

Welcome to the:

***Twenty-Sixth Tactical Fire Remote Sensing
Advisory Committee (TFRSAC) Meeting***

Hosted By:

USDA-Forest Service: Everett Hinkley and Brad Quayle

NASA Applied Science Program: Vince Ambrosia



**3 November 2016
National Interagency Fire Center (NIFC)
Boise, ID**

TFRSAC Schedule: 3 November (AM)



8:30 AM

Meeting start:

Morning Session (100 minutes)

Welcome and Introductions / Logistics (15)

Ambrosia / Hinkley

Forest Service Outlook (20)

E. Hinkley / Lisa

Elenz

NASA Outlook (20)

Ambrosia

View from NIFC / National IR Program Manager (20)

T. Mellin

AMS Update (20)

Quayle / Smith, Kazimir, Buechel

10:00 AM

Break (15 min)

10:15 AM

Resume Morning Session (105 minutes)

USFS UAS Update (20)

Jami Anzalone

Dept. of Interior UAS Update (20)

Gill Dustin

Colorado Multi-Mission Aircraft (20)

Bruce Dikken

NNU sUAS Activities(20)

Dale Hamilton

Wildfire XPRIZE (15)

David Ayward

12:00 PM

- 1:15 PM

Lunch

TFRSAC Schedule: 3 November (PM)



1:15 PM Afternoon Session #1 (100 minutes)

Canadian Fire Season (25)

Tim Lynham / Josh

Johnston Update: Hawkeye / Thermal Summit (25)

Hawkeye Team

FASMEE Developments (25)

N. French / M. Dickinson

UAS Demo on the North Fire, Cibola NF, NM. (25)

Guilbert Dustin (BLM)

3:10 PM Break

3:20 PM Afternoon Session #2 (100 Minutes)

CALFIRE Update (20)

Predator B

Jana Luiz

Wildfire SBIR – Processing, Exploitation & Delivery (20)

Chris Rowley

Practitioner Involvement with SBIR (20)

Ed Freeborn

Snow Valley Cameras for Fire Detection(20)

T. Ball / C. Pennypacker

5:00 PM Wrap-Up Discussions and Plans / Ideas (20)

5:20 PM Close Meeting

Additional Topics on Deck:

Fire Danger Project

Natasha Stavros

Meeting Logistics



Please sign-in / check your name on the attendance sheet being passed around;

Presentations will be made available to all participants (author permitting) after the meetings. We will provide a link to the access point.

POCs:

Vince Ambrosia cell: 408.666.7609

Everett Hinkley cell: 801.455.8764

Brad Quayle cell: 801.440.6945

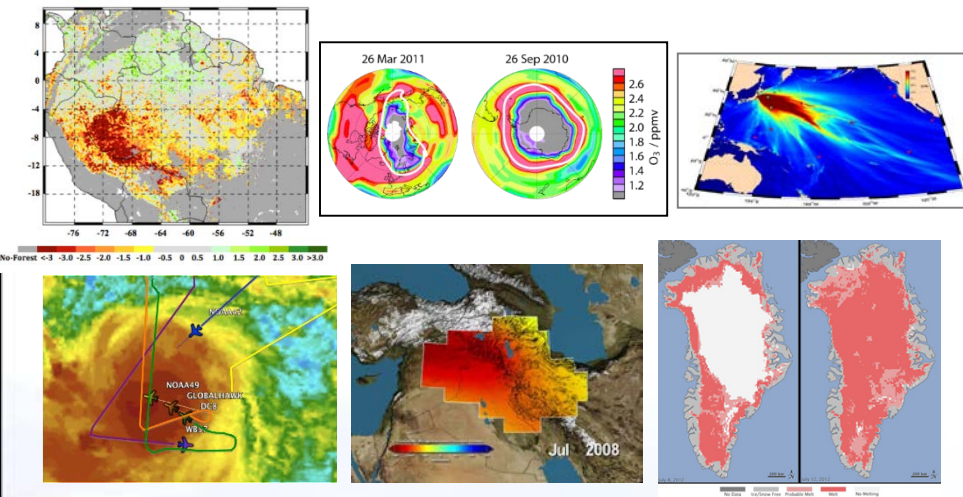


NASA Overview

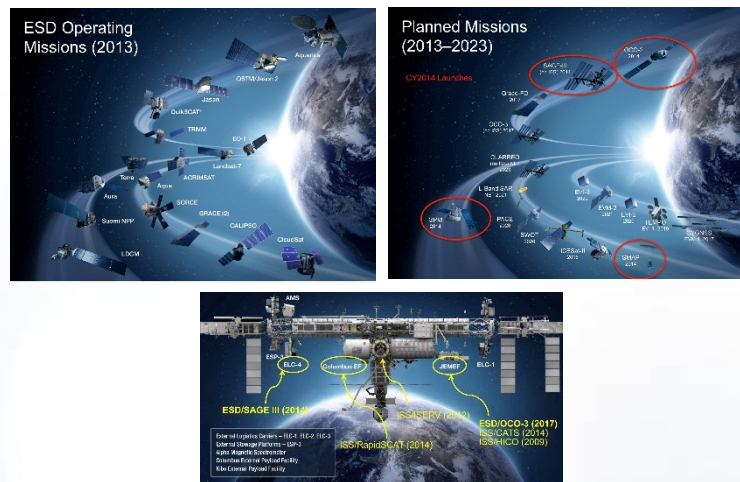
NASA's Earth Science Division



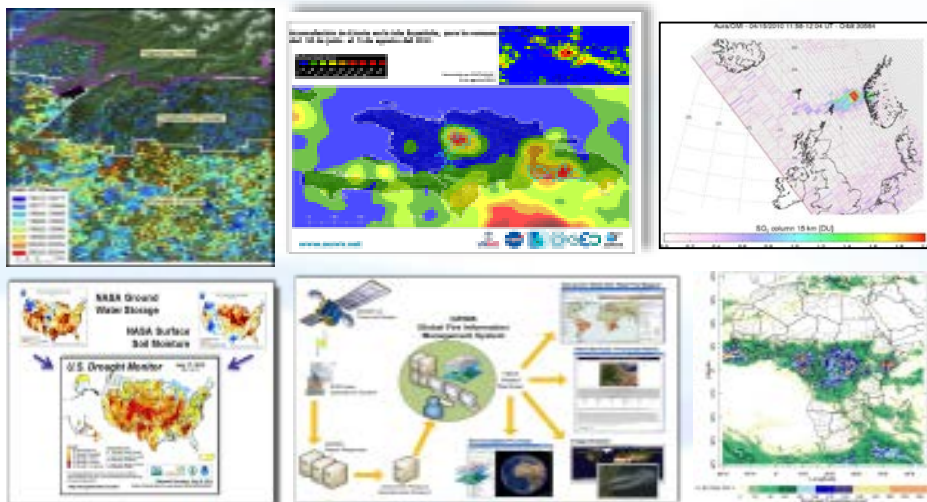
Research



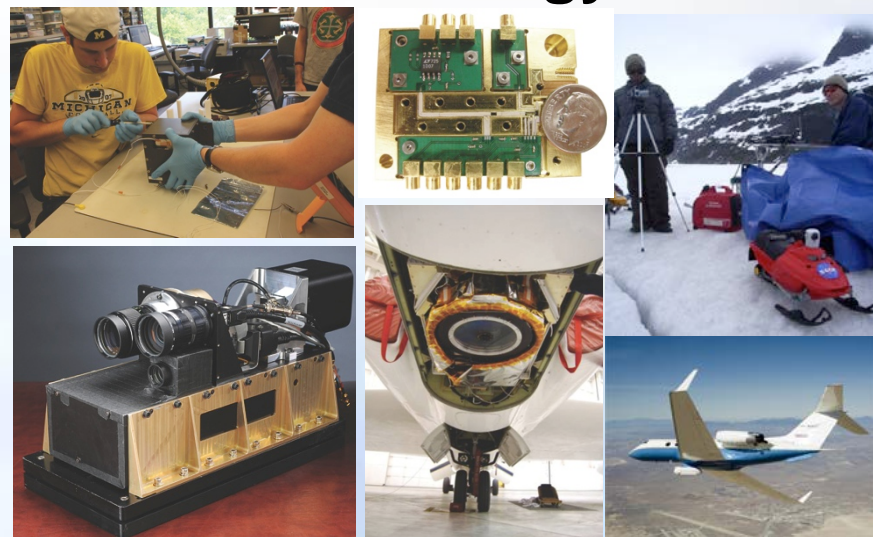
Flight



Applied Sciences



Technology

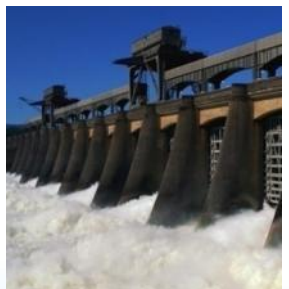


Applications Themes & Societal Benefit Areas

Emphasis in 4 Applications Areas



Health & Air Quality



Water Resources



Disasters

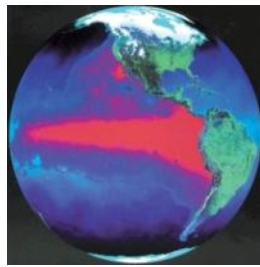


Ecological Forecasting

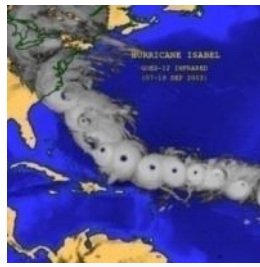
Support opportunities in 5 additional areas



Agriculture



Climate



Weather



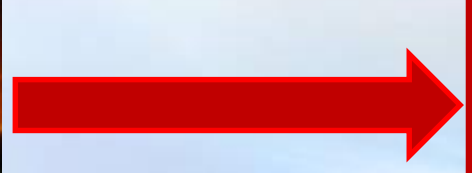
Energy



Oceans



Crosscutting theme:
Wildland Fires





Lawrence Friedl:

**NASA Applied Sciences Program Director /
Wildfire Program Manager**

Vince Ambrosia:

Associate Wildfire Program Manager

Amber Soja:

Associate Wildfire Program Manager

ROSES-2011 A.35 Phase II Projects



Zachary Holden / USDA Forest Service:

A Prototype System for Predicting Insect and Climate-Induced Impacts on Fire Hazard in Complex Terrain;

Sher Schranz / NOAA:

Wildland Fire Behavior and Risk Prediction;

James Vogelmann / USGS EROS Center

Improving National Shrub and Grass Fuel Maps Using Remotely Sensed Data and Biogeochemical Modeling to Support Fire Risk Assessments;

Birgit Peterson / USGS EROS Center:

Enhanced Wildland Fire Management Decision Support Using Lidar-Infused LANDFIRE Data;

Karyn Tabor / Conservation International Foundation

An Integrated Forest and Fire Monitoring and Forecasting System for Improved Forest Management in the Tropics;

Wilfrid Schroeder / University of Maryland

Development and Application of Spatially Refined Remote Sensing Active Fire Data Sets in Support of Fire Monitoring, Management and Planning;

Stephen Howard / USGS EROS Center:

Utilization of Multi-Sensor Active Fire Detections to Map Fires in the US;

Mary Ellen Miller / Michigan Tech Research Institute (MTRI):

Linking Remote Sensing and Process-Based Hydrological Models to Increase Understanding of Wildfire Effects on Watersheds and Improve Post-Fire Remediation Efforts;

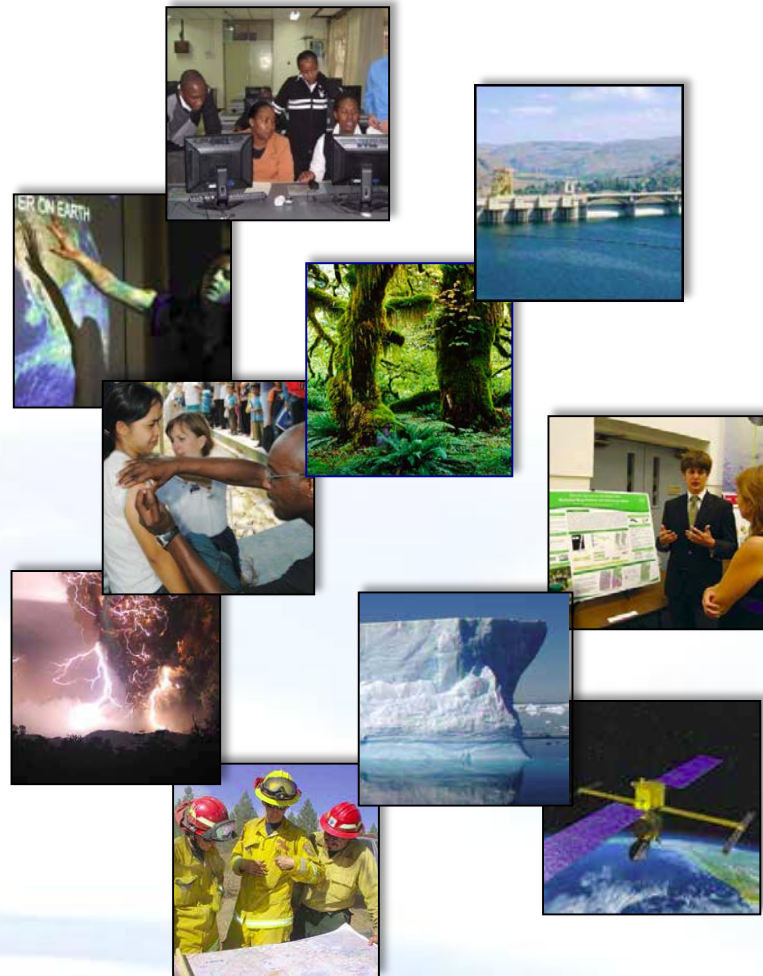
Keith Weber / Idaho State University

RECOVER: Rehabilitation Capability Convergence for Ecosystem Recovery;



NASA Earth Science Applied Sciences Program

Wildfires and 2017 Earth Science Decadal Survey





DECADAL SURVEY FOR EARTH SCIENCE AND APPLICATIONS FROM SPACE (ESAS 2017)

The 2017-2027 Decadal Survey for Earth Science and Applications from Space (ESAS 2017) will help shape science priorities and guide agency investments into the next decade. The survey, sponsored by NASA, NOAA, and the USGS, is driven by input from the scientific community and policy experts.

Decadal Survey Wildfire Submissions



- The Wildfire Science and Applications community submitted five (5) documents that refer to the importance of wildland fire science and applications for the next NAS Decadal Survey:
 - *“Burning Questions: Critical Needs for Remote Sensing of Fire Impacts on Ecosystems”* (P. Dennison, et al);
 - *“Prudent Observations Necessary to Address Wildland Fire Science and Applications Grand Challenges: Critical Feedbacks with the Climate System”* (A. Soja, et al);
 - *“Input to NRC Decadal Survey from a Broad Audience of Remote Sensing Scientists – Air Quality-Fire Themes”* (Amy Thomas, et al);
 - *“Views of the Fire, Fuels, Smoke, and Air Quality Community for the 2017 NRC Decadal Survey in Earth Science and Applications from Space”* (D. Sullivan, et al)
 - *“The Role of Fire in the Earth System”* (Stavros, et al.)

ABOVE is a large-scale NASA-led study of environmental change in arctic & boreal regions and the implications for ecological systems and society



Our overarching Science Question is

How vulnerable or resilient are ecosystems and society to environmental change in the arctic and boreal region of western North America?

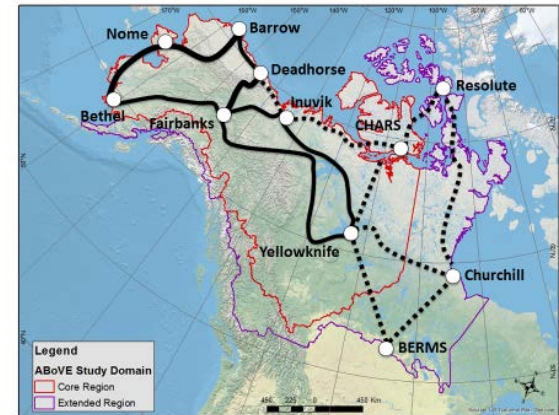
NASA ABoVE Campaign



The ABoVE field campaign seeks a better understanding of the vulnerability and resilience of ecosystems and society to the changing environment in the Arctic and boreal regions of western North America.

- **6 Thematic Research Areas:**

- Disturbance
- Permafrost
- Hydrology
- Flora and Fauna
- Carbon Biogeochemistry
- Societal Impacts



Proposed flight lines for the
2017 ABoVE Airborne Campaign

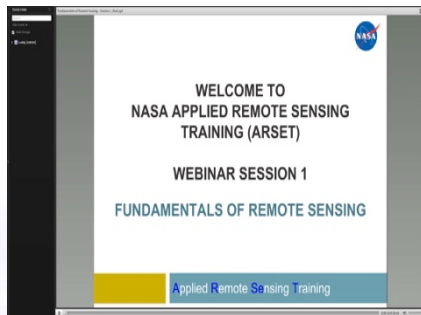
- Initial NASA projects for ABoVE selected in late summer 2015
- Additional projects have been identified and project members have become part of the ABoVE Science Team (44 total ABoVE Projects)
- ABoVE Science Team is developing ABoVE Science Implementation Plan and the Airborne Remote Sensing Science Plan

NASA ABoVE website: <http://above.nasa.gov/>

Applied Remote Sensing Training Program (ARSET)



Training activities for environmental professionals to increase usage of NASA observational and modeling data for decision-making support.



Online Webinars

- 1 hr a week, 4-6 weeks
- Live & recorded
- Include demos on data access



In-person Workshops

- Held in a computer lab for 2 - 4 days
- Focus on data access
- Locally relevant case studies



Train the Trainers

- Courses & training manuals for those interested in doing their own remote sensing trainings

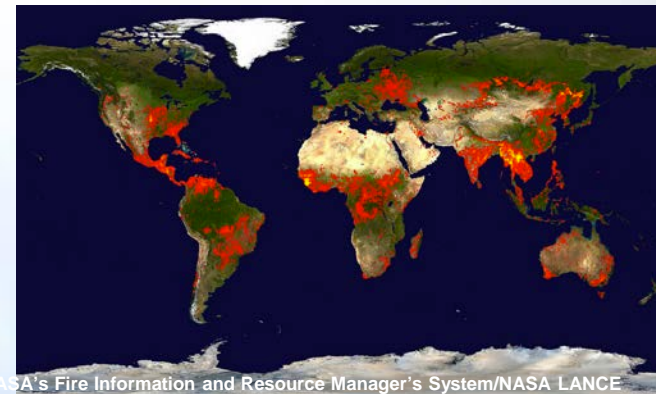
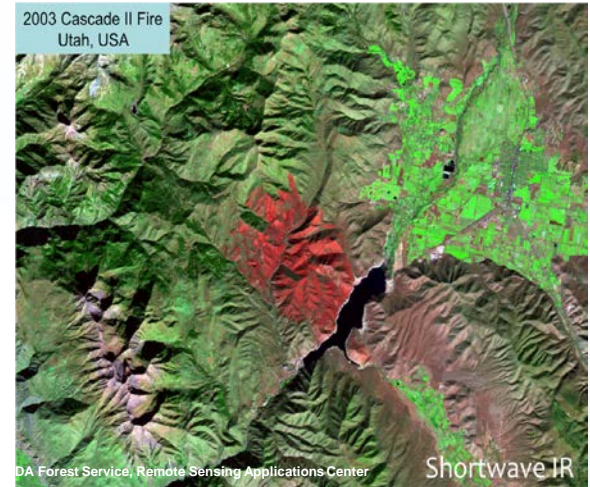
<http://arset.gsfc.nasa.gov>

Webinar: Introduction to Remote Sensing for Wildfire Applications: March 31 - April 28, 2015



- **Objectives:** *Provide an overview of relevant NASA Earth science data products, tools, and access portals for wildfire applications for enhanced decision-making and assessment methods.*
- 278 participants, 183 organizations, 42 countries, 32 states
- **US Federal and State Agencies:** USDA Forest Service, National Park Service, National Weather Service, Bureau of Land Management, US Geological Survey, US EPA, CAL FIRE, Idaho Army National Guard
- **International and National Organizations:** Alaska Fire Science Consortium, Ministry of Environment and Natural Resources, El Salvador (MARN), Risk Management Solutions Inc., Western States Air Resources (WESTAR) Council, United Nations, Nature's Foster, ESRI, African Wildlife Foundation, Conservation International.

First ARSET webinar focused on wildfire applications



Available at:

<https://arset.gsfc.nasa.gov/wildfires/webinars/intro-wildfire-applications>



Wildfire-Related Workshops

October 6 - 8, 2015, Idaho State University

Objectives: *Provide an in-depth hands-on training on the use of Earth Observation data and tools for wildfire applications such as analyzing pre- and post-burn land surface conditions, near real time data acquisition for incident management, and creating burn extent and severity maps.*



Tools: RECOVER, the MODIS and VIIRS active fire mapper, the Level 1 and Atmospheric Archive and Distribution System (LAADS web), Worldview, the Fire Information for Resource Management System (FIRMS), and the USGS Earth Explorer.

November 14, 2016, ISS2, Long Beach, CA

Objectives: The workshop will detail the applications of NASA resources to decision-making activities for:

- air quality forecasting
- smoke, fire, and PM2.5 monitoring
- image interpretation
- data access for inclusion in modeling efforts

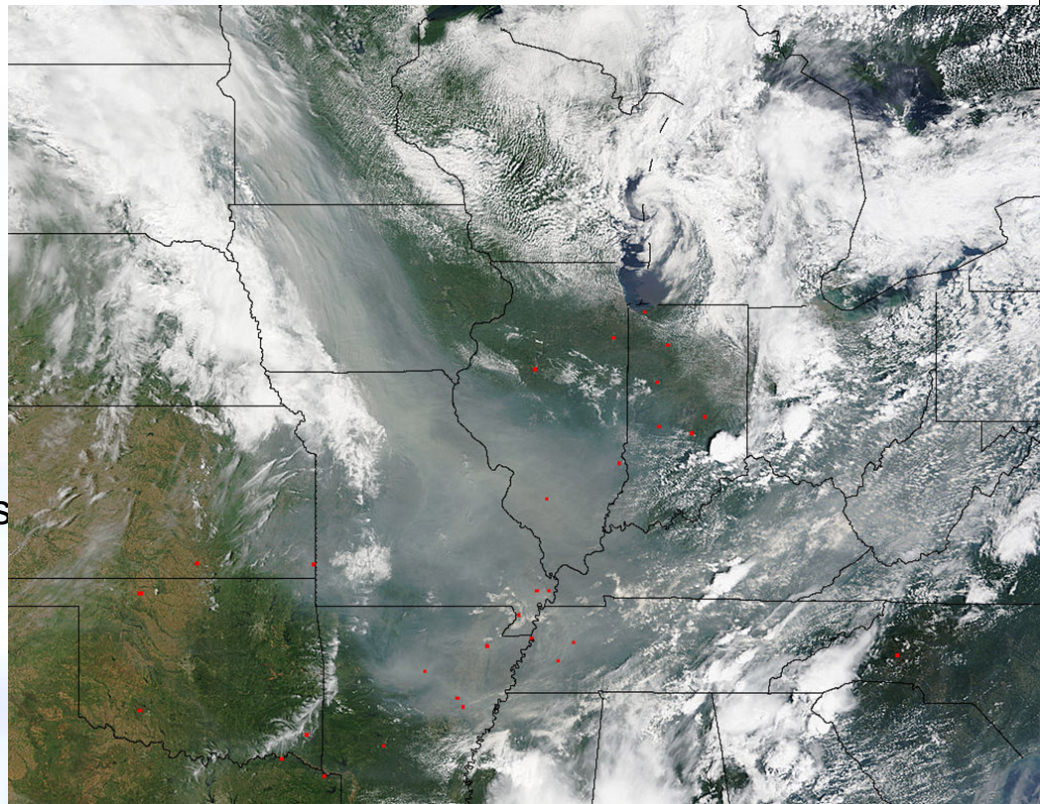
The training will provide practitioners in wildland fire, smoke management, public health, and air quality management with tools to incorporate satellite remote sensing into their decision-making process.



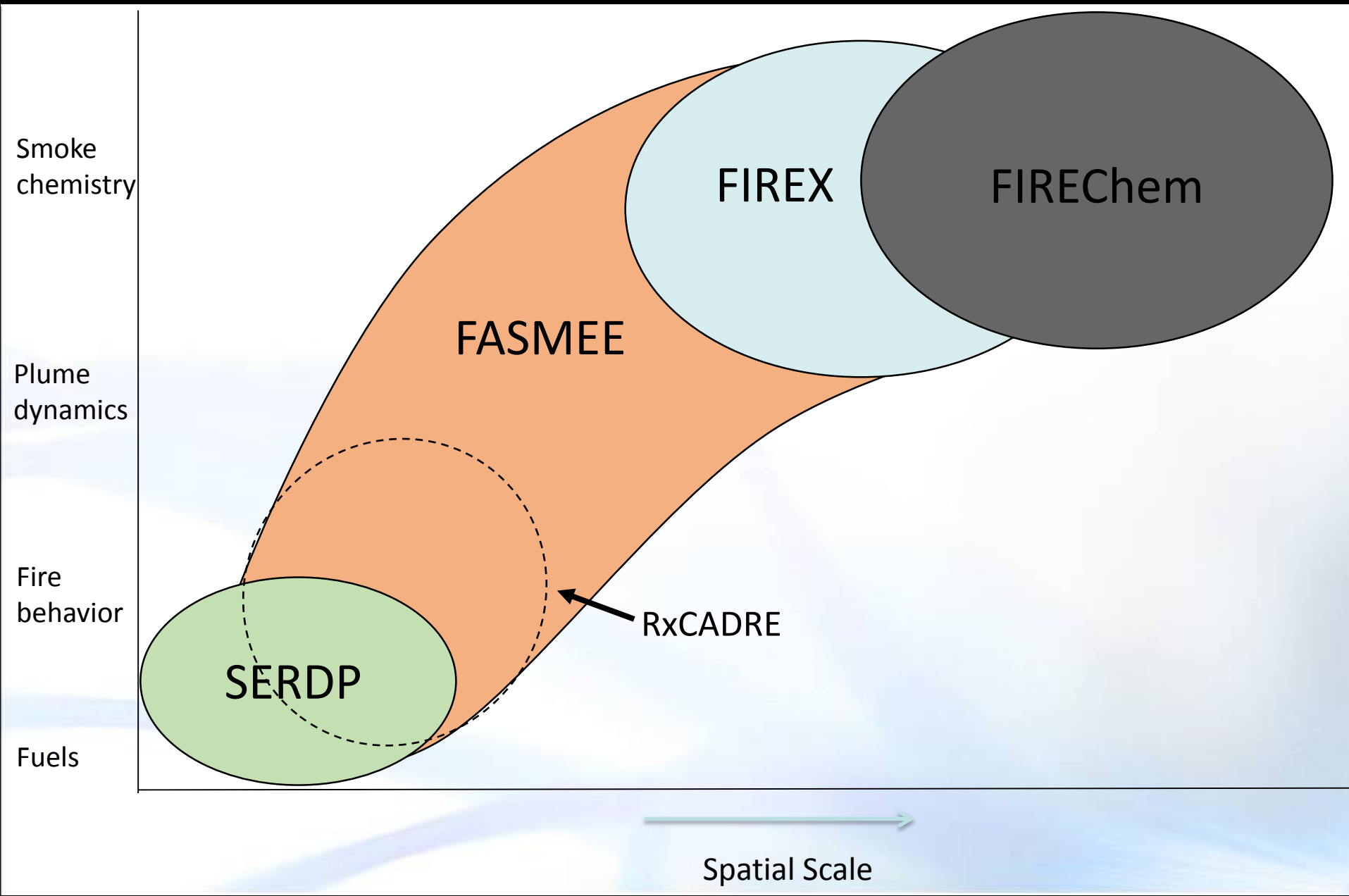
FIREChem: A Cooperative Wildfire Air Quality Field Study



- A NASA sponsored field study (July 23rd to September 15th, 2018) to focus on the links between satellite and ground-based measurements of both fresh and aged biomass burning plumes in the continental United States.
- Coordinated sampling with the NOAA FIREX and Joint Fire Science Program FASMEE field campaigns. Coordinated aircraft flights with NOAA P-3. NASA DC-8 will be ready to sample FASMEE burn in Fishlake National Forest, Richfield, UT during first 2 weeks of Sept. 2018.
- Actively working with NSF and EPA to leverage opportunities for additional aircraft and ground-based measurements.
- FIREChem will include NASA DC-8 & B200 aircraft for *in situ* sampling and remote sensing to measure upwind and downwind of natural and agricultural fires.
- Goals: (1) improve our understanding of the transport of and chemical transformations in biomass burning plumes and their impact on air quality, and (2) improve the ability to incorporate wildfires into air quality forecast models using satellite products.



FIREChem Interaction With Other Campaigns

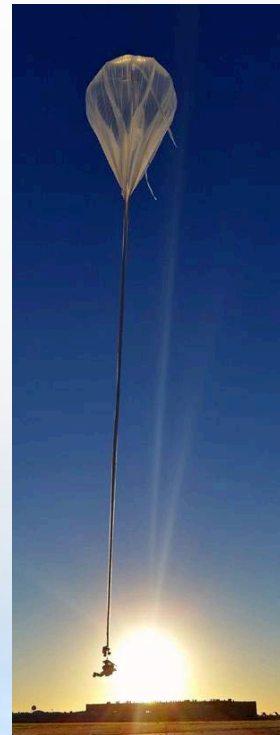
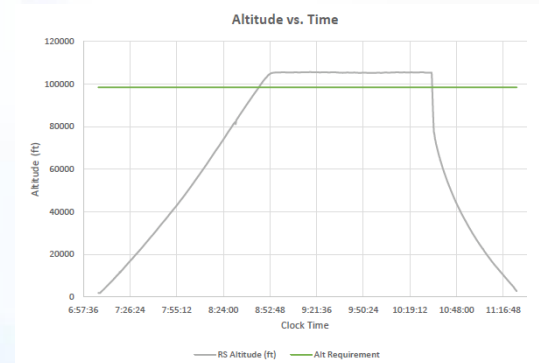


LTA Fire Imaging Mission Concept



NASA Projects & Programs Directorate (NASA-Ames) and World View Enterprises (<http://worldview.space/>) exploring joint mission development demonstration focused on long-duration fire imaging mission development.

- World View Principal Staff include: Dr. A. Stern (Former NASA Chief Scientist) and M. Kelly (former NASA Astronaut)
- Statollite LTA Platform:
 - High altitude capable (46km)
 - Heavy Payload capable (4500 kg)
 - Long-duration flight (up to months)
 - Persistent Flight over AOI
 - Rapid deployment
 - Pinpoint Landing with recoverable payloads
 - Downlink / Uplink Control / sensor data



LTA Fire Imaging Mission Concept



XIOMAS / NASA-Ames investigating TMAS or Stare-WAI as a sensor of choice for integration / operations on the Stratollite.

TMAS Performance Specs:

Alt — 25 km = 82k ft

Speed — 15 kts.

GSD at NADIR = 3.3 meters

GSD at edge of FOV = 5.8 meters

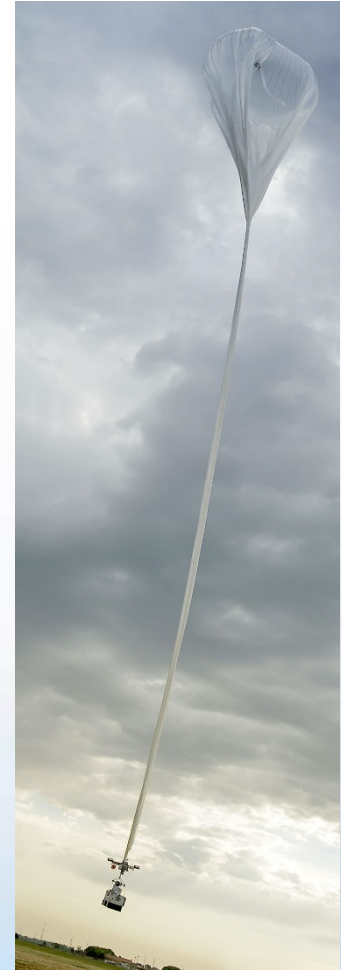
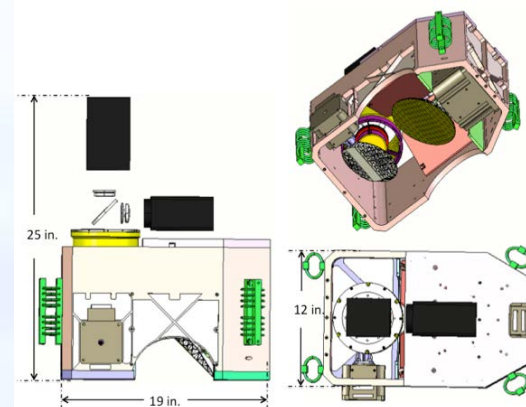
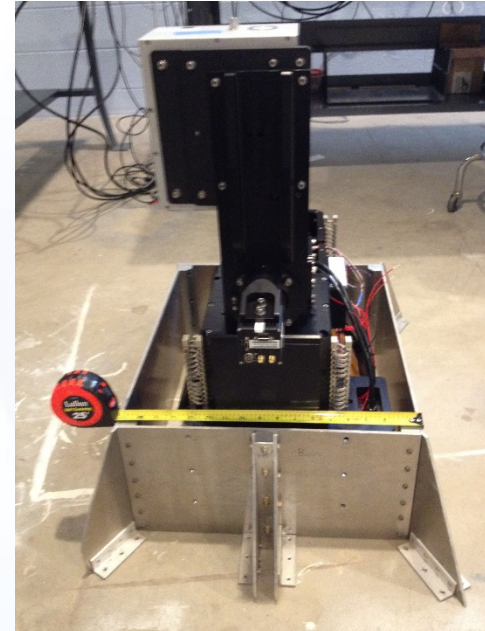
FOV = 110 degrees (44 mile swath)

Acquisition Rate = 485,000 Acres per hour

Mission Demonstrations Contemplated for summer 2017 (or later)

- Prescribed Fire
- Wildfire

Engagement with USFS (sensor), mission coordination, operational clearances, cost-sharing, etc.





TMAS on Stratollite

XIOMAS / NASA-Ames investigating TMAS or Stare-WAI as a sensor of choice for integration / operations on the Stratollite.

TMAS Performance Example:

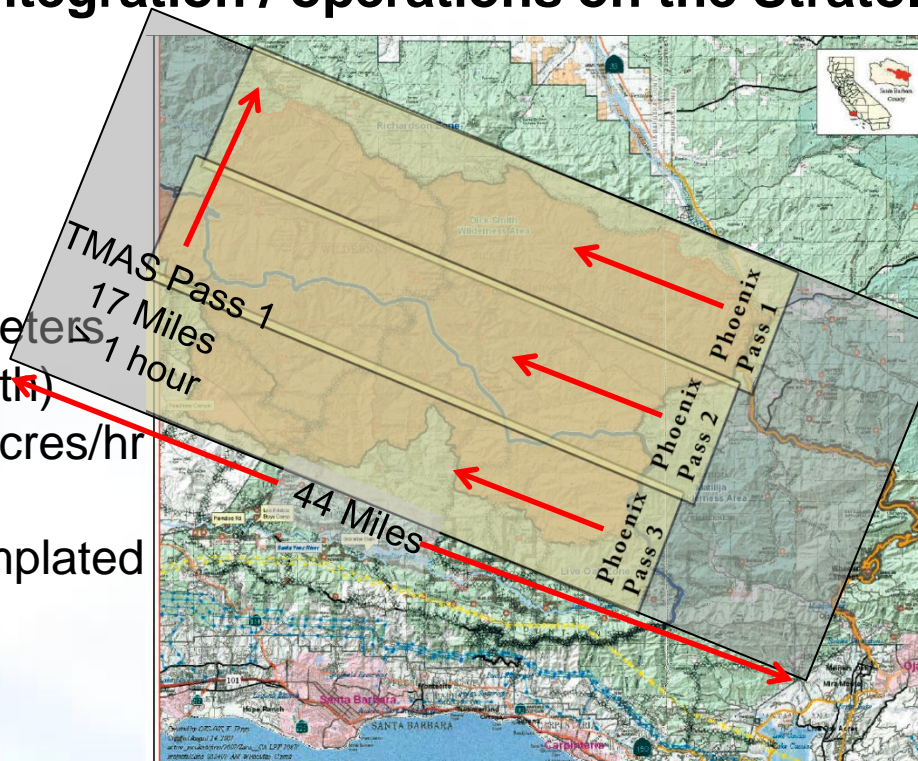
- Alt. = 25 km (82k ft.)
- Speed = 15 kts. to 25 kts.
- GSD at NADIR = 3.3 meters
- GSD at edge of FOV = 5.8 meters
- FOV = 110 deg. (44 mile swath)
- Acquisition Rate > 485,000 Acres/hr

Mission Demonstrations Contemplated for Summer 2017 (or later)

- Prescribed Fire
- Wildfire

The Phoenix system operated by the U.S.F.S. NIROPS has a swath approximately 6 miles wide and generates a 12.5 foot pixel at nadir from an altitude of 10,000 feet. The Xiomas TMAS on board the Stratollite system will have a 10.75 foot pixel from 82,000 feet and approximately a 44 mile swath width.

XIOMAS



ZACA FIRE
Aug. 2007
235,601 Acres





- NASA Applied Sciences Program updated website:
 - <http://appliedsciences.nasa.gov/wildfires-program>
 - Updates on Current announcements
 - Upcoming Events
 - Library of Conference announcements, agendas, documents, publications
 - Project graphics and updates
 - News Items
 - Videos
 - Links to Partner Agencies

Recent & Upcoming Activities



- **NASA Wildfire Pls** (Weber and Miller), supported the Canadian Ft. McMurray Wildfire Complex with modeling efforts (Summer 2016);
- **Workshop:** “*Application of Satellite Remote Sensing Data for Fire and Smoke Monitoring*”; 2nd International Smoke Symposium, Long Beach, CA (14 November 2016)
- **NASA ASP-Wildfire Program Mtg**; Boulder, CO (28 Feb – 2 Mar 2017)
- **UAS Workshop**, NASA Ames, Hosted by USGS; POC: Bruce Quirk quirk@usgs.gov; (March 28-30, 2017);
- **Workshop:** “*Opportunities to Apply Remote Sensing in Boreal / Arctic Wildfire Management & Science*”; Fairbanks, AK (4-7 April 2017);
- **Special Sessions at ISRSE-37**, Tshwane, South Africa (8-12 May 2017):
 - *Improving Wildfire Knowledge Through Earth Observations: From Local to Global Perspectives*;
 - *Paradigm Shift: Autonomous Aerial Vehicles Supporting Earth Observations*;
- **NASA-ARC / USFS-RSAC re-writing SAA verbiage**, Provides collaboration mechanism for 2017-2022.

NASA Applied Science Program - Wildfire

<http://appliedsciences.nasa.gov/>

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EXTRA SLIDES

Objective / Goals of TFRSAC Meeting



OBJECTIVES

- Inform on the various earth observations of wildfire by community partners; both from airborne and orbital assets; Help to increase awareness of use of data / info.
- Inform on partner affiliated programs (NASA, USFS, JFSP, DOI, Universities, Private orgs., etc.);
- Encourage Collaborations!

GOALS

- Build new relationships / knowledge;
- Be exposed to new ideas / concepts; Learn something new today!
- Walk away from the meeting with a sense of accomplishment and excitement for the coming year!
- **Be relaxed and have fun while learning!**

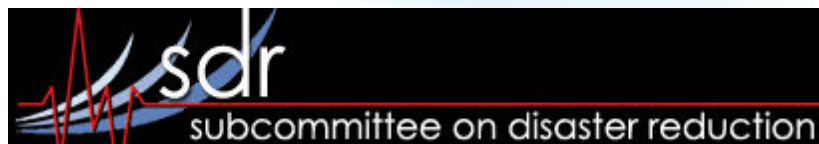


- **FY17 Budget is:**
 - ~1.1M for closeout of 9 Phase 2 Projects
 - Unknown (similar to FY16) for staff support and additional projects, etc.
- ***In FY17, no new NASA ASP Wildfire-specific solicitation in ROSES is anticipated. Wildfires may be component of other ASP Programs (Disasters, etc.), in FY17 and status beyond FY17 is currently unknown.***
- ***But!!!...Stay tuned...***

NASA Participation in Research / Applications Committees



- Group on Earth Observations (GEO), Global Wildfire Information System (GWIS);
- National Science & Technology Council (NSTC) Subcommittee on Disaster Reduction (SDR) Wildland Fire Science and Technology Task Force (WFST TF);
- Interagency Arctic Research Policy Committee (IARPC); Wildfire Implementation Team (WIT);
- NRC, Div. of Earth & Life Sciences, Wildfire Study Team;
- JFS Program, Fire and Smoke Model Evaluation Experiment (FASMEE) Team



Interagency Partnerships

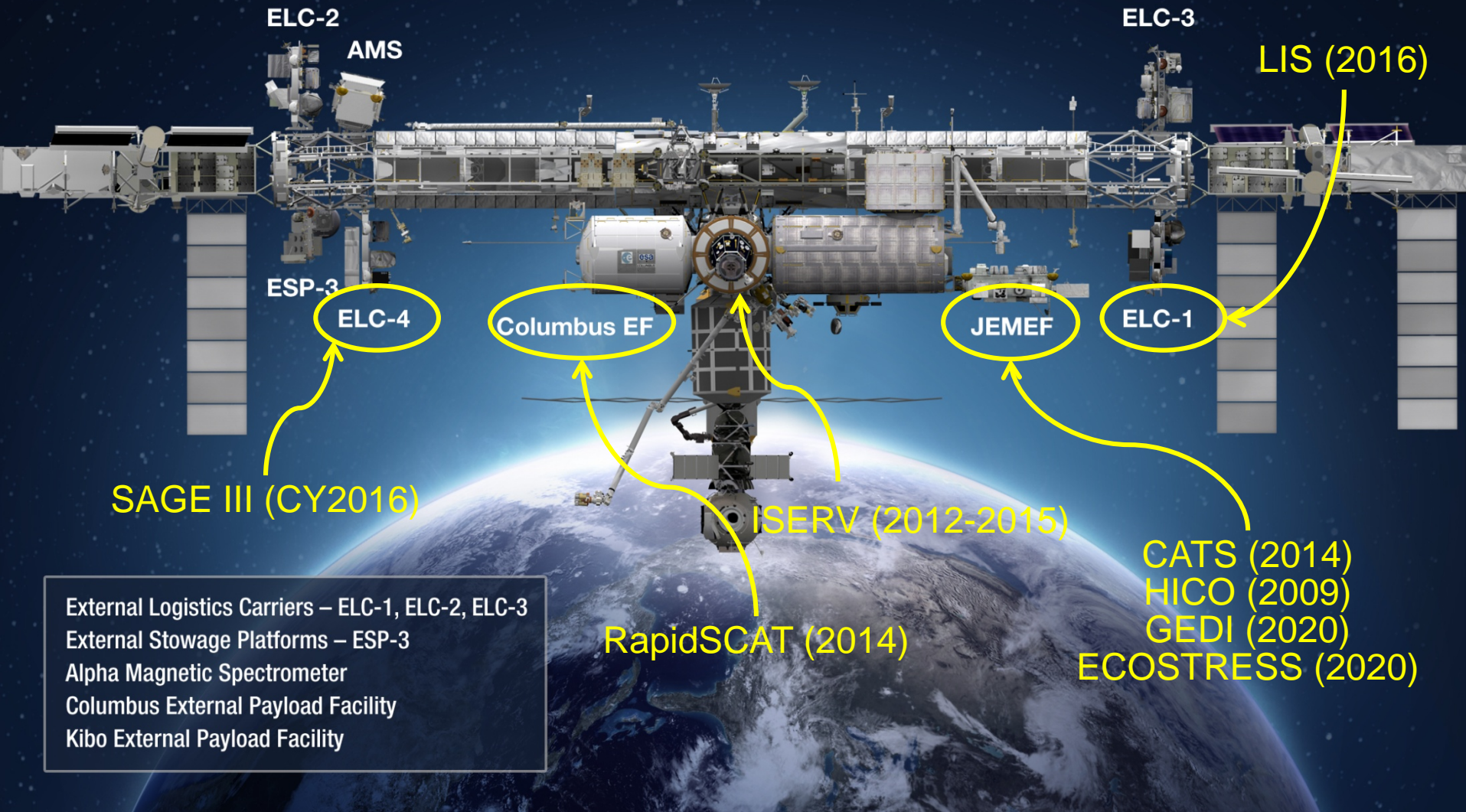


NASA collaborates with numerous land management agencies and other partners in the United States to improve wildfire characterization



International Space Station

Earth Science Instruments



External Logistics Carriers – ELC-1, ELC-2, ELC-3
External Stowage Platforms – ESP-3
Alpha Magnetic Spectrometer
Columbus External Payload Facility
Kibo External Payload Facility