

Participatory Science Data Management Case Studies

Urban Heat ATL



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Improving Data Management for Participatory Science

UrbanHeatATL is a new community-based participatory science project to map temperature data in Atlanta. Students and other volunteers use inexpensive mobile temperature sensors while walking or biking to collect data for mapping urban heat extremes at meter-scale resolution, allowing for solutions to be targeted at the most vulnerable communities. Data is collected via smartphone and mapped, along with data from stationary sensors and from a single-day NOAA event spanning multiple cities, to indicate heat islands.

Project Overview & Goals

UrbanHeatATL is an academic and community-based participatory science project to collect temperature data in Atlanta to determine who is most impacted by today's urban heat hotspots, and how communities can work with officials to mitigate these impacts as heat waves worsen in coming decades. There is already a lot known about heat islands, so the UrbanHeatATL Team is focused on gathering the data across Atlanta to support community-based recommendations for mitigating the impacts, provide storytelling opportunities for community narratives, and support decision-making around community claims. UrbanHeatATL also establishes partnerships for the co-design of solutions. The UrbanHeatATL team is a collaboration between the Spelman College Environmental and Health Sciences Program, the West Atlanta Watershed Alliance, the Partnership for Southern Equity, the City of Atlanta, and at Georgia Tech, the Center for Serve-Learn-Sustain, the Urban Climate Lab, and the Global Change Program. The project launched in March 2021 with in-kind support from the Atlanta Science Festival.

Role of Project Participants

Approximately 40 students from Georgia Tech and Spelman College began the data collection using small temperature sensors

that they connected to their smartphones via the vendor's app, with guidance from the UrbanHeatATL team. The program has since grown to over 80 students as well as 10 community members from southwest Atlanta. UrbanHeatATL

provides sensor packets to volunteers along with short instructional videos accessible via smartphones. Students and volunteers cover Atlanta on foot or bike. Other volunteers monitor and service one of ten stationary sensors that the UrbanHeatATL team installed at points of interest identified by community members.

Data Management

In 7 months, UrbanHeatATL has collected more than 1.5 million air temperature data points in over 350 hours since the project began in March 2021. Students and community volunteers' email or upload the mobile sensor data via smartphone to a server at Georgia Tech. The data undergoes a QA/QC process to detect potential errors. Since the program is relatively new, most data quality issues derive from user error as well as data artifacts and biases associated with the sensor itself. The program is just beginning

Issue:
Urban Heat

Location:
Atlanta, Georgia

Tools:
Mobile & stationary
temperature
sensors

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to address sensor calibration, and based on early QA/QC data, is undertaking a redesign of the sensor probe in partnership with the vendor to eliminate as many data artifacts as possible.

Mobile sensor data are combined with temperature data from stationary sensors and, most recently, high-powered mobile sensors as part of a single-day NOAA heat island project in 20 cities across the country. At this point, the three sensor inputs are aggregated but are not used for cross-validation. Following processing by a series of scripts, the data are stored in a repository in CSV format without a database.

Data Use

UrbanHeatATL uses the data within the project to map urban heat islands in Atlanta, especially as they relate to the impacts on frontline communities, and the role of urban greenspace, city planning, and energy burden in shaping environmental justice priorities. The project is just beginning to overlay health, demographic and economic data with the temperature data.

Issues and Lessons Learned

The project, while in its early phases, has gone very smoothly and has not encountered any significant technical or non-technical issues. Addressing the user experience related to the mobile sensors earlier in the project would have allowed the project to scale up more quickly, particularly in terms of the number of community volunteer participants. The principal investigators have been surprised by the degree of student and community engagement and media interest and support. The investigators have spent time aggregating smaller funding sources to

retain paid interns while pursuing larger federal grant awards.

Outcomes and Success Factors

The collection of relevant data that lends credibility and validity to anecdotes regarding the impact of urban heat in Atlanta is filling a void. Through its outreach activities, UrbanHeatATL has brought awareness of the issue to the public and targeted decision makers. Based in part on the work of UrbanHeat ATL, Atlanta was chosen as one of 20 cities to participate in NOAA's Urban Heat Watch Day.

Major success factors include having decision makers and trusted community partners at the table from the beginning and a close collaboration with the sensor vendor.

Opportunities

- Share what is learning with other stakeholders and across its spheres of influence to help people understand the value and utility of participatory science (PS) data.
- Share data collection devices, protocols, and QA/QC methodologies as transferable infrastructure.
- Formalize Communities of Practice in areas of interest that would bring PS projects together to form networks.
- Develop a framework for PS projects to more easily respond or ramp up to respond to federal (especially EPA) procurement opportunities.
- Provide a framework for addressing some of the questions around data ownership, the rights of the

community, data use, shared funding models, etc.

- Initiate activities to support peer-to-peer sharing to reduce the level of reinvention that small PS projects currently go through.