



NASA's Applied Remote Sensing Training Program: Building Capacity in Using Earth Science Data for Decision Making

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ARSET Team (2025)



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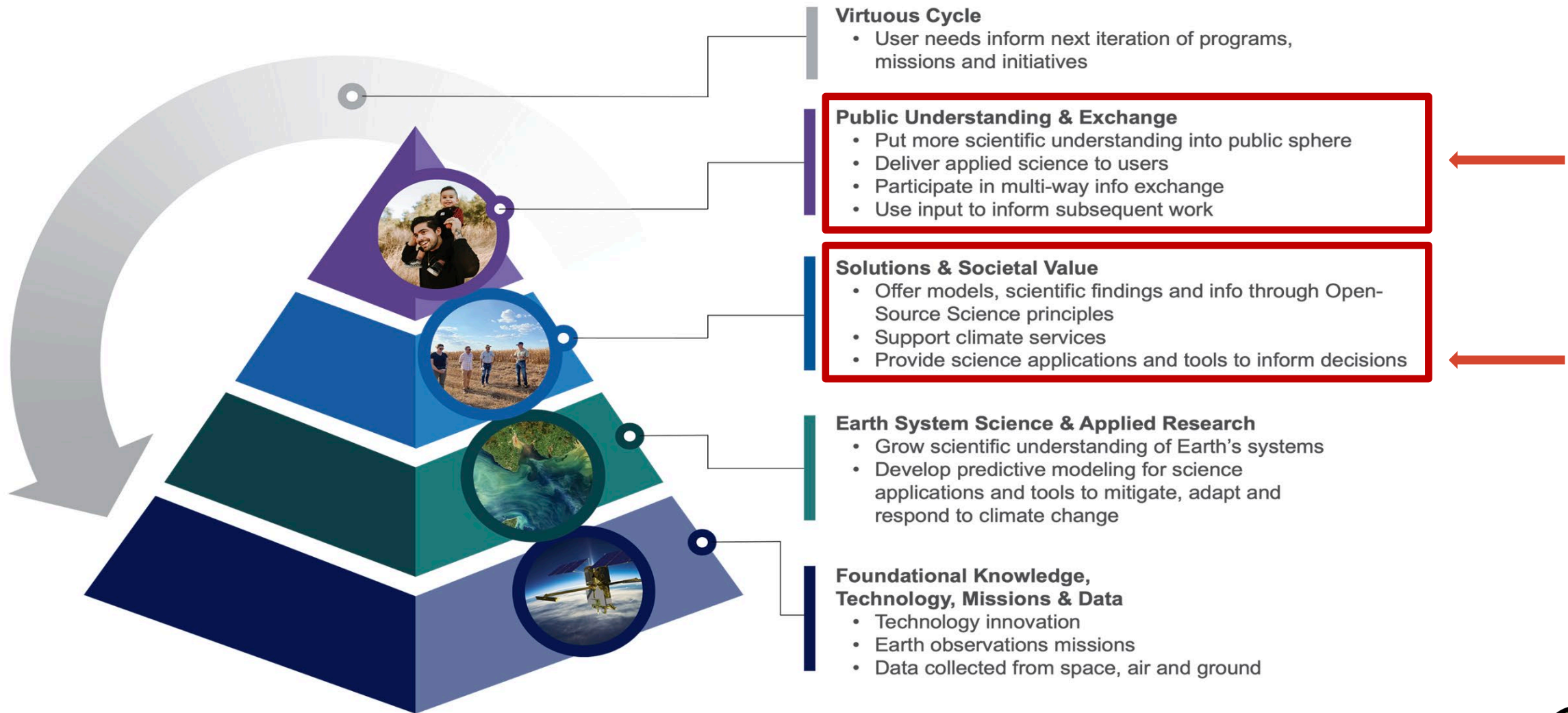
Erika Podest
Lead Instructor



Applied Remote Sensing Training (ARSET) Program

NASA Earth Science to Action

Vision: A thriving world, driven by trusted, actionable Earth science.



Source: [Earth Science to Action](#)



About ARSET

- The Applied Remote Sensing Training (ARSET) program provides accessible, relevant, and cost-free training on remote sensing satellites, sensors, methods, and tools.
- Trainings include a variety of applications of satellite data and are tailored to audiences with a variety of experience levels.



AGRICULTURE



DISASTERS



ECOLOGICAL CONSERVATION



HEALTH & AIR QUALITY



WATER RESOURCES



WILDLAND FIRES



EARTH SCIENCE DIVISION
EARTH ACTION



ARSET Global Reach

2009 – 2026



200+ Trainings



172850 + Participants



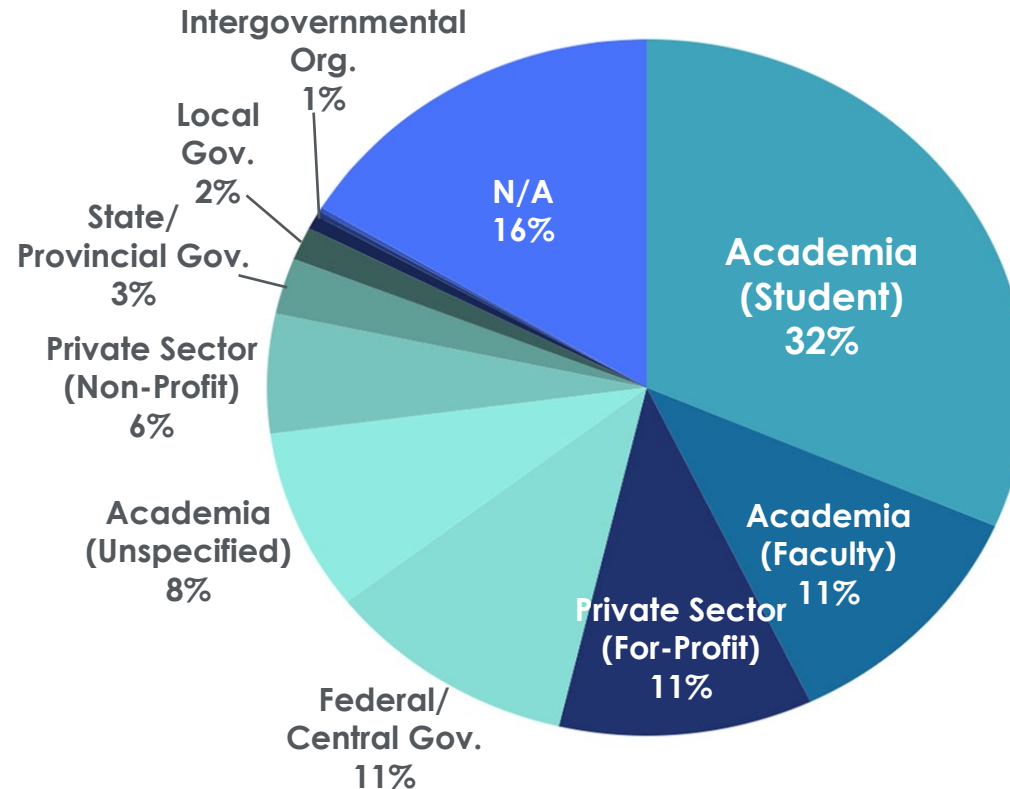
189 Countries



26300+ Organizations

56 US States and Territories

8,668 Unique Organizations (2025)





ARSET Training Development Process

About ARSET Trainings

- Accommodate differing levels of expertise, **introductory** to **advanced**
- **Online** or **in-person**
- Live and instructor-led or asynchronous and self-paced
- Provided at **no cost**, with materials and recordings available from our website
- Use **open-source** data and software (QGIS, Python/Jupyter Notebook)
- **Bilingual** and **multilingual** options (mainly Spanish)

Available for Beginners



FUNDAMENTALS

[ARSET - Fundamentals of Remote Sensing](#)

TRAINING TYPE: Online Self-Paced

LEVEL: Introductory

Online, Self-paced Training

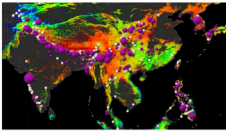


ARSET Trainings Provide a Variety of Learning Experiences

Lectures

Citizen Science and Earth Observations

- Expanded access to the internet/bandwidth including scientific information
- Engagement of thousands or millions of participants performing small tasks
- Volunteered Geographic Information via GPS in smartphones
- Provide data where satellite EO have gaps
 - Rain or snow – mountainous regions
 - Critical information during emergencies
 - where EO temporal resolution is limited
 - Information integration

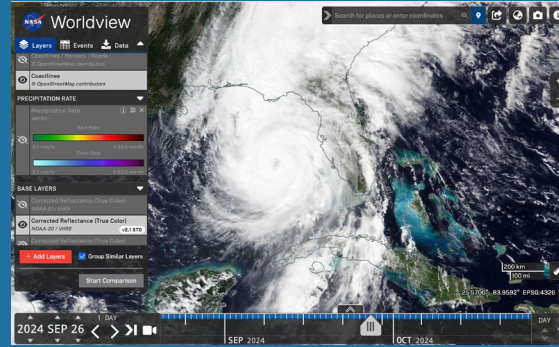


Potential landslide activity during July in Southeast Asia as evaluated by NASA's Landslide Hazard Assessment model for Situational Awareness.

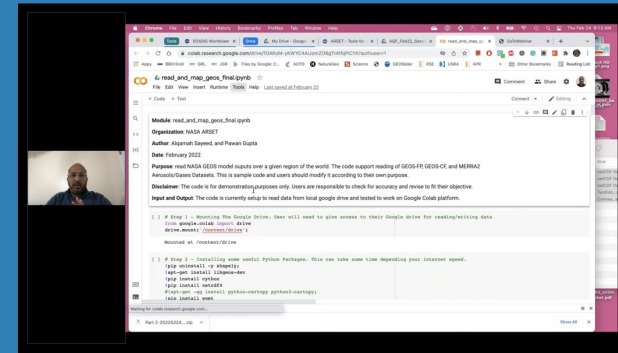
NASA's Applied Remote Sensing Training Program

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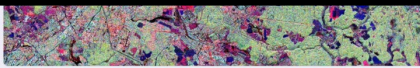
Demonstrations



Hands-on Exercises



Homework



Disaster Assessment Using Synthetic Aperture Radar

This assignment includes questions from the 3 parts of the webinar series "Disaster Assessment Using Synthetic Aperture Radar". We recommend writing down your answers on a piece of paper or in a Word document before submitting. You will not be able to save your answers and complete this form at a later time.

To receive a course completion certificate, you must have attended all 3 live parts and completed this assignment by Nov. 17, 2022. When you submit the assignment, you will receive an email with a copy of your responses.

Once you click to submit, you can click "View Score" to see your results.

[melanie.f.cook@gmail.com](mailto:melanief.cook@gmail.com) [Switch account](#)

* Required

Q&A



Evaluating Ecosystem Services with Remote Sensing
August 23 - 30, 2022

Questions & Answers Part 1

Please type your questions in the Question Box. We will try our best to get to all your questions. If we don't, feel free to email Amber McCullum

(amberjean.mccullum@nasa.gov) or Juan Torres-Pérez (juan.l.torresperez@nasa.gov).

Question 1: What are the parameters to be used in assessing the Economic Ecosystem Service Valuation of a freshwater wetland?

Answer 1: The variables you use will depend on your local study area and desired outcomes. Some that may be of interest are wetland extent and change, which can be

Training Evaluation



Climate Change Monitoring and Impacts Assessment using
NASA Earth Observations (Pecora Symposium)

Thank you for taking part in this ARSET training! We welcome your constructive criticism and thoughtful responses to help us evaluate and improve the program. All responses are confidential, and participation is optional.

Thank you -
The ARSET Training Team



Introduce NASA Earth Observing Satellites, Earth System Models, and Data Products for Thematic Applications and Decision Making

Satellites

- GPM
- xLandsat 8 & 9
- Terra, Aqua, +SNPP, +JPSS, TEMPO
- SMAP
- ICESAT-2
- GRACE-FO
- Jason-3, SWOT
- *Sentinel 1, 2, 3, 5, & 6
- PACE
- OCO-2
- ISS

Models

- MERRA-2/GEOS-5
- Land Data Assimilation Systems
- NEX-GDDP-CMIP6

Current NASA Satellites



Data Products

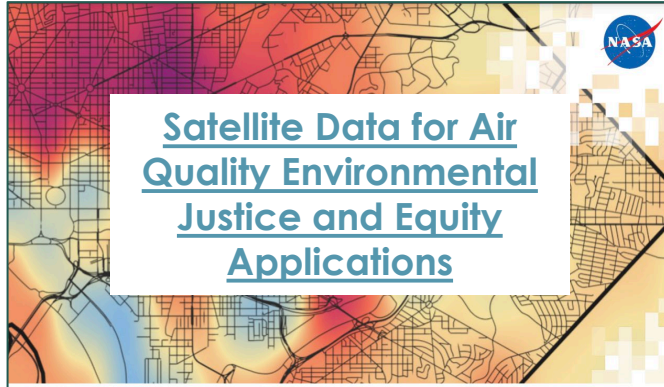
- Air Quality
- Precipitation
- Winds
- Sea Level Pressure
- Clouds
- Surface Inundation
- Fires
- Land and Sea Surface Temperatures
- Land Cover
- [snow/ice, vegetation, surface water]
- Soil Moisture
- Evapotranspiration
- Runoff
- Ground Water
- Water Quality
- Surface Water Height
- CO₂, CH₄

xNASA-USGS +NASA-NOAA *ESA Satellite



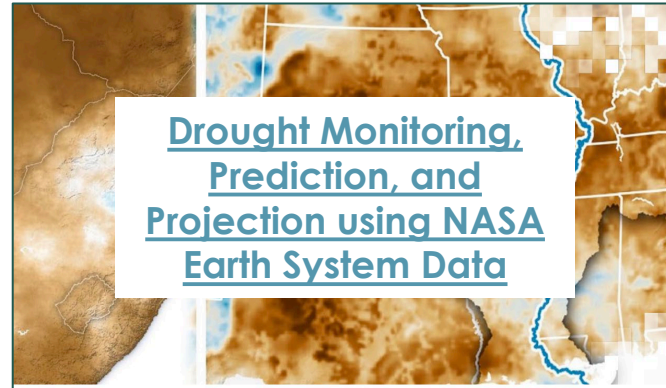
Examples of ARSET Trainings

Air Quality



Level: Intermediate

Water Resources and Disasters



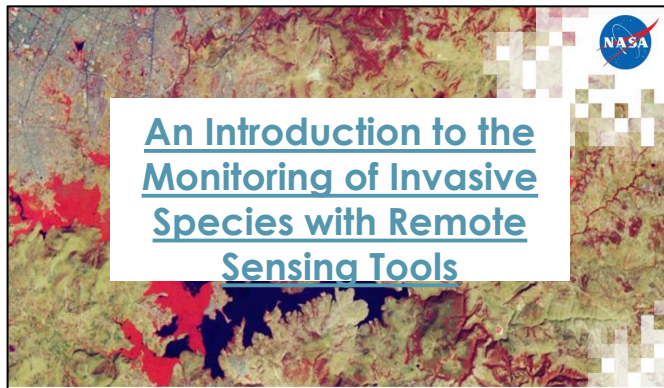
Level: Advanced

Disasters: Floods



Level: Introductory

Ecological Conservation



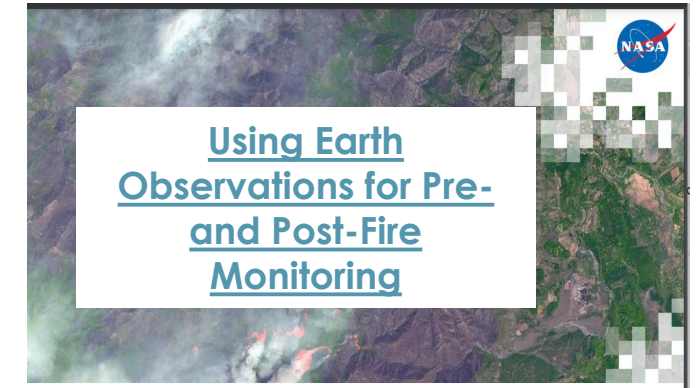
Level: Introductory

Climate and Resilience



Level: Introductory

Wildland Fires

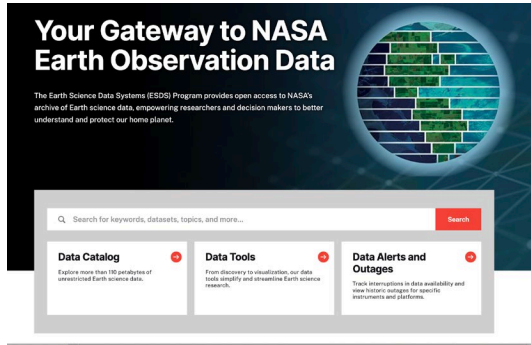


Level: Advanced

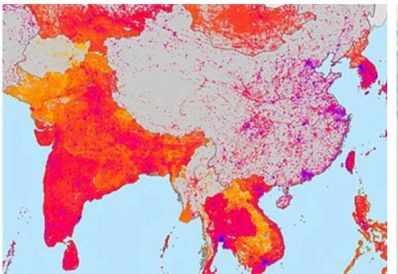


Demonstrate and Instruct Webtools for Data Search, Access, Analysis, and Visualization for Quick Decision Support

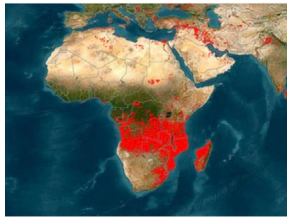
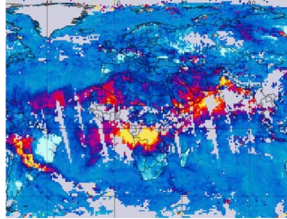
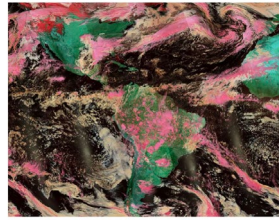
NASA Earth Data



- Search and download **Earth System data and socioeconomic data**



New SEDAC Data Releases Include First-Ever Global Poverty Grid



Worldview

- Near-real time and historical, 1200+ imagery and data products

Giovanni

- Online data analysis and visualization without downloading

FIRMS

- Active fire/hotspots, location, extent, and intensity of wildfires

ASF

- Search and download Synthetic Aperture Radar data

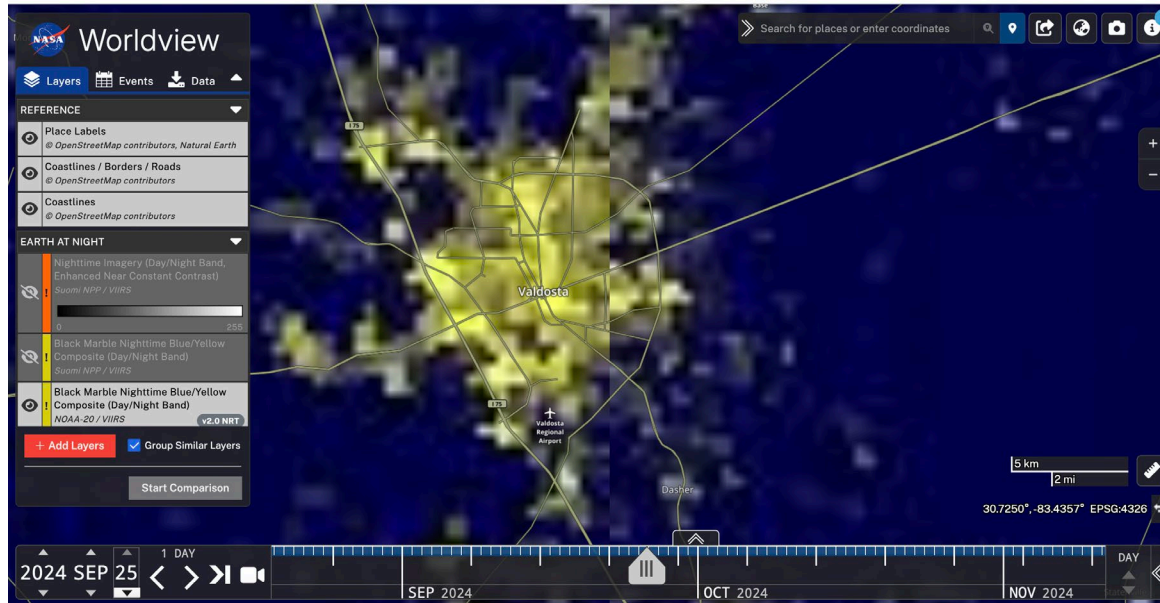


Case Study Example: Hurricane Helene (26–27 September 2024)

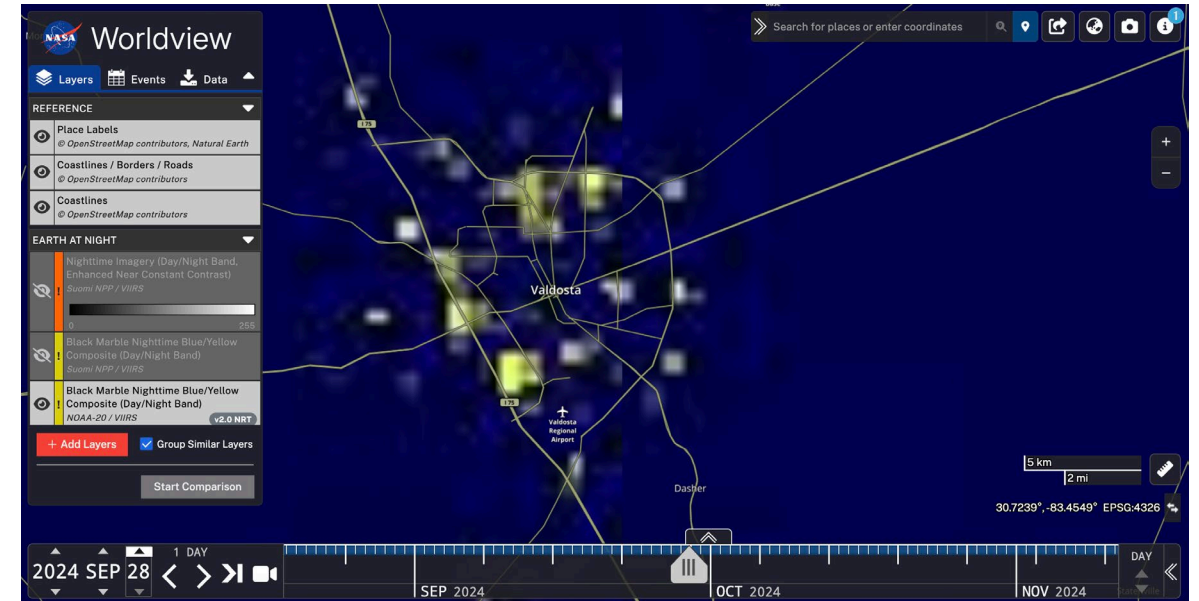
Monitor Post-Hurricane Power Outages using NASA Worldview

Night Light Imagery from NOAA-20 VIIRS

25 September 2024



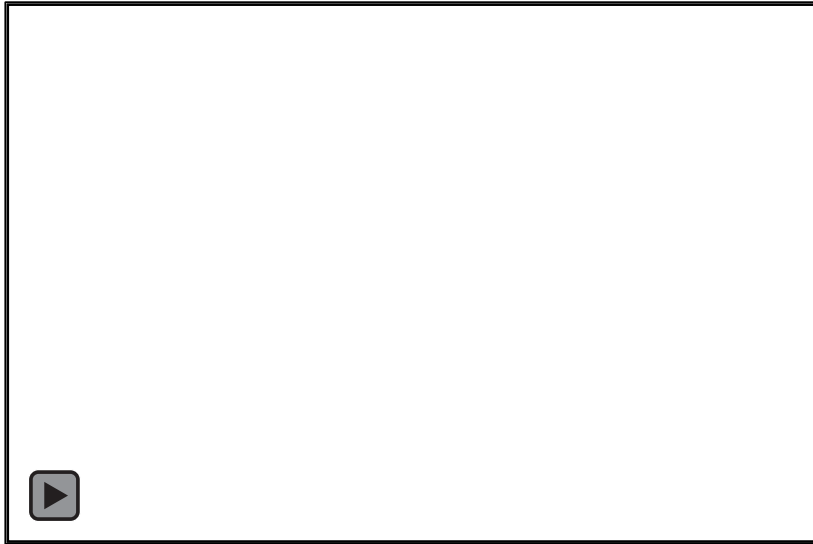
28 September 2024



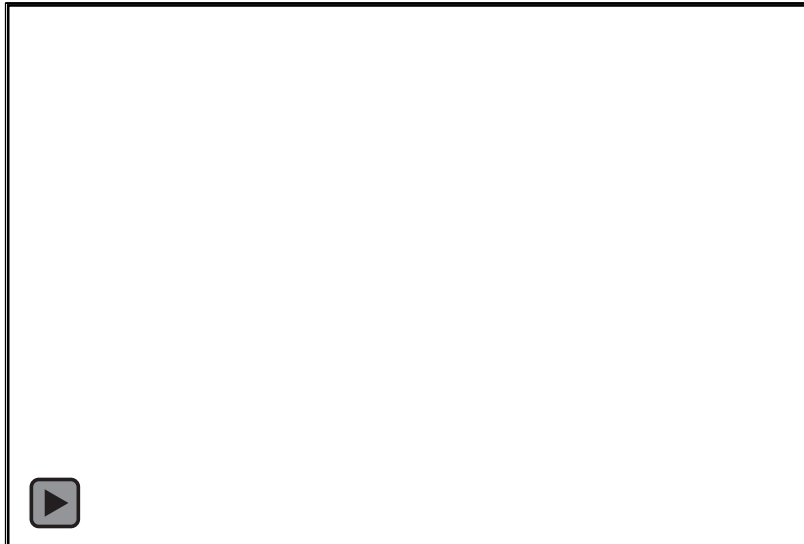
Case Study Example: Hurricane Helene (26–27 September 2024)

Monitor Hurricane Helene using Giovanni Data Analysis and Visualization Capability

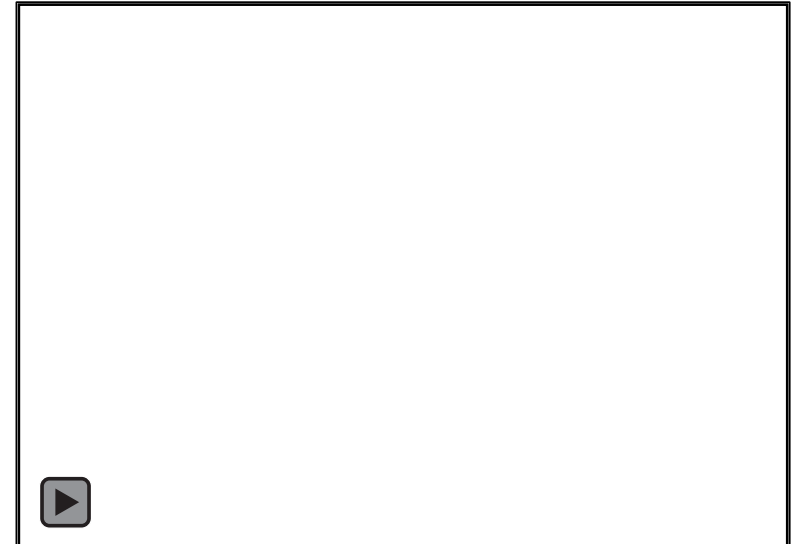
IMERG Rainfall mm.hr⁻¹



MERRA-2 Sea Level Pressure hPa



MERRA-2 Surface Wind Speed. m.s⁻¹



IMERG: Integrated Multi-satellite Retrievals for Global Precipitation Measurements (GPM)



ARSET Trainings in Collaboration with WWAO

Drought Monitoring, Prediction, and Projection using NASA Earth System Data

Level: Advanced, 2024

Speaker: Amber McCullum

Navajo Nation Drought Severity Evaluation Tool (DSET)

Navajo Rain Gauge Data

Satellite Data

Modeled Data and Drought Indices

Drought Severity Evaluation Tool (DSET)

- Goal to improve upon drought reporting for the Navajo Nation Department of Water Resources
- Partner-driven tool where co-development and sustained relationships were key
- Acknowledgment of preexisting Indigenous knowledge systems and capacity building efforts ensured continued use of the tool
- [User guide link](#)

"I'm...Navajo - I grew up on the Navajo Reservation. It is monumental to have an organization like NASA work with us to diversify and augment the water tools we have at our disposal."
Carlee McClellan, Navajo Nation Department of Water Resources

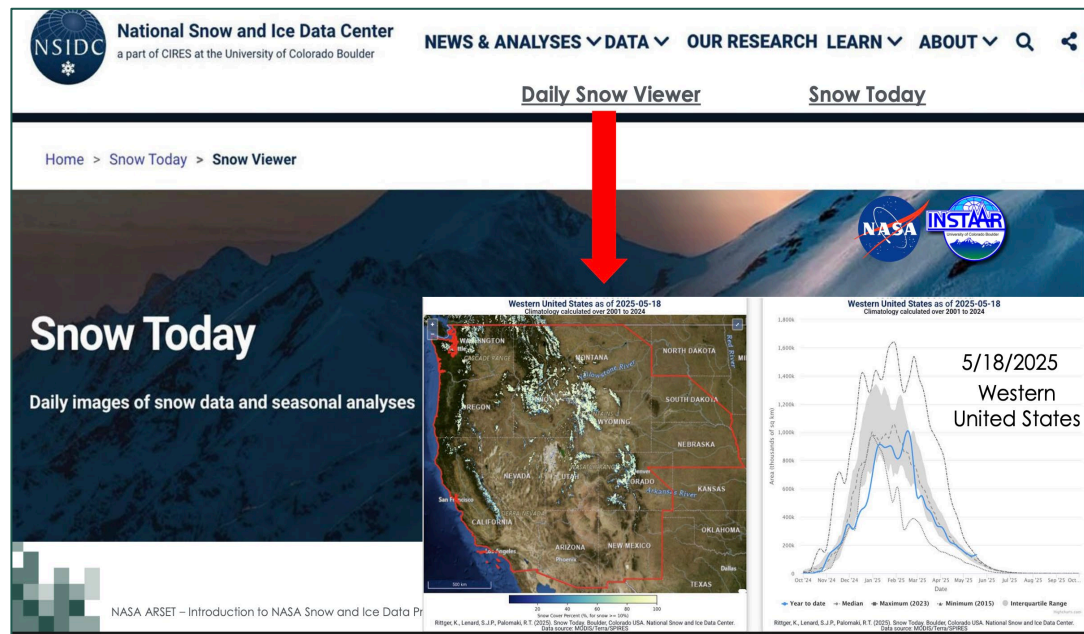
NASA ARSET – Drought Monitoring, Prediction, and Projection using NASA Earth System Data

ARSET Trainings in Collaboration with WWAO

Monitoring Mountain Snowpack and Prediction of Water Availability in the Western US for Water Resources and Disaster Applications

Level: Introductory, 2025

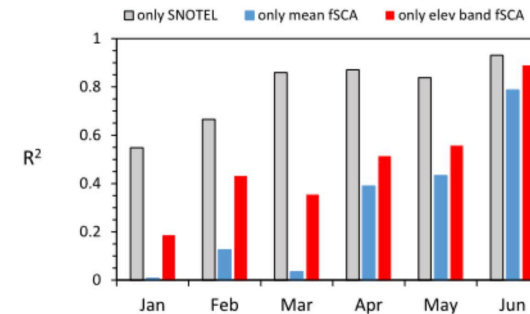
Speakers: Karl Rittger, Sean Fleming



Multi Model Machine-learning Metasystem (M4)

Water Supply Forecast using only Satellite Data

For basins where the spring-summer runoff is dominated by snowmelt, using MODSCAG with no in situ data may provide serviceable short- and medium-lead WSFs: potentially useful in sparsely monitored regions (e.g., international development applications?)



Example: Piedra River using M4

NASA ARSET – Introduction to NASA Snow and Ice Data Products and Applications

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ARSET Trainings Focusing on the Western US

Monitoring Groundwater Changes for Water Resources Management

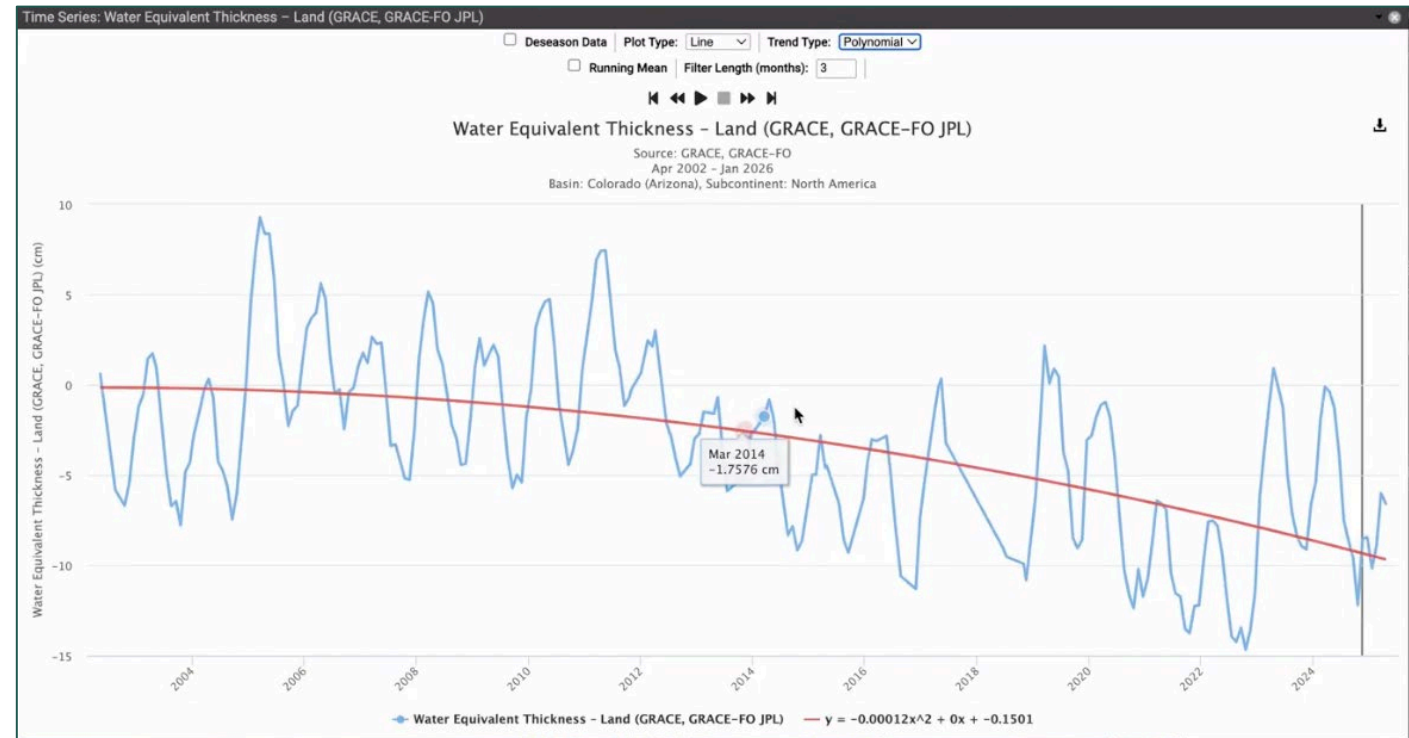
Level: Advanced, 2026

Speakers: Matthew Rodell, Eric Fielding

Terrestrial Water Change in Colorado Basin from GRACE/GRACE-FO

Overview and hands-on analysis of

- GRACE/GRACE-FO
- GLDAS 2.2
- OPERA Displacement Data



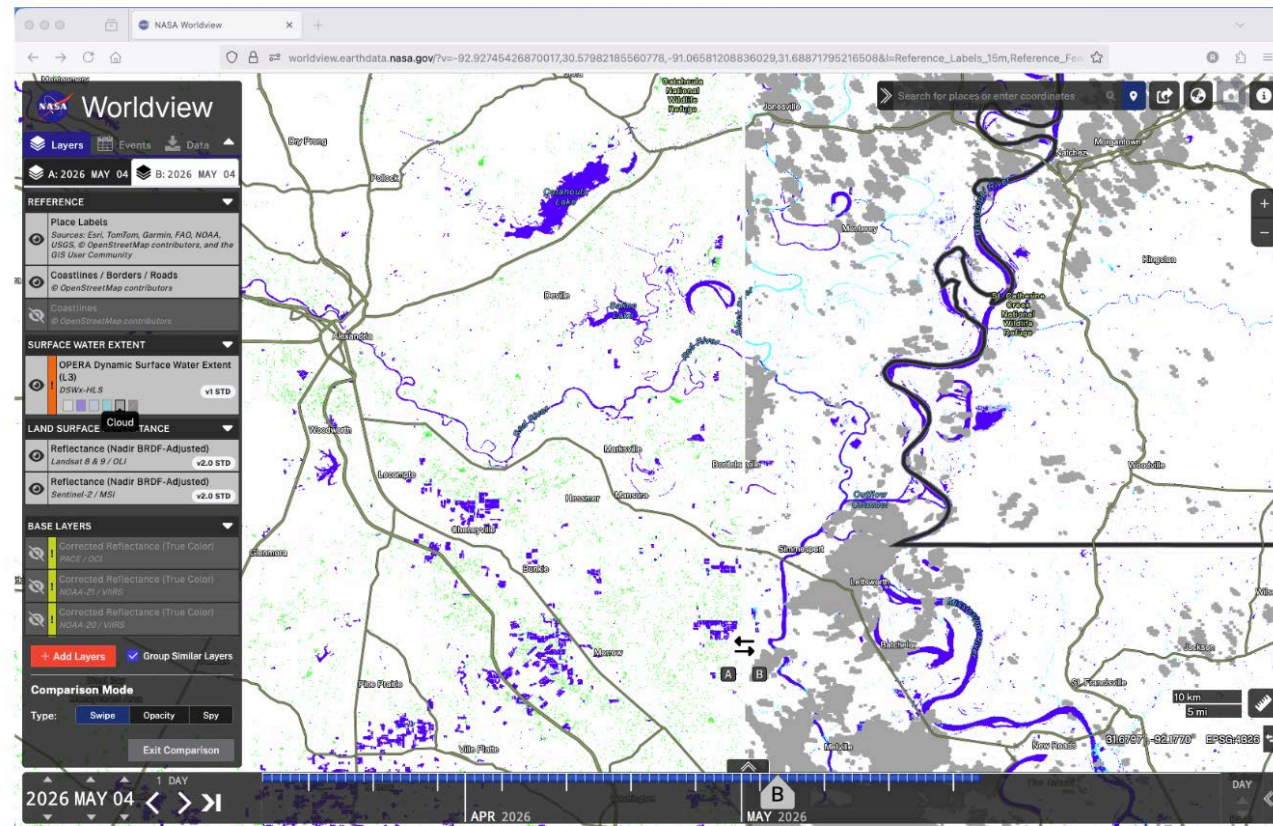
ARSET Trainings in Collaboration with WWAO

Monitoring and Predicting Floods Using Earth Observations for Planning and Preparedness

Overview of Monitoring Floods using OPERA Surface Water Extent based on Optical and SAR Observations

Level: Intermediate, 2026
Speaker: Renato Frason

Worldview for comparing DSWx-HLS and DSWx-S1





Impacts of Earth Observations and ARSET Trainings for Decision Making

Impact of Earth System Data and Trainings

Survey quotes from training participants:

- As a Military planner for peace keeping missions we need a variety of latest maps to ascertain the ground situation before executing the tasks. The kind of data and maps which I can use through ARSET will be very useful for my work. (**Intergovernmental organization employee, United States**).
- Remote sensing data supports my work by allowing me to extract crucial information such as flood data and historical images. These datasets are invaluable for my project and research activities. This platform is user-friendly, making it easy to access and download the necessary datasets. (**Private sector employee, Nepal**).
- I use to perform annual groundwater reports in Kansas, using water well data and to estimate water level elevations/changes. It would be fascinating to compare that approach with the TWS analyses we learned. Ground-truth is a terrible thing to waste! (**State Government employee, United States**)



Summary

- ARSET builds capacity in global community to increase use of earth observations for decision support and societal benefits.
- ARSET Trainings enable combined use of multiple satellite and model datasets for thematic applications via open-source software and tools.
- ARSET can offer thematically and geographically customized in-person trainings.
- Upcoming Training (4, 6, and 11 August):

[NASA Earth Observations for Reservoir and Water Utility Management](#)

Case Study: Monitoring Lake Powell water inflow, and surface water elevation, and watershed parameters (snow cover, snow water equivalent, precipitation, soil moisture, and runoff)



ARSET Resources

- [ARSET Website](#)
- [ARSET YouTube](#)

For questions, comments, or to share how you have applied our trainings to your work or studies, email nasa.arset@gmail.com.

Join our mailing list to stay up-to-date on our latest trainings. Visit our [Contact](#) page to subscribe.



ARSET Annual Retreat (2026)





Thank You!





Acronyms

MERRA-2:	Modern-Era Retrospective analysis for Research and Applications Version 2
NEX-GDDP-CMIP6:	NASA Earth Exchange-Daily Downscaled Projections for the Coupled Model Intercomparison Project Phase 6
GPM:	Global precipitation Mission
GRACE-FO:	Gravity Recovery and Climate Experiment – Follow On
ICESAT-2:	Ice, Cloud, and Land Elevation Satellite-2
ISS:	International Space Station
JPSS:	Joint Polar Satellite System
SMAP:	Soil Moisture Active Passive
SNPP:	Suomi National Polar Partnership
SWOT:	Surface Water Ocean Topography
OCO-2:	Orbiting Carbon Observatory-2
PACE:	Plankton, Aerosol, Cloud, ocean Ecosystem
TEMPO:	Tropospheric Emissions: Monitoring of POLLution

^xNASA-USGS ⁺NASA-NOAA ^{*}ESA Satellites

