



## Open Source Science for ESO Mission Processing Study

- + Identify a system architecture that meets the ESO mission processing objectives, supports open science, enables system efficiencies, and promotes earth-system science.

Workshop #1

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# Applied Sciences Program Perspective

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EARTH SCIENCE  
APPLICATIONS





# VISION

A WORLD WHERE  
EARTH SCIENCE DATA AND  
KNOWLEDGE ROUTINELY  
GUIDE DECISIONS AT ALL  
LEVELS OF SOCIETY –  
AND PEOPLE WANT MORE.

## **Mission**

Enable people & organizations to apply insights from Earth science to benefit the economy, health, quality of life, and environment.

## **What we do**

We make financial and programmatic investments to generate creative solutions and lower the technical and institutional barriers to using Earth science information.

## PARTNERSHIPS ARE CORE TO OUR MISSION

Thriving partnerships are a key goal for Applied Sciences.

We aim to expand connections with businesses, foundations, and nonprofit organizations, while continuing to build upon our robust partnerships with government agencies.







## ***Innovative & Practical Applications***

Develop, test, prove-out, transition, and extol uses



## ***Capacity Building***

Build capabilities in US and developing countries



## ***Mission Planning***

Support applications throughout mission lifecycles

# APPLICATIONS

Enable innovative to practical uses of Earth science information to help public and private sector organizations make better-informed decisions

## Individual Project Grants

Scores of grants to universities and agencies; Develop creative uses of Earth science; Done in partnership with user organizations.

## Longer Term Efforts

For key issues that cross multiple organizations/sectors (agriculture, water management), we establish consortia. Approach allows flexibility and agility in size, scope, and duration of projects.



**NASA Harvest  
Agriculture Consortium**

<https://nasaharvest.org/>



**Western Water  
Applications Office**

<https://wwao.jpl.nasa.gov/>

## Problem-Solving Teams

Team Members routinely interact with managers on the ground to collaborate on topics of emerging and urgent need.



**Health and Air  
Quality Applied  
Sciences Team**

<https://haqast.org/>

# CAPACITY BUILDING

Improve the capabilities of individuals and institutions to access and apply NASA Earth Science data and information

## Trainings

Satellite remote sensing training to professionals, building skills to integrate NASA Earth Science data into decision-making activities

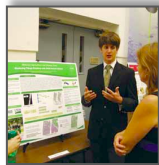


**ARSET**



## Feasibility Projects

Early career professionals gain experience applying geospatial data and tools through 10-week feasibility projects with nonprofits, state & local governments, and others.



**DEVELOP**



## International Development

Work with developing countries to use satellite data to address critical challenges in food security, water, land use, disasters, and air quality



**SERVIR**



# MISSION PLANNING SUPPORT

Integrate user-needs throughout the mission lifecycle – from mission concept through operations

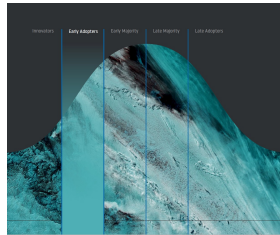
## Bringing User Perspectives to the Table

Gathering input from a wide range of user communities to inform mission planning decisions



## Getting Users Ready through Early Adopter Programs

Helping potential users work with proxy data prior to mission launch and gathering feedback to inform data products



## Supporting Initial Uses of Mission Data

Providing guidance to users applying mission data in their own decision-making contexts



# Vision for Open Science

- Open source science should amplify applications development and scaling.
- We can explore opportunities with Early Adopters to use open source science so that others can build on their results.
- Capacity building program elements DEVELOP and SERVIR already incorporate elements of open source science.
- Currently open SERVIR Applied Science Team solicitation calls for open source science.
- Barriers:
  - Software approval process that DEVELOP projects undergo time-consuming.
  - Equitable access for all applied scientists could be a barrier depending on assets provided by NASA and others, e.g. cloud and compute resources.



# Vision for Mission Data Processing

- Mission data processing systems need to support open science, earth system science, **and applications developers and decision makers.**
- Early Adopters should be supported alongside efforts of DAAC(s) to work with and support mission science team meetings, and as efforts begin developing end user tools in collaboration with the community.
- For Applied Sciences, efficient mission data processing systems would provide low latency data as much as possible.
- Lessons learned from Early Adopters Programs to date:
  - Have successfully taught users how to use NASA data products for their applications.
  - Have engaged new stakeholders and developed novel applications with the NASA data.
  - Need to strengthen engagement between the Early Adopters and the NASA Science Team members.
  - Need to strengthen engagement with decision-makers, not only science researchers.
  - **How can the mission data processing systems enable better Early Adopter integration?**

# Guidance for the Study

- Specific guidance for the System Architecture Working Group (SAWG)
  - Consider holistically integration
    - Across Earth system science and applications for societal benefit
    - Across the different satellites within the Earth System Observatory
  - Consider what decision-makers need and provide appropriate end user tools
  - Enable co-development approaches with decision-maker, analyst, and scientist teams
- Recommendations for the study steering committee
  - Review “Assessment of Early Adopter Programs” report and consider impacts to future system architecture
  - Consider applied user perspective that the priority is how to bring all Earth science information to their decision or action, and they don’t think by instrument, mission, model...but across entire discipline area (and not only NASA data), time, spatial scale