The NASA DEVELOP Model of Community Science & Engagement: Localizing Earth Science Information

SY43E – 1089

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ABSTRACT

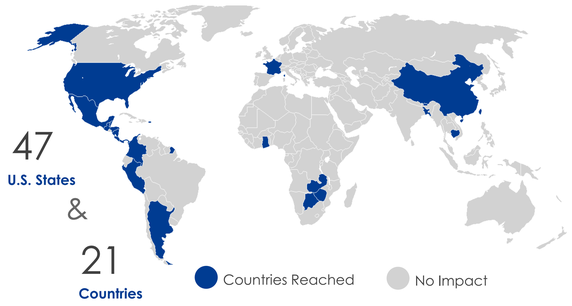
The NASA DEVELOP Program conducts 10-week feasibility studies that apply Earth observation data to address community priorities and support informed decision-making. Part of NASA's Earth Action Capacity Building Program, DEVELOP builds skills in both participants (students, recent graduates, and early/transitioning career professionals), who work on small interdisciplinary project teams, and partner organizations (state and local governments, federal agencies, non-profit and for-profit organizations, universities, and international organizations) that work closely with DEVELOP to design the project. Projects address a wide variety of environmental issues, such as disaster risk and resilience, air pollution, and the impact of urban development, with a growing number of projects exploring how satellite data can help inform decision-making around environmental injustices. A subset of DEVELOP partner organizations are local municipalities or community-led non-profits, with the co-production model serving as an effective engagement tool and an introduction for communities to engage in Earth science research and become familiar with satellite remote sensing. This presentation will highlight the DEVELOP co-production model, community project use cases, and lessons learned in partnering with local communities.

2023 By The Numbers

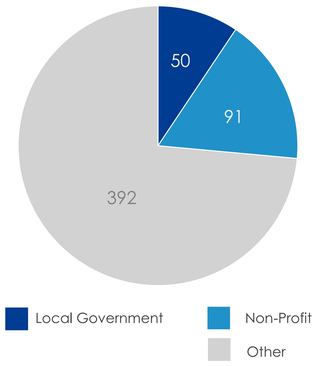
252 **Participants**

65 **Feasibility Studies**

125 **Unique Partner Organizations**



Community Partners 2020 to Present



Focus on Decisions & Priorities

DEVELOP works with organizations across a spectrum – from those entirely new to Earth observations to avid users. For the former, the engagement should build around the potential partner's decision-making process, organizational priorities, and desired interventions. Partners don't necessarily know what Earth observations have to offer or what they might need. Early conversations should identify decision making processes and priorities while informing what is possible through the application of the Earth science information.

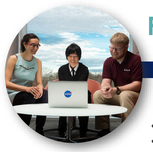
THE DEVELOP DUAL CAPACITY BUILDING MODEL

DEVELOP builds capacity to use Earth observations in both participants (students, recent graduates, early career professionals, and transitioning career professionals) and project end-users (organizations making environmental decisions) through co-developed 10-week feasibility studies.

Identify Partners

Understand & Empathize
Set the Context

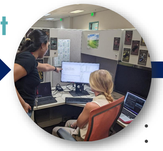
- Organizational introductions
- Insight into partner values, organizational structure, and decision-making processes
- Understand environmental issues at hand that organization and community faces
- Clarity between potential partner needs & wants
- Clear communication of limitations of Earth observation data



Project Idea Development

Define & Ideate
Plan Together

- Collective brainstorming
- DEVELOP composes project proposal
- Proposal serves as mechanism to outline objectives & expectations
- Partners weigh in on proposal
- Proposal outlines what is feasible in 10 weeks: decision-making process at hand, how EO can potentially be applied, and what end-products will be created



Project Execution

Test & Implement
Work the Plan

- An interdisciplinary team of four work the project
- Fast paced – 10 week term
- Take the skeleton of the proposal and insert their own experience and contributions into the project
- Partners meet with the team on a weekly or biweekly basis for check-ins and to ask and answer questions
- DEVELOP advisors and National Program Office support teams

Project Handoff

Decision Support
Share Results & Methodologies

- Emphasis on science communication
- Each project culminates in a set of shared deliverables: technical report, presentation, feedback forms, creative communications, and other supporting documentation as warranted
- Deliverables are reviewed and edited by Leads and advisors
- Teams present their results and methods to partner organizations

Assessment & Feedback

Evaluate, Learn & Inform
Inform All Steps

- Monitoring and evaluation feeds all steps of the process
- Inputs are gathered from both participants and partners, before and after the project
- Participants: exit surveys, personal growth assessments, feedback forms
- Partners: pre- and post-partner forms
- Project Strength Index (PSI) assesses processes and gives a standard for comparisons

DEVELOP Projects Focused on Community Science

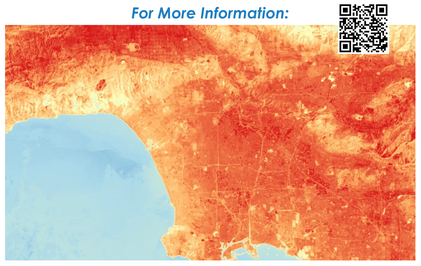
LOS ANGELES URBAN DEVELOPMENT

Utilizing NASA Earth Observations to Evaluate the Impact of Tree Coverage on Urban Heat Mitigation

Many organizations have turned to urban greening and tree-planting initiatives to help cool vulnerable communities. NASA DEVELOP partnered with City Plants and the City of Los Angeles, Office of Forest Management, to study the role of trees in urban environments and their relation to the mitigation of local urban heat islands.

Their analysis reveals a spatial and temporal connection between temperature and vegetation, suggesting that areas with more vegetation are less likely to suffer high summertime temperatures.

For More Information:



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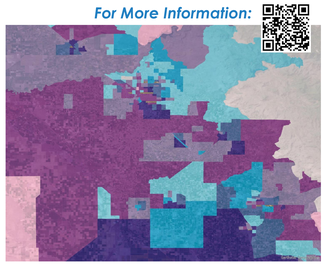
SAN JOAQUIN VALLEY HEALTH & AIR QUALITY

Evaluating the Overlap of Social Vulnerabilities and Air Quality in the San Joaquin Valley Air Pollution Control District

Little Manila Rising is a nonprofit in Stockton, California that has been increasingly concerned by the air pollution in their city and the neighboring San Joaquin Valley. By leveraging NASA Earth observations along with sociodemographic and public health data, the DEVELOP team created maps identifying the areas experiencing the highest vulnerabilities and disparities in pollution exposure. These results will support Little Manila Rising's organizing strategies for stricter enforcement of air pollution regulations and increased public health equity for community members.

For More Information:



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PORTLAND URBAN DEVELOPMENT

Quantifying and Visualizing Urban Heat with Compounding Vulnerabilities to Support Community Depaving Initiatives

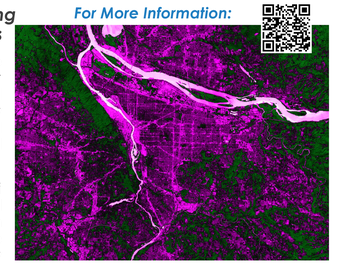
Urban heat is a pressing concern in Portland, Oregon as climate change induced heat waves increase. Cities experience higher temperatures due to the urban heat island effect (UHI), and environmental injustice and disenfranchisement in minority communities expose low-income and Black, Indigenous, and People of Color (BIPOC) residents to more extreme and debilitating heat events.

This team identified Portland's communities on the frontlines of urban heat impacts by overlapping environmental and social vulnerabilities using NASA Earth observations. They partnered with Depave, a Portland-based nonprofit that works alongside communities to replace pavement with greenspace in historically disenfranchised areas.

The team's analysis demonstrated that, throughout Portland, there are frontline communities experiencing high potential social vulnerability to extreme temperatures due to environmental injustices and over-pavement.

Depave's impact on urban heat is observable and quantifiable using remote-sensing data and tools, with an average of 1°F LST decrease across the six case studies. We illustrated the significance of local urban heat mitigation efforts and proposed next steps for conducting inclusive and intentional research that highlights the lived experiences and resilience of frontline communities.

For More Information:



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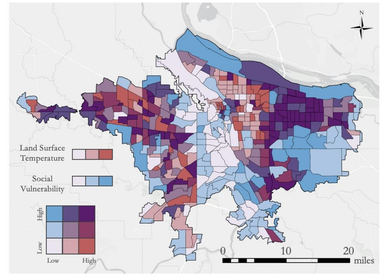


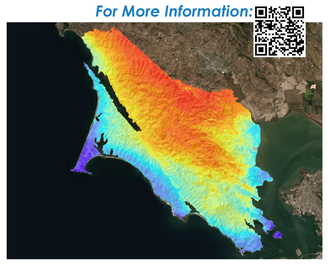
Bivariate map of our baseline LST and Social Vulnerability Index to demonstrate the geographic distribution of heat vulnerability in Portland, Oregon. We identified the dark purple areas of the map to indicate communities on the frontlines of Portland's urban heat crisis.

MARIN COUNTY WILDLAND FIRES II

Examining Fuel Load and Land Cover Change to Inform Fire Prevention and Suppression Decision in Marin County, CA

Marin County, located in the San Francisco Bay Area, has had significant development in the wildland-urban interface and periods of highly wildfire-prone conditions. The NASA DEVELOP team collaborated with Fire Foundry (a Marin-based fire service workforce development program) and the Marin County Fire Department to develop models to assist with fire management. The team developed three different models. They compared model outputs and performed a weighted overlay analysis to identify specific locations where a fireline could be constructed to interrupt the progress of an active fire. These tools will assist partners in preparing for and managing active wildfire situations.

For More Information:



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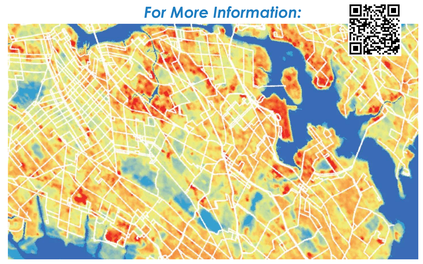
NEW YORK CITY TRANSPORTATION & INFRASTRUCTURE

Assessing Urban Heat Island Effects at Bus Stops in New York City to Support Cooling Interventions

New York City, the most populous city in the United States, is threatened by exacerbated heat exposure due to the urban heat island (UHI) effect induced by its heavily urbanized environment and limited tree canopy cover. Decades of racist policy and planning have led extreme heat to disproportionately impact people of color and low-income residents, especially in the context of public transportation by bus. This project partnered with Transportation Alternatives to identify the most heat vulnerable populations in the city, characterize the extent of urban heat, and complete an individual bus stop analysis.

Their end products will be incorporated into Transportation Alternative's Spatial Equity NYC dashboard and inform their community engagement strategies as they organize with residents to advocate for cooling interventions.

For More Information:



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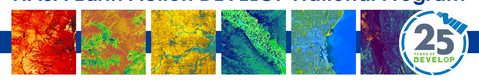
What is DEVELOP?

Since 1998, DEVELOP has fostered the use of Earth observation data and geospatial information to better inform environmental decision making. As a dual capacity building program, DEVELOP builds skills to access and apply satellite data in both its participants (students, recent graduates, and transitioning career professionals) and project partners (federal, state, and local governments; non-profits and for-profits; and international organizations). Projects are conducted in rapid, 10-week terms (spring, summer, & fall), by small teams of participants under the guidance of NASA and partner Science Advisors.

Visit the DEVELOP website for more information for how to get involved!

NASA Earth Action DEVELOP National Program



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