Community Science Urban Heat Island Mapping Campaigns

Understanding and addressing extreme heat in our cities and counties

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- Rock Creek Park: 23, 30, 27°C
- NOAA: 26, 35, 32°C
- Beltsville USCRN Station: TMAX: 33.3°C
- Arboretum USCRN Station: TMAX: 33.9°C
- Eckington: 27, 37, 34°C
Historical Housing Policies and Inequity in Urban Heat Exposure

Figure 3. Land Surface Temperature (LST) anomalies binned by HOLC classification

Figure 2. HOLC classification and LST in Richmond, VA
Enabling Urban Solutions with Better Urban Heat Island Information

Many of the existing actions and interventions used to reduce the health impacts of extreme heat can be informed by detailed urban heat island information. They can be targeted to the hottest areas in the short-run, and cities can be better designed to manage UHIs in the long-run.
NIHHIS will facilitate an integrated approach to providing a suite of decision support services to reduce heat related illness and death.

- NOAA and CDC launched the National Integrated Heat Health Information System (NIHHIS) in June of 2015 to address heat risk planning, preparedness, and response.
- NIHHIS develops new integrative information products and coordinates programmatic activities with an interagency working group.
- NIHHIS has also launched local pilots and urban heat island mapping campaigns to understand local decision-making context and information needs, and to improve the information available for heat health risk mitigation.

Ongoing activities include:
- Prototyping new integrated climate-health products such as the NIHHIS extreme heat vulnerability tool, the climate and health monitor and outlook, and informative story maps.
- Developing Masterclasses through the Global Heat Health Information Network to increase capacity across the world.

NIHHIS operates according to a common framework of core questions under the following thematic areas: capacity & partnership, heat-health parameters & outcomes, data and forecast products, communication, intervention effectiveness.
The Field Campaign

The day prior:
Volunteers collect the gear and receive training on how to install it and operate it. They also get a science lesson on UHI.

The day of:
Volunteers run their assigned transect routes in the morning, afternoon, and evening.
The sensors log the temperature and humidity every second, along with GPS location.

Later this year:
The CAPA Strategies team combines the transects & landcover data from Landsat via a machine learning (random forest) process to generate heat intensity surfaces.

Figure 2 Rendering of Sensor Setup. (A) Front of base; (B) Aspirator detail; (C) GPS unit; (D) Back of base; (E) Bottom of base; (F) Profile of device; (G) Front of device; (H) Approximate scale of device and GPS unit (GPS unit kept inside of vehicle).

From Voelkel and Shandas 2017; adapted with permission from Makido et al., 2016.
HEAT BEAT newsletter

Timely information for people and communities who are working to address local concerns about heat health.

NOAA-funded 2020 Heat Campaign Cities Announced

Through a peer-review process, NOAA’s Climate Program Office (CPO) selected thirteen community partners in cities across the U.S. to receive funding support to perform a community science urban heat research project. These projects are designed to increase awareness and understanding of heat health impacts in urban areas.

2020 Campaigns

Seattle, WA
Miami, FL
Miami, FL
Jacksonville, FL
Jacksonville, FL
Dallas, TX
San Antonio, TX
New Orleans, LA
Cincinnati, OH
Cleveland, OH

CAPA Heat Watch

Organizer Training for CAPA Heat Watch

1. Set Goals
Determine the timing of your heat watch campaign and set up your team with partner organizations and a lead campaign organizer.

2. Establish
Get to know the Heat Watch process, begin volunteer engagement with provided outreach materials, and schedule a kickoff meeting with the CAPA team.

3. Prepare
Ensure volunteers are ready for their important role as data collectors with a training session and equipment.

4. Activate
Finish preparation steps by finalizing campaign details, notifying volunteers, and distributing CAPA-provided equipment.

5. Execute
Conduct a successful campaign, mapping the distribution of heat across your city at morning, afternoon, and evening. Participants can contact your team for further information.

CAPA Strategies

HARC
The Nature Conservancy
Resilient Houston
Public Health

NIHHS.cpo.noaa.gov
<table>
<thead>
<tr>
<th>Urban Heat Island (UHI) Campaign City Location</th>
<th>NWS Site</th>
<th>WPC Forecast Maximum Temperature and UHI Weather Criteria Assessment</th>
<th>Average Summer lgh</th>
<th>Average Summer Record High</th>
<th>Average Annual 90° Days</th>
<th>Average Annual 95° Days</th>
<th>Average Annual 100° Days</th>
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<tr>
<td>Seattle, WA</td>
<td>SEA</td>
<td>SAT 76°F</td>
<td>SUN 83°F</td>
<td>MON 89°F</td>
<td>TUE 85°F</td>
<td>WED 80°F</td>
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<td>San Jose/Santa Clara, CA</td>
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<td>MON 88°F</td>
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<td>WED 89°F</td>
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<td>SUN 94°F</td>
<td>MON 93°F</td>
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<td>WED 90°F</td>
<td>91°F</td>
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2020 Campaign Support from the NOAA Weather Prediction Center & Weather Forecast Offices
Why run these campaigns as community science initiatives?

From the 2020 Campaign:

Over 1 million measurements taken by 375 volunteer citizen scientists plying 173 transects in 13 communities
Involvement and Outcomes

Clockwise from upper-left:

- 10,000 Trees Honolulu (NGOs)
- Houston Resilience Plan (city & county government)
- Worcester Polytechnic Institute Bachelor of Science Qualifying Student Project (educational institutions)
- Museum of Science Boston, Wicked Hot Boston (museums)
2021 Campaign Timeline

- Late fall - Applications opened for NOAA/NIHHIS support
- Early spring – Heat Watch onboarding for cities with CAPA Strategies; Communities join NIHHIS urban heat cohort, get connected to local National Weather Service forecast offices, develop volunteer outreach and complementary activities.
- Late spring – CAPA + NOAA Weather / Climate Prediction Center plan logistics to move sensors cross-country; communities activate volunteers; cohort calls continue
- Summer – Volunteers fan out across their communities with sensors, driving transects, taking readings and having fun!
- Fall – CAPA Strategies processes results into GIS layers and a report for cities to use.