RL, Wu JS (2020) How to effectively mitigate urban heat island effect? A perspective of waterbody patch size threshold. *Landscape and Urban Planning* 202 103873.

Rana SK, Rana HK, Ranjitkar S, Ghimire SK, Gurmachhan CM, O'Neill AR, Sun H (2020) Climate-change threats to distribution, habitats, sustainability and conservation of highly traded medicinal and aromatic plants in Nepal. *Ecological Indicators* 115 106435.

Richards D, Wang JW (2020) Fusing street level photographs and satellite remote sensing to map leaf area index. *Ecological Indicators* 115 106342.

Rodrigues M, Santana P, Rocha A (2020) Modelling climate change impacts on attributable-related deaths and demographic changes in the largest metropolitan area in Portugal: A time-series analysis. *Environmental Research* 190 109998.

Sakhvon V, Kover L (2020) Distribution and habitat preferences of the urban Woodpigeon (Columba palumbus) in the north-eastern breeding range in Belarus. *Landscape and Urban Planning* 201 103846.

Sarkar D, Kar SK, Chattopadhyay A, Rakshit A, Tripathi VK, Dubey PK, Abhilash PC, others (2020) Low input sustainable agriculture: A viable climate-smart option for boosting food production in a warming world. *Ecological Indicators* 115 106412.

Sayedain SA, Maghsoudi Y, Eini-Zinab S (2020) Assessing the use of cross-orbit Sentinel-1 images in land cover classification. *International Journal of Remote Sensing* 41 7801-7819.

Schau-Noppel H, Kossmann M, Buchholz S (2020) Meteorological information for climate-proof urban planning - The example of KLIMPRAX. *Urban Climate* 32 100614.

Schlickmann MB, da Silva AC, de Oliveira LM, Matteucci DO, Machado FD, Cuchi T, Duarte E, Higuchi P (2020) Specific leaf area is a potential indicator of tree species sensitive to future climate change in the mixed Subtropical Forests of southern Brazil. *Ecological Indicators* 116 106477.

Shabani F, Ahmadi M, Kumar L, Solhjouy-fard S, Tehrany MS, Shabani F, Kalantar B, Esmaeili A (2020) Invasive weed species' threats to global biodiversity: Future scenarios of changes in the number of invasive species in a changing climate. *Ecological Indicators* 116 106436.

Sharma A, Wuebbles DJ, Kotamarthi R, Calvin K, Drewniak B, Catlett CE, Jacob R (2020) Urban-Scale Processes in High-Spatial-Resolution Earth System Models. *Bulletin of the American Meteorological Society* 101 E1555-E1561.

Shin J-Y, Kim K-R, Ha J-C (2020) Intensity-duration-frequency relationship of WBGT extremes using regional frequency analysis in South Korea. *Environmental Research* 190 109964.

Shorabeh S-N, Hamzeh S, Shahraki S-Z, Firozjaei M-K, Arsanjani J-J (2020) Modelling the intensity of surface urban heat island and predicting the emerging patterns: Landsat multi-temporal images and Tehran as case study. *International Journal of Remote Sensing* 41 7384-7410.

Sinclair JS, Adams CR, Reisinger AJ, Bean E, Reisinger LS, Holmes AL, Iannone BV (2020) High similarity and management-driven differences in the traits of a diverse pool of invasive stormwater pond plants. *Landscape and Urban Planning* 201 103839.

Singh S (2020) Farmers' perception of climate change and adaptation decisions: A micro-level evidence from Bundelkhand Region, India. *Ecological Indicators* 116 106475.

Skelton M (2020) How cognitive links and decision-making capacity shape sectoral experts' recognition of climate knowledge for adaptation. *Climatic Change* 162 1535–1553.

Slater J, Tonttila J, McFiggans G, Connolly P, Romakkaniemi S, Kuhn T, Coe H (2020) Using a coupled large-eddy simulation-aerosol radiation model to investigate urban haze: sensitivity to aerosol loading and meteorological conditions. *Atmospheric Chemistry and Physics* 20 11893-11906.

Sreenath S, Sudhakar K, Yusop A (2020) Solar photovoltaics in airport: Risk assessment and mitigation strategies. *Environmental Impact Assessment Review* 84 106418.

Stafoggia M, Bellander T (2020) Short-term effects of air pollutants on daily mortality in the Stockholm county - A spatiotemporal analysis. *Environmental Research* 188 109854.

Steimer SS, Patton DJ, Vu TV, Panagi M, Monks PS, Harrison RM, Fleming ZL, Shi Z, Kalberer M (2020) Differences in the composition of organic aerosols between winter and summer in Beijing: a study by direct-infusion ultra-high-resolution mass spectrometry. *Atmospheric Chemistry and Physics* 20 13303-13318.

Steinke VA, Martins Palhares de Melo LA, Luiz Melo M, Rodrigues da Franca R, Luna Lucena R, Torres Steinke E (2020) Trend Analysis of Air Temperature in the Federal District of Brazil: 1980?2010. *Climate* 8 89.

Stričević R, Srdjević Z, Lipovac A, Prodanović S, Petrović-Obradović O, Ćosić M, Djurovića N (2020) Synergy of experts' and farmers' responses in climate-change adaptation planning in Serbia. *Ecological Indicators* 116 106481.

Sun D, Yin Z, Cao P (2020) An improved CAL3QHC model and the application in vehicle emission mitigation schemes for urban signalized intersections. *Building and Environment* 183 107213.

Sutzl BS, Rooney GG, van Reeuwijk M (2020) Drag Distribution in Idealized Heterogeneous Urban Environments. *Boundary-Layer Meteorology* 1-24.

Tian G, Conan B, Calmet I (2020) Turbulence-Kinetic-Energy Budget in the Urban-Like Boundary Layer Using Large-Eddy Simulation. *Boundary-Layer Meteorology* 1-23.

Top S, Milosevic D, Caluwaerts S, Hamdi R, Savic S (2020) Intra-urban differences of outdoor thermal comfort in Ghent on seasonal level and during record-breaking 2019 heat wave. Building and Environment 185 107103.

Touitou Y, Point S (2020) Effects and mechanisms of action of light-emitting diodes on the human retina and internal clock. *Environmental Research* 190 109942.

Tsalicoglou C, Allegrini J, Carmeliet J (2020) Non-isothermal flow between heated building models. *Journal of Wind Engineering and Industrial Aerodynamics* 204 104248.

Ugolini F, Massetti L, Calaza-Martínez P, Cariñanos P, Dobbs C, Ostoić SK, Marin AM, Pearlmutter D, Saaroni H, Šaulienė I, Simoneti M, Verlič A, Vuletić D, Sanesi G (2020) Effects of the COVID-19 pandemic on the use and perceptions of urban green space: An international exploratory study. *Urban Forestry & Urban Greening* 56 126888.

Venter ZS, Shackleton CM, Van Staden F, Selomane O, Masterson VA (2020) Green Apartheid: Urban green infrastructure remains unequally distributed across income and race geographies in South Africa. *Landscape and Urban Planning* 203 103889.

Wang J, Feng J, Yan Z, Zha J (2020) Urbanization Impact on Regional Wind Stilling: A Modeling Study in the Beijing-Tianjin-Hebei Region of China. *Journal of Geophysical Research-atmospheres* 125 e2020JD033132.

Wang JW, Yang HJ, Kim JJ (2020) Wind speed estimation in urban areas based on the relationships between background wind speeds and morphological parameters.

Journal of Wind Engineering and Industrial Aerodynamics 205 104324.

Wang WW, Yang TS, Li YN, Xu YP, Chang M, Wang XM (2020) Identification of pedestrian-level ventilation corridors in downtown Beijing using large-eddy simulations. *Building and Environment* 182 107169.

Waugh DW, He Z, Zaitchik B, Peng RD, Diette GB, Hansel NN, Matsui EC, Breysse PN, Breysse DH, Koehler K, Williams D, McCormack MC (2020) Indoor heat exposure in Baltimore: does outdoor temperature matter?. *International Journal of Biometeorology* 1-10.

Wellmann T, Schug F, Haase D, Pflugmacher D, van der Linden S (2020) Green growth? On the relation between population density, land use and vegetation cover fractions in a city using a 30-years Landsat time series. *Landscape and Urban Planning* 202 103857.

Wen BH, Musa SN, Onn CC, Ramesh S, Liang LH, Wang W, Ma K (2020) The role and contribution of green buildings on sustainable development goals. *Building and Environment* 185 107091.

Whisson DA, Zylinski S, Ferrari A, Yokochi K, Ashman KR (2020) Patchy resources and multiple threats: How do koalas navigate an urban landscape?. *Landscape and Urban Planning* 201 103854.

Williams DS, Costa MM, Kovalevsky D, van den Hurk B, Klein B, Meißner D, Pulido-Velazquez M, Andreu J, Suárez-Almiñana S (2020) A method of assessing user capacities for effective climate services. *Climate Services* 19 100180.

Williams TG, Logan TM, Zuo CT, Liberman KD, Guikema SD (2020) Parks and safety: a comparative study of green space access and inequity in five US cities. *Landscape and Urban Planning* 201 103841.

Yang C, Zhang C, Li Q, Liu H, Gao W, Shi T, Liu X, Wu G (2020) Rapid urbanization and policy variation greatly drive ecological quality evolution in Guangdong-Hong Kong-Macau Greater Bay Area of China: A remote sensing perspective. *Ecological Indicators* 115 106373.

Yang SH, Zhou D, Wang YP, Li P (2020) Comparing impact of multi-factor planning layouts in residential areas on summer thermal comfort based on orthogonal design of experiments (ODOE). *Building and Environment* 182 107145.

Yenneti K, Ding L, Prasad D, Ulpiani G, Paolini R, Haddad S, Santamouris M (2020) Urban Overheating and Cooling Potential in Australia: An Evidence-Based Review. *Climate* 8 126.

Zeqiong X, Xuenong G, Wenhui Y, Jundong F, Zongbin J (2020) Decomposition and prediction of direct residential carbon emission indicators in Guangdong Province of China. *Ecological Indicators* 115 106344.

Zhang JG, Yu ZW, Cheng YY, Chen CJ, Wan Y, Zhao B, Vejre H (2020) Evaluating the disparities in urban green space provision in communities with diverse built environments: The case of a rapidly urbanizing Chinese city. *Building and Environment* 183 107170.

Zhang J-Y, Gong T-T, Huang Y-H, Li J, Liu S, Chen Y-L, Li L-L, Jiang C-Z, Chen Z-J, Wu Q-J (2020) Association between maternal exposure to PM10 and polydactyly and syndactyly: A population-based case-control study in Liaoning province, China. *Environmental Research* 187 109643.

Zhang P, Kohli D, Sun QQ, Zhang YX, Liu SX, Sun DF (2020) Remote sensing modeling of urban density dynamics across 36 major cities in China: Fresh insights from hierarchical urbanized space. *Landscape and Urban Planning* 203 103896.

Zhang X, Steeneveld G-J, Zhou D, Ronda RJ, Duan C, Koopmans S, Holtslag AA (2020) Modelling urban meteorology with increasing refinements for the complex morphology of a typical Chinese city (Xi'an). *Building and Environment* 182 107109.

Zhao CH, Weng QH, Hersperger AM (2020) Characterizing the 3-D urban morphology transformation to understand urban-form dynamics: A case study of Austin, Texas, USA. *Landscape and Urban Planning* 203 103881.

Zhao YL, Chew LW, Kubilay A, Carmeliet J (2020) Isothermal and non-isothermal flow in street canyons: A review from theoretical, experimental and numerical perspectives. *Building and Environment* 184 107163.

Zhu L, Huang Q, Ren Q, Yue H, Jiao C, He C (2020) Identifying urban haze islands and extracting their spatial features. *Ecological Indicators* 115 106385.

Zhu Y, Chen J, Bi X, Kuhlmann G, Chan KL, Dietrich F, Brunner D, Ye S, Wenig M (2020) Spatial and temporal representativeness of point measurements for nitrogen dioxide pollution levels in cities. *Atmospheric Chemistry and Physics* 20 13241-13251.

A great debt of appreciation goes to our outgoing Bibliography Committee Chair, **Matthias Demuzere**. Many thanks Matthias, for your years of service!

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.

AMERICAN METEOROLOGICAL SOCIETY (AMS) ANNUAL MEETING

New Orleans, Louisiana, USA • January 10-14, 2021

https://annual.ametsoc.org/index.cfm/2021/

EUROPEAN GEOSCIENCES UNION (EGU) GENERAL ASSEMBLY

Vienna, Austria • 25-30 April, 2021

https://www.egu2021.eu

"OUTDOOR THERMAL COMFORT IN CITIES: ASSESSING AND DEVELOPING GREEN, BLUE AND GREY SOLUTIONS FOR HEALTHY AND SUSTAINABLE URBAN FUTURE"

Special issue of Atmosphere

Deadline: June 18, 2021

https://www.mdpi.com/journal/atmosphere/special_issues/urban_outdoor_thermal_comfort

INTERNATIONAL CONFERENCE ON URBAN CLIMATE (ICUC-11 HAS BEEN POSTPONED FROM THE ORIGINAL DATES OF AUGUST 30-SEPTEMBER 2, 2021)

Sydney, Australia • August 29 -September 2, 2022

https://conference.unsw.edu.au/en/icuc11

Calls for Papers...

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

Special Issue of Sustainability

Anthropogenic activities are dramatically impacting the quality of our environment, and this is especially the case in cities. Factors such as the sealing of soil, contamination of water and air, and emission of atmospheric greenhouse gases are combining to make the urban environment less livable. Efforts to better understand these problems have been intensifying within the scientific community, with research focusing on topics related to environmental quality and human health, the urban heat island, outdoor thermal comfort, and urban air quality. These phenomena have been analyzed from the microscale to the city level, using approaches such as field monitoring, remote sensing, and simulation models. Unfortunately, however, these diverse aspects of urbanization are rarely integrated in a systematic way in the actual development process. This Special Issue aims to collect works that improve on this 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

Deadline: January 31, 2021

https://www.mdpi.com/journal/sustainability/special_issues/Urban_Microclimate_Air_Quality

"APPLICATION OF GIS-BASED MAPPING OF LOCAL CLIMATE ZONES IN URBAN AREAS"

Special Issue of ISPRS Intl Journal of Geo-Information

The concept of local climatic zones (LCZs) has become a widely recognized standard for the description of urban climate sites, gaining substantial attention from scholars worldwide in recent years. The original concept was extended to the mapping of urban and suburban landscapes, resulting in widespread application in urban climate research and beyond. With such a radical shift in the LCZ concept, new problems were identified (e.g. the quality and level of GIS data detail, user accuracy, appropriate resolution, spatiotemporal variability, level of generalization, and standardization of classification). Most popular among authors dealing with LCZ delineation are methods based on widely available remote sensing data. The majority of such studies, however, have reported user accuracy inappropriate for recent urban climate science, demanding exact data for modeling and for application in real urban planning. We therefore have devoted this *Special Issue* to GIS-based methods of LCZ delineation and their application to the development of high-quality LCZ data. Topics of interest include, but are not limited to: Innovative GIS-based LCZ mapping methods; Analyses on producer and user accuracy for GIS-based/other methods; Studies on spatiotemporal variability of thermal exposure in LCZs; Application of LCZ concept in urban areas.

Guest Editors: Michal Lehnert, Jan Geletič, Stevan Savić

Deadline: February 28, 2021

https://www.mdpi.com/journal/ijgi/special_issues/Climate_Urban

Community Engagement Committee launches new IAUC Webinar Series

The IAUC is a vibrant community! The members and the ongoing activities within the realm of urban climate continue to thrive even amidst COVID-19 restrictions. If anything, COVID-19 has highlighted the critical importance of understanding the urban environment and the manner in which socioeconomic well-being can be managed.

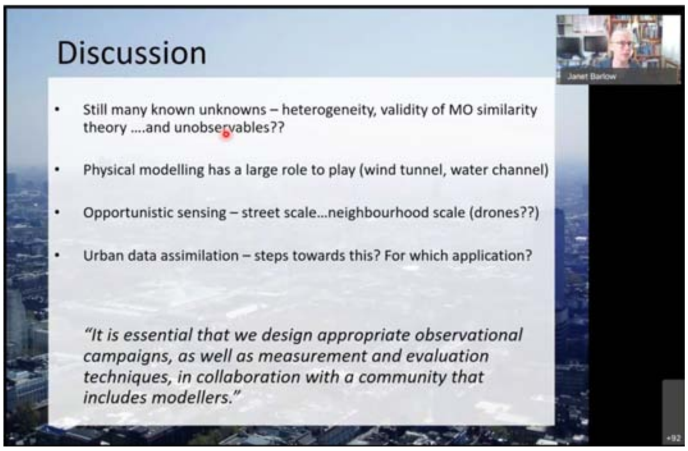
Many conferences in 2020/2021 were canceled or postponed. This includes our own ICUC-11 Sydney, which has been postponed to August 2022. In the absence of these avenues, and also in response to the 2020 community survey, a need for virtual community engagement was urgently felt. For these reasons the IAUC established a Community Engagement Committee and initiated our first online webinar series in 2020.

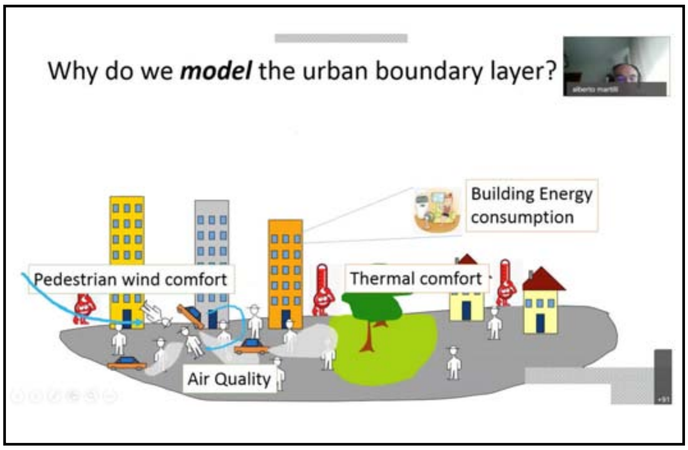
The series started by celebrating award winners and success stories within our community. The Luke Howard and Timothy Oke award winners – who silently received their high recognition in the absence of an in-person conference – were nominated as ideal candidates to bring the community together. These presentations were also selected to introduce students and early-career researchers to recent accomplishments and state-of-the-art research in the urban climate field.

The first IAUC webinar was held on November 6, introducing the most recent Luke Howard award winners, **Prof. Janet Barlow** (University of Reading, UK) and **Dr. Alberto Martilli** (CIEMET, Spain). Speakers discussed the current state-of-the-art and critical future directions in understanding the urban boundary layer using various measurements and modeling methodologies. Dr. Barlow highlighted novel observation methods and insights that these measurements have provided us over the last decade. Dr. Martilli elaborated on different methods of modelling the atmosphere in cities and discussed how atmospheric processes, mitigation strategies, and intra-city heterogeneity should be considered in numerical investigations. The session was concluded with an interactive discussion with the community led by **Prof. Andreas Christen** (University of Freiburg, Germany). A recording of the first webinar can be found online (unfortunately, due to technical issues the first part has been cut off).

The second webinar was held on December 16, 2020, featuring the 2020 inaugural Timothy Oke Award winners, **Prof. Chao Ren** (University of Hong Kong, Hong Kong) and **Prof. Scott Krayenhoff** (University of Guelph, Canada) discussing their research on extreme urban heat. This event was particularly special as it started with remarks from **Prof. Timothy Oke** himself, who congratulated the recipients of this award established to support early- to mid-career scientists in the field. Prof. Ren then presented her work on assessing the risks of extreme heat events in densely-built urban areas such as Hong Kong, followed by Prof. Krayenhoff, who presented results on heat mitigation methods and modelling strategies needed to address these challenges. Finally, **Prof. Dev Niyogi** (University of Texas at Austin) led an interactive discussion on extreme heat, climate change in urban areas, and heat mitigation. A recording of the second event is also available online.

The 2021 webinar sessions are in the works and we hope to showcase the strength, creativity, and diversity of our community through these online events. The topics that are being planned include diverse areas such as the history of the urban climate, urban climate and it's importance during the pandamic, climate change, and





Discussion points from Prof. Janet Barlow's presentation (left) and a snapshot of Dr. Alberto Martilli's talk (right) during the first webinar.

Screenshots of Timothy Oke saying a few words (top), and participants catching up with other IAUC members (bottom), before the second webinar.

air pollution. We are also looking forward to receiving suggestions and are open to volunteers who want to get involved. So, if you have a proposal for a future webinar, please let us know.

Stay tuned for new webinars and other online events and our best wishes for a very happy, healthy, joyous, urban climate friendly, 2021!

— *The IAUC community engagement committee:* Natalie Theeuwes, Negin Nazarian, Melissa Hart and Dev Niyogi

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
- Leena Järvi (University of Helsinki, Finland), 2016-20
- 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

Editor: David Pearlmutter
davidp@bgu.ac.il

Urban Projects: Helen Ward
Helen.Ward@uibk.ac.at

News: Help wanted!
Volunteer here

Conferences: Joe McFadden
mcfadden@ucsb.edu

The next edition of ***Urban Climate News*** will appear in late March. Contributions for the upcoming issue are welcome, and should be submitted by February 28, 2020 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