Program Information Sheet

Program Name

Climate Program Office (CPO) Extreme Heat Risk Initiative

Program Mission

The mission of the NOAA Climate Program Office Extreme Heat Risk Initiative is to improve climate information and services to support the management and reduction of societal risks associated with extreme heat by advancing application-oriented research and evidence-driven risk reduction practices.

Focus for FY21

Urban Climate Science for Decision-making & Evaluation of Heat Health Interventions

In FY21, the Extreme Heat Risk Initiative is soliciting proposals for projects that support decision making in communities grappling with the health impacts of extreme heat by improving the climate information and services available to inform consideration, selection, and evaluation of actions, plans, programs, and policies to improve resilience to heat and mitigate health impacts in urban areas in the short- and long-term. Specifically, this competition seeks to expand on NOAA-supported urban heat mapping campaigns, combining the observations, modeling and outputs from them with new experimental methods and follow-on applied research.

Funding for FY21

Depending on the availability of funds and the quality of proposals, the Extreme Heat Risk Initiative will seek to fund a combination of 1 and 2 year projects in FY 21. Proposals should not exceed $150,000 per year, or $300,000 total. It is anticipated that $500,000 will be available for the first year of funded projects.

Competition Information

Background

Each year in the United States, over 700 people are lost to heat-related deaths[1], and tens of thousands of heat-related visits to the emergency room[2] cause avoidable suffering and healthcare costs. Much of this impact is felt in cities, where a growing majority of individuals live, work, and play. Demographic, land use, and climate research all project increasing trends of urban living[3], urbanization[4], and heat extremes[5], making urban heat management a priority area for resilience and adaptation projects in communities across the country.

State and local governments are taking action to manage urban heat, both in the near and long-term, but could benefit from climate services linked to evidence-driven practices to manage urban heat to ensure the best interventions are put in place to achieve desired outcomes given the local climate and urban structure[6]. Tree planting and rooftop albedo are

common solutions, but there are many more, and the challenge of selecting the most beneficial and cost effective interventions while also weighing potential co-benefits and side effects requires more targeted, transdisciplinary urban climate research to explore the many overlapping drivers of urban heat extremes.

This competition builds upon recent NOAA-supported heat and health activities focused on improving the link between science and practice for heat resilience. Since 2017, NOAA (Office of Education, Climate Program Office, National Integrated Heat Health Information System) has partnered with CAPA Strategies to enable communities to map their Urban Heat Islands using a community science field campaign approach known as CAPA Heat Watch. As of November 2020, at least 26 cities have performed Heat Watch mapping campaigns, and are actively applying the resulting partnerships and data to mitigate the Urban Heat Island effect in their cities (e.g. 1, 2, 3, 4, 5). This new funding opportunity affords past and future (summer 2021 cohort) campaign cities the capacity to further apply campaign outcomes and outputs for heat resilience, and to explore new and innovative approaches to monitoring, modeling, and mapping urban heat.

FY 21 Extreme Heat Risk Initiative Competition Focus

The CAPA Heat Watch approach to UHI mapping produces high resolution, modeled air temperature and heat index maps for cities via a community science field campaign approach. CAPA combines volunteer vehicle transects (temperature and humidity outcome variables) and satellite remote sensed data (input variables) in a machine learning process to create a city-specific model and ultimately map of predicted air temperatures and heat index[7].

The FY21 Extreme Heat Initiative competition seeks to expand upon these campaigns, combining the observations, modeling, and outputs produced from them with new experimental methods and follow-on applied research.

We invite proposals focused on extending the observations, modeling, or applications of these campaigns, including in any of the following ways:

1. Incorporate new observation targets for modeling or monitoring urban climate and heat-health hazards (e.g. air and water quality parameters, indoor temperatures, WBGT/UTCI, ecological impacts driving disease vectors), new observation platforms (e.g. long-term in-situ monitors, drones), or additional datasets (e.g. LST, tree canopy, LiDAR, anthropogenic heat flux) in the analysis of urban heat island parameters.
2. Produce new model outputs and derivative information products or indices targeted to a specific use or decision-making requirement.
3. Explore the potential to create a scaled-up, national UHI model, testing generalizability to other communities, and ground truthing the modeled outputs with observations.
4. Develop or enhance data-driven decision-making processes enabling communities to select and evaluate the most appropriate urban heat mitigation approaches given the specific underlying factors contributing to urban heat in a given neighborhood.

Proposals should address research gaps to improve our understanding of how and why urban heat varies and to inform decisions about interventions to address it. Examples include:

- Attribution analysis of the drivers of the spatio-temporal distribution of temperature or another heat-health related variable across a community
- The effect of urban ecological changes, land use patterns, structures, materials, and anthropogenic heat on urban heat islands
- The effect of different weather patterns, diurnal and seasonal variation, and long-term climate change on heat islands

- The effectiveness of different interventions across varying climates and urban structures, and effectiveness over time (trees must grow in place for many years)
- The co-benefits and side effects of UHI interventions beyond heat-related illness and death, such as environmental justice and equity, energy efficiency, greenhouse gas emissions, air quality (ground ozone), disease vector habitat, and mental health

The Extreme Heat Risk Initiative prioritizes proposals that are transdisciplinary, co-developed with decision-makers and the at-risk communities most affected by urban heat, scalable to other cities within the CAPA-NOAA mapping community of practice, and that leverage existing NOAA assets (data, services, etc…), collaborations, programs (e.g RISAs), frameworks (e.g. climate.gov "Steps to Resilience"), and investments. Proposals are encouraged to also leverage programs and resources of other federal agencies (e.g., CDC BRACE program, EPA Urban Heat Island program, USFS Urban and Community Forestry program, FEMA benefit-cost analysis and hazard mitigation planning), NGOs, and private sector companies.

We expect to make awards under this competition as cooperative agreements; awardees will be expected to participate in the NIHHIS-CAPA urban heat community of practice.

Competition Scope

The FY 21 CPO Extreme Heat Risk Initiative competition is focused on applying the new observations, information, and partnerships developed by communities that have participated in a Heat Watch campaign, including those that participated in mapping campaigns that were not part of the recent NOAA/NIHHIS cohorts in 2018-2020. The list of in-scope communities and links to the relevant data sets are below. Applicant PIs need not be based in one of these communities, but collaboration with decision-makers in these cities is required.

- Austin, TX
- Baltimore, MD
- Boston/Cambridge, MA
- Burlington, VT
- Cincinnati, OH
- Detroit, MI
- El Paso, TX
- Fort Lauderdale, FL
- Honolulu, HI
- Houston, TX
- Jackson, MS
- Las Cruces, NM
- Miami, FL
- New Orleans, LA
- Portland, OR
- Providence, RI
- Richmond, VA
- Roanoke, VA
- San Jose / Santa Clara, CA
- San Juan, PR
- Seattle / King County, WA
- Vancouver, CA-BC
- Washington, DC
- West Palm Beach, FL
- Worcester, MA
- Yonkers, NY

City contacts, details, and data are also available at: https://nihhis.cpo.noaa.gov/Urban-Heat-Island-Mapping/UHI-Campaigns/Campaign-Cities

New communities expected to be a part of the 2021 NIHHIS-CAPA Heat Watch cohort may also apply for funding under this opportunity. The process for applying to be part of the 2021 cohort will be posted on https://nihhis.cpo.noaa.gov/

The competition manager for this competition is Hunter Jones [hunter.jones@noaa.gov].

Data Archiving

Successful awardees will be expected to share their data sets in an open access capacity that is publicly discoverable and accessible. Use of open-standard formats and methods is encouraged. Proposals are permitted to include the cost of data sharing or archiving in their budgets if needed.

References

[1] Vaidyanathan, A., Malilay, J., Schramm, P., & Saha, S. (2020). Heat-Related Deaths — United States, 2004–2018. MMWR. Morbidity and Mortality Weekly Report, 69(24), 729–734. doi:10.15585/mmwr.mm6924a1

[2] Fechter-Leggett, E. D., Vaidyanathan, A., & Choudhary, E. (2015). Heat Stress Illness Emergency Department Visits in National Environmental Public Health Tracking States, 2005–2010. Journal of Community Health, 41(1), 57–69. doi:10.1007/s10900-015-0064-7

[3] Fragkias, M., Güneralp, B., Seto, K. C., & Goodness, J. (2013). A Synthesis of Global Urbanization Projections. Urbanization, Biodiversity and Ecosystem Services: Challenges and Opportunities, 409–435. doi:10.1007/978-94-007-7088-1_21

[4] (2019). World Urbanization Prospects 2018: Highlights. doi:10.18356/6255ead2-en

[5] Chapman, S., Watson, J. E. M., Salazar, A., Thatcher, M., & McAlpine, C. A. (2017). The impact of urbanization and climate change on urban temperatures: a systematic review. Landscape Ecology, 32(10), 1921–1935. doi:10.1007/s10980-017-0561-4

[6] Leal Filho, W., Echevarria Icaza, L., Emanche, V., & Quasem Al-Amin, A. (2017). An Evidence-Based Review of Impacts, Strategies and Tools to Mitigate Urban Heat Islands. International Journal of Environmental Research and Public Health, 14(12), 1600. doi:10.3390/ijerph14121600

[7] Shandas, V., Voelkel, J., Williams, J., & Hoffman, J. (2019). Integrating Satellite and Ground Measurements for Predicting Locations of Extreme Urban Heat. Climate, 7(1), 5. doi:10.3390/cli7010005