



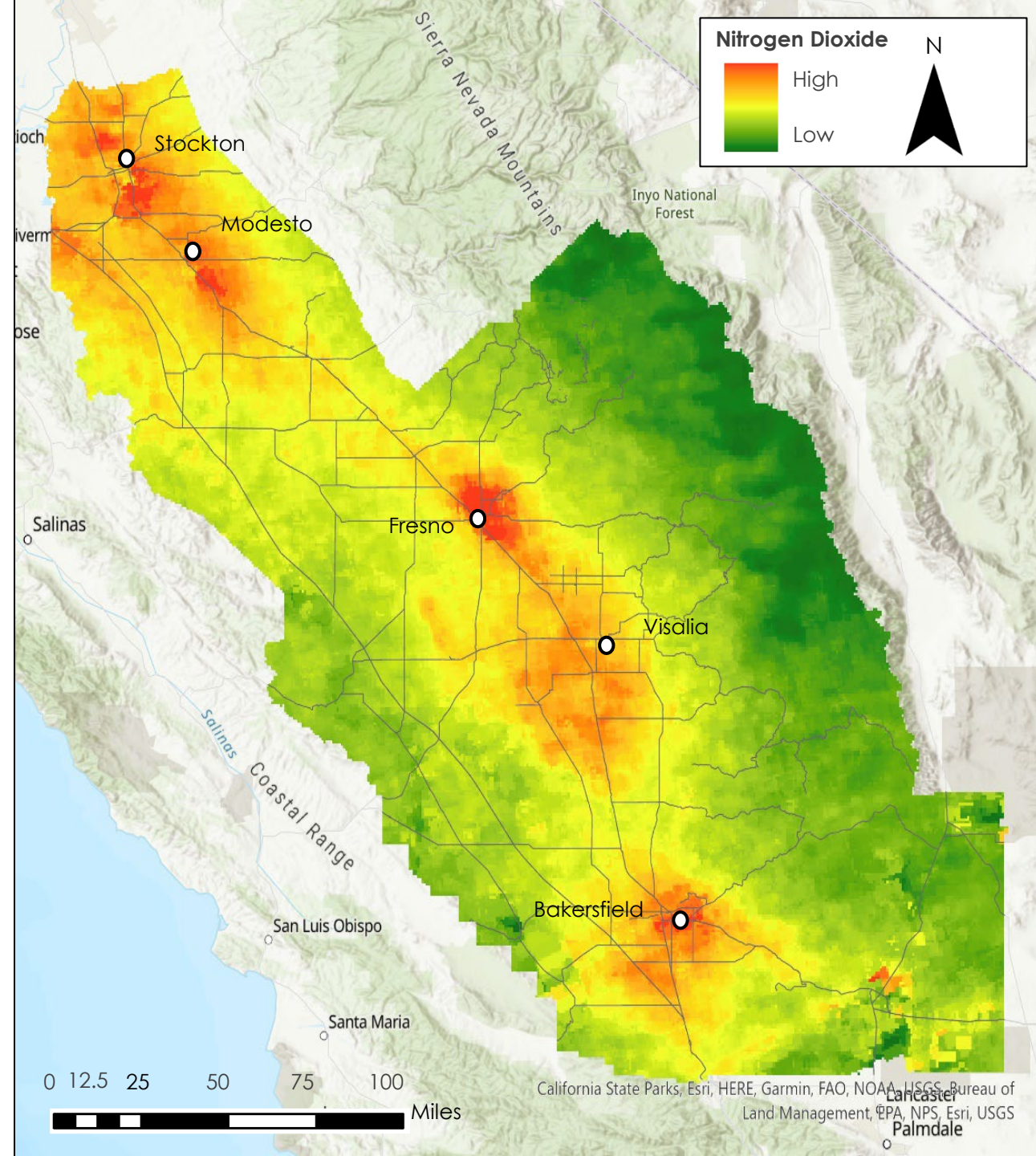
DEVELOP

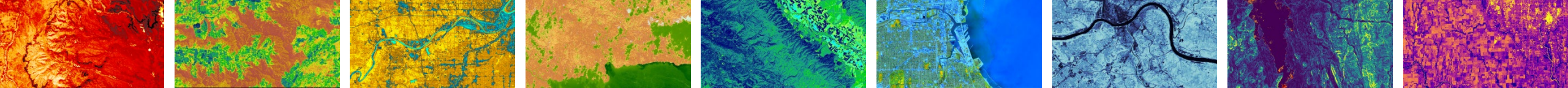
Building Capacity in Early Career Individuals to Apply NASA Earth Observations in Health and Air Quality

April 24th, 2024

Xia Cai¹ • Kenton Ross¹ • Amanda Clayton^{1,2} • Laramie Platt^{1,2}

¹NASA DEVELOP National Program, ²Analytical Mechanics Associates





MISSION:

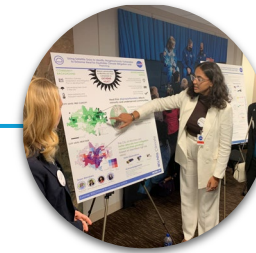
Integrating **NASA Earth observations** with society to foster future innovation and cultivate the **professionals of tomorrow** by addressing diverse environmental issues today.



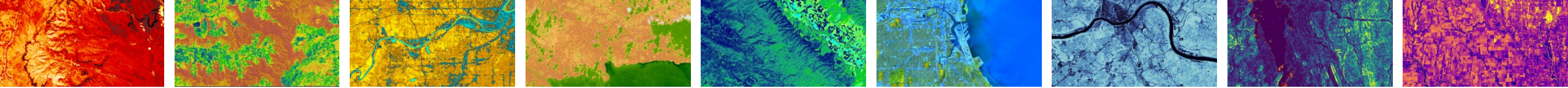
Geospatial **workforce** development



Explore capabilities of **Earth observations** for informing decision-making



Conduct Earth science application **feasibility studies** in 10-week terms



Dual Capacity Building

Mechanism to **build skills** and competency for using Earth observations to inform decisions:

Rapid Feasibility Projects



Participants



6,034

Capacity-Building Opportunities Provided



1,200

Feasibility Projects Conducted

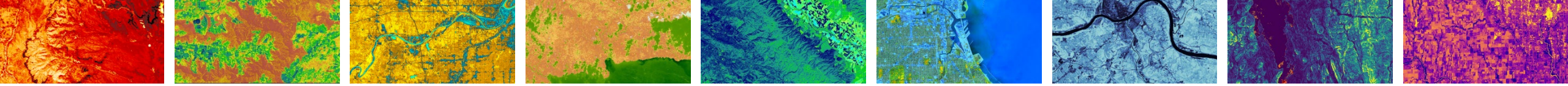


Partners



1,140

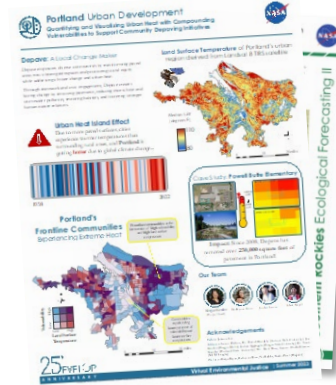
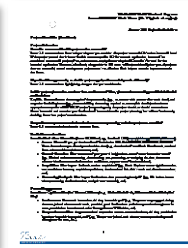
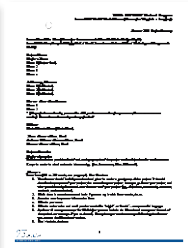
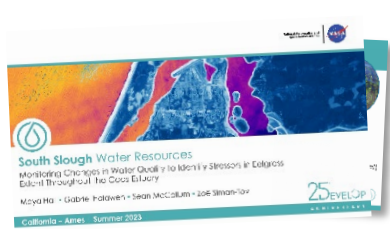
Unique Partner Organizations Engaged



Project Characteristics

- Center on **environmental decision-makers'** priorities & decision-making process
- Assess the feasibility of **NASA Earth observations** to inform decision-making
- Conducted in **10-week terms** by small interdisciplinary **teams**
- **Advised** by NASA scientists and partner organizations
- Hand off **end products** to partner organization
- Focus on at least one of nine thematic **application areas**
- Create a consistent set of **deliverables**

- DISASTERS 
- WILDLAND FIRES 
- AGRICULTURE 
- ENERGY & INFRASTRUCTURE 
- ECOLOGICAL CONSERVATION 
- WATER RESOURCES 
- URBAN DEVELOPMENT 
- CLIMATE 
- HEALTH & AIR QUALITY 



DEVELOP

FY2023 HAQ PORTFOLIO

ENGAGEMENT:

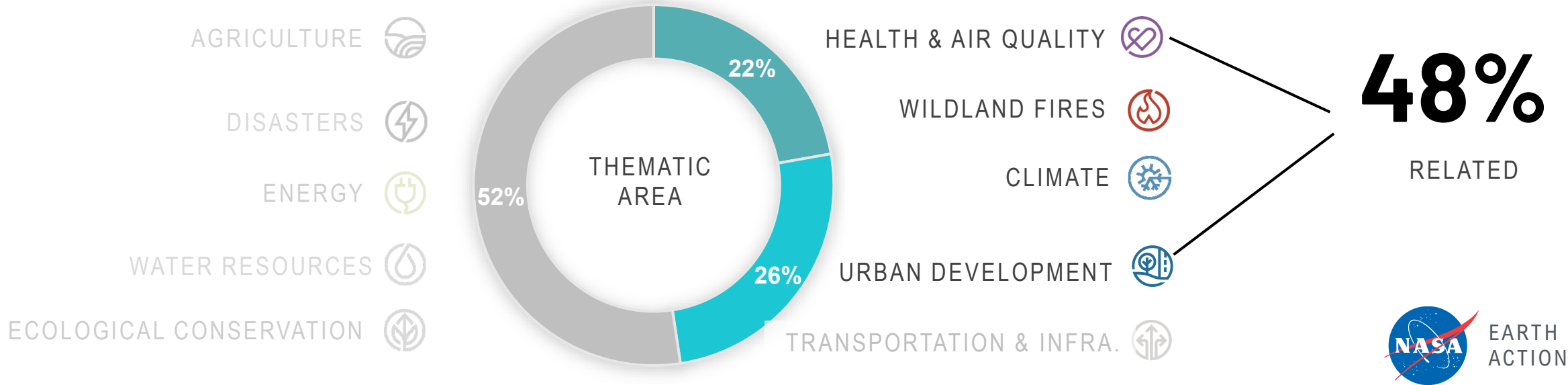
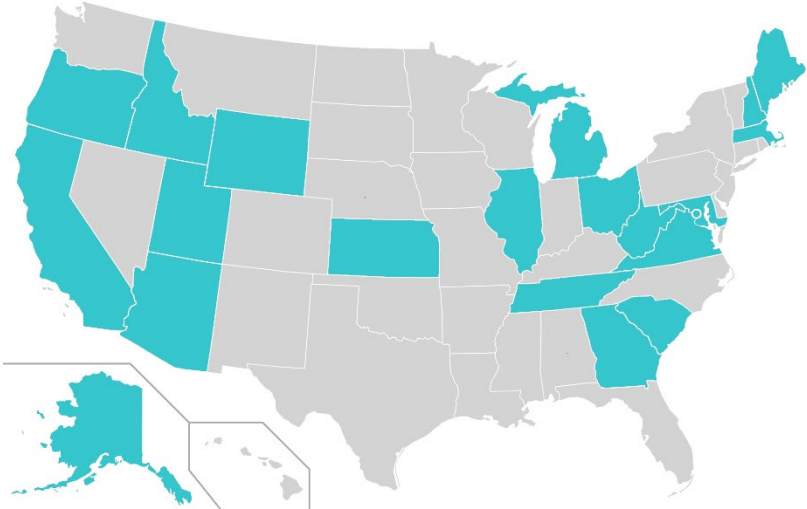
118 PARTICIPANTS

44 PARTNER ORGS

30 PROJECTS

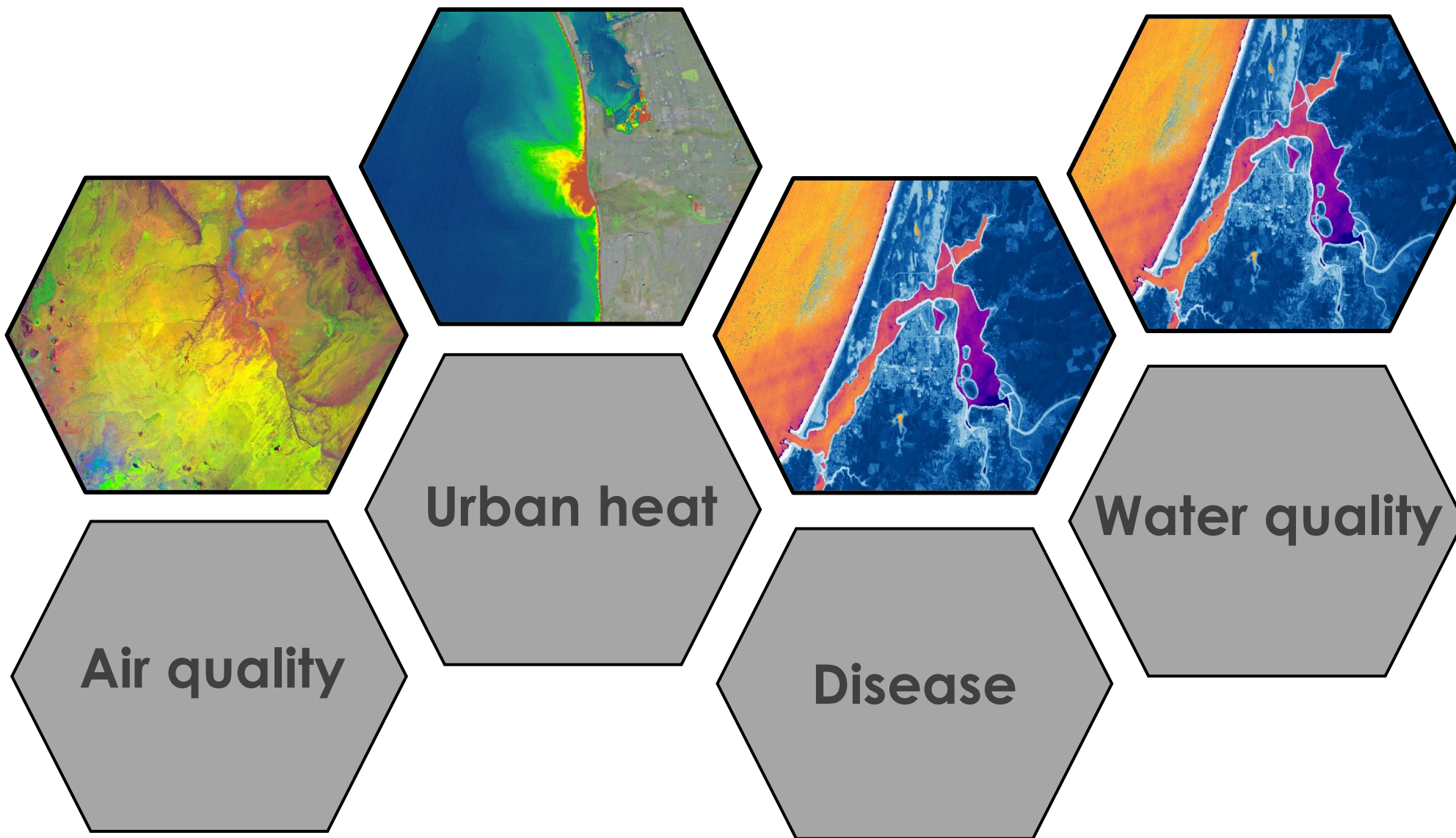
IMPACT:

20 U.S. STATES & MALDIVES CHILE





Common Project Topics





Air pollution: San Joaquin Valley, CA



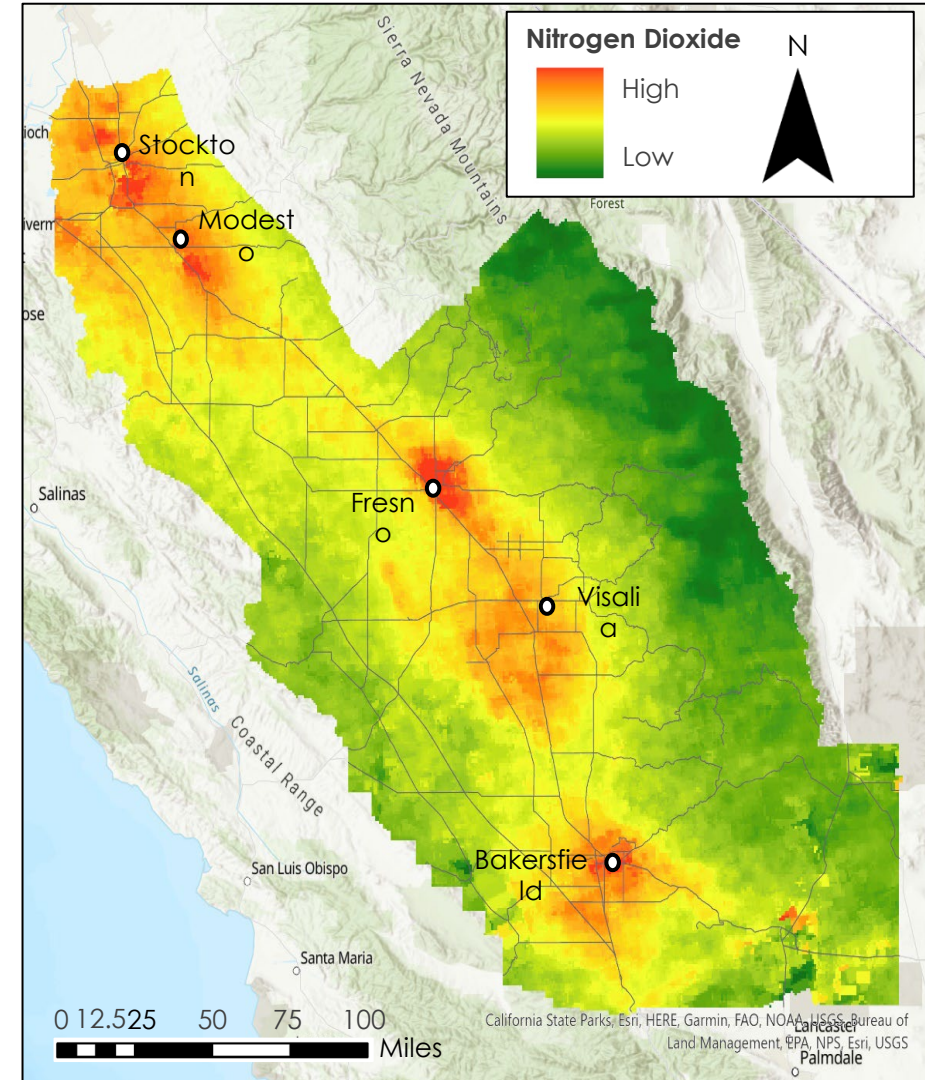
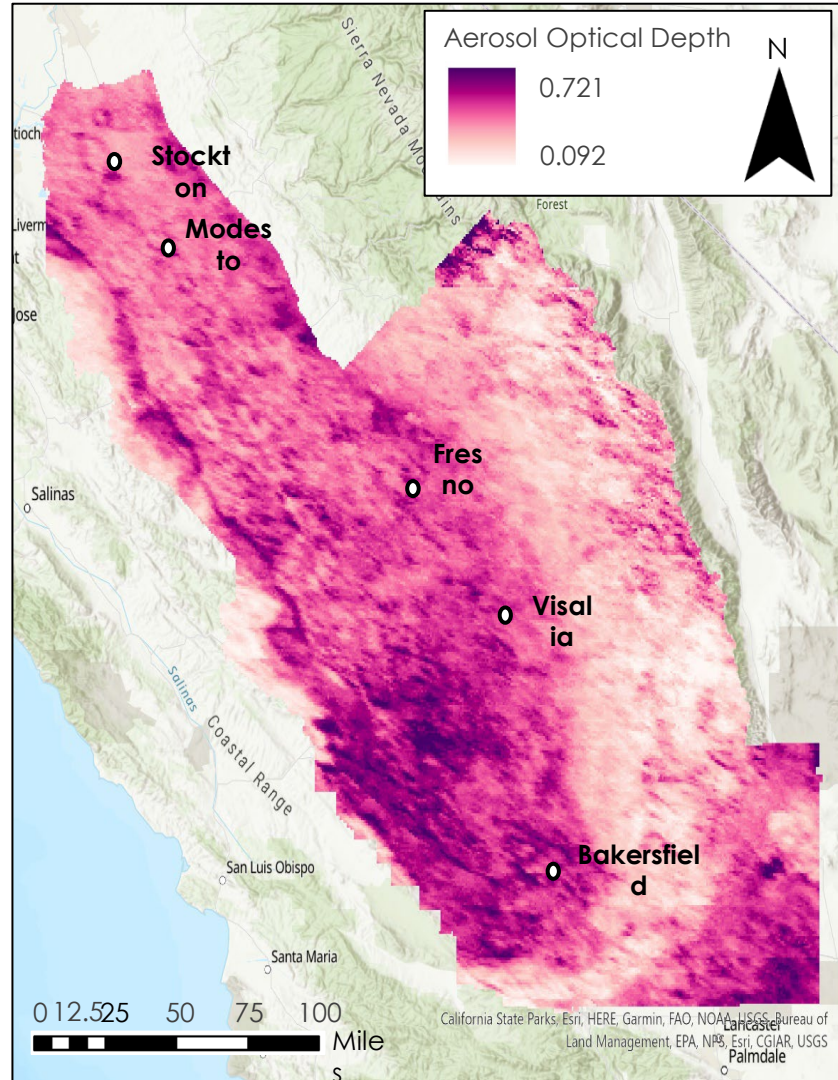
2023 Summer

Partner
Little Manila Rising

What?
Evaluate PM2.5 and NO2 pollution

EO
TERRA, Aquia, NPP, CALIPSO, Sentinel-5

Impact?
Advocate for more **robust policies** to improve health quality





Urban heat: Bridgeport, CT



2024 Spring

Partner

Groundwork Bridgeport

What?

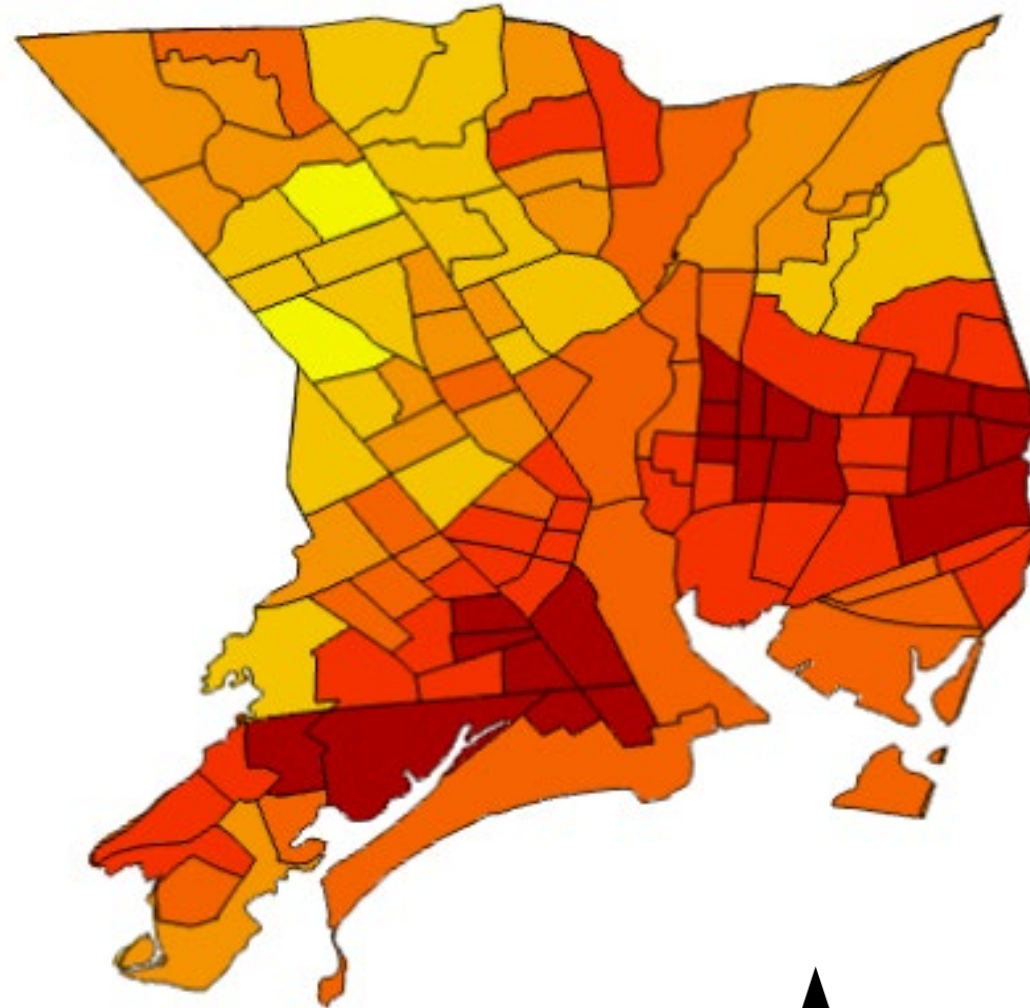
Urban heat intensity, elevated heat exposure, individual sensitivity, heat relief

EO

Landsat-8, Landsat-9

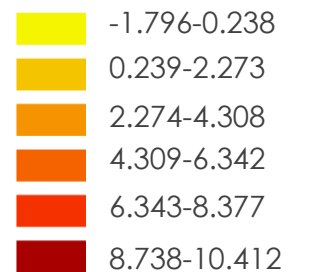
Impact?

Inform cooling interventions as a part of the Cool Corridor project



Temperature Difference between Bridgeport and Fairfield City

Block Groups



0 0.75 1.5 miles





Disease incidence: Peruvian Amazon

2021 Summer

Partner

Peru Ministry of the Environment, Peru Ministry of Health

What?

Explore trends between changes in land use and disease incidence

EO

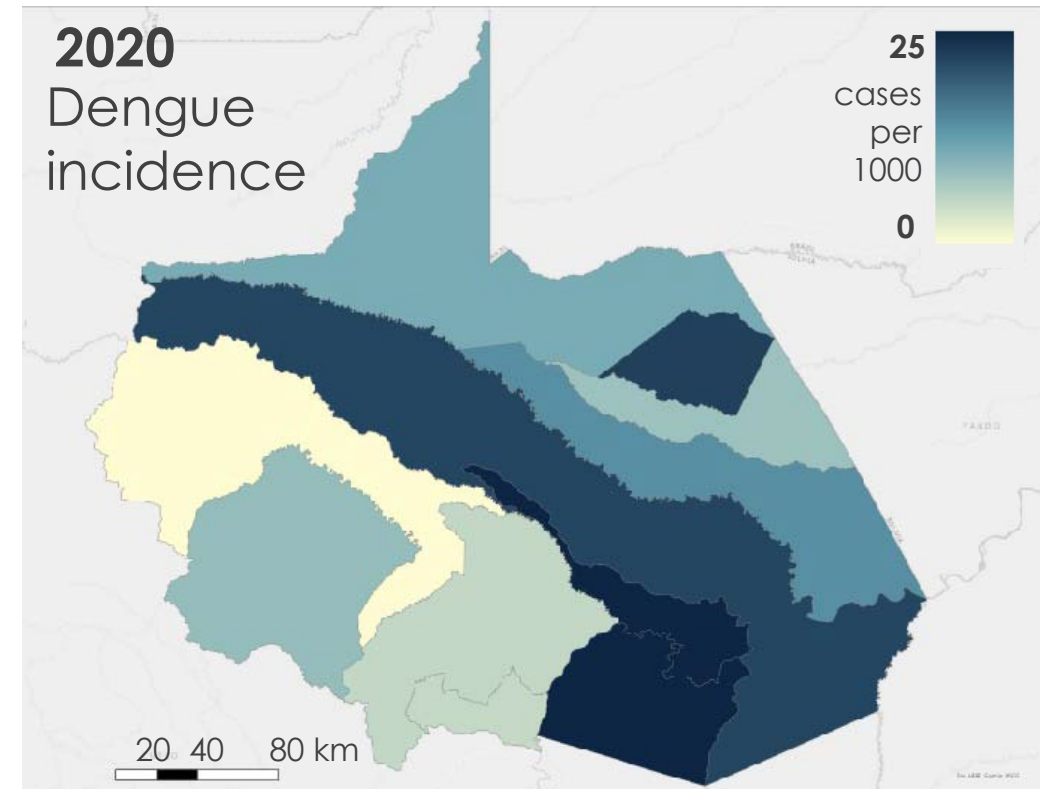
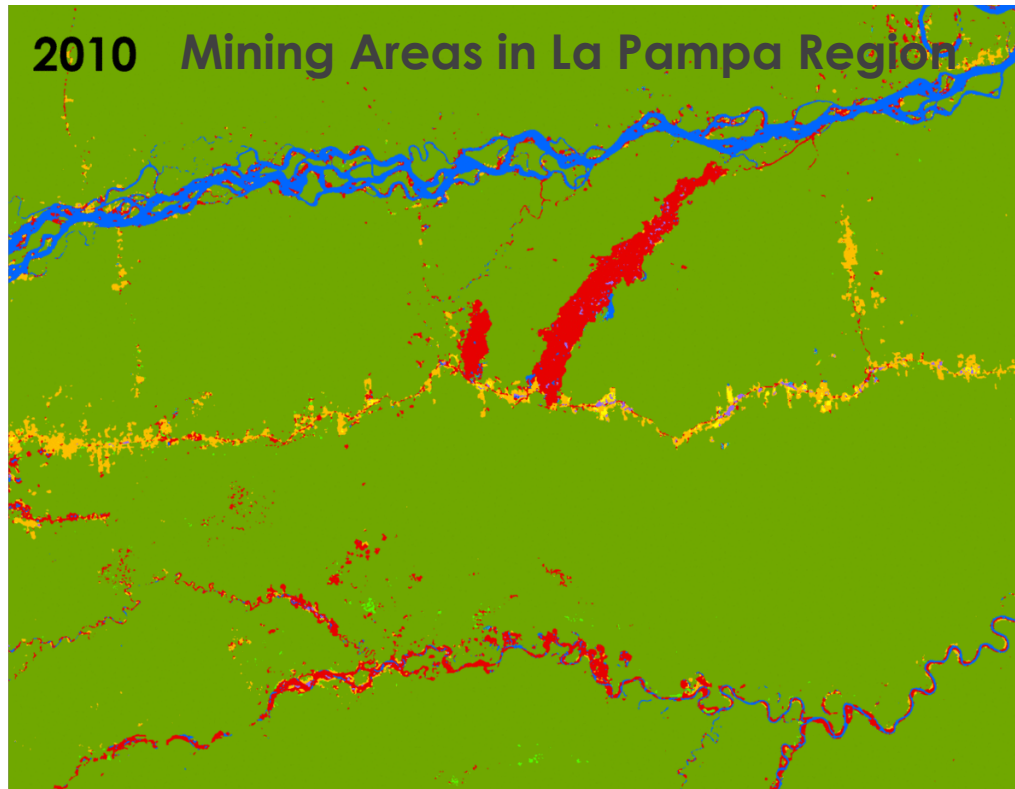
Landsat-5, Landsat-8

Impact?

Better **guide agency resources** to protect human and environmental health

Land Class

-  Forest
-  Sec. Veg.
-  Pastures
-  Agriculture
-  Mining
-  Water
-  Wetlands
-  Urban





Air pollution: Tidewater, VA



2024 Summer

- ❑ Since 1885, coal has been transported through Tidewater communities. Coal dust and transportation facilities pose potential health risks.
- ❑ The Virginia DEQ measures toxic metals and PM found within dust.
- ❑ This project will assess air quality using EOs to provide VA DEQ with resources to raise awareness of potential health risks and improve health outcomes.

Earth Observations:

- Sentinel-5p TROPOMI
- TEMPO
- Terra/Aqua MODIS



Letters for Feb. 9: Elected officials must regulate the coal industry in Hampton Roads – The Virginian-Pilot



Harmful Algal Blooms: Chile



2024 Summer

- Harmful Algal Blooms (HAB) pose great threat to Chile fishery and natural resources
- Create regional algal event timeseries to help quantify trends that lead to HAB events.
- Create nutrient runoff potential maps to help better understand locations of nitrogen and phosphorus sources within watersheds.
- This project will help authorities effectively respond to HAB

Earth Observations:

- Landsat
- Terra/Aqua
- Suomi
- Sentinel-2



A non-toxic red tide bloom of Noctiluca scintillans in New Zealand. (M. Godfrey)



Lessons Learned

Earth Observations

#1

Earth observations will help inform decisions across a **range of topics and partners**.

#2

The Earth observation toolbelt is vast. **Picking the right tool(s)** for the project is imperative.

#3

Earth observations are not a silver bullet, and sometimes don't offer desirable results. **This is ok.**

#4

When utilizing Earth observations, the **appropriate resolution** must be used to match what is being observed.

Project Best Practices

#1

Developing projects **with partner input** and creating **user-focused end products** leads to the best partnerships (and typically results).

#2

For applied projects, the best results are **conclusive results**.

#3

The experiential learning model leads to **capacity built** for participants & partners and conclusive results.

#4

Don't count out **early career researchers!**

PARTNER WITH DEVELOP

Next Steps

Term Dates

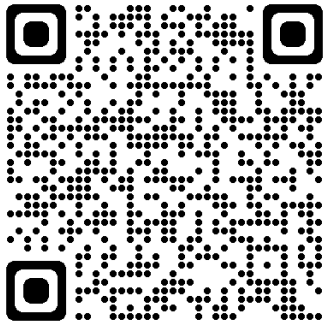
Spring 2025 (January 27 – April 4, 2025)

Summer 2025 (June 2 – August 8, 2025)

Idea Collection

April/May 2024

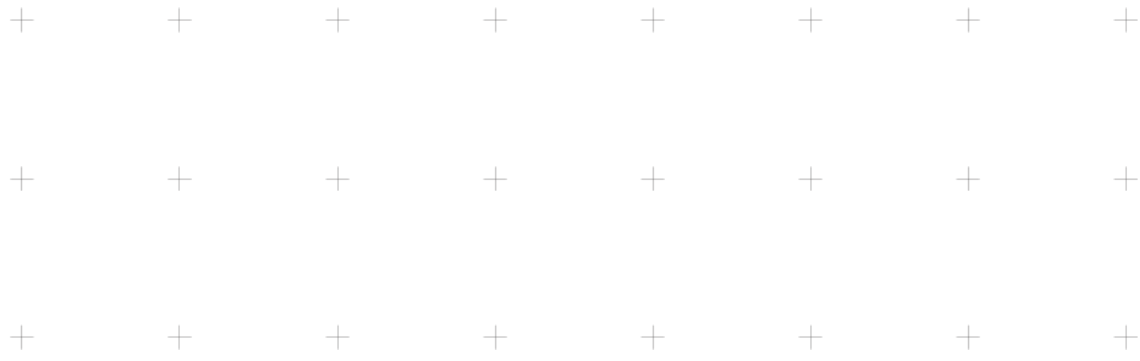
September 2024



Visit the [Partner with DEVELOP](#) page & submit a Project Request Form to:

xia.cai@nasa.gov or
NASA-DL-DEVELOP@mail.nasa.gov





Thank You!

Visit the DEVELOP website:

<https://appliedsciences.nasa.gov/nasadevelop>

Email us at:

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