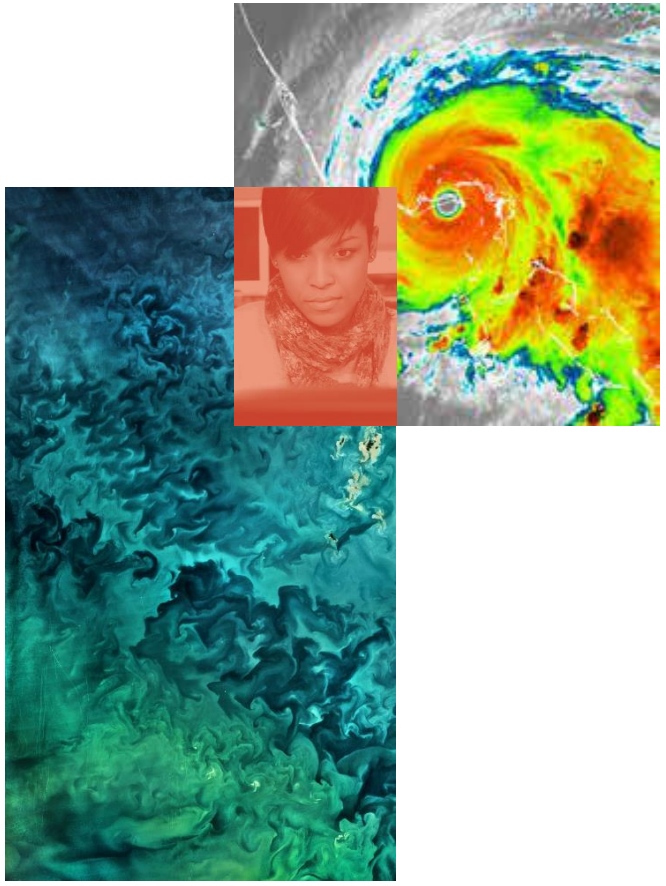
An Introduction To NASA Capacity Building Program

Highlights from DEVELOP

Xia Cai (xia.cai@nasa.gov)

DEVELOP
National Program Office

Making Earth Data Accessible to All



The **Capacity Building Program** provides individuals and institutions with workforce development, training activities, and collaborative projects to strengthen understanding of Earth observations and expand their use around the world.

We work with everyone at every level — from first-time users to long-time professional users of Earth science data. We work to promote open data access and coordinate capacity building activities focused on users needs.

Four elements:

ARSET | DEVELOP | SERVIR | IPI

International engagement (e.g., EOTEC DevNet, GEO, AmeriGEO)

NASA Applied Remote Sensing Training (ARSET)

https://appliedsciences.nasa.gov/arset

EARTH SCIENCE APPLIED SCIENCES

CAPACITY BUILDING

ARSET AQ & Health Trainings

Cost-free training on the use of Earth Observations for decision making

- Our trainings are:
  - Online and in-person
  - Live and instructor-led, or self-guided
  - Provided at **no cost**, with materials and recordings available from our website
  - Often **multi-lingual**
  - Range in level from **introductory** to **advanced**

- Remote sensing of trace gases and aerosols
- Column to surface relationship
- Active fire and smoke detection
- Forecasting and reanalysis
- Data access, visualization, and analysis

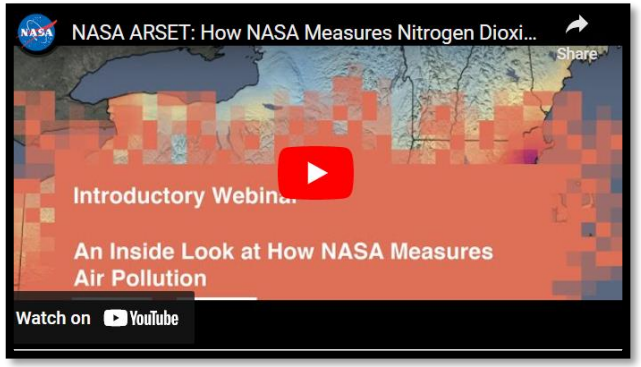
ARSET website

ARSET Online Training Guide

Connect with ARSET

https://appliedsciences.nasa.gov/arset

- **View all recordings and materials** from previous trainings
- **Register** for an upcoming training
  - We use training survey responses to assess the effectiveness of each component of the training and get **ideas for future trainings.**
- Browse all our previous trainings since 2015 in our **Online Resource Guide**
- Take our **new self-paced training** on Building Sustainable Earth Science Applications
- Take our **Fundamentals of Remote Sensing** training
- **Sign up for our listserv and follow us** on Twitter/X (@NASAARSET) to find out about our newest trainings



Coming in 2024

NASA Atmospheric Composition Ground Networks Supporting Air Quality and Climate Applications

Fundamentals of Remote Sensing for Air Quality Applications (self-paced)

ARSET website

ARSET Online Resource Guide

SERVIR

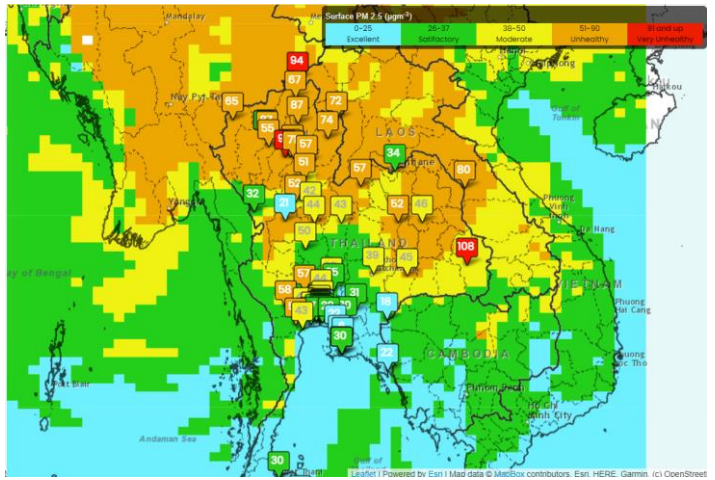
SERVIR's name is derived from the Spanish word meaning "to serve"

NASA EARTH SCIENCE APPLIED SCIENCES

- A joint initiative between NASA and the U.S. Agency for International Development
- Leading geospatial organizations in Asia, Africa, and Latin America
- Partners with countries and organizations to address critical challenges in climate change, food security, water and related disasters, land use, and air quality.

- Uses EOs to help decision-makers map sources of air pollution, track how this pollution moves within and across borders, and study how it affects people's health.
- Works with regional and local partners to support vital air quality monitoring and public health services.

Mekong Air Quality Explorer
(PM2.5 and GHG)



https://aqatmekong-servir.adpc.net/en/map/

Email: **SERVIR_Support@bixal.com**

https://servirglobal.net/

Indigenous Peoples Initiative (IPI)

- We engage and support Indigenous communities through listening sessions, meetings/conferences, and with regional organizations
- We co-develop place-based, in-person and online trainings focused on content relevant to Indigenous lands and territories
- We help build the capacity of Indigenous peoples to use NASA Earth Observations to monitor and manage their natural and cultural resources via place-based approaches


Amber Jean McCullum, lead


Nikki Tulley


Sativa Cruz


Victoria Ly

https://appliedsciences.nasa.gov/indigenous-peoples-initiative

EARTH ACTION

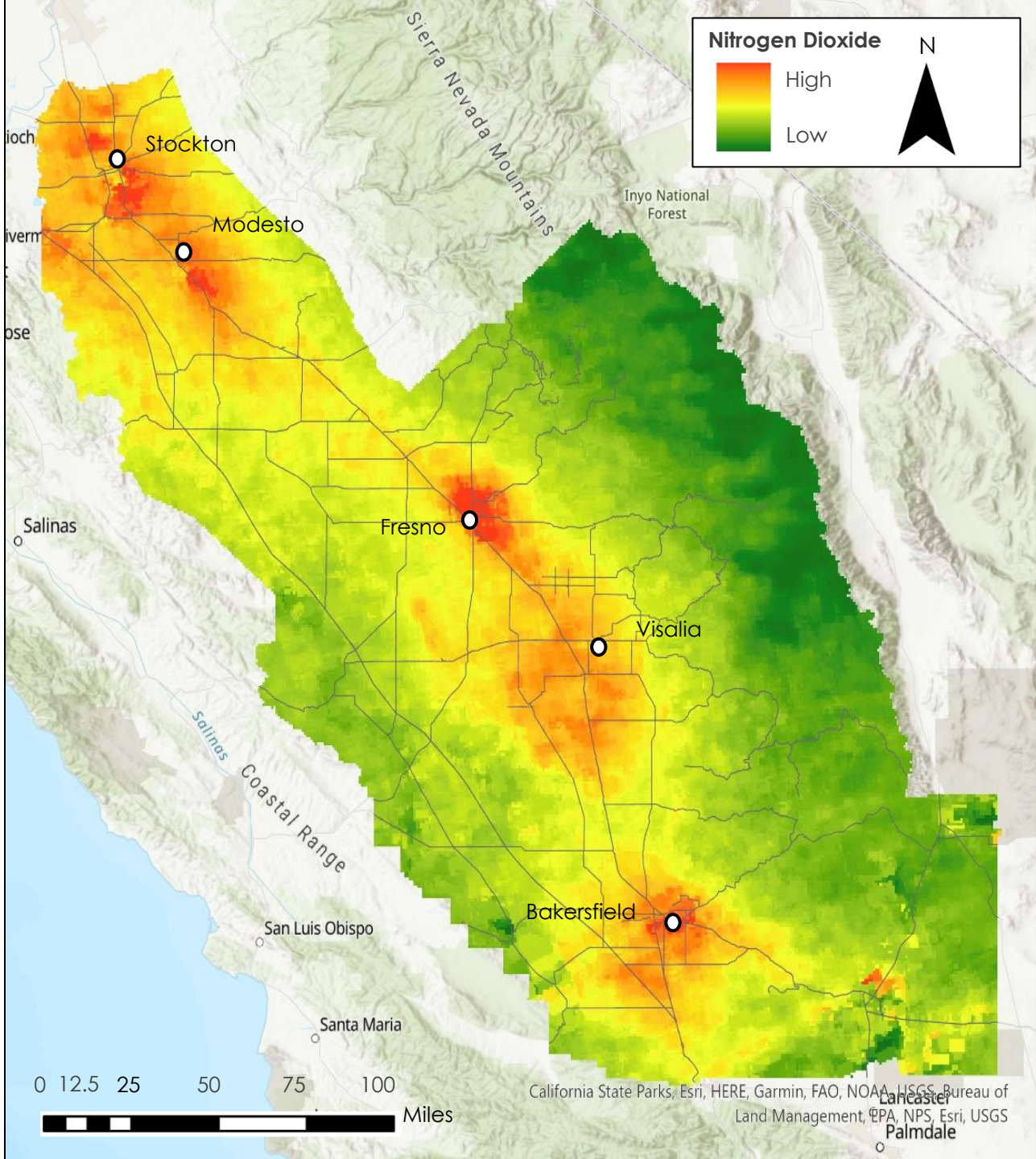
DEVELOP

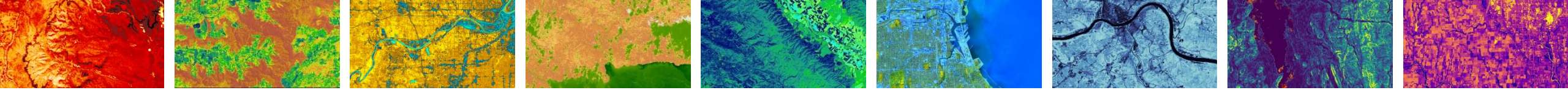
Building Capacity in Early Career Individuals to Apply NASA Earth Observations in Health and Air Quality

April 24th, 2024

Xia Cai[1] • Kenton Ross[1] • Amanda Clayton[1,2] • Laramie Platt[1,2]

[1]NASA DEVELOP National Program, [2]Analytical Mechanics Associates



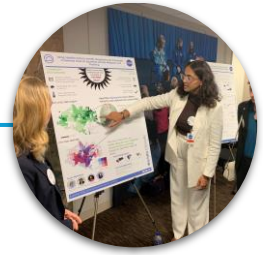


MISSION:

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

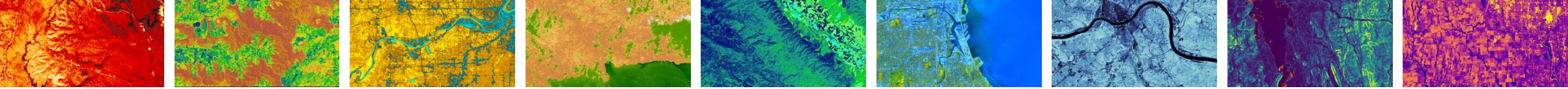
Geospatial **workforce** development

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



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

EARTH ACTION



Dual Capacity Building

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

Rapid Feasibility Projects

Participants

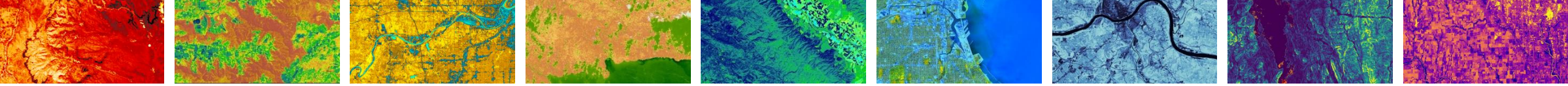
6,034
Capacity-Building Opportunities Provided

1,200
Feasibility Projects Conducted

Partners

1,140
Unique Partner Organizations Engaged

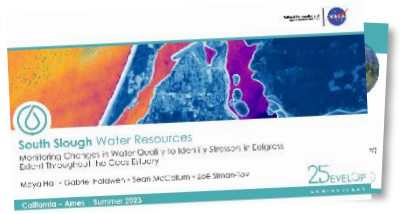
NASA EARTH ACTION

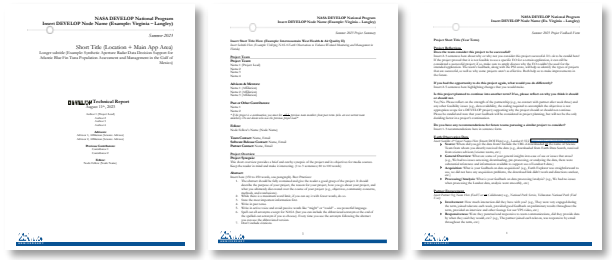


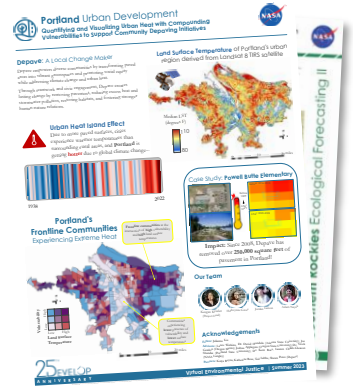
Project Characteristics

- 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

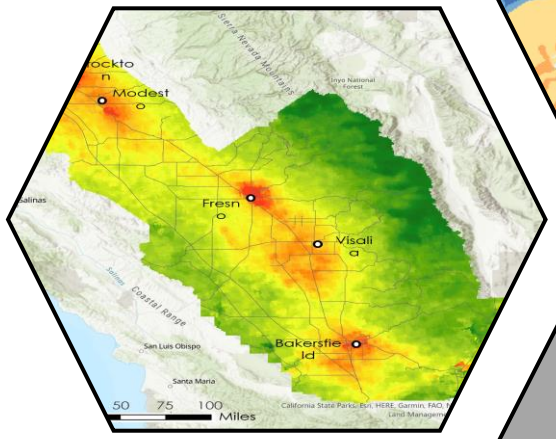


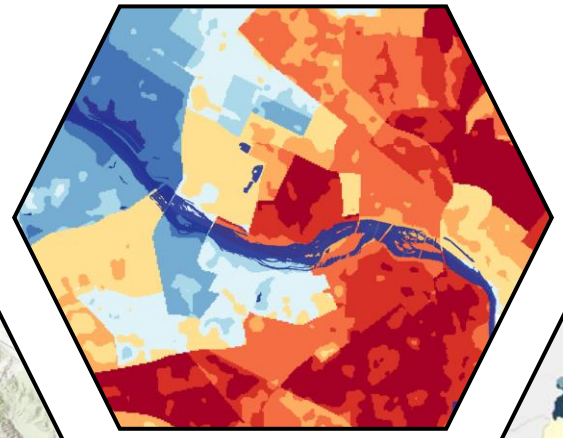


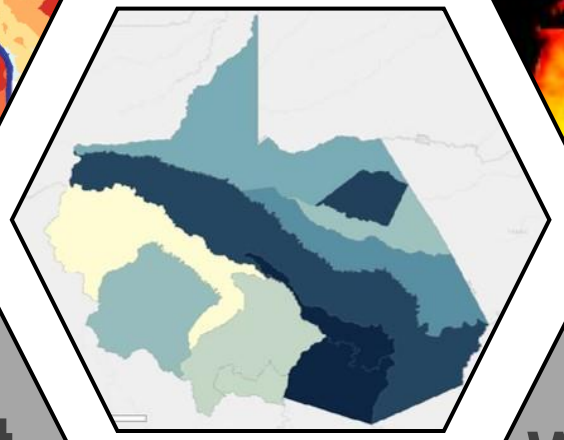


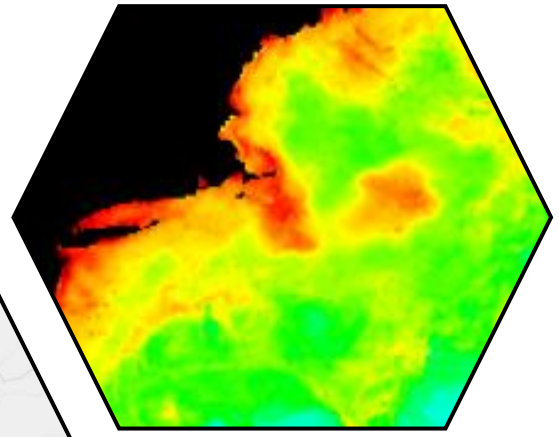
NASA EARTH ACTION

Common Project Topics









Air quality

Urban heat

Disease

Water quality

Air pollution: San Joaquin Valley, CA

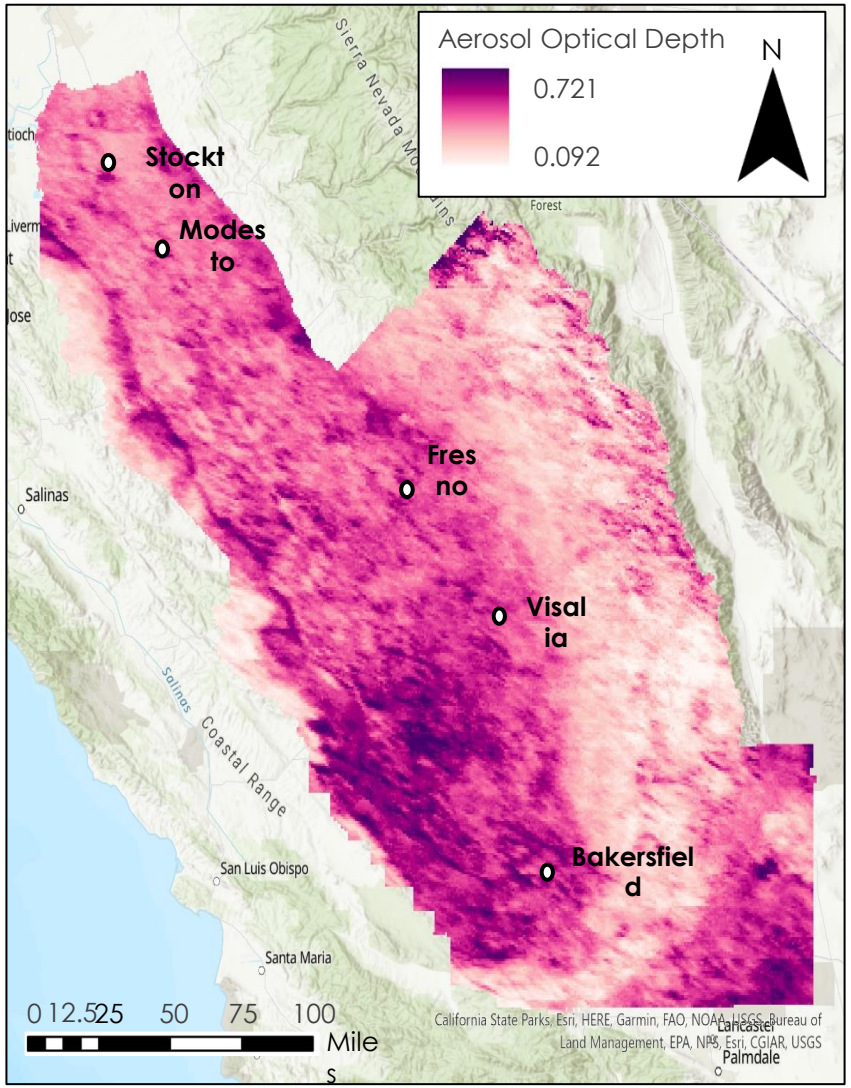
2023 Summer

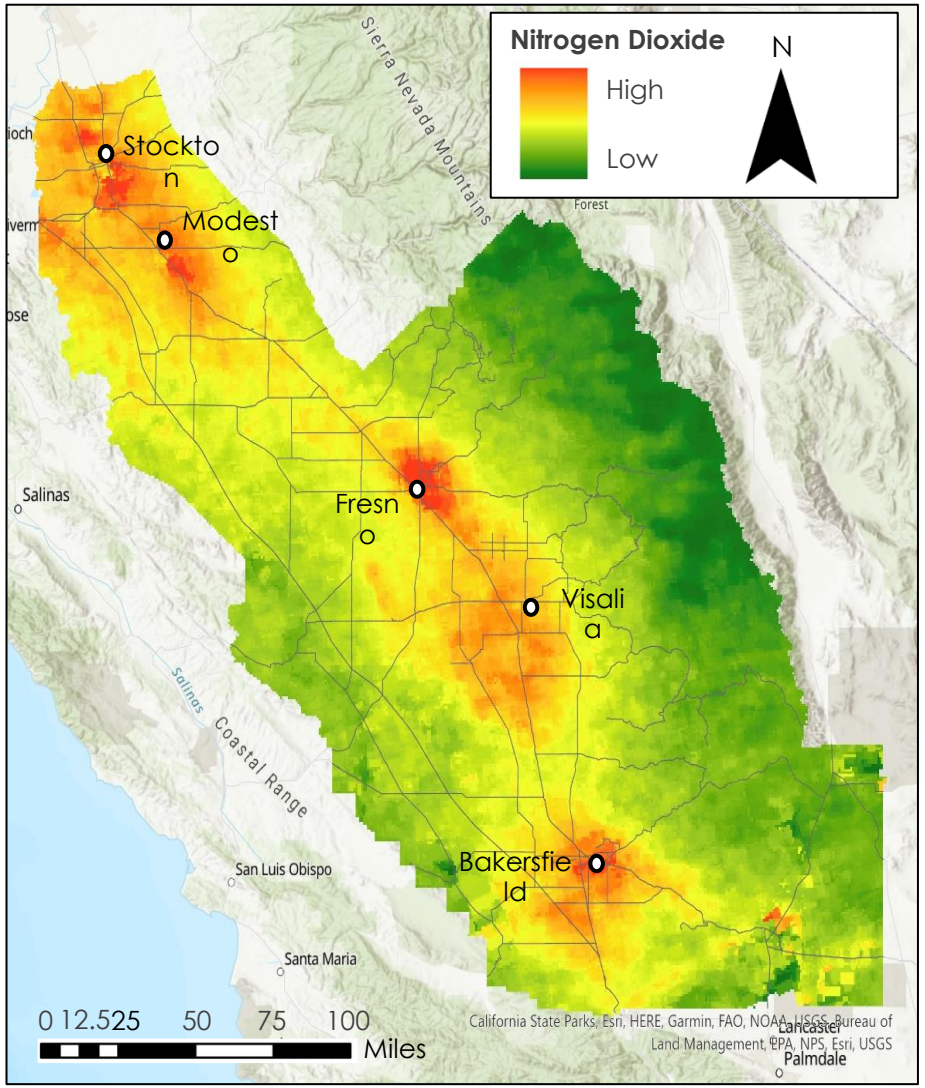
Partner
Little Manila Rising

What?
Evaluate PM2.5 and NO_2 pollution

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

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





Urban heat: Bridgeport, CT

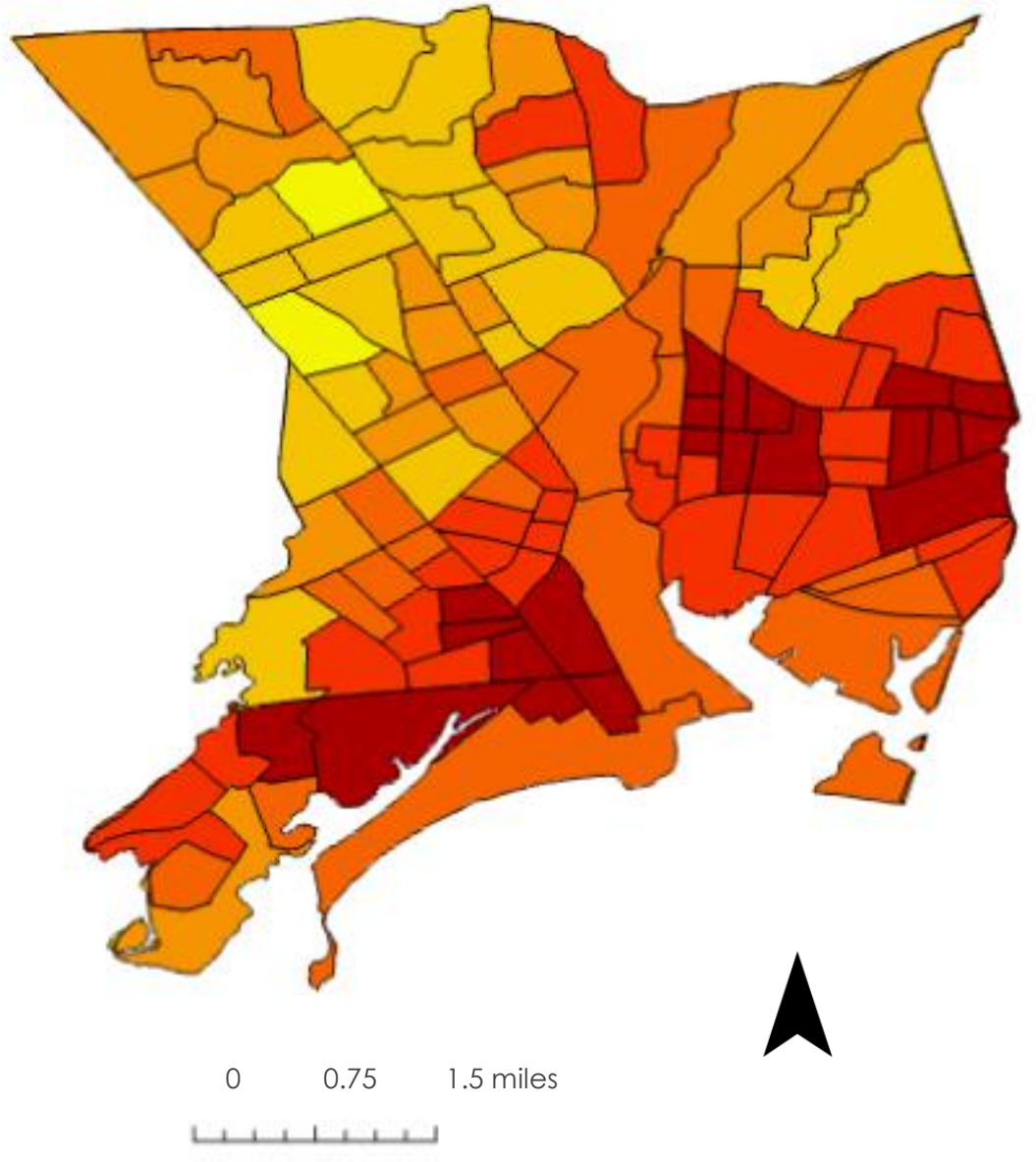
2024 Spring

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



Disease incidence: Peruvian Amazon

2021 Summer

Partner

Peru Ministry of the Environment, Peru Ministry of Health

What?

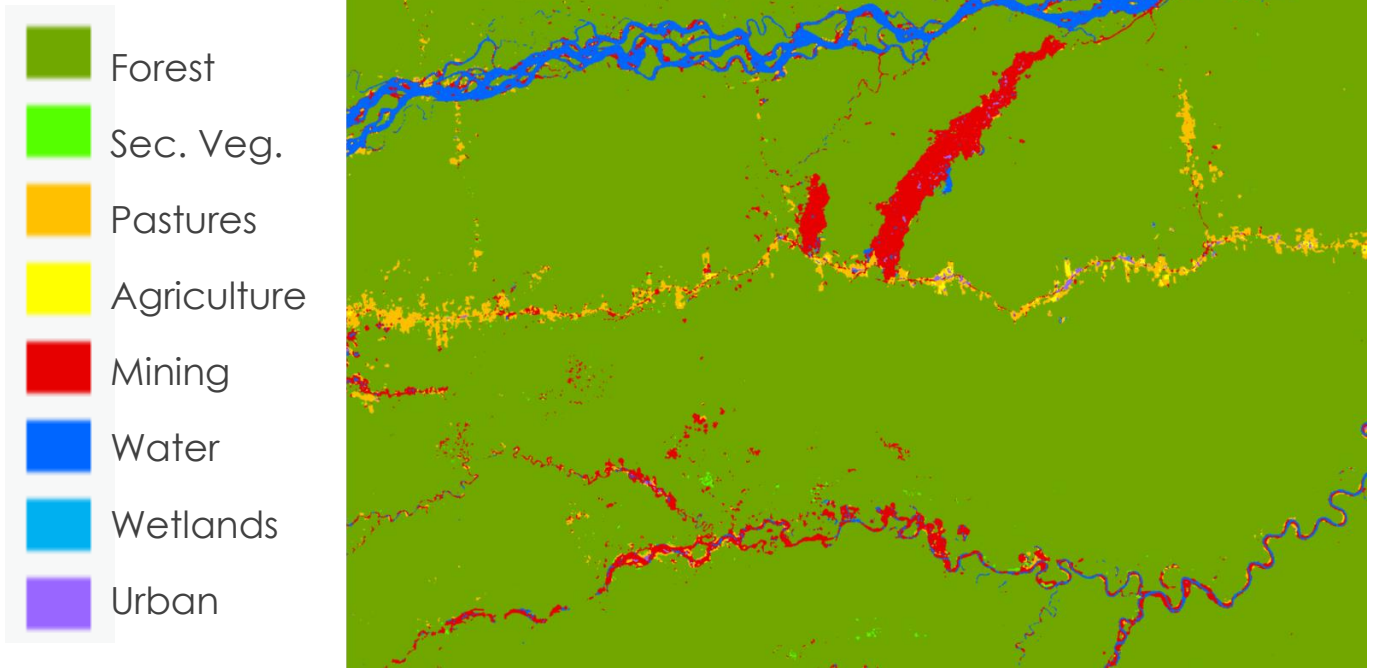
Explore trends between changes in land use and disease incidence

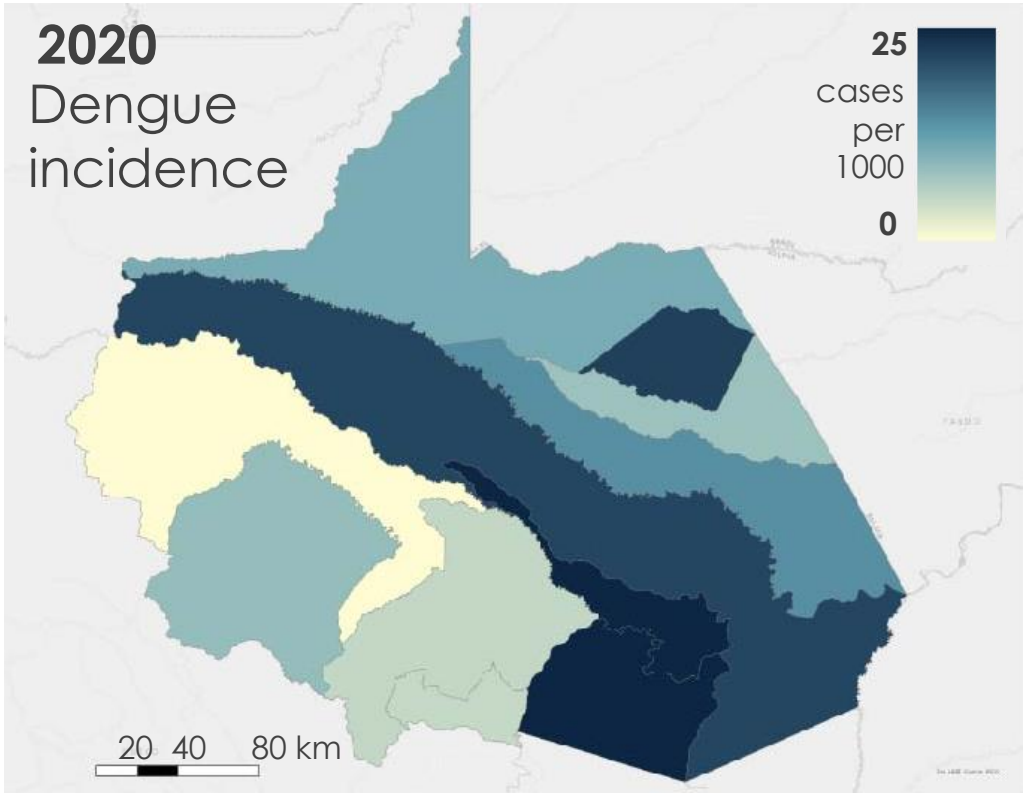
EO

Landsat-5, Landsat-8

Impact?

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

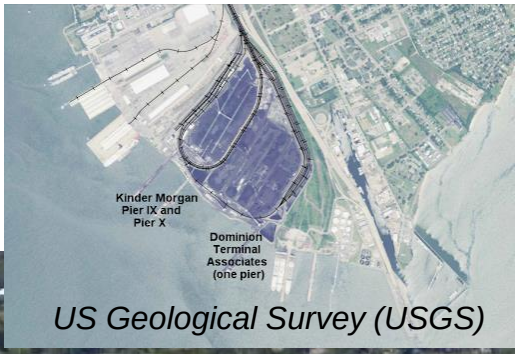




Air pollution: Tidewater, VA

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 particulate matter (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.



US Geological Survey (USGS)

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

Earth Observations:

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

DEQ
VIRGINIA DEPARTMENT OF ENVIRONMENTAL QUALITY

2024 Summer

Harmful Algal Blooms in Chile

- ❑ Harmful Algal Blooms (HABs) 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.
- ❑ Help authorities effectively respond to HABs

Earth Observations:

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

ciren
Centro de Información de Recursos Naturales

Ministerio de Agricultura
Gobierno de Chile

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)

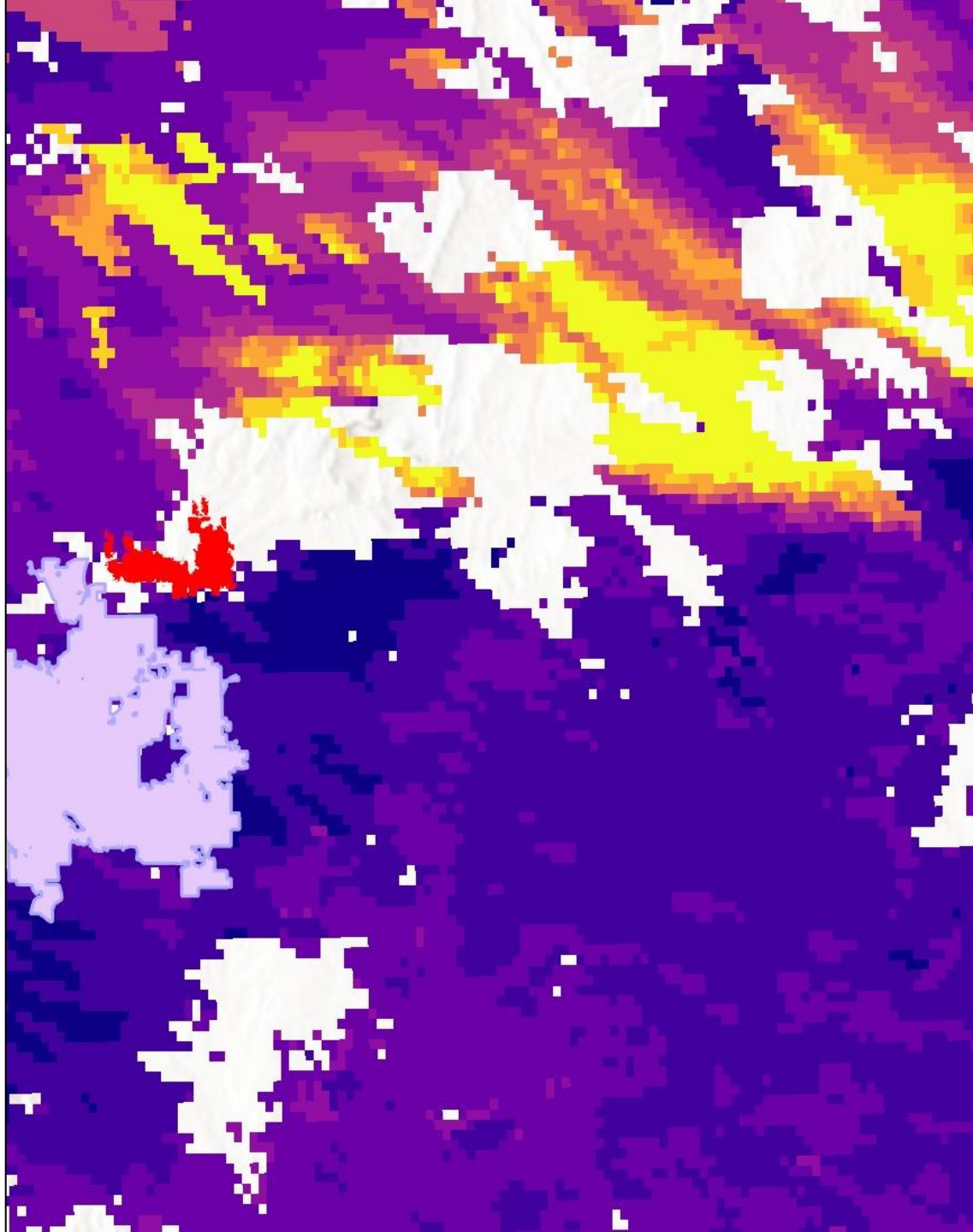
Idea Collection

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:
NASA-DL-DEVELOP@MAIL.NASA.GOV

EARTH
ACTION