An Introduction to NASA DEVELOP & Project Applications of Airborne Data

Dr. Kenton Ross, DEVELOP Chief Scientist

EARTH SCIENCE
APPLIED SCIENCES

Empowered Participants + Earth Observations + Engaged Decision Makers

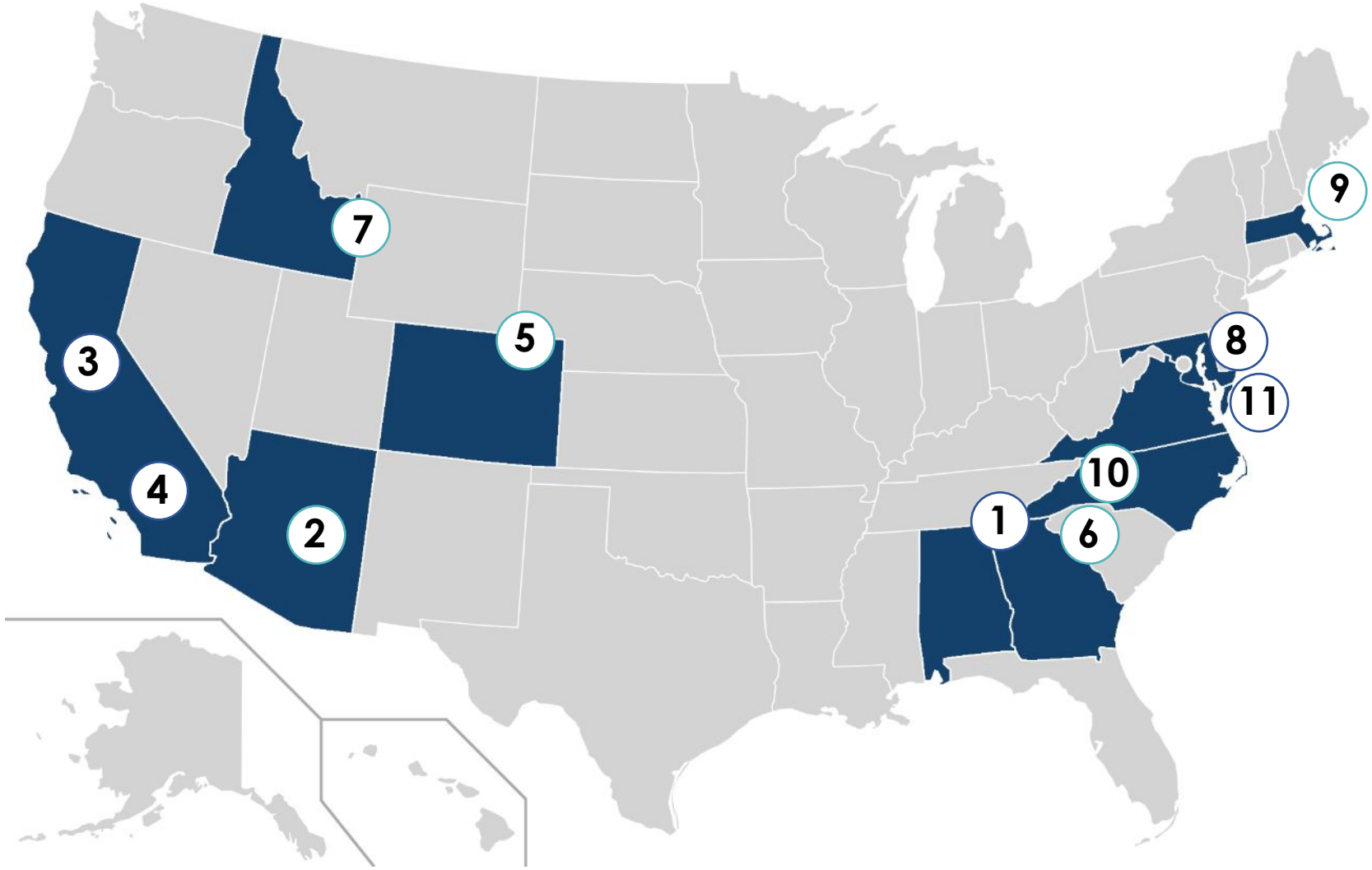
"Shaping the future by integrating Earth observations into global decision making"

DEVELOP bridges the gap between NASA Earth Science and society, building capacity in both its participants and end-user organizations to better prepare them to use remote sensing to address environmental challenges that face society.

Part of NASA's Applied Sciences' Capacity Building Program, DEVELOP addresses these challenges by conducting interdisciplinary feasibility projects to examine community concerns around the globe through the lens of NASA Earth observations.

DEVELOP Office Locations*

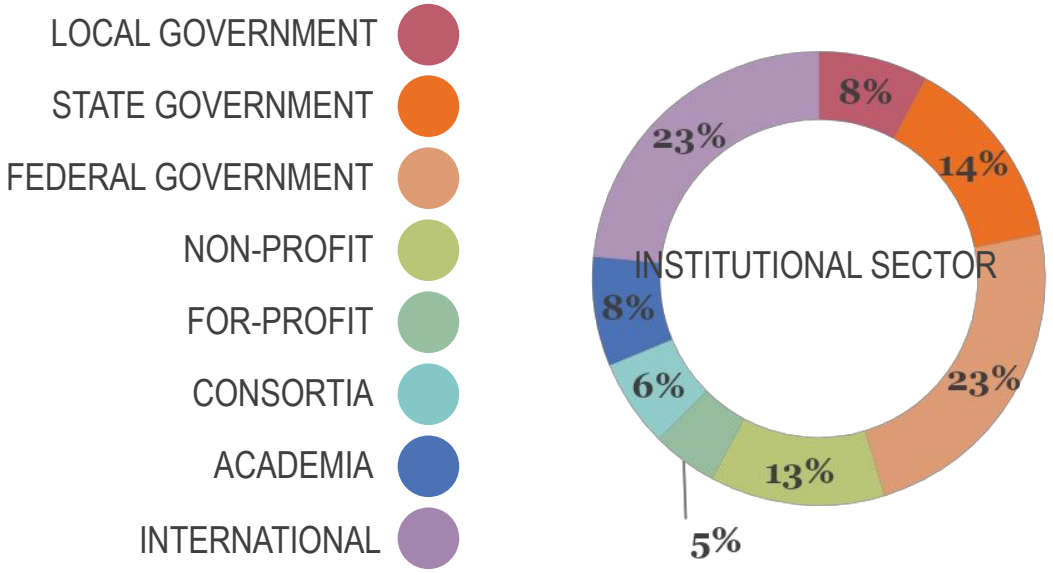
(virtual since spring 2020)



1. Alabama – Marshall
2. Arizona – Tempe
3. California – Ames
4. California – JPL
5. Colorado – Fort Collins
6. Georgia – Athens
7. Idaho – Pocatello
8. Maryland – Goddard
9. Massachusetts – Boston
10. North Carolina – NCEI
11. Virginia – Langley

Project Partners

Any organization can partner with DEVELOP – state & local governments, federal agencies, tribal governments, non-profits, for-profits, international organizations, academia, etc.



2021 Summer Term Partner Sectors

Project Development Process

Idea Generation & Partner Engagement

- Initial engagement w/potential partner – DEVELOP listens to interests, priorities, needs, and understand their decision-making process.
- Generate project idea – identify: study area, thematic focus area, actionable decision, potential end-products

Proposal Writing & Approvals

- Initial ideas reviewed by DEVELOP National Program Office.
- If approved, DEVELOP Fellows draft a proposal – including the partner in review and iteration.
- Proposals reviewed and approved by HQ, those selected are scheduled for a specific term and listed in the DEVELOP application.

Project Execution & More Iteration

- Communication lines are reopened with partners following approvals.
- Partners regularly meet with DEVELOP team during the term to discuss progress and preliminary results.
- Project findings, end-products, and methodologies are handed off at the end of the term.

Project Characteristics

50+ projects take place each year – at their core they share these characteristics:

- Highlight the applications and capabilities of NASA Earth observations
- Address community concerns relating to decision-making for real-world environmental issues
- Co-created with partner organizations that can benefit from using NASA Earth observations to enhance decision making by providing decision support tools
- Conducted in 10-week terms (spring, summer, and fall) by small teams with diverse backgrounds
- Create a consistent set of deliverables
- Research is conducted under the guidance of Science Advisors and mentors from NASA and partner organizations
- Align with at least one of the nine NASA Applied Sciences Program's National Application Areas

DEVELOP Earth Observation Data Sources

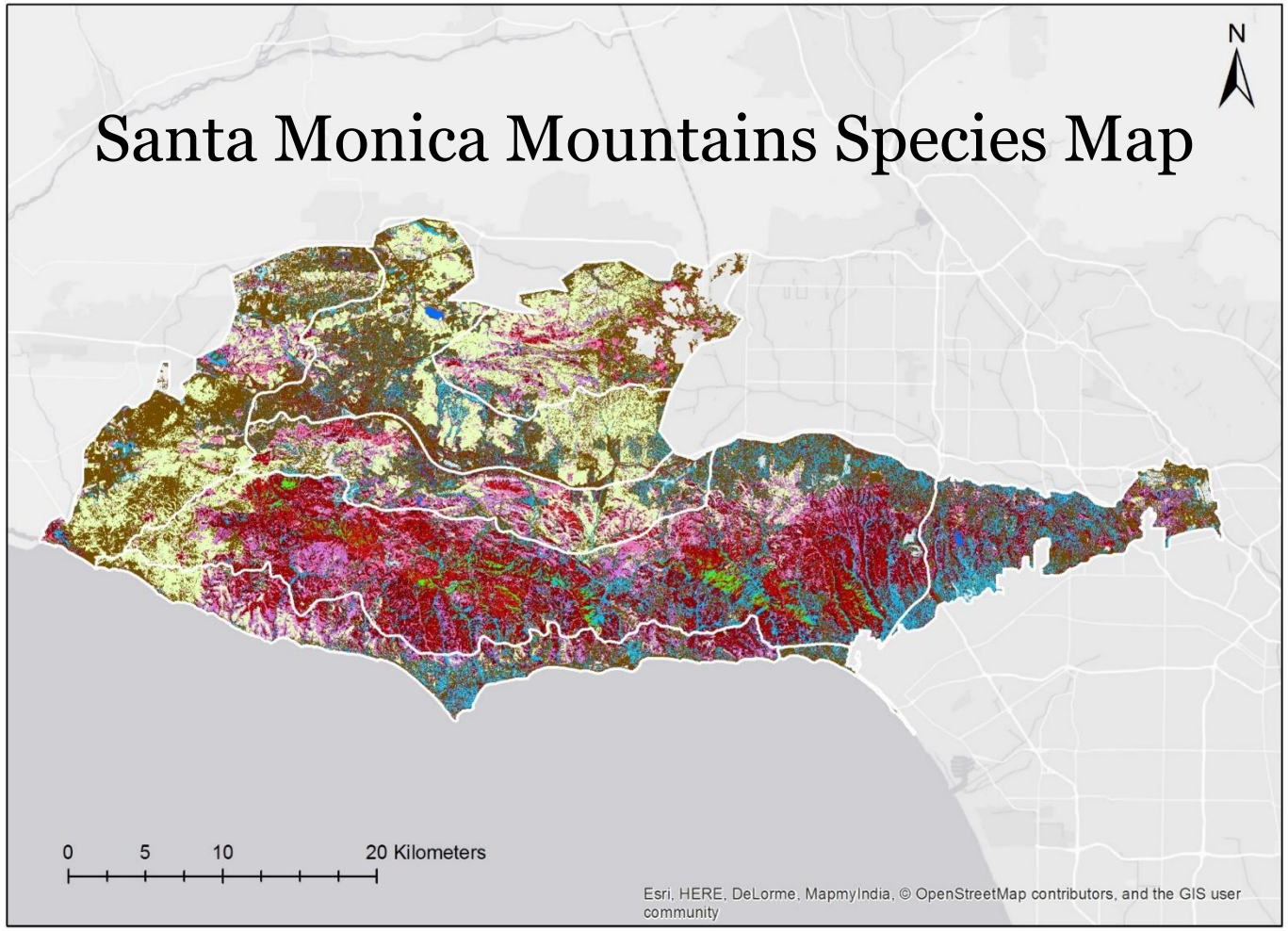
- Sources can include: satellites, airborne missions, model outputs, future sensor proxy datasets, in situ measurements, etc.
- Key consideration – can partner can access the data & continue/replicate the project findings if they are so inclined

DEVELOP project use of airborne EO data in applications or applications research:

- May be used directly as decision support data
- May be used as proxy data for future spaceborne sensors
- May be used as a standard of comparison for spaceborne sensors

PROJECT EXAMPLE

Santa Monica Mountains Eco Forecasting (2017)



Utilizing NASA EO to Determine Drought Dieback and Insect-related Damage in the Santa Monica Mountains, California

Land Cover / Species Mapped

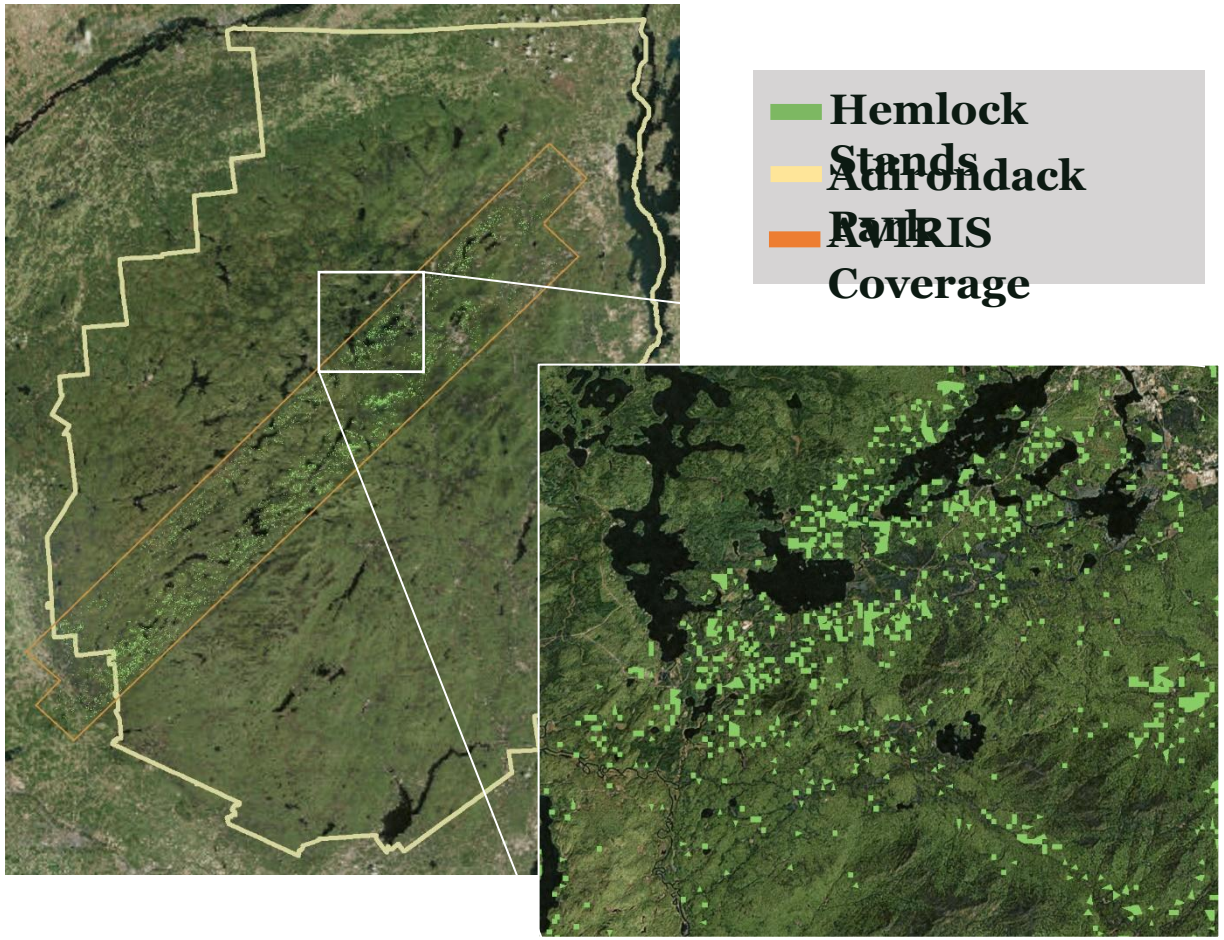
- Annual grass
- *Ceanothus megacarpus*
- *Ceanothus spinosus*
- Chaparral - common
- Coastal sage – drought deciduous
- Coastal sage – summer active
- *Malosma laurina*
- Coast live oak woodland
- Riparian
- Substrate
- Water

Data Source: AVIRIS

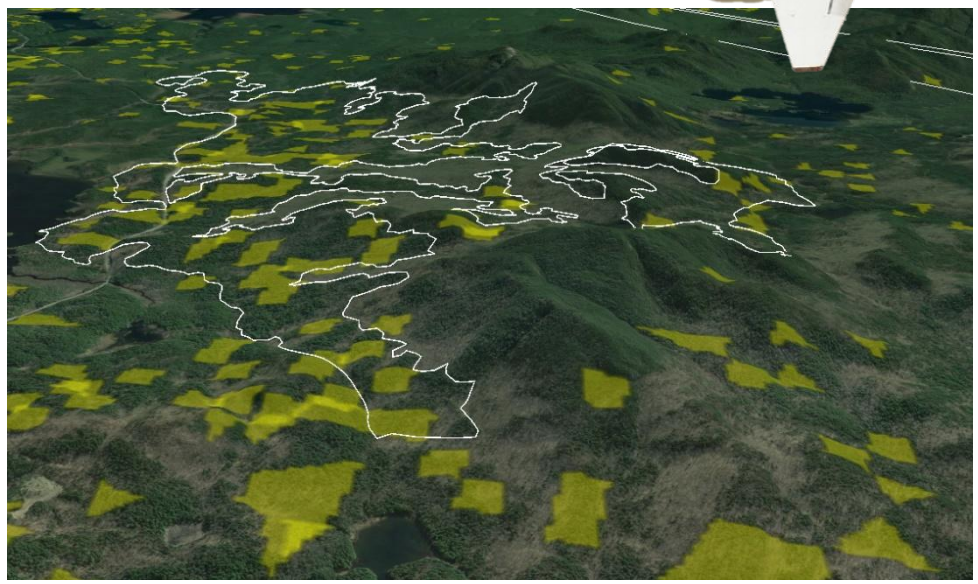
https://develop.larc.nasa.gov/2017/fall/SantaMonicaMountainsEcoII.html

PROJECT EXAMPLE

New York Eco Forecasting (2017)



Data Source: AVIRIS

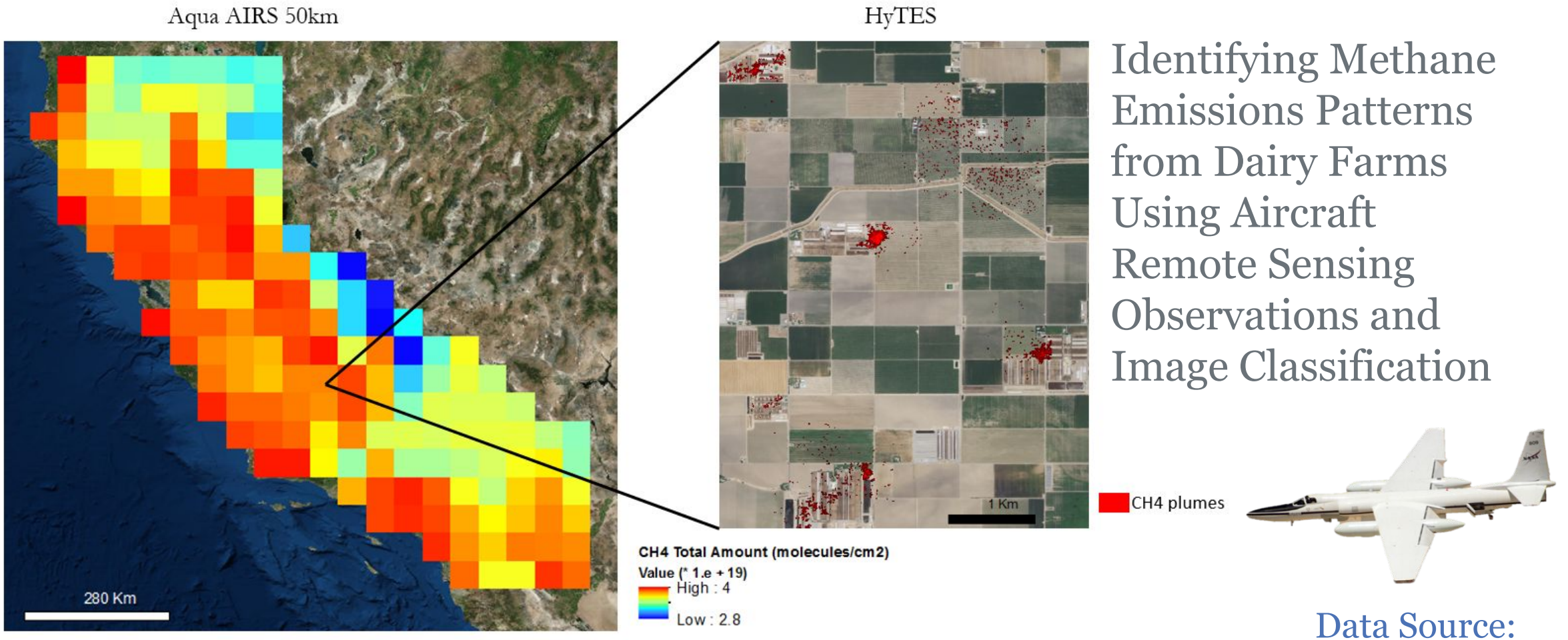


Comparing the Efficiency of Space-Based Imagery to AVIRIS Airborne Data for the Identification of Hemlock Forests to Mitigate Invasive Species Expansion

https://develop.larc.nasa.gov/2019/summer/NewYorkEcoII.html

PROJECT EXAMPLE

California Health & Air Quality (2017)



Identifying Methane Emissions Patterns from Dairy Farms Using Aircraft Remote Sensing Observations and Image Classification

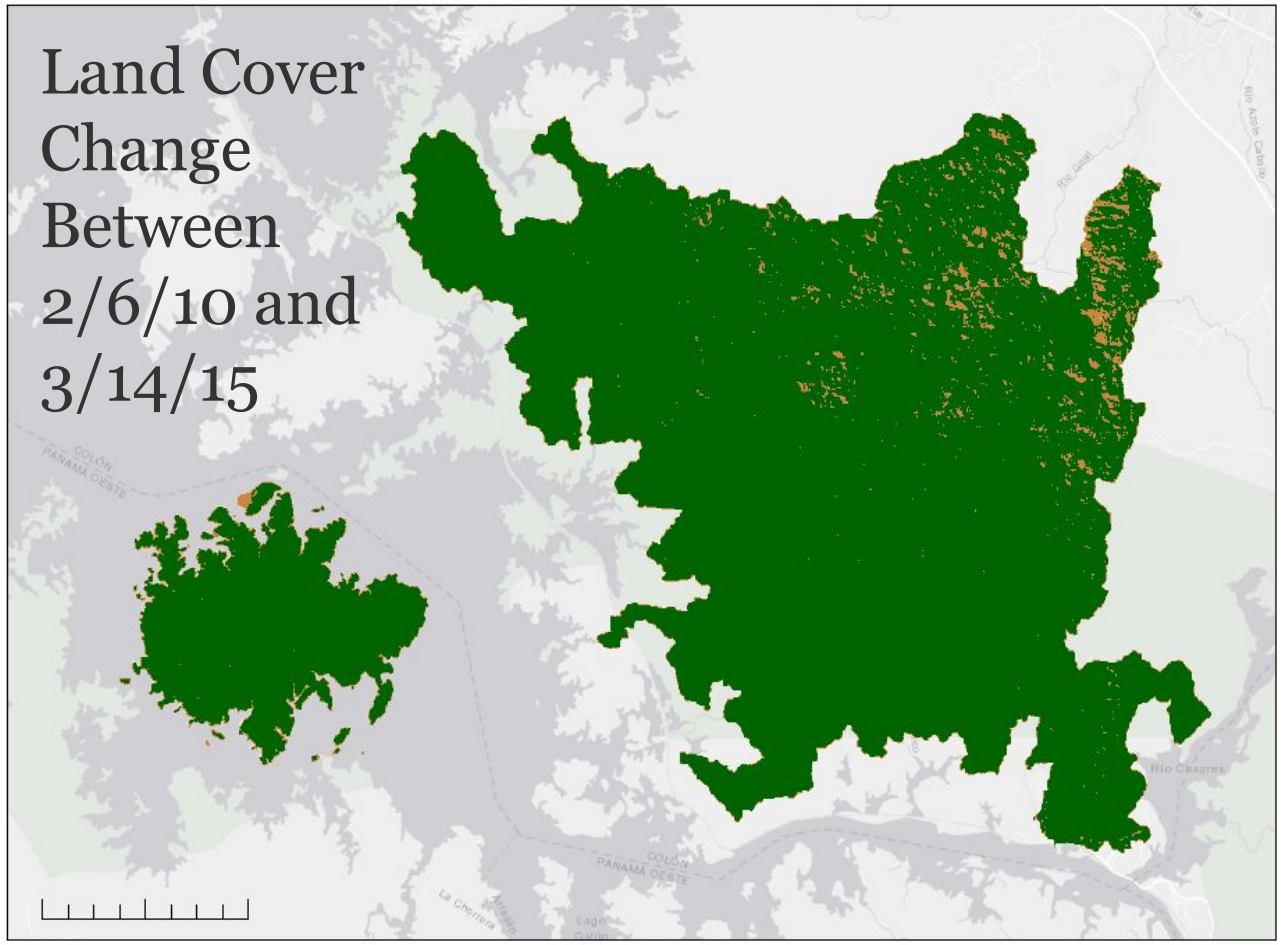
Data Source:
AVIRIS-NG & HyTES

https://develop.larc.nasa.gov/2017/summer/CaliforniaHealthAQ.html

PROJECT EXAMPLE

Panama Water Resources (2019)

Data Source:
UAVSAR



Characterizing Vegetation Water Use in the Panama Canal Watershed to Inform Water Management in the Panama Canal

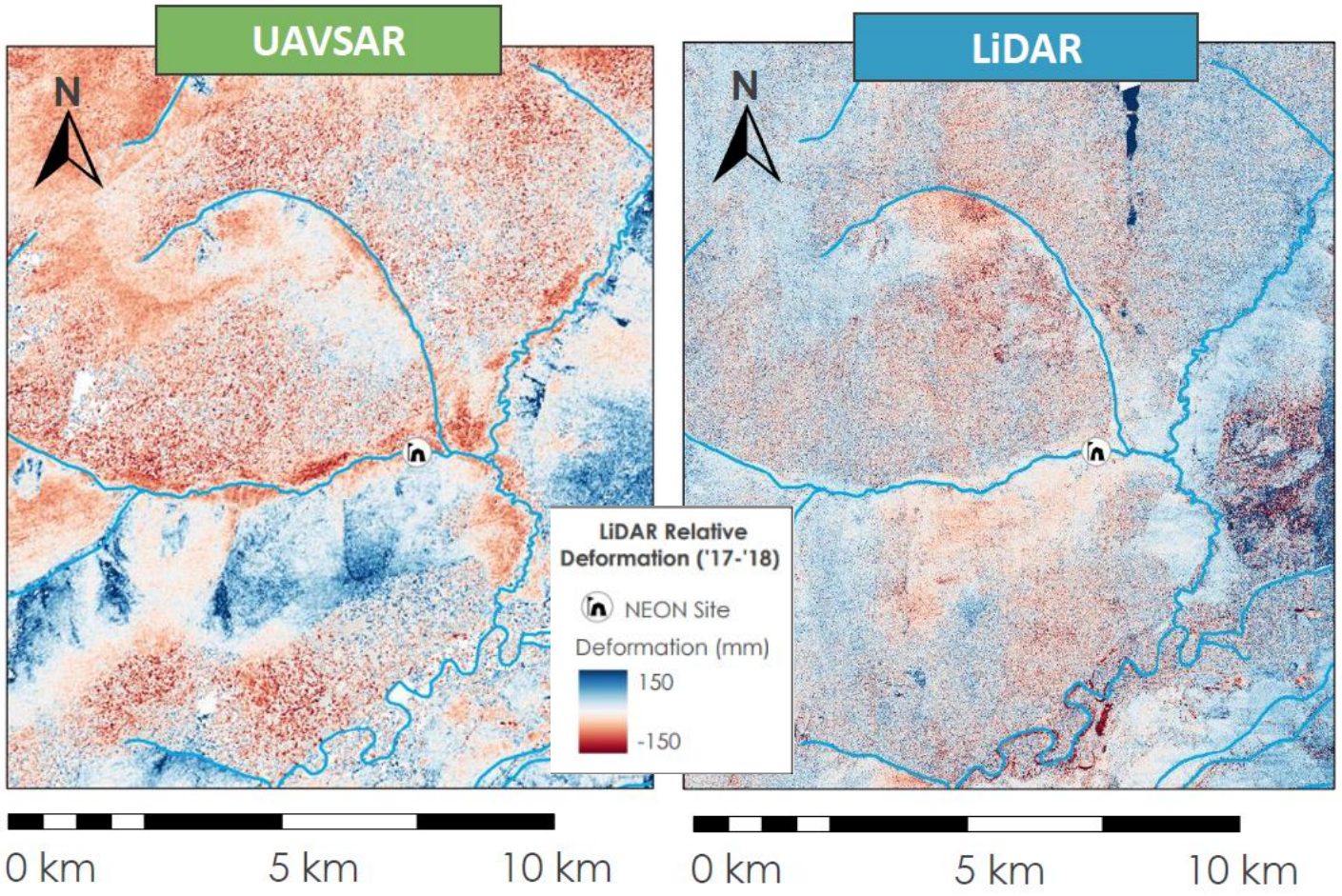
Land Cover Type	Average Area
Forested	96%
Non-Forested	4%

Average Overall Accuracy Compared w/In Situ Data: 73.8%

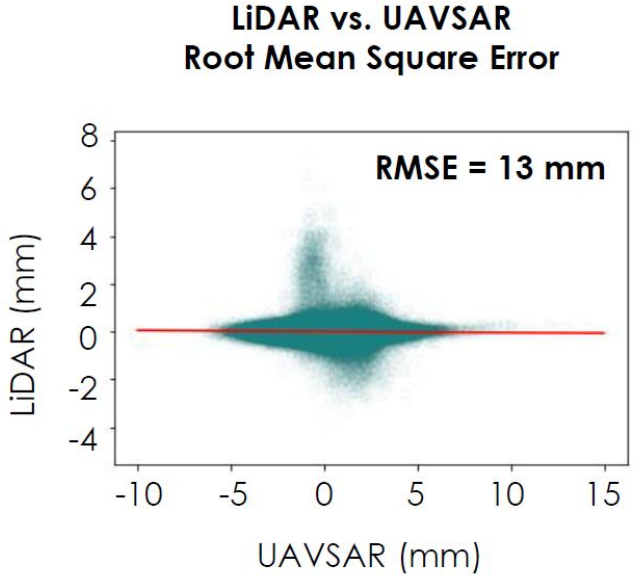
https://develop.larc.nasa.gov/2019/fall/PanamaWater.html

PROJECT EXAMPLE

Alaska Transportation & Infrastructure (2020)



Identifying Permafrost Subsidence Using NASA Earth Observations to Pinpoint Road & Infrastructure Vulnerability in Fairbanks, Alaska



Data Source: UAVSAR

https://develop.larc.nasa.gov/2020/summer/AlaskaTI.html

NASA Airborne Sensors Used in the Last Decade:

- AirSWOT
- AVIRIS
- AVIRIS-NG
- HyTES
- UAVSAR

DEVELOP Use of Airborne Data

- DEVELOP projects often explore how NASA airborne data can aid partners in understanding the feasibility of using EO to support decisions.
- The use of NASA airborne EO has been a strong capacity building tool for many DEVELOP participants.
- A key to success in the DEVELOP projects was NASA scientists with expert knowledge of the airborne sensor data. NASA scientists will have to continue in this role until the community knowledge/capacity is built up as for many of the spaceborne EO data.

Thank You.

Questions? Ideas?

Kenton.W.Ross@nasa.gov

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