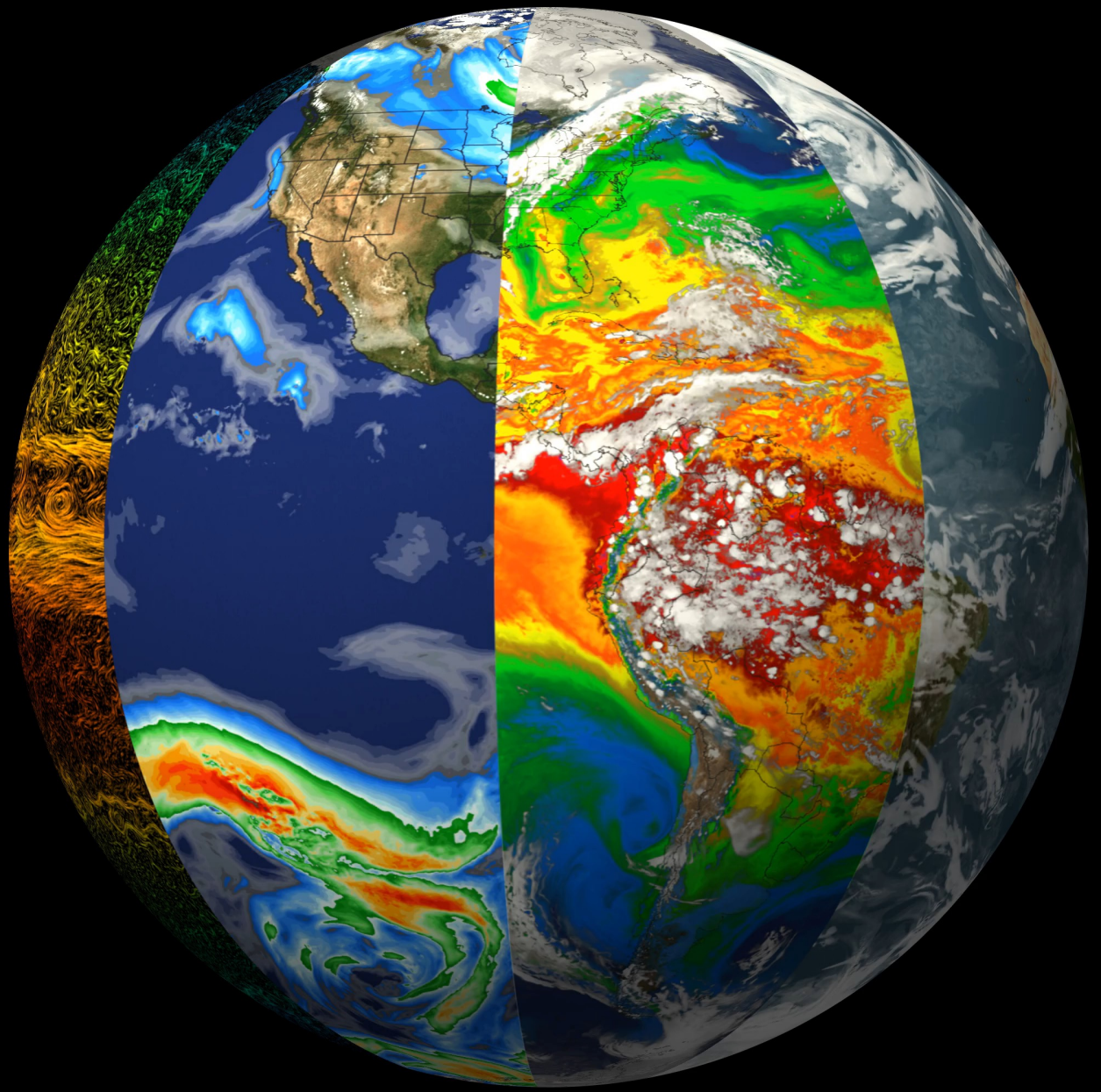
erika.podest@jpl.nasa.gov

APPLIED REMOTE SENSING TRAINING PROGRAM
TRAIN - EMPOWER - ADVANCE

Building Capacity to Use Earth Observations in Addressing Environmental Challenges in Bhutan

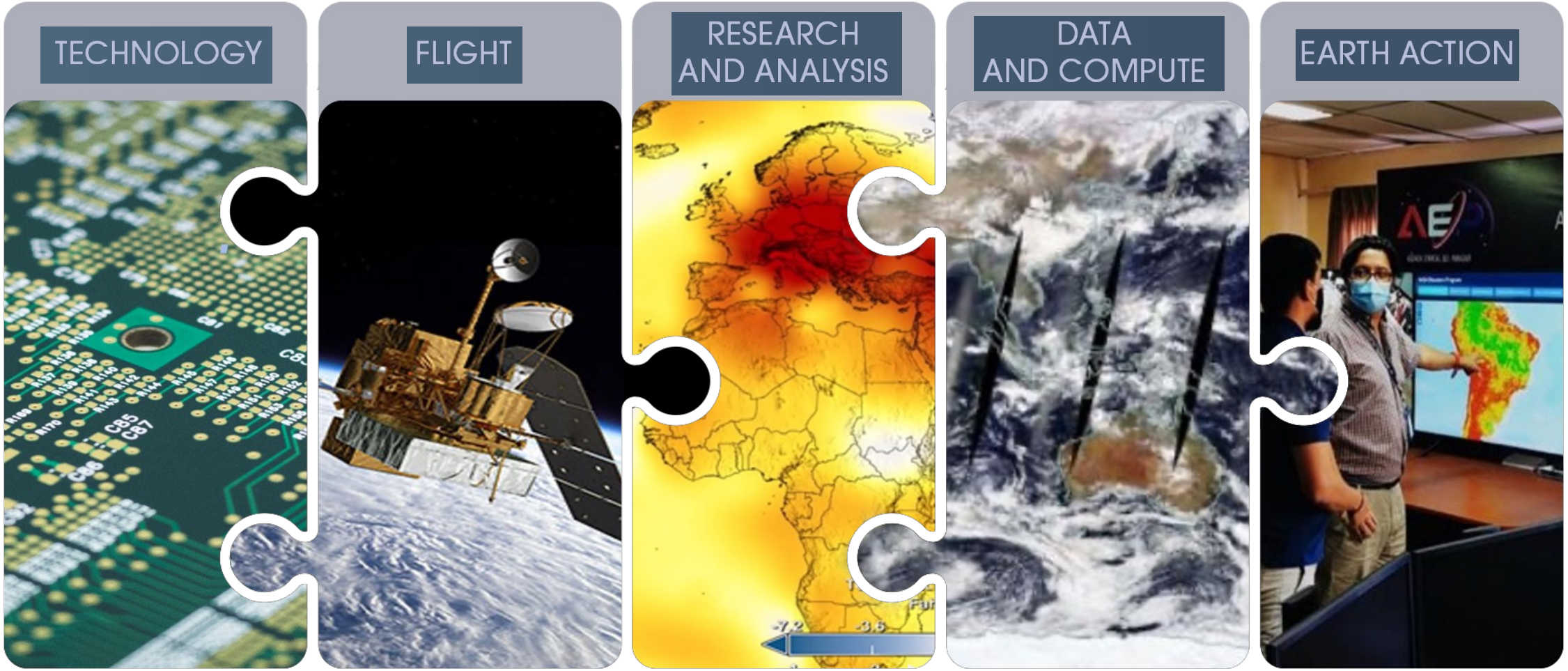
Earth is a System of Systems…..



Animation by NASA Science Visualization Studio (SVS)

Earth: A System of Systems

Advancing Earth System Science End to End



EARTH SCIENCE APPLIED SCIENCES

Data Delivery ➔ Decisions

Unique programs solve our planet's most pressing issues and build capacity to use Earth science information in decision-making

AGRICULTURE

CLIMATE & RESILIENCE

DISASTERS

ECOLOGICAL CONSERVATION

HEALTH & AIR QUALITY

WATER RESOURCES

WILDLAND FIRES

EARTH MISSION ENGAGEMENT

CAPACITY BUILDING

Applied Remote Sensing Training (ARSET)

Applied Remote Sensing Training (ARSET)

https://appliedsciences.nasa.gov/arset

Delivers cost-free training on the use of Earth observations for decision making.

ARSET empowers the global community through remote sensing training.

ARSET Training Themes

- Disasters
- Agriculture
- Ecological Conservation
- Water Resources
- Climate & Resilience
- Health & Air Quality

EARTH SCIENCE
APPLIED SCIENCES

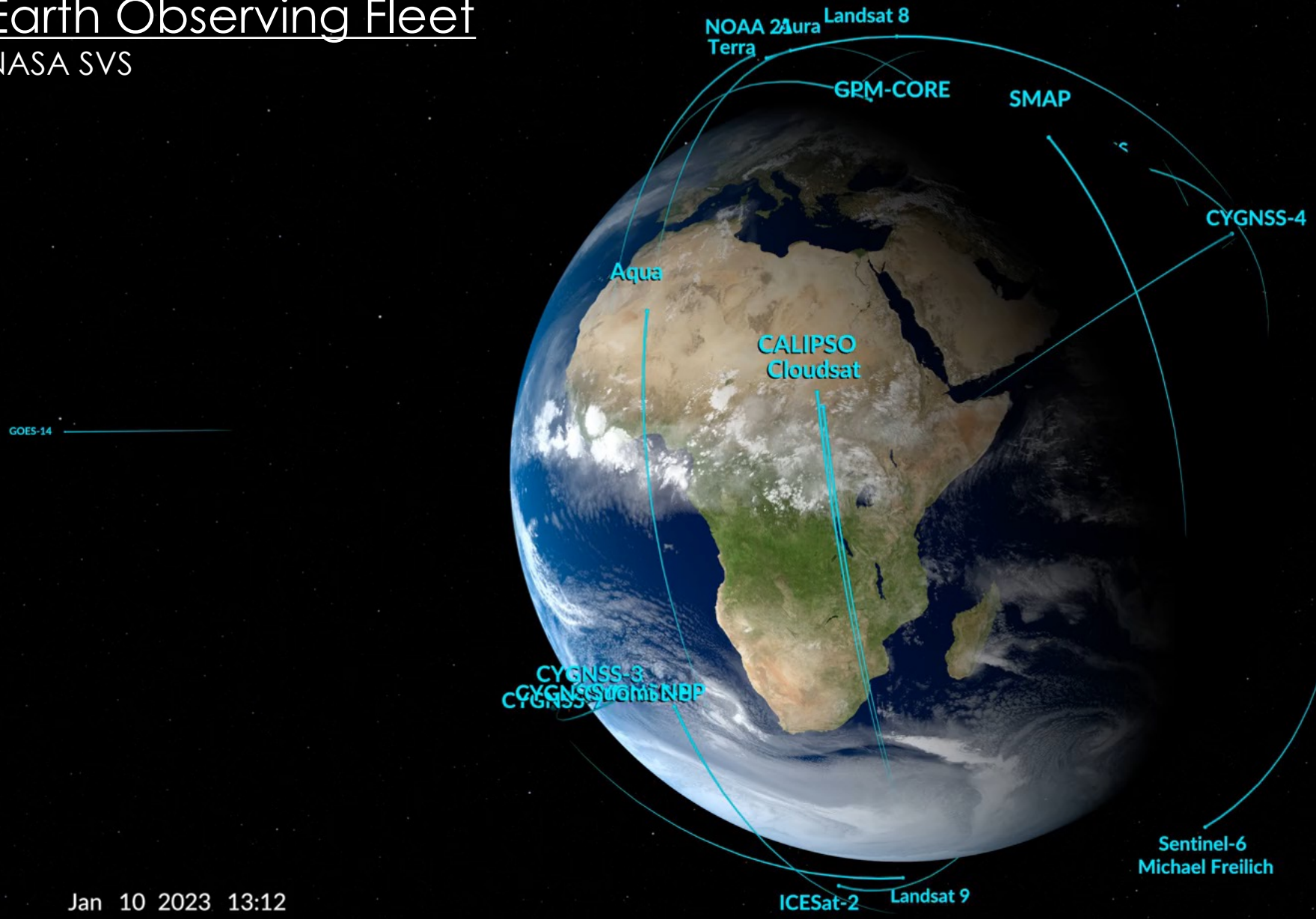
CAPACITY BUILDING

NASA Applied Remote Sensing Training (ARSET)

- Cost-free
- Online or in-person
- Bilingual and multilingual options
- Only use open-source software and data
- Accommodate differing levels of expertise
- Live and instructor-led or asynchronous and self-paced
- Visit the ARSET website to learn more.

Earth Observing Fleet

NASA SVS



Earth Observing Fleet

Global Precipitation Every 30 Minutes

NASA SVS

7/25/2014 00:55

Painting the
World with Water

Liquid Precipitation Rate

0.1 0.2 0.3 0.5 1.0 2.0 3.0 5.0 10 20 50

mm/hour

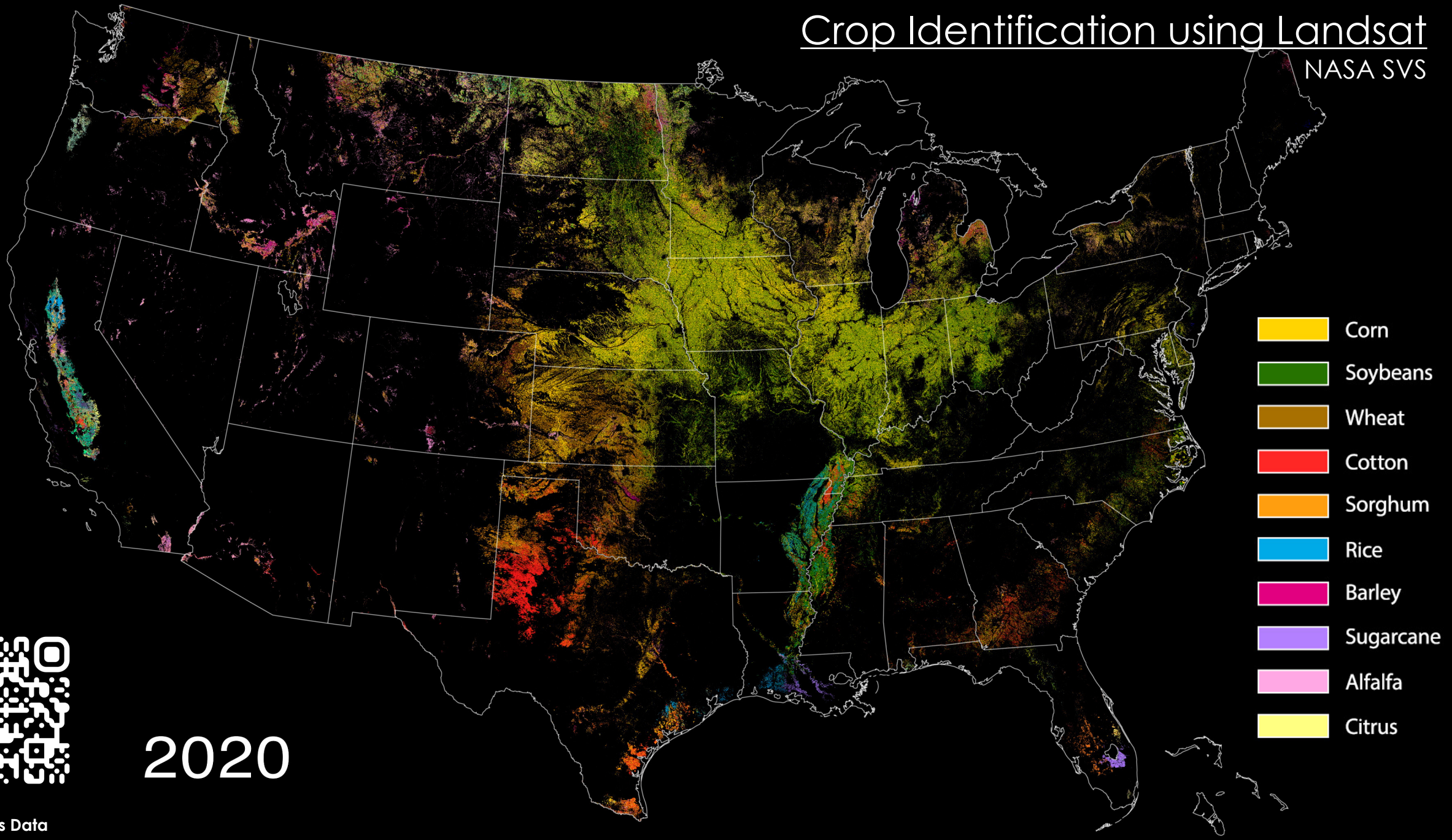
Frozen Precipitation Rate

0.1 0.2 0.3 0.5 1.0 2.0 3.0 5.0 10 20 50

mm/hour

Crop Identification using Landsat

NASA SVS

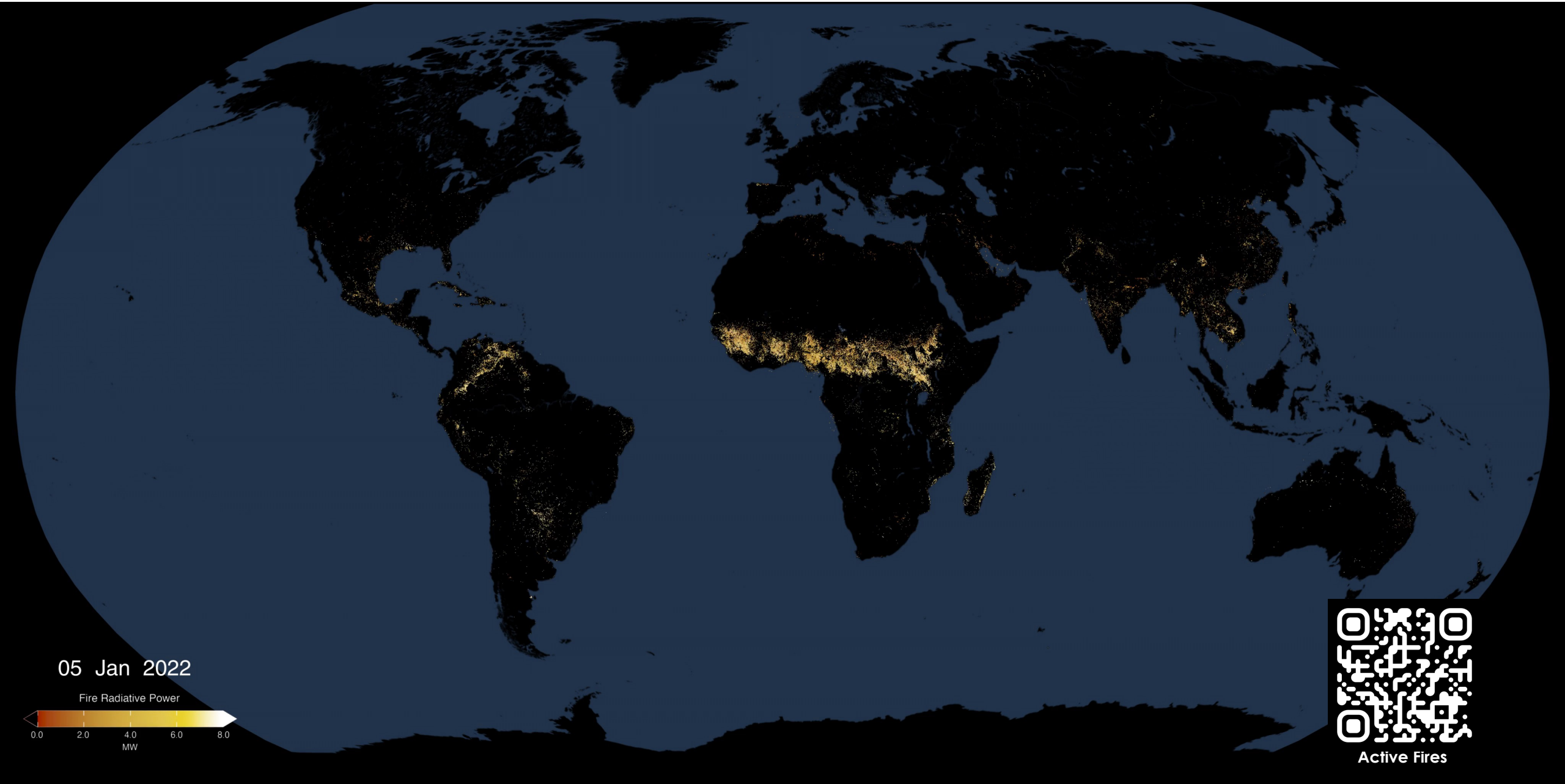


2020

Landsat
Croplands Data
Overview

Fire Detections and Intensity

NASA SVS



Learning Objectives

By the end of this training attendees will be able to:

- Identify the different remote sensing and modeled data for environmental monitoring.
- Use cloud computing to acquire and analyze time series of remote sensing data.
- Demonstrate how satellite data can be used to monitor and quantify changes in land use and land cover.
- Practice using satellite and modeled data for monitoring disasters (fire, flood, earthquake, landslide).
- Recognize how Earth observations are used in climate change monitoring and impacts.
- Identify passive (optical) and active (microwave) remote sensing data and how it relates to agricultural parameters.

Training Outline

Public

Agenda: May 13 – 16, 2024 Thimphu Tech Park

- https://appliedsciences.nasa.gov/sites/default/files/2024-04/Agenda_Bhutan_1.pdf

- **Day 1 – Monday, May 13 – 8:00am-5:00pm**
  - Session I: Introduction and Overview of Earth Observations and Earth System Models
    - Fundamentals of Remote Sensing
    - Overview of Data Products from Earth Observations and Earth System Models for Environmental Monitoring
  - Session II: Climate Change Projections and Risk Assessment
    - Introduction and Background to Climate Change Projections and Analysis (Anomalies & Trends)
    - Introduction to Google Earth Engine (GEE)
    - Assessing Regional Climate Change & Impacts in Bhutan

Agenda: May 13 – 16, 2024 Thimphu Tech Park

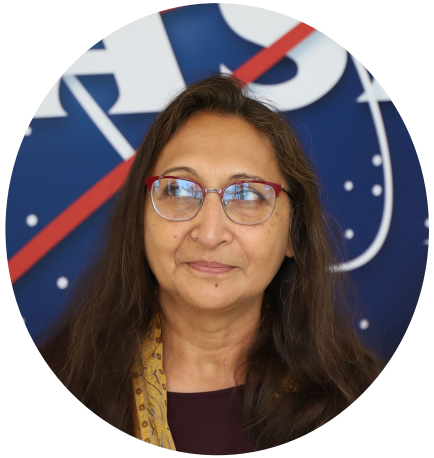
- https://appliedsciences.nasa.gov/sites/default/files/2024-04/Agenda_Bhutan_1.pdf

- **Day 2 – Tuesday, May 14 – 8:30am-5:00pm**
  - Session III: Disasters – Floods, Landslides, Fires
    - Extreme Weather and Flood Monitoring
    - Surface Inundation Monitoring
    - Assessing Landslide Hazard Probability
    - Pre-Fire Risk Assessment
    - Active Fire & Post-Fire Assessment
    - Monitoring Pre- and Post-Fire Conditions

Agenda: May 13 – 16, 2024 Thimphu Tech Park

- https://appliedsciences.nasa.gov/sites/default/files/2024-04/Agenda_Bhutan_1.pdf
- **Day 3 – Wednesday, May 15 – 8:30am-5:00pm**
  - Session IV: Land Cover Mapping and Monitoring
    - Overview of Land Cover Products
    - Land Cover Mapping and Monitoring (Optical & Radar) – Forestry
    - Land Cover Mapping and Monitoring (Urban Growth)
- **Day 4 – Thursday, May 16 – 8:30am-5:00pm**
  - Session V: Satellite Remote Sensing for Agricultural Applications
    - Best Practices for Collecting Field-Based Training Data
    - Crop Mapping using a Time Series of Radar and Optical Imagery
  - Session VI: Exercises and Participant Presentations
    - Case Study in Participant's Area of Interest
    - Group Presentations
    - Closing Ceremony

Amita Mehta, PhD



ARSET Trainer

Sean McCartney

ARSET Trainer

Erika Podest, PhD

ARSET Trainer

Aparna R. Phalke, PhD

SERVIR Thematic Lead

Sarah Cox

SERVIR Research Scientist

Contacts

Trainers:

Sean McCartney – sean.mccartney@nasa.gov

Amita Mehta – amita.v.mehta@nasa.gov

Erika Podest – erika.podest@jpl.nasa.gov

Aparna Phalke – aparna.r.phalke@nasa.gov & aparna.phalke@uah.edu

Sarah Cox – sec1825@uah.edu

Visit our Sister Programs:

- DEVELOP
- SERVIR

- ARSET Website
- Follow us on X!
  - @NASAARSET
- ARSET YouTube