



Welcome to the

2026 Harmonized Landsat and Sentinel-2 (HLS) Workshop

What is your favorite remote sensing index?



Wednesday May 13, 2026 starting at 10:00 am CDT

Session 1: HLS in Action

Goals:

- Exemplify real-world use of HLS across sectors and use areas and methods used.
- Discuss the benefits and challenges to adopting HLS for downstream impact.

Time (CDT)	Topics	Format	Speaker
10:00 - 10:05 (5 min)	Welcome & Logistics	Presentation	Stephanie Jiménez, NSITE & UAH
10:05 - 10:10 (5 min)	Introducing Impactful Applications of HLS	Presentation	
10:10 - 10:30 (20 min)	HLS in NASA's Fire Information for Resource Management System (FIRMS)	Presentation	Jenny Hewson & Diane Davies, NASA LANCE/FIRMS
10:30 - 10:50 (20 min)	Prithvi EO - Foundation Model	Presentation	Venkatesh Kolluru, NASA ODSI & UAH
10:50 - 11:10 (20 min)	HLS Applications Challenges, Questions, and Needs	Interactive 	NSITE MCs



NSITE Workshop Facilitation

Your MCs



Stephanie Jiménez

NSITE Stakeholder
Engagement Liaison

NASA MSFC, ODSI,
UAH



Rhea Bridgeland

NSITE Management
Office Support

NASA MSFC, ODSI,
UAH



BC Ray

NSITE Management
Office Support

NASA MSFC, ODSI,
UAH



Essence Raphael

NSITE Management
Office Support

NASA MSFC, ODSI,
UAH





What is your name?

- This session requires participants to enter a name to join.
- Your name will be recorded with your responses and questions, but will not be shared with other participants.

Your name **Use same name you registered with**

Join session



Presenter's view

Wednesday May 13, 2026 starting at 10a CDT
Welcome to the
2026 Harmonized Landsat and Sentinel-2 (HLS) Workshop

What is your favorite remote sensing index?

savi evi ndvi
nbr2 nbr ndmi



menti.com
3385 2003

1 of 1 responded

22

You may submit multiple responses

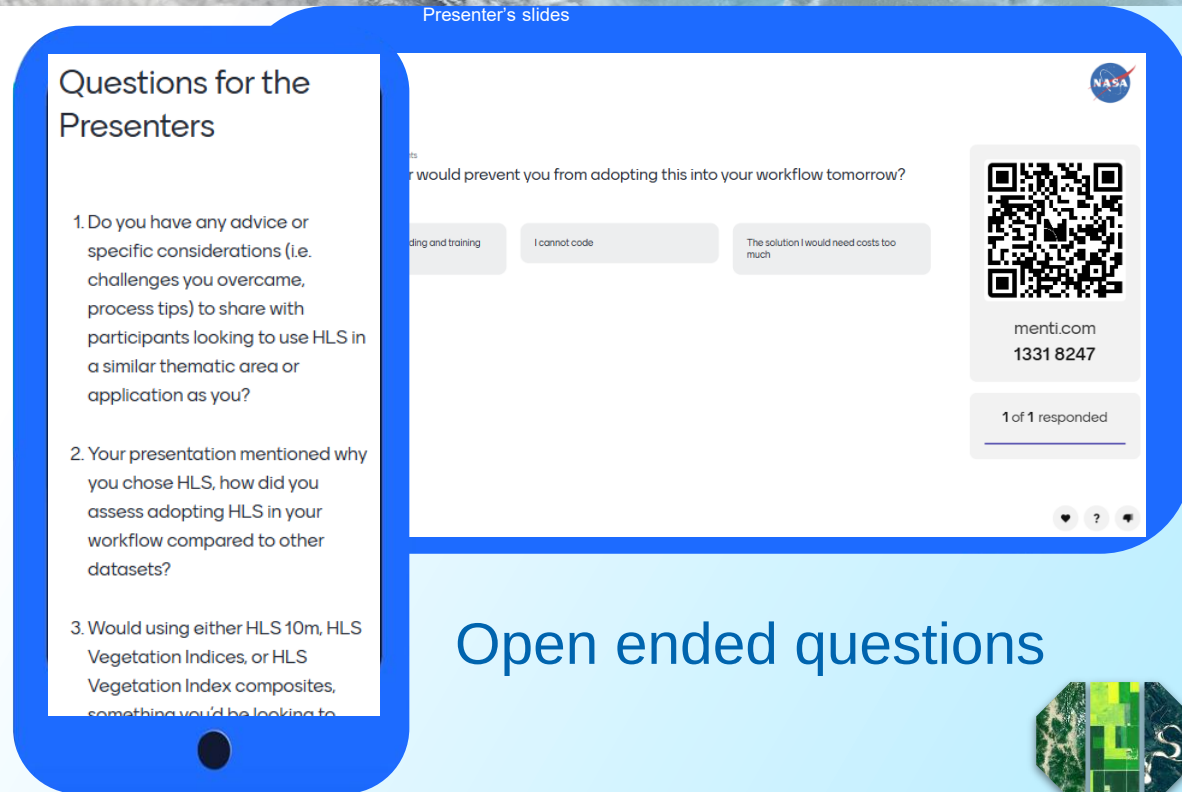
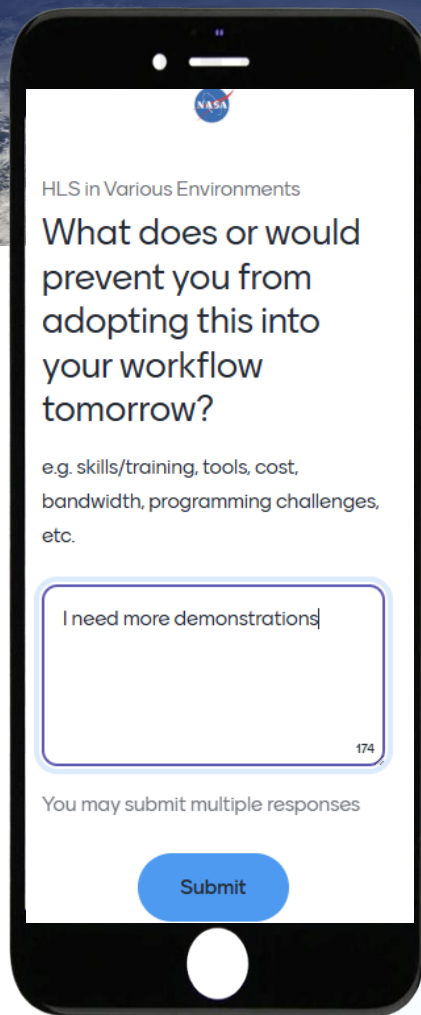
Submit

Responding as Earth

Powered by Mentimeter

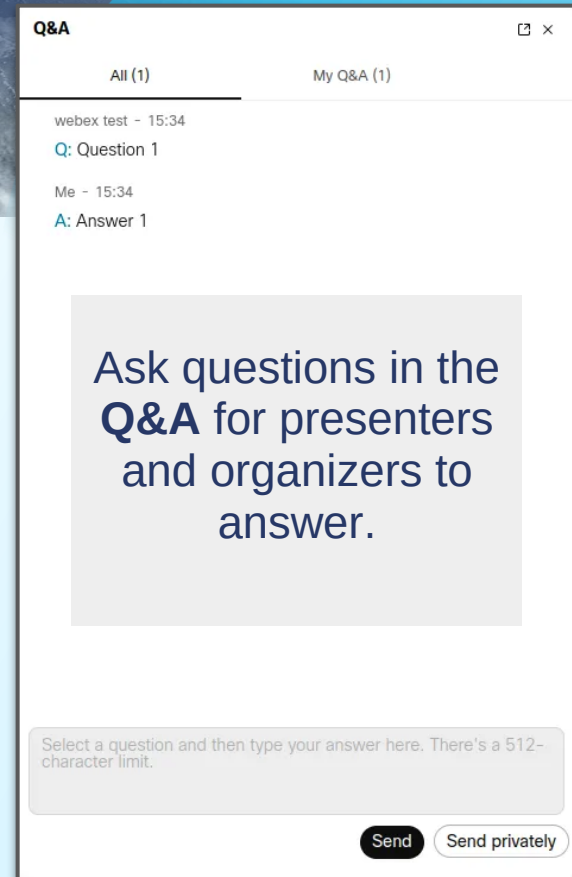
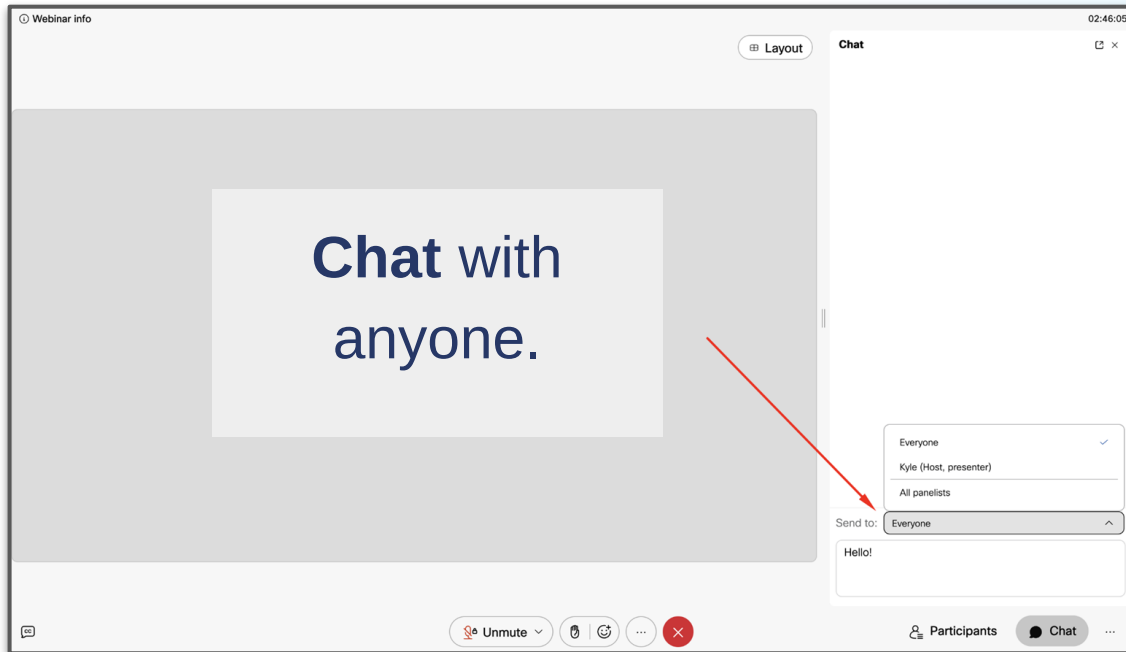
Interactive questions





Open ended questions





On Webex: participant driven interaction



HLS Workshop Agenda, Slides, & Webpage

<https://bit.ly/4t6xGN9>

Visit the NSITE website
to find more solutions

<https://bit.ly/41NcHn9>

Don't worry if we miss
your question
while live...

Each asset will be linked
to the workshop page!

- Answered Q&A
- Transcripts
- Recordings
- Slides
- Questionnaire



Wednesday May 13, 2026 starting at 10 am CDT



Welcome to the *2026 Harmonized Landsat and Sentinel-2 (HLS) Workshop*

Tell us about yourself.



Wednesday May 13, 2026 starting at 10 am CDT

Welcome to the *2026 Harmonized Landsat and Sentinel-2 (HLS) Workshop*

Workshop Objectives



**Communicate
scientific updates
and solicit
feedback**



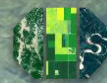
**Build HLS user
community
collaboration**



**Support real-
world HLS
adoption**



**Increase
understanding of
& innovation with
HLS products**



Wednesday May 13, 2026 starting at 10 am CDT

Welcome to the *2026 Harmonized Landsat and Sentinel-2 (HLS) Workshop*

What You'll Experience



Overview of HLS history, ongoing initiatives, and future work



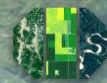
Interactive Q&A and reflective discussions



Demonstrations of HLS access and analysis



Examples of HLS in action across sectors



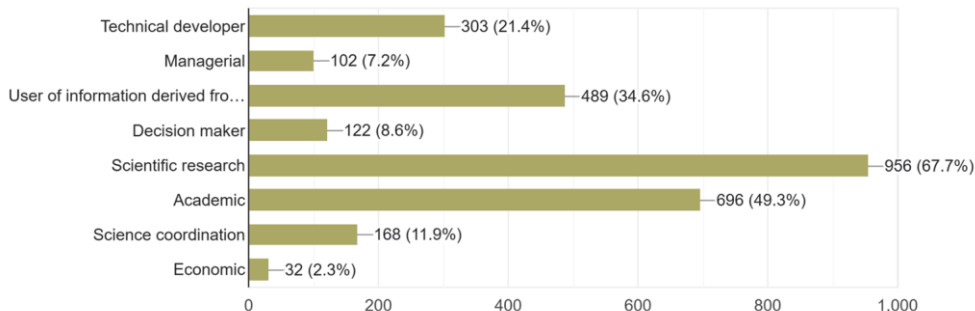
Just the beginning of more engagement amongst the HLS community

Attendees from public, government, NGO, private, and academic sectors are at all experience levels

Your diverse perspectives will highlight unique challenges and opportunities around HLS

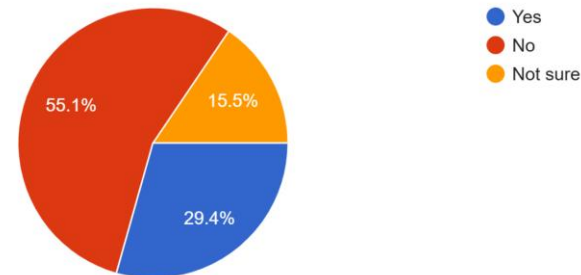
What is your role (how it interacts with satellite remote sensing data). Check all that apply.

1,413 responses



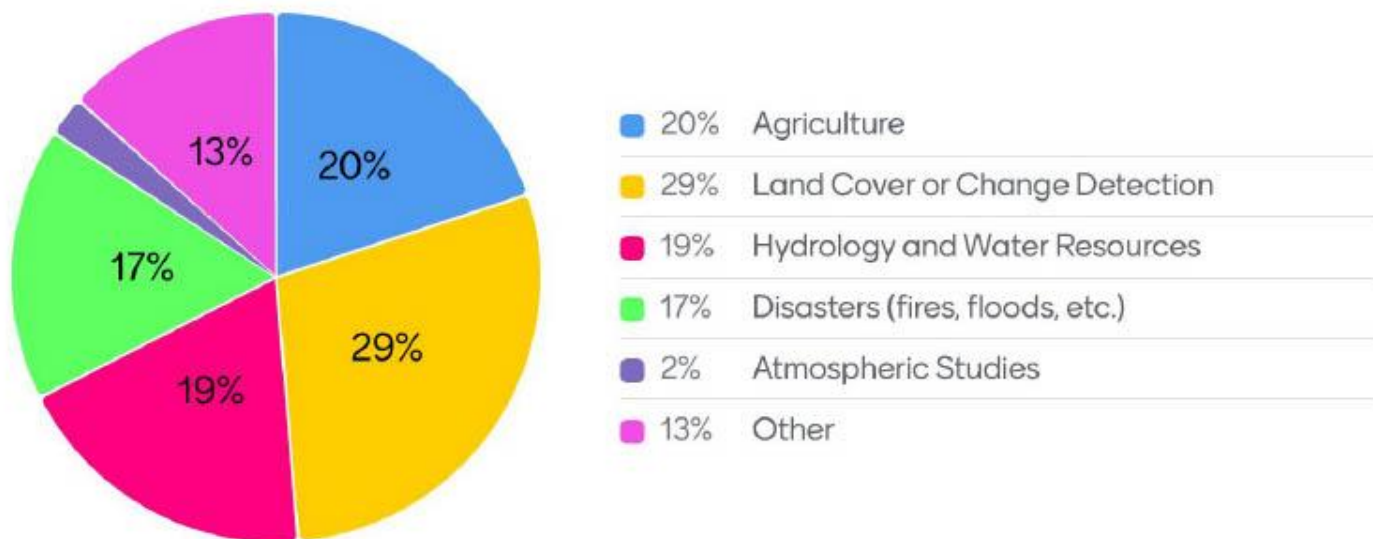
Have you integrated an HLS product into a project or workflow?

1,413 responses



Your feedback helps us
**improve products and
develop future community
activities and resources**

(1/2) Which domains are most relevant to your work?



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We are a part of an **ecosystem**

Users & Decision-makers

Fed, state & local gov,
general public, private sector,
and others



Private Sector LLMs,
Consultancies,
Value-added Data Resellers



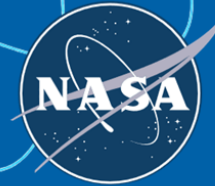
Commercial Satellite
Data Providers



Other public EO data
providers

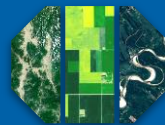


Researchers



NASA
Earth Science

Understanding our relationships helps guide solution
development and engagement priorities

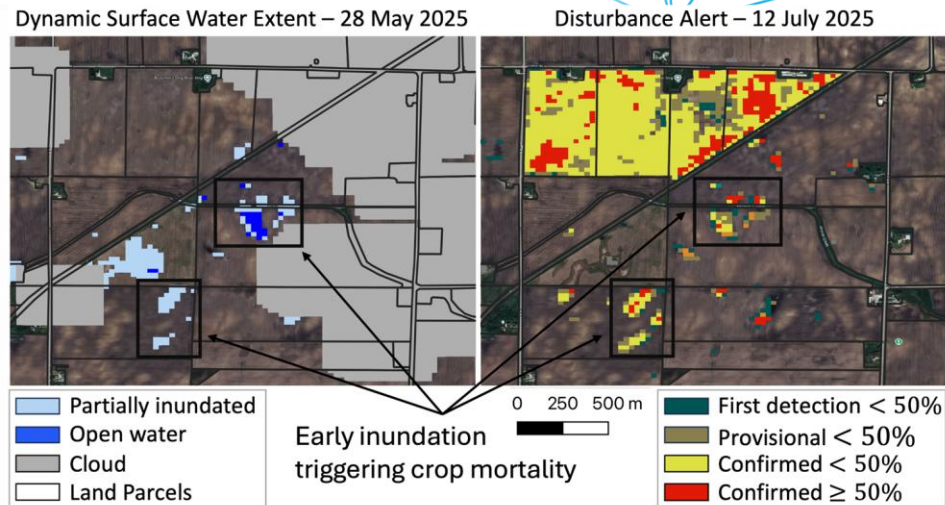


Use Case Example: Monitoring crops and forecasting yields

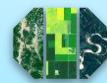
“Filtering data products by the beginning and end date let us see fallow fields. This is helpful!” – USDA ARS staff

Early season flooding after planting prevents the development of healthy crops and causes billions of dollars in yield losses in corn and soybean crops across the U.S.

USDA Agricultural Research Service (ARS) can now use **OPERA Dynamic Surface Water (DSWx)** and **Land Surface Disturbance (DIST-ALERT)** products, available every 2-3 days, for early season inundation detection and to track the impacts on crop yields with greater precision. It allows **USDA-ARS** to forecast potential yields and project crop insurance claims more efficiently.



DSWx product from 28 May 2025 (left) detects early-season inundations in the Midwest. Long-lasting inundation can kill plant seedlings and suppress plant growth, which is detected in the DIST-ALERT product from 12 July 2025 (right) with moderate (< 50%) and severe (> 50%) disturbance recorded over those previously flooded fields. This information is critical for measuring the impact on crop yields.



(2/2) What types of features or changes are you trying to detect or predict using satellite data? (in 1-2 words)



Session 1: HLS in Action Presenters



Diane Davies

LANCE Operations
Manager

NASA LANCE /
FIRMS



Jenny Hewson

LANCE Outreach
and Implementation
Manager

NASA LANCE /
FIRMS



Venkatesh Kolluru

Research Scientist
for AI Research to
Operations

NASA MSFC, ODSI,
UAH



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Space Administration

EARTHDATA

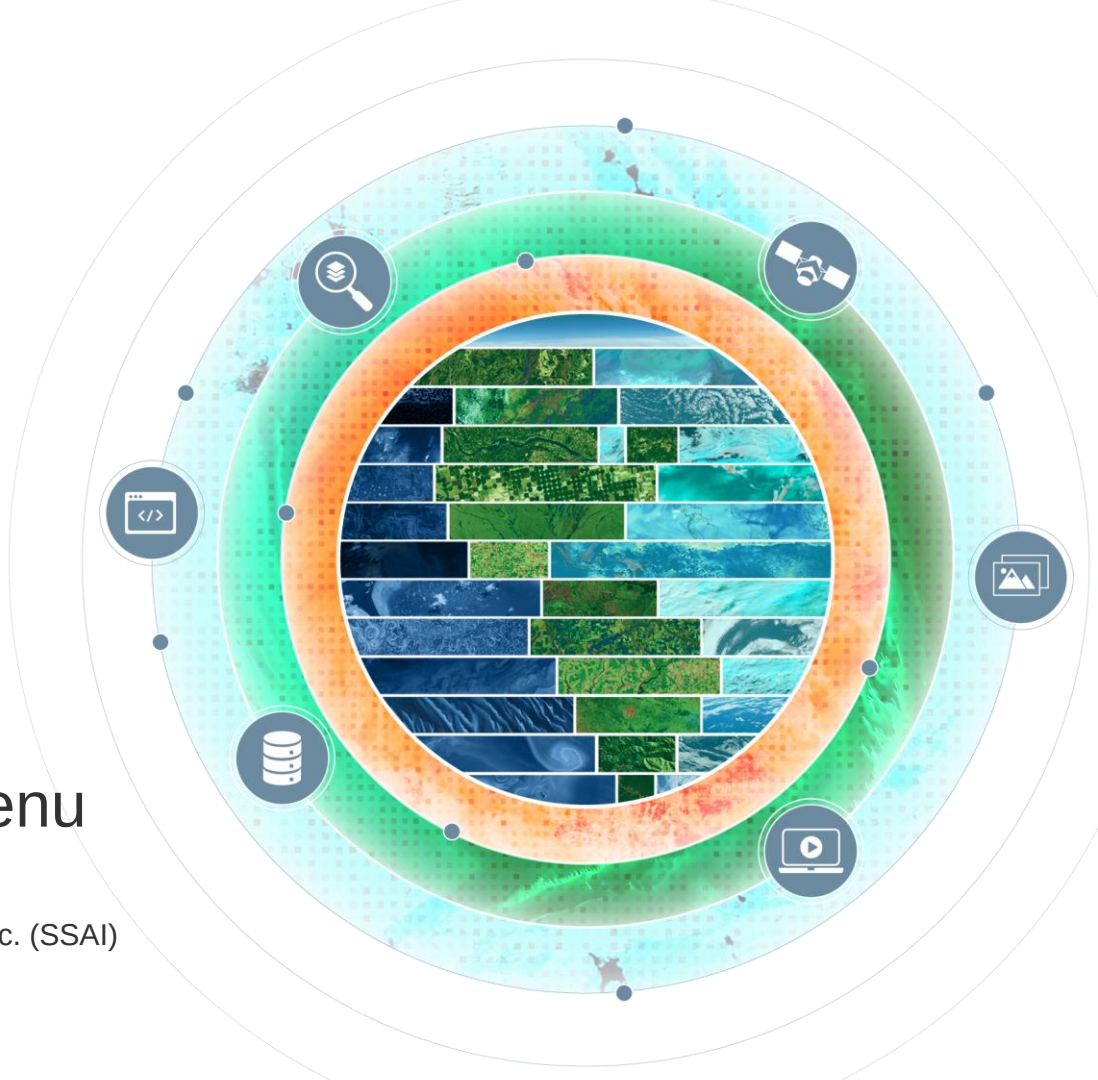
NASA's Fire Information for Resource Management System (FIRMS)

Integration of the HLS Menu

Jenny Hewson¹ & Diane Davies¹

¹NASA LANCE / Science Systems and Applications Inc. (SSAI)

Presentation Date 05/13/26 (10:10-10:30AM CDT)

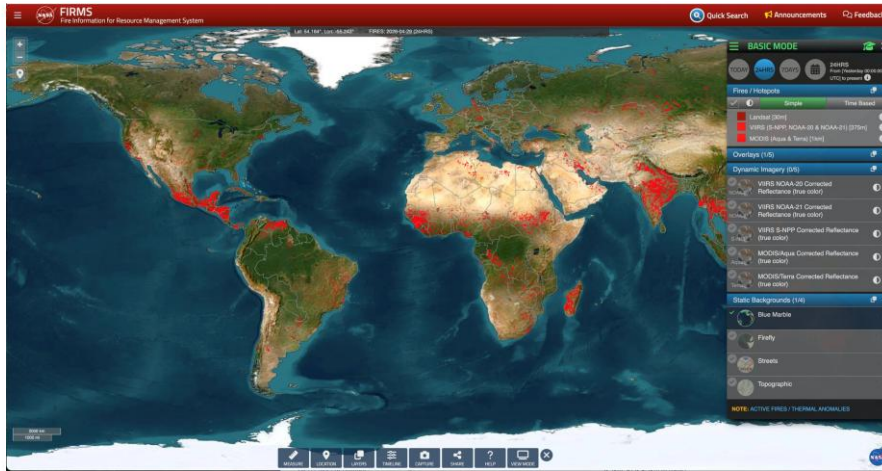


Outline

- FIRMS Overview
- HLS & Wildland Fire Management
- FIRMS HLS Menu
- Demo



FIRMS Global and FIRMS US/Canada



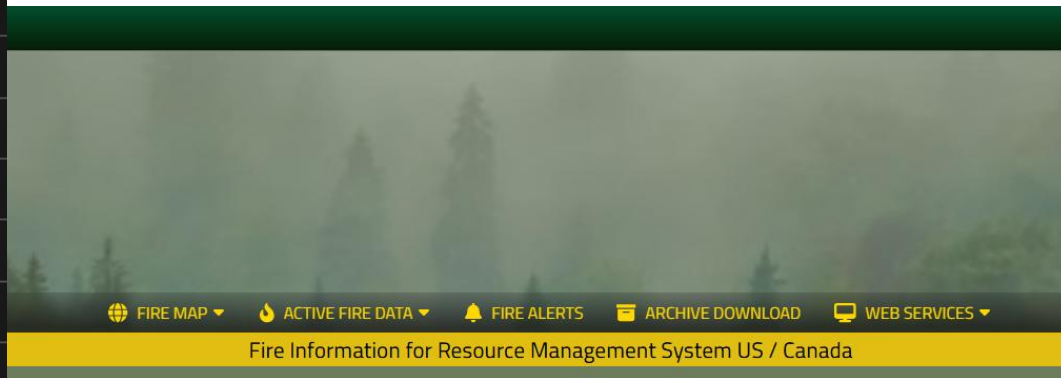
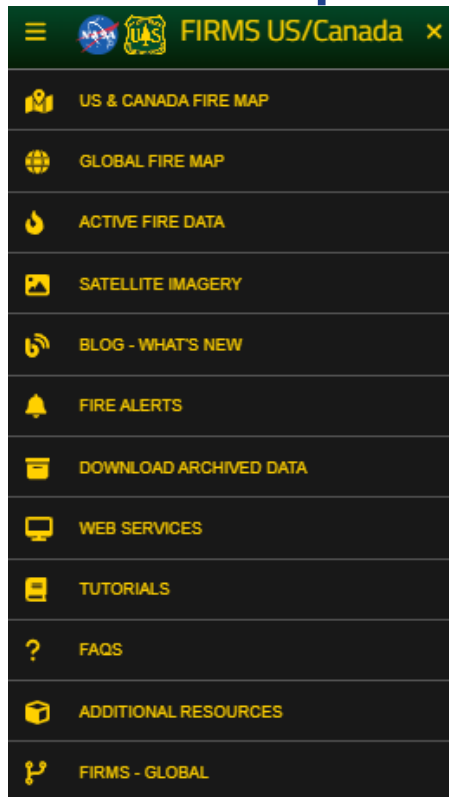
- <https://firms.modaps.eosdis.nasa.gov>
- NRT and RT imagery and fire remote sensing products for the world.
- Developed by U of Maryland in early 2000s and used data from MODIS Rapid Response. Transitioned to NASA LANCE in 2012.



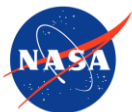
- <https://firms.modaps.eosdis.nasa.gov/usfs>
- Partnership between NASA and USDA Forest Service
- Launched within NASA LANCE in 2021.
- NRT, RT and URT imagery and fire remote sensing products for the US & Canada.
- Provides contextual data/information relevant to fire management.



FIRMS Components



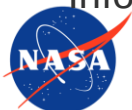
FIRMS was established to get satellite-derived active fire data into the hands of users, regardless of their level of expertise in remote sensing.



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HLS and Wildland Fire Management

- Inform moisture content of fuels and susceptibility to fire risk
- Facilitate small fire mapping*
- Facilitate fire perimeter mapping and comparison with perimeter maps
- Map extent of burned area
- Perform change detection analyses
- Assess burned area and post-fire dynamics
- Identify patterns of burn severity
- Support post-fire response
- Support recovery planning activities
- Inform restoration management plans



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*Imagery is available in FIRMS ~2-4 days after satellite overpass

HLS Menu in FIRMS

- Includes HLS Sentinel-2 and HLS Landsat 8/9:
 - True color composites (TCC)*
 - False color composites (FCC)**
 - HLS-derived vegetation indices** relevant to wildland fire management
 - Ability for users to visualize customized band combinations

*accessed via GIBS

**available in FIRMS via the Tiler-CMR service developed by NASA ODSI

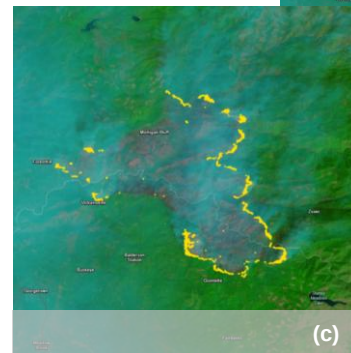
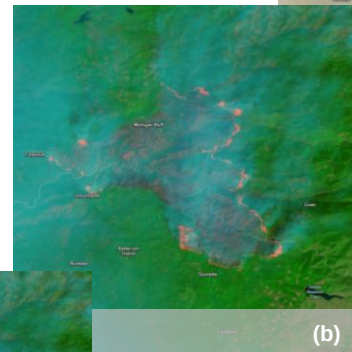
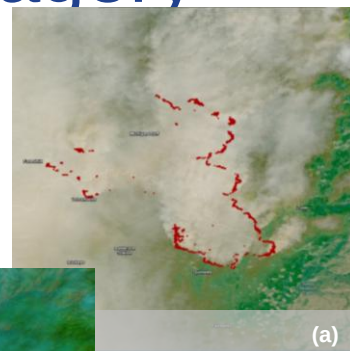


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True Color & False Color Composite Imagery

In the context of wildland fire management:

- True color composite (TCC) imagery*
 - Quickly distinguish surface types and features
 - Identify smoke, clouds, and cloud shadows that can prevent satellite-derived active fire detection
- False color composite (FCC) imagery**
 - Identify fire affected areas
 - Identify active fire fronts
 - Better smoke penetration
 - Facilitate burned area mapping
 - Inform post-fire assessments



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*accessed in FIRMS via GIBS

**available in FIRMS via the Tiler-CMR service developed by NASA ODSI

Mosquito fire, CA (09/25/22)
(a) TCC w 30m Landsat active fire detections;
(b) FCC;
(c) FCC w 30m Landsat active fire detections

Normalized Difference Vegetation Index (NDVI)

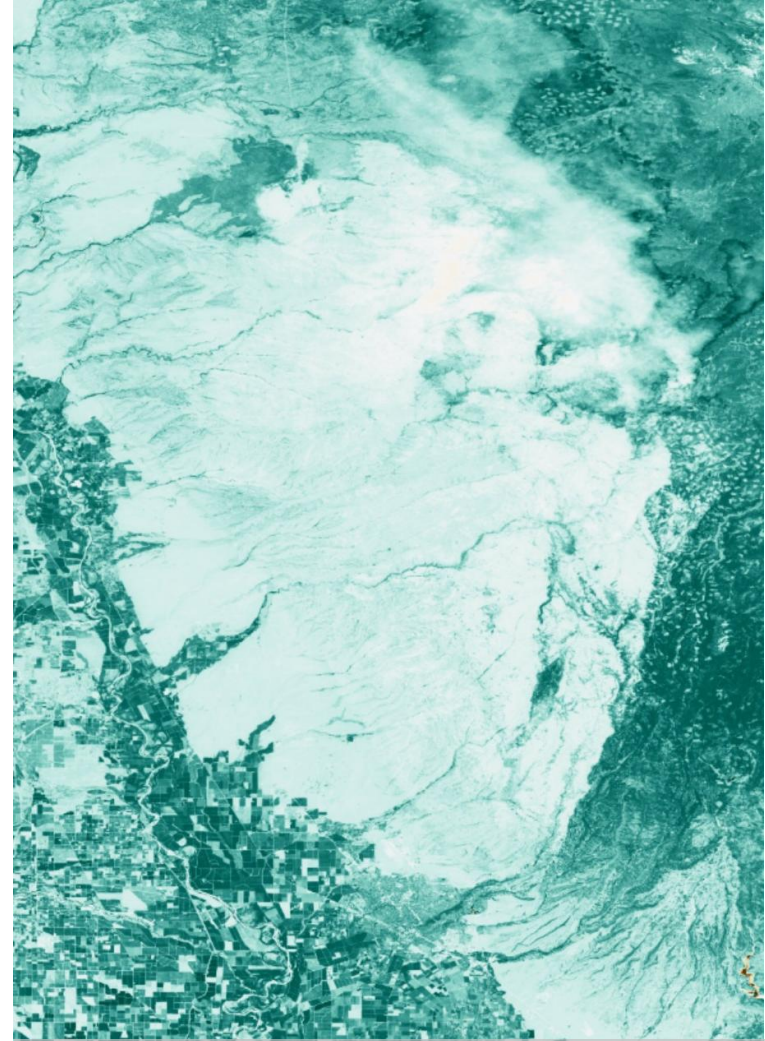
$$NDVI = (NIR - red) / (NIR + red)$$

In the context of wildland fire management:

- Assess condition, health, & density of vegetation
- Map extent of burned area
- Assess fire impacts to aboveground vegetation



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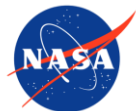
Park fire, CA (08/01/24)

Normalized Difference Moisture Index (NDMI)

$$NDMI = (NIR - SWIR^*) / (NIR + SWIR^*)$$

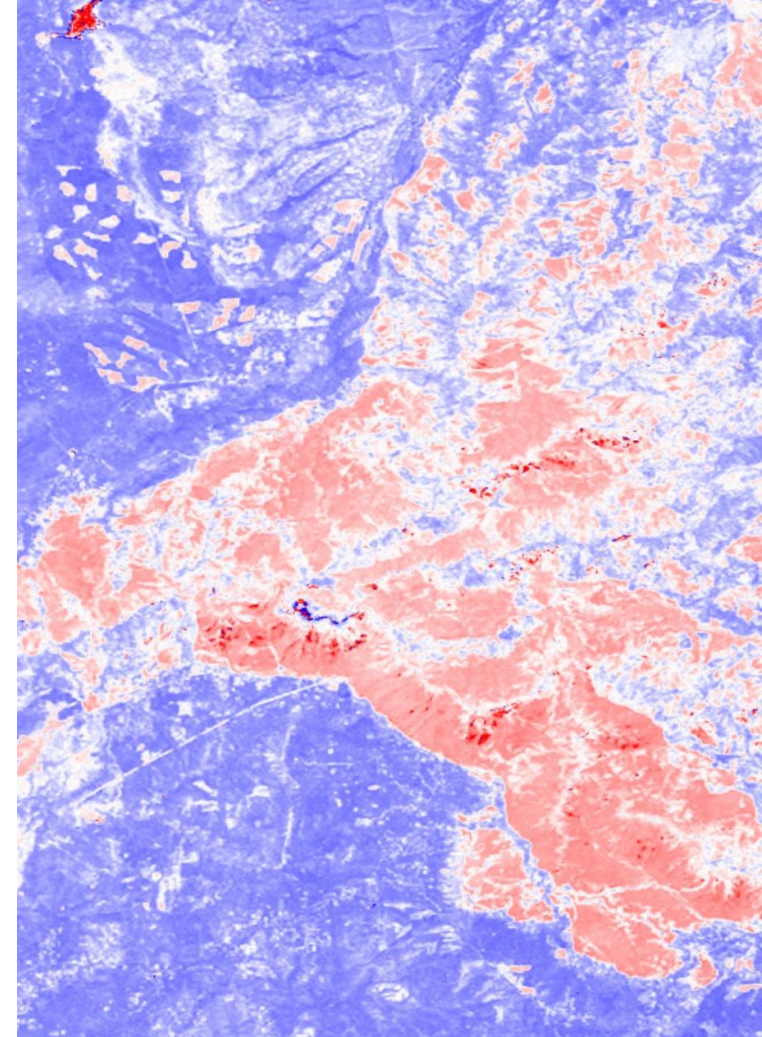
In the context of wildland fire management:

- Determine vegetation water content and monitor drought stress
- Inform the moisture content of fuels
- Useful in pre-fire risk assessment
- Highlights susceptibility of fuels to fire



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*water content in healthy vegetation strongly absorbs in 1.6 μ m shortwave infrared band



Mosquito fire, CA (09/25/22)

Normalized Burn Ratio (NBR)

$$NBR = (NIR - SWIR^*) / (NIR + SWIR^*)$$

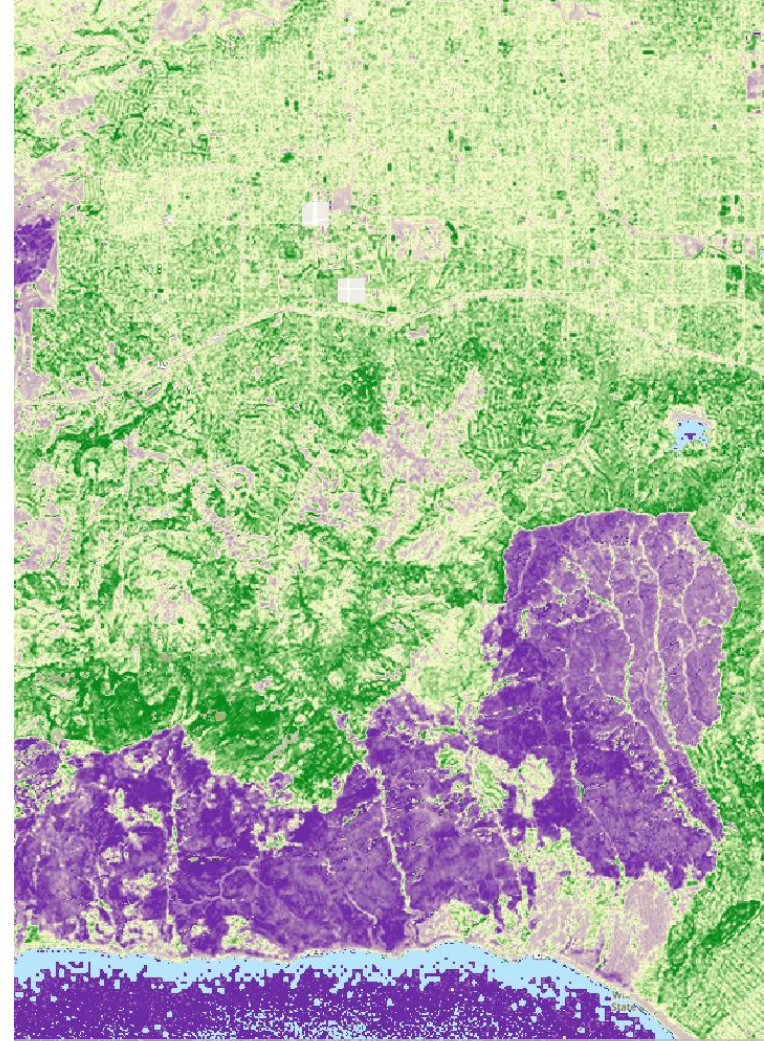
In the context of wildland fire management:

- Perform change detection analyses by combining images from before and after fire
- Map extent of burned area
- Assess magnitude of burn severity
- Support post-fire response
- Inform recovery planning activities



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*2.1 μ m shortwave infrared band



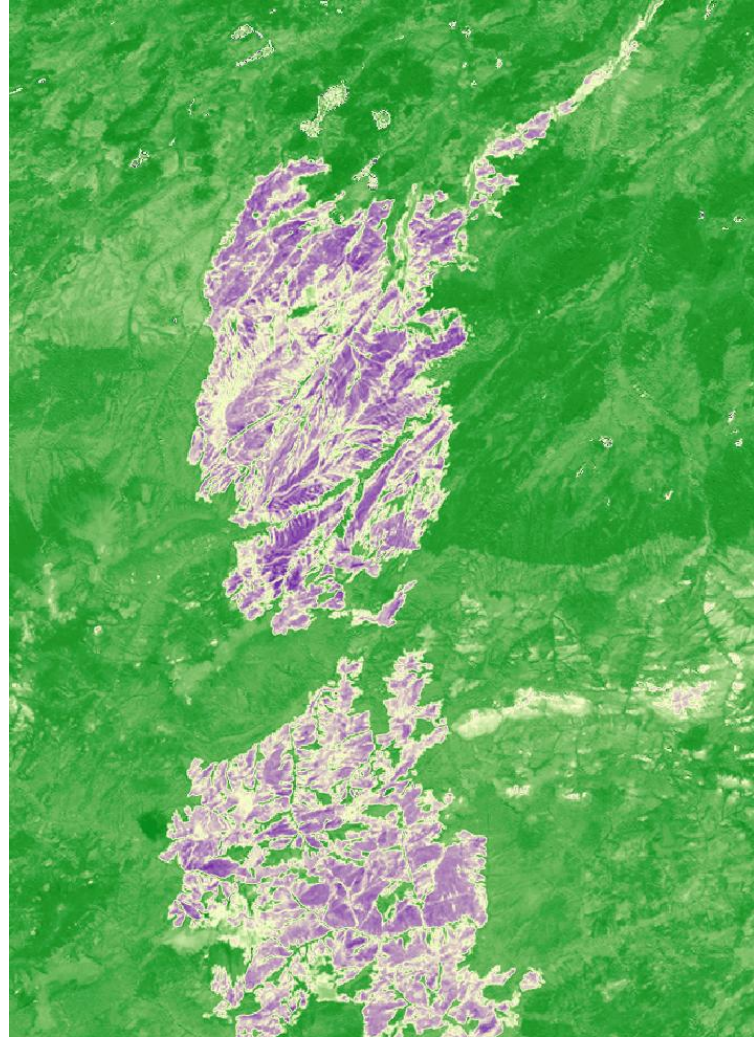
Palisades fire, CA (01/14/25)

Normalized Burn Ratio 2 (NBR2)

$$NBR2 = (SWIR^* - SWIR^{**}) / (SWIR^* + SWIR^{**})$$

In the context of wildland fire management:

- Variant of NBR
- Highlights water sensitivity in vegetation
- Useful in assessing post-fire vegetation / recovery conditions



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* 1.6 μm SWIR band: particularly sensitive to moisture content in vegetation

**2.1 μm SWIR band: informative for burned area extent & burn severity

National fire (N) and Noordor fire (S), AK (07/19/25)

NASA FIRMS HLS Menu - demo

FIRMS team: Diane Davies, Jenny Hewson,
Dylan Mendes, Otmar Olsina, Asen Radov

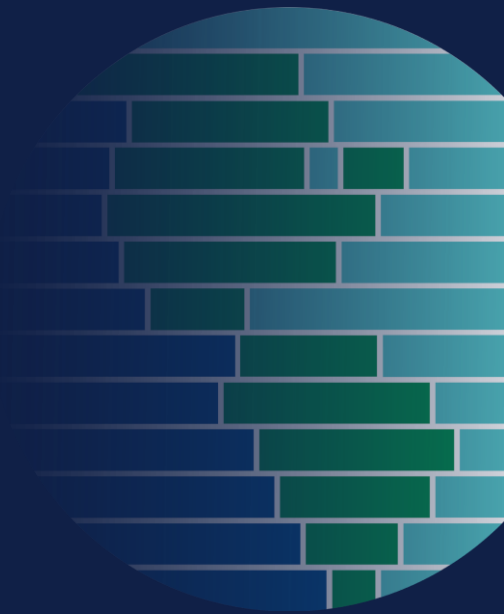
FIRMS USFS Partner: Brad Quayle

FIRMS collaborators: Louis Giglio, Joanne Hall

NASA Official: Amy McNally



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Space Administration



For more information about this presentation

Visit our website

<https://www.earthdata.nasa.gov/data/tools/firms>

s

Contact:

jennifer.h.hewson@nasa.gov

diane.k.davies@nasa.gov



Scan to access more information

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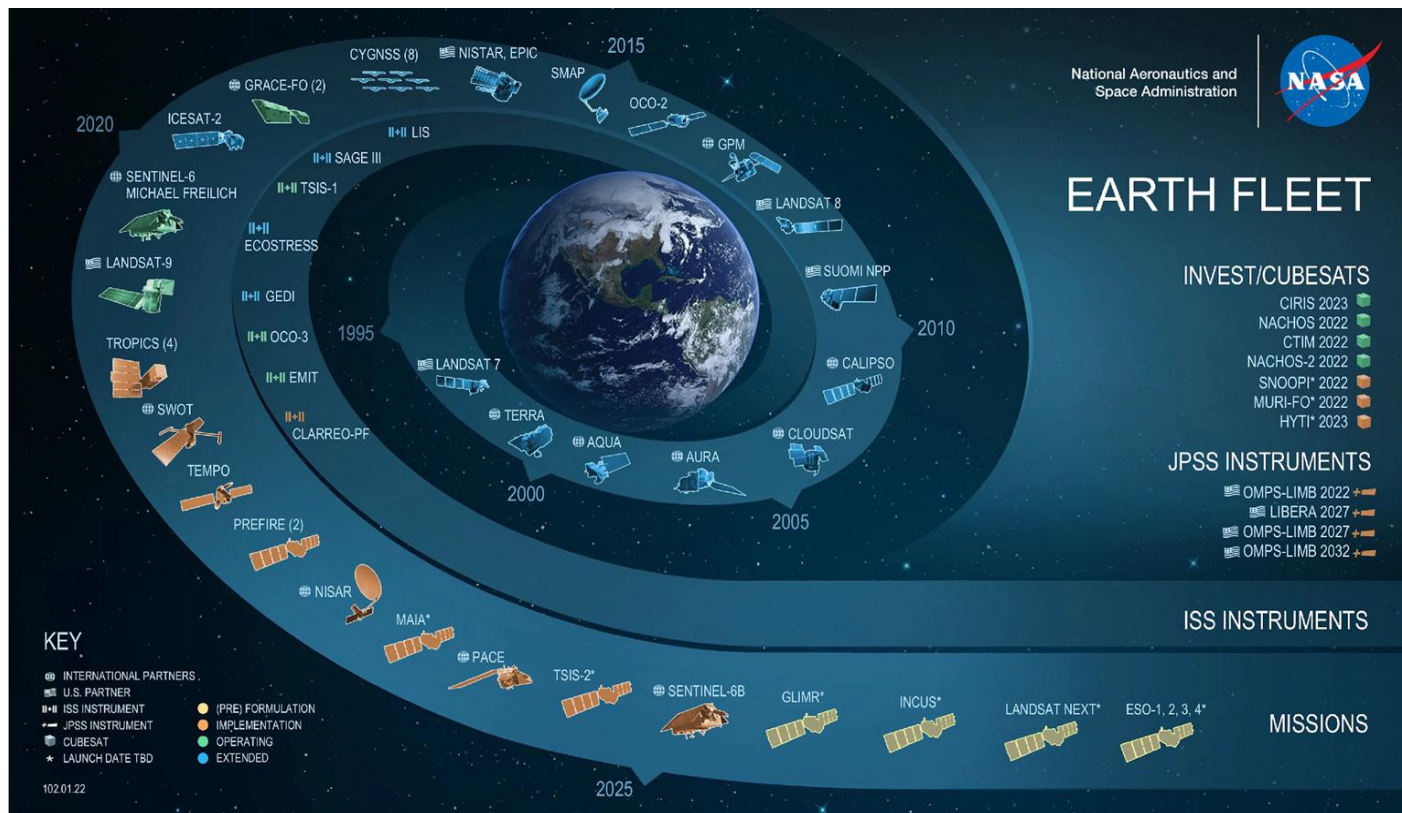




Prithvi-EO-2.0 Foundation Model for Near Real-Time Earth Observation

Presenter:
Venkatesh Kolluru

University of Alabama in Huntsville

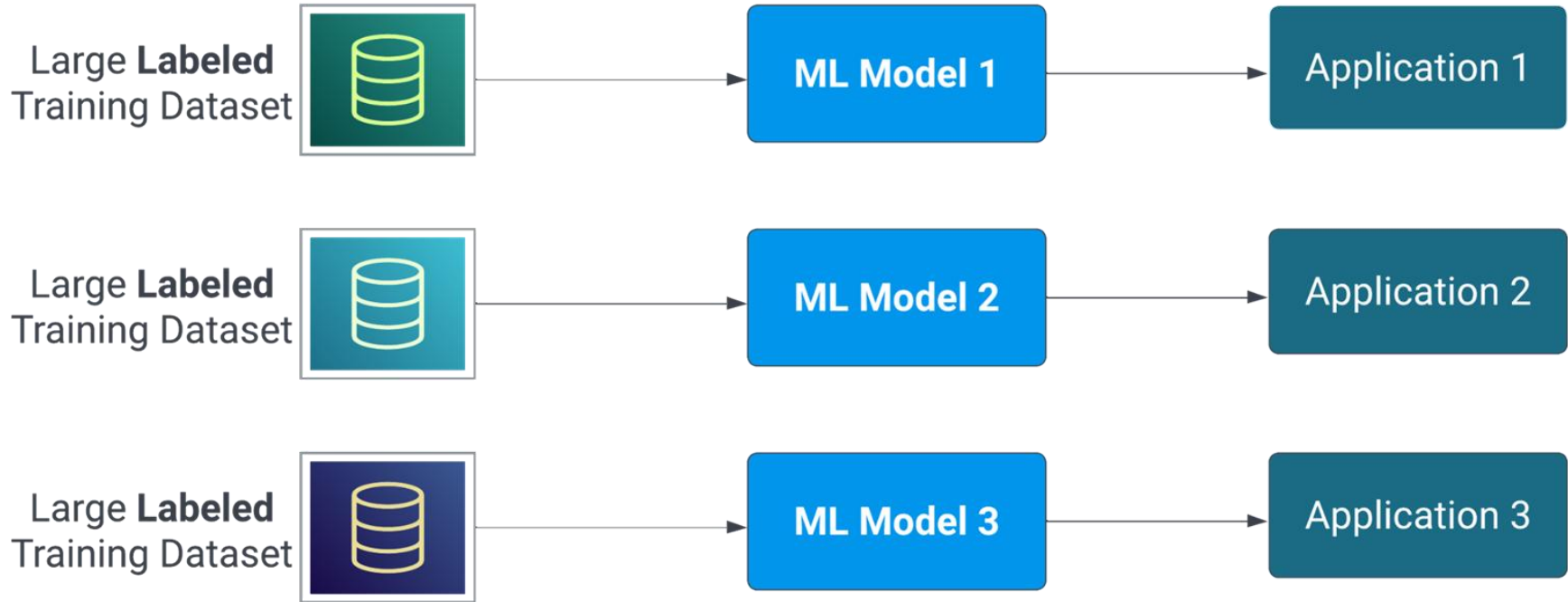


- Collected hundreds of petabytes of data
- Challenging to explore and process the massive unlabeled data

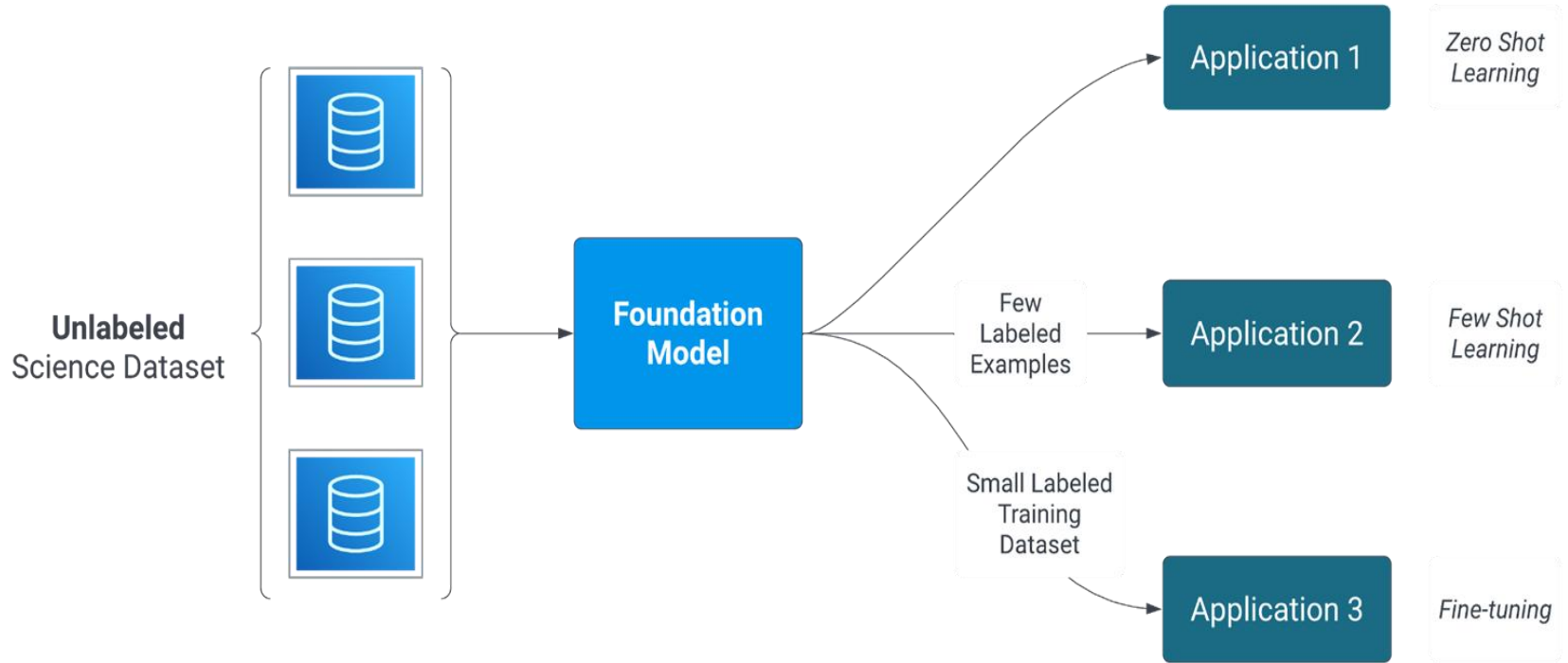
1 PB = 1,000,000,000,000,000 bytes

Image Credit: NASA Headquarters

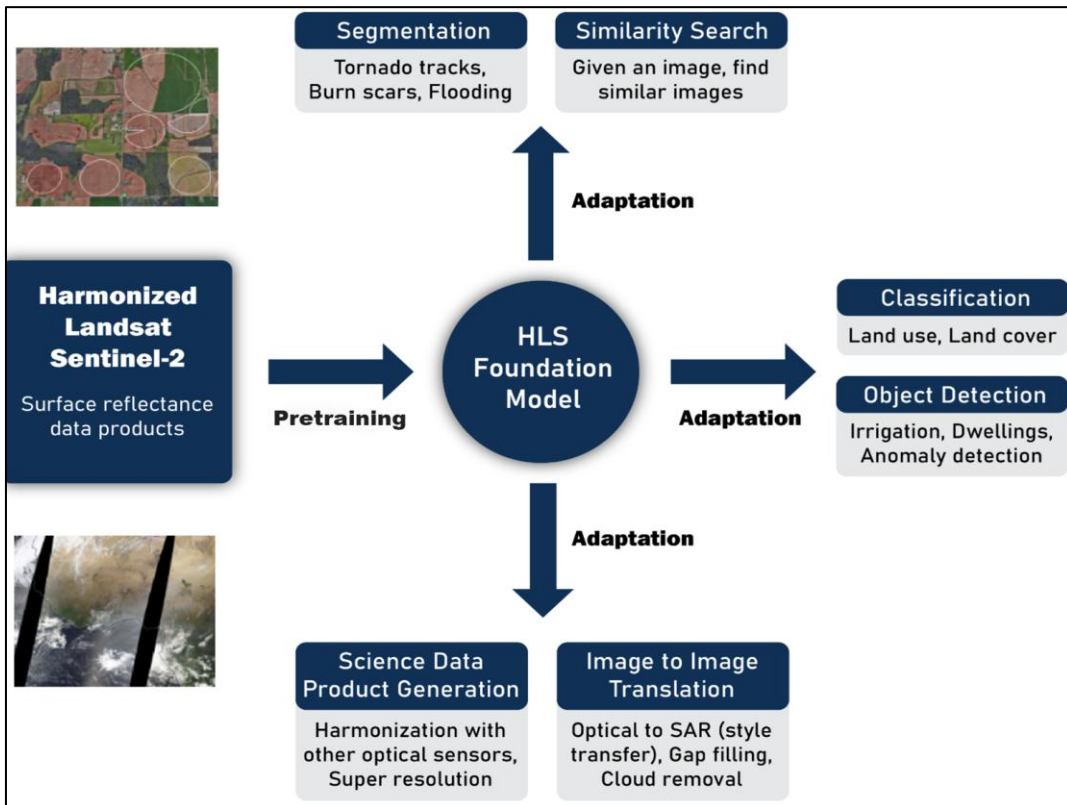
AI-Traditional Supervised Learning Approach



AI - Foundation Model Approach



Prithvi: Generalist Geospatial FM

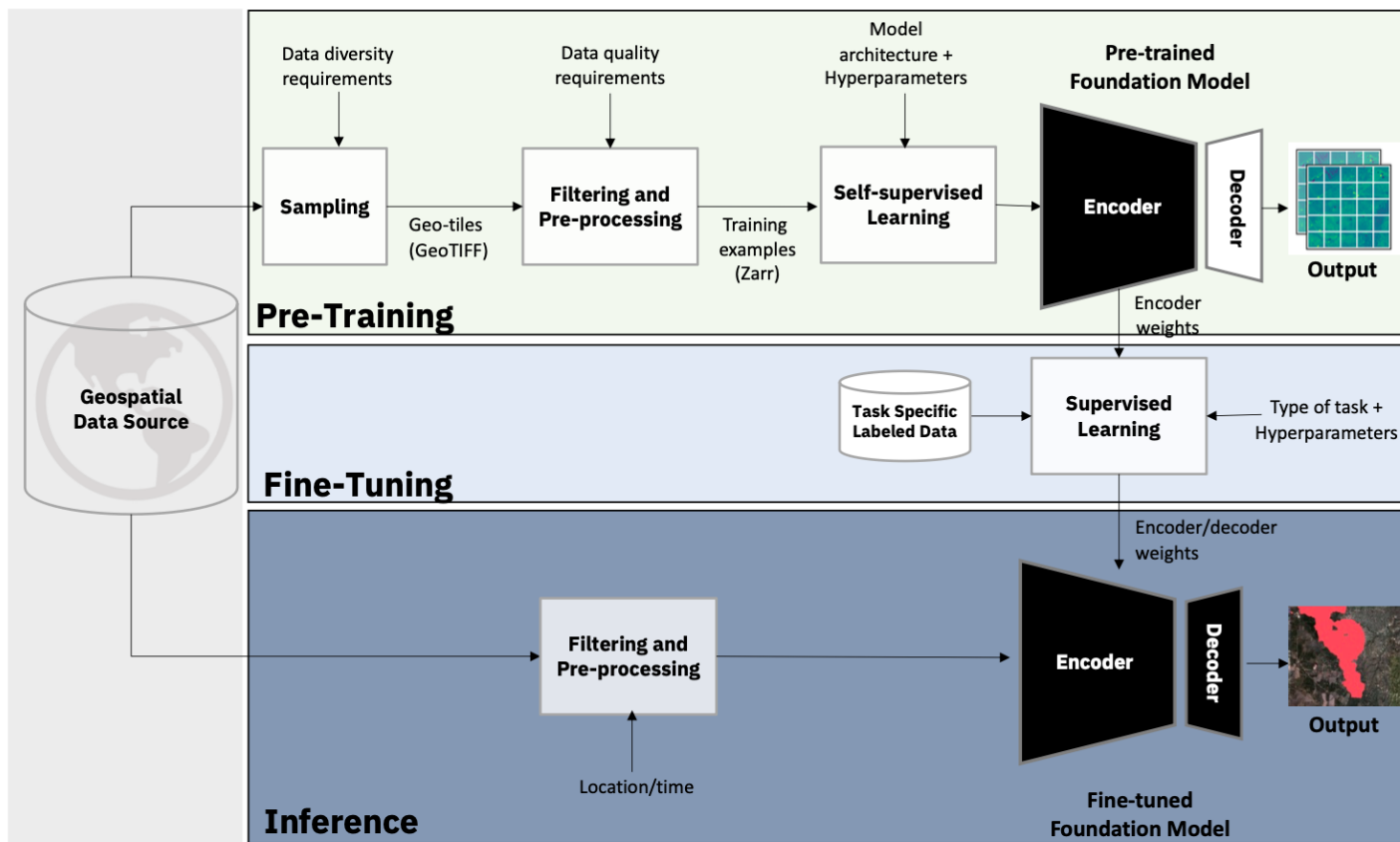


Collaboration: IBM, UAH, Clark University, ORNL, Hugging Face

- Built in collaboration with IBM Research
- Initially released (2023) as 100M parameter model pretrained on HLS CONUS data
- Evaluated for adaptation for different categories of downstream tasks

Associated papers:

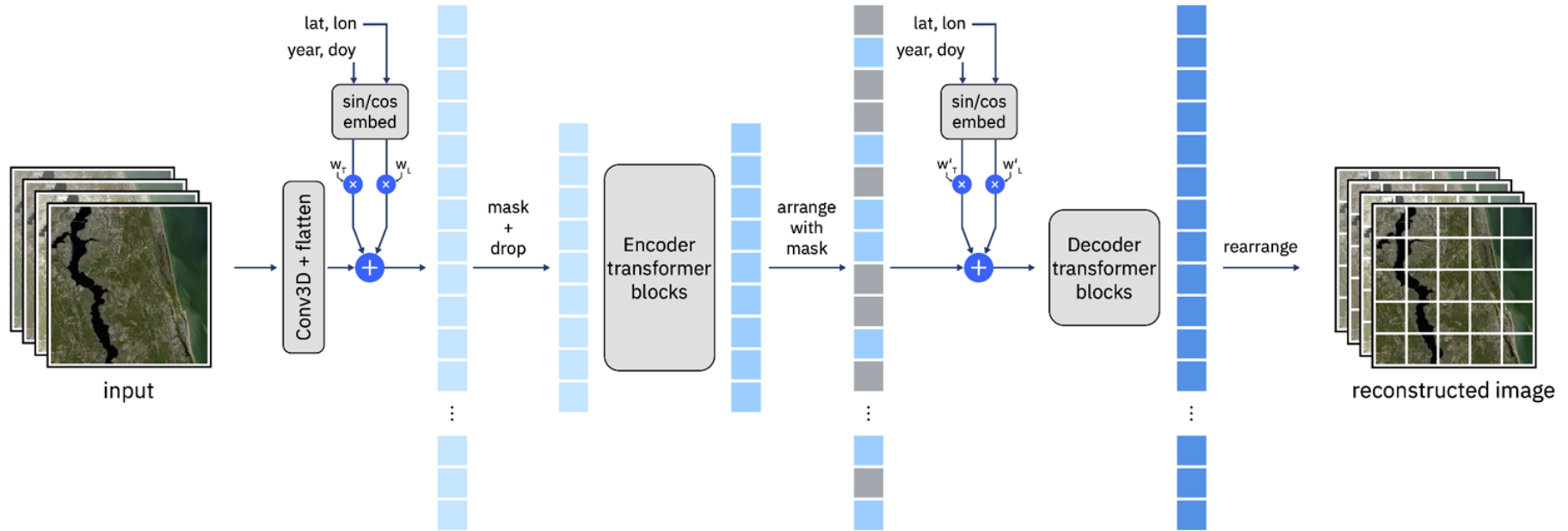




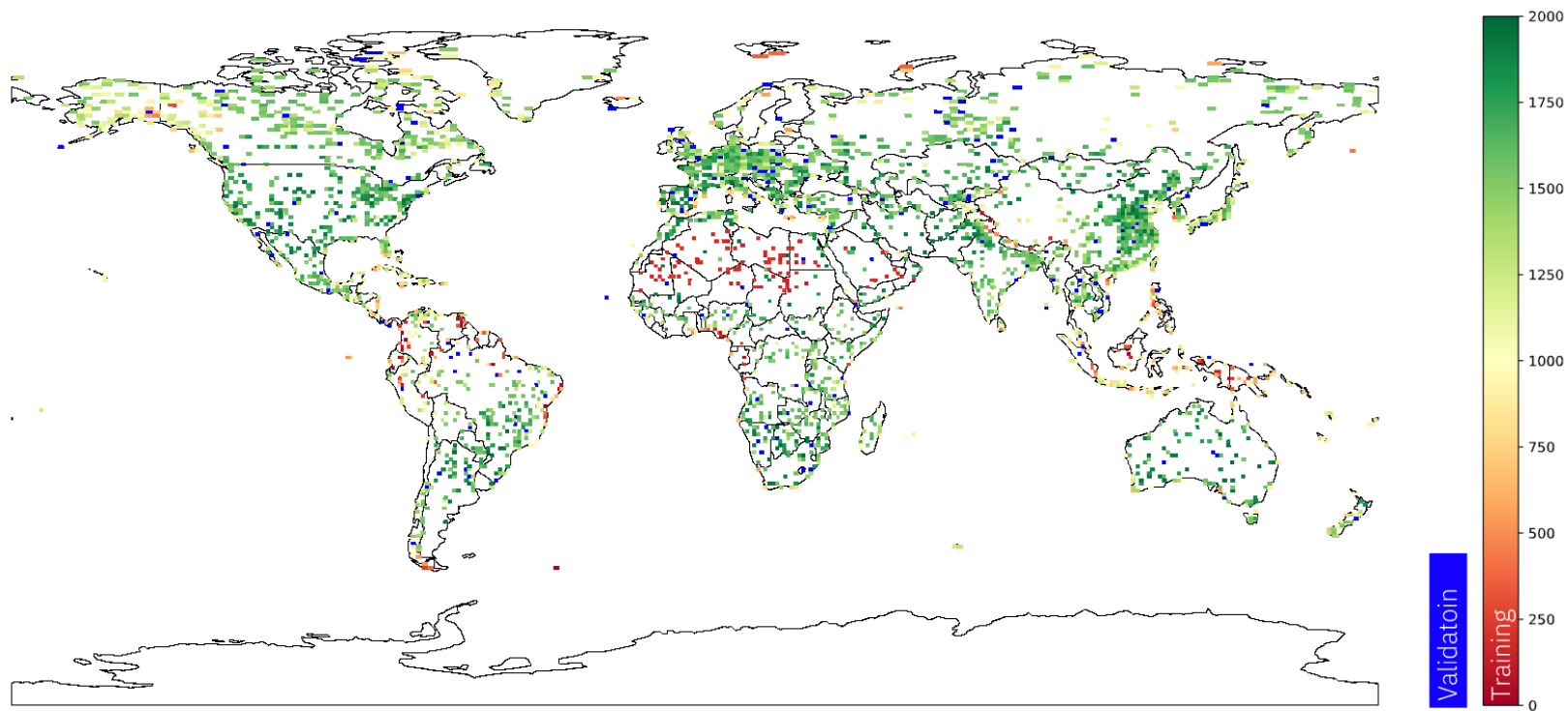
The pretrained models with 300M and 600M parameters are available on 🤖



Prithvi EO Foundation Model 2.0 (600M)



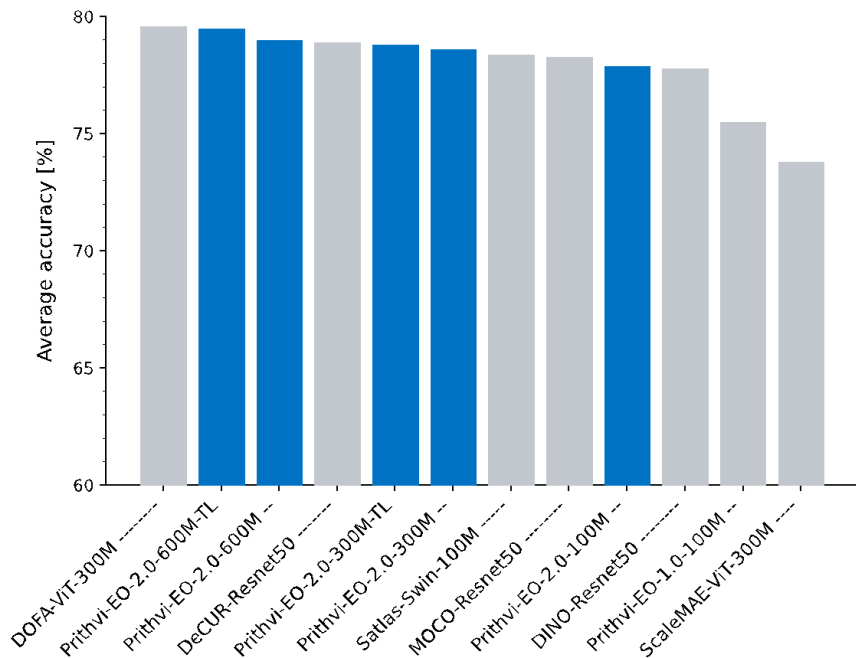
Source: [Prithvi-EO-2.0: A Versatile Multi-Temporal Foundation Model for Earth Observation Applications](#)



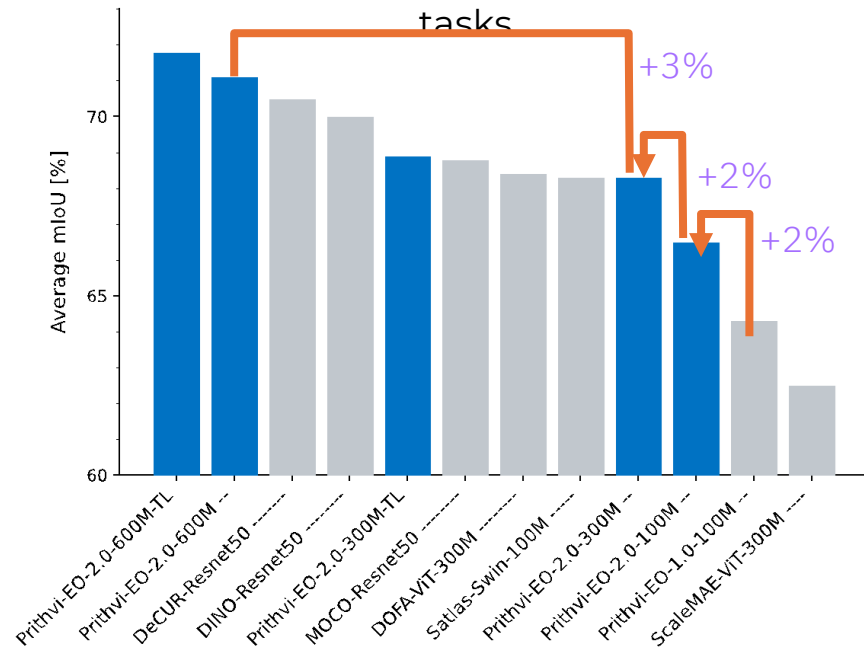
- 3028 train tiles visualized in green to red. 163 validation tiles visualized in blue (up to 392 samples per tile).
- 35 sampled train tiles and 2 validation tiles have no samples because of insufficient data coverage or cloud-free areas (e.g., Antarctica).
- 96 tiles in the far north have been dropped due to quality issues.

Prithvi EO 2.0 – Data and Model Scaling Matters

GEO-Bench¹ classification tasks



GEO-Bench¹ segmentation tasks



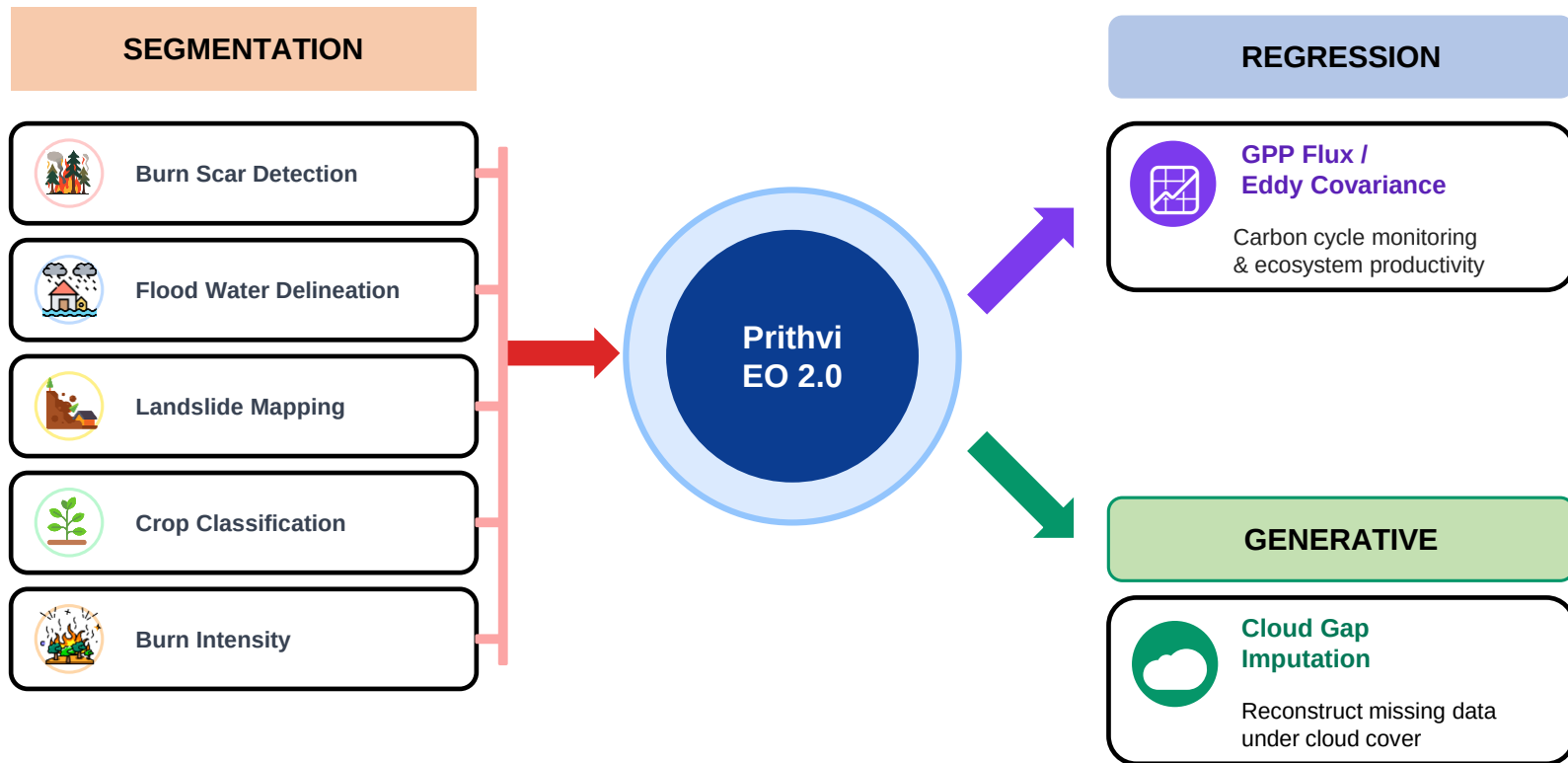
Hands-on session GeoFMs / © 2025 IBM & NASA

Office of Data Science and Informatics

NASA Marshall Space Flight Center

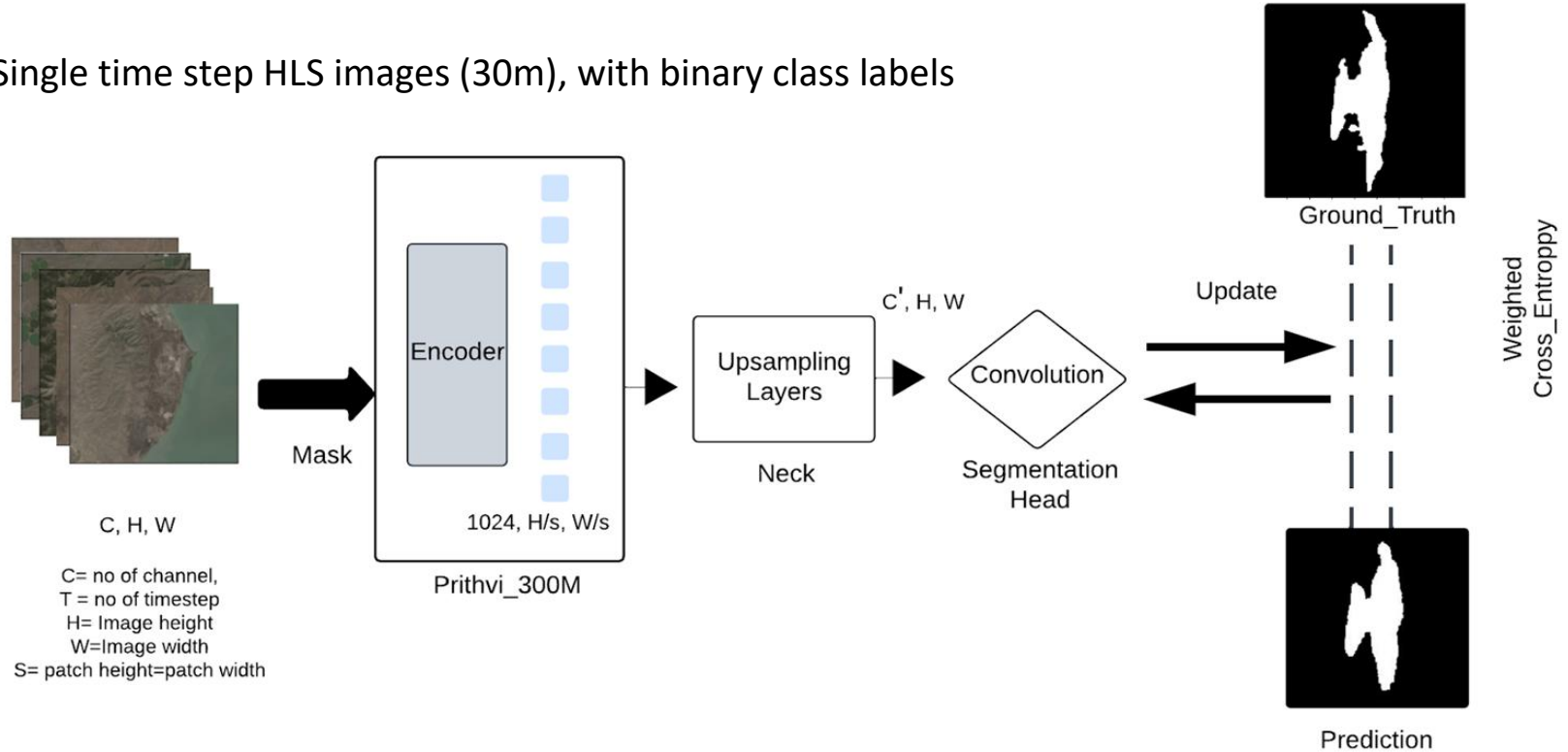
¹ Lacoste, A., Lehmann, N., Rodriguez, P., Sherwin, E., Kerner, H., Lütjens, B., ... & Zhu, X. (2024). Geo-bench: Toward foundation models for earth monitoring. *Advances in Neural Information Processing Systems*, 36.

Downstream Applications



Prithvi Fine Tuning for Burn Scars, Flood Mapping

Data: Single time step HLS images (30m), with binary class labels



Results on the Sen1floods11 Dataset

Model	mIoU (std)	mF1 (std)	IoU water (std)
Prithvi-EO-1.0-100M	88.3 (0.3)	97.3 (0.1)	79.6 (0.5)
Prithvi-EO-2.0-300M	89.7 (0.3)	97.6 (0.1)	82.2 (0.6)
Prithvi-EO-2.0-300M-TL	90.0 (0.2)	97.7 (0.1)	82.6 (0.3)
Prithvi-EO-2.0-600M	89.9 (0.6)	97.6 (0.2)	82.5 (1.0)
Prithvi-EO-2.0-600M-TL	90.3 (0.3)	97.7 (0.1)	83.1 (0.5)

Results on the Wildfire Scar Mapping Dataset

Model	mIoU (std)	mF1 (std)	IoU burn scar (std)
Prithvi-EO-1.0-100M	86.9 (0.8)	97.2 (0.2)	76.8 (1.4)
Prithvi-EO-2.0-300M	88.6 (0.5)	97.6 (0.1)	79.9 (0.8)
Prithvi-EO-2.0-300M-TL	89.3 (0.9)	97.8 (0.3)	81.1 (1.6)
Prithvi-EO-2.0-600M	90.5 (0.6)	98.1 (0.2)	83.2 (1.1)
Prithvi-EO-2.0-600M-TL	90.5 (0.7)	98.1 (0.2)	83.2 (1.1)

Summary

- Trained geospatial FM Prithvi-EO-2.0 on global HLS v2 satellite data
- Sampling strategy was based on LULC and temporal conditions (T=4)
- Prithvi has been evaluated on multiple downstream tasks
 - a. Segmentation: burn scar, flood water delineation, landslide, crop classification and burn intensity
 - b. Regression: GPP flux eddy covariance
- Red teaming exposes real-world failure modes that benchmarks miss
- Prithvi-EO performs well but must be stress-tested end-to-end
- Preprocessing, inference, and postprocessing each introduce unique risks
- System-level validation improves reliability more than model accuracy alone
- Robust operationalization = model + data + pipeline + QA + red teaming

Models and Datasets



<https://huggingface.co/ibm-nasa-geospatial>

Paper



<https://arxiv.org/pdf/2412.02732>

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THANK YOU

Wednesday May 13, 2026 starting at 10:00 am CDT

Session 1: HLS in Action

Goals:

- Exemplify real-world use of HLS across sectors and use areas and methods used.
- Discuss the benefits and challenges to adopting HLS for downstream impact.

Time (CDT)	Topics	Format	Speaker
10:00 - 10:05 (5 min)	Welcome & Logistics	Presentation	Stephanie Jiménez, NSITE & UAH
10:05 - 10:10 (5 min)	Introducing Impactful Applications of HLS	Presentation	
10:10 - 10:30 (20 min)	HLS in NASA's Fire Information for Resource Management System (FIRMS)	Presentation	Jenny Hewson & Diane Davies, NASA LANCE/FIRMS
10:30 - 10:50 (20 min)	Prithvi EO - Foundation Model	Presentation	Venkatesh Kolluru, NASA ODSI & UAH
10:50 - 11:10 (20 min)	HLS Applications Challenges, Questions, and Needs	Interactive 	NSITE MCs



HLS in Action

Presenter Insights

1. Why did you choose to use HLS over other data?
2. What advice would you give to somebody in your field who is interested in using HLS?
3. What would be possible in your work if you had access to **HLS 10 m, HLS Vegetation Indices, or HLS Vegetation Index composites?**



Day 2: HLS in Action

What are you interested in learning more about
Prithvi Foundation Model or Geo-AI models in
general?

Participants, please post your questions in the Webex Q&A





HLS in Action

Questions from the Audience

What other **questions do the participants have** that we haven't answered yet?

What else could the presenters help with?

Participants, please post your questions in the Webex Q&A

