PRESS CONFERENCE:
Unequal impacts of heat, pollution and climate change

Wednesday, 9 December
11:00 am US Eastern Time
PANELISTS

Susanne Benz, University of California San Diego
Allison Grant, University of Mary Washington
Angel Hsu, University of North Carolina at Chapel Hill
INFORMATION FOR REPORTERS

Slides from this presentation are available in the Fall Meeting Media Center: https://www.agu.org/Fall-Meeting/Pages/Attend/Media-Center

A recording of this event will be posted to AGU’s YouTube channel: https://www.youtube.com/c/AGUvideos
Playlist “Fall Meeting 2020 Press Conferences”

An informal, 30-minute discussion room via Zoom will follow this event:
Link will be posted in this event’s chat box
Meeting ID: 962 1469 2326
Passcode: agupress

Questions: Email news@agu.org
WHO’S FEELING THE BURDEN OF URBAN HEAT?

KEY FINDINGS:
WIDESPREAD CLASSIST DISPARITIES
WIDESPREAD RACIST DISPARITIES
UNEQUAL URBAN DESIGN

Susanne A. Benz and Jennifer Burney
9 Dec 2020
AGU press conference “Unequal impacts of heat, pollution and climate change”
WHAT IS URBAN HEAT?

- Temperatures in a city are different than outside of a city.

- Most often, cities are warmer than their surrounding.

- Among others, these urban heat islands are caused by
  - darker surfaces (light is cooler than dark)
  - a lot of built-up area (trapping the heat)
  - only little vegetation (less “sweating”)
  - our waste heat.
URBAN HEAT IN THE USA DURING SUMMER DAYS.
URBAN HEAT IN THE USA IS DIFFERENT FOR DIFFERENT COUNTIES.
WITHIN MIAMI, URBAN HEAT IS DIFFERENT FOR DIFFERENT COMMUNITIES.

The diagram illustrates the urban heat index for different communities in Miami. The x-axis represents the temperature difference from the rural background, with locations colder than the rural background on the left side and hotter on the right. The y-axis shows the number of locations. The graph separates rich and poor neighborhoods, with poor neighborhoods having a higher density of hotter locations compared to rich neighborhoods.
ANALYSIS PERFORMED FOR ALL URBAN COUNTIES.

https://sabenz.users.earthengine.app/view/urbanheatusa
MORE THAN 80% OF ALL URBAN COUNTIES DISPLAY SIGNIFICANT CLASSIST DISPARITIES IN URBAN HEAT.

- Poor neighbourhoods are hotter
- Rich neighbourhoods are hotter
More than 50% of all urban counties display significant racist disparities in urban heat (in addition to classist disparities).

non-white neighbourhoods are hotter

white neighbourhoods are hotter
Throughout the US disadvantaged communities live in areas with

- a higher population density than their neighbors
  ➢ they experience more waste heat
- less vegetation than their neighbors
  ➢ their neighborhoods cannot “sweat”
- more built-up areas than their neighbors
  ➢ their neighborhoods trap the heat
ALLISON GRANT

Co-authors: Dr. Pamela Grothe¹, Dr. Jeremy S. Hoffman², and Dr. Bev Wilson³

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Redlined neighborhoods have significantly higher summertime land surface temperatures than non-redlined neighborhoods.

Long-term trends in land surface temperatures are insignificant.

IMPERVIOUS SURFACES
Center for Disease Control’s Social Vulnerability Index

Example:
Richmond, VA, USA
WHY SHOULD WE CARE?

• > 600 people are killed by extreme heat each year (Wilson, 2020)
• Populations are getting adversely exposed to urban heat
• This is a climate change issue AND a social justice issue
THANK YOU

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URBAN HEAT ISLAND INEQUALITIES IN MAJOR U.S. CITIES

Angel Hsu\textsuperscript{1,2,3}, Glenn Sheriff\textsuperscript{4}, Tirthankar Chakraborty\textsuperscript{5}, Diego Manyà\textsuperscript{3}
\textsuperscript{1}Yale-NUS College, \textsuperscript{2}UNC-Chapel Hill, \textsuperscript{3}Data-Driven EnviroLab, \textsuperscript{4}Arizona State University, \textsuperscript{5}Yale School of Environment

AGU2020: Unequal impacts of heat, pollution and climate change
December 9, 2020
• Low-income, marginalized communities may be disproportionately burdened by urban heat.

• Small-scale case studies have found disparities in urban heat distribution.

• But are these patterns persistent, pervasive, across a range of sociodemographic factors (race/ethnicity, age, income)?
SATellite data provide globally-consistent dataset for surface urban heat island intensity.

Source: NASA (2010)
US SURFACE URBAN HEAT ISLAND EXPLORER APP

Earth Engine Apps

Click on another census tract...

US SUHI Disparity Explorer

This platform displays census-tract level surface urban heat island (SUHI) intensities for US urbanized areas (polygons with red boundaries), as well as socioeconomic information at the same level of aggregation. Use the search bar to find your urbanized area of interest. Click on your neighborhood, and the corresponding SUHI and population statistics will be listed below.

Region: Chicago, IL--IN

Annual daytime UHI: 3.21 °C
Annual nighttime UHI: 0.72 °C
Summer daytime UHI: 3.79 °C
Summer nighttime UHI: 0.98 °C
Winter daytime UHI: 1.62 °C
Winter nighttime UHI: 0.36 °C
Average Annual Income: $34760

https://datadrivenlab.users.earthengine.app/view/usuhiapp
PATTERNS OF URBAN HEAT ISLAND DISPARITIES

- In most major U.S. cities, populations in red exposed to higher urban heat island intensity than populations in blue.
- Exposure patterns virtually identical for populations c) Below poverty and People of Color.
- Distributions for age alone similar, except when combined with race (g-h).
97% MAJOR US CITIES – EXPOSE MINORITY POPULATIONS TO HIGHER URBAN HEAT ISLAND INTENSITY
94% MAJOR US CITIES – EXPOSE BELOW POVERTY TO HIGHER URBAN HEAT ISLAND INTENSITY
EXPOSURE FOR POPULATIONS OF COLOR AND BELOW POVERTY ROUGHLY EQUAL
BUT PATTERNS OF EXPOSURE VARY BY CITY – GREENVILLE, SC
BUT PATTERNS OF EXPOSURE VARY BY CITY – BALTIMORE, MD

- Hotter
- Black %
- Below Poverty %
- Greener

Daytime UHI(°C)
- 0 to 2
- 2 to 4
- 4 to 6
- 6 to 8
- 8 to 10

Percentage Black
- <30%
- 30 to 50%
- 50 to 75%
- >80%

Below Poverty
- 0 to 15%
- 15 to 25%
- 25 to 25%
- 25 to 40%

ΔNDVI (Greenness)
- -0.50 to -0.39
- -0.39 to -0.26
- -0.28 to -0.15
- -0.15 to 0.00
THANK YOU

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QUESTIONS
Please write your questions in the Q&A box and AGU will ask it on your behalf.

Reminder: A 30-minute, informal discussion will commence in Zoom after this event ends.