Forest Service
National Remote Sensing Program

Civil GPS Service Interface Committee (CGSIC)
Fall 2020 Meeting
September 21, 2020

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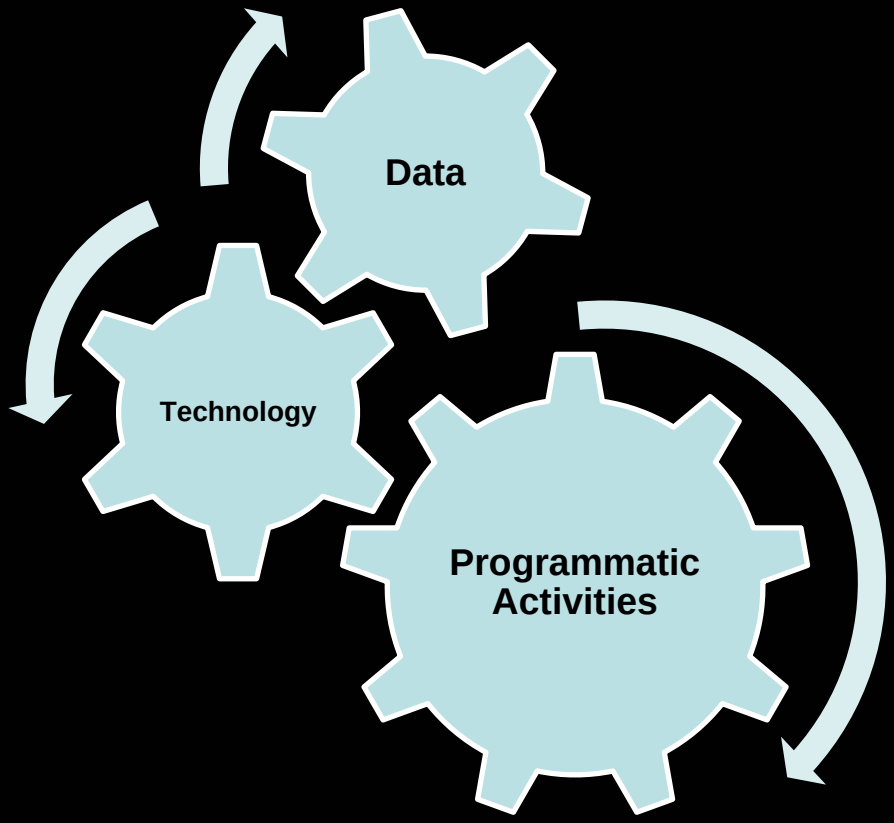
The National Remote Sensing Program

The National Remote Sensing Program provides critical subject matter expertise in the field of remote sensing to a wide range of agency business areas in the Forest Service.

Strategically, the position provides remote sensing leadership and direction to the Geospatial Management Office, Fire, Forest Health, Law Enforcement, and the Forest Service region officess and field units.

The National Remote Sensing Program



The basic pieces – working together

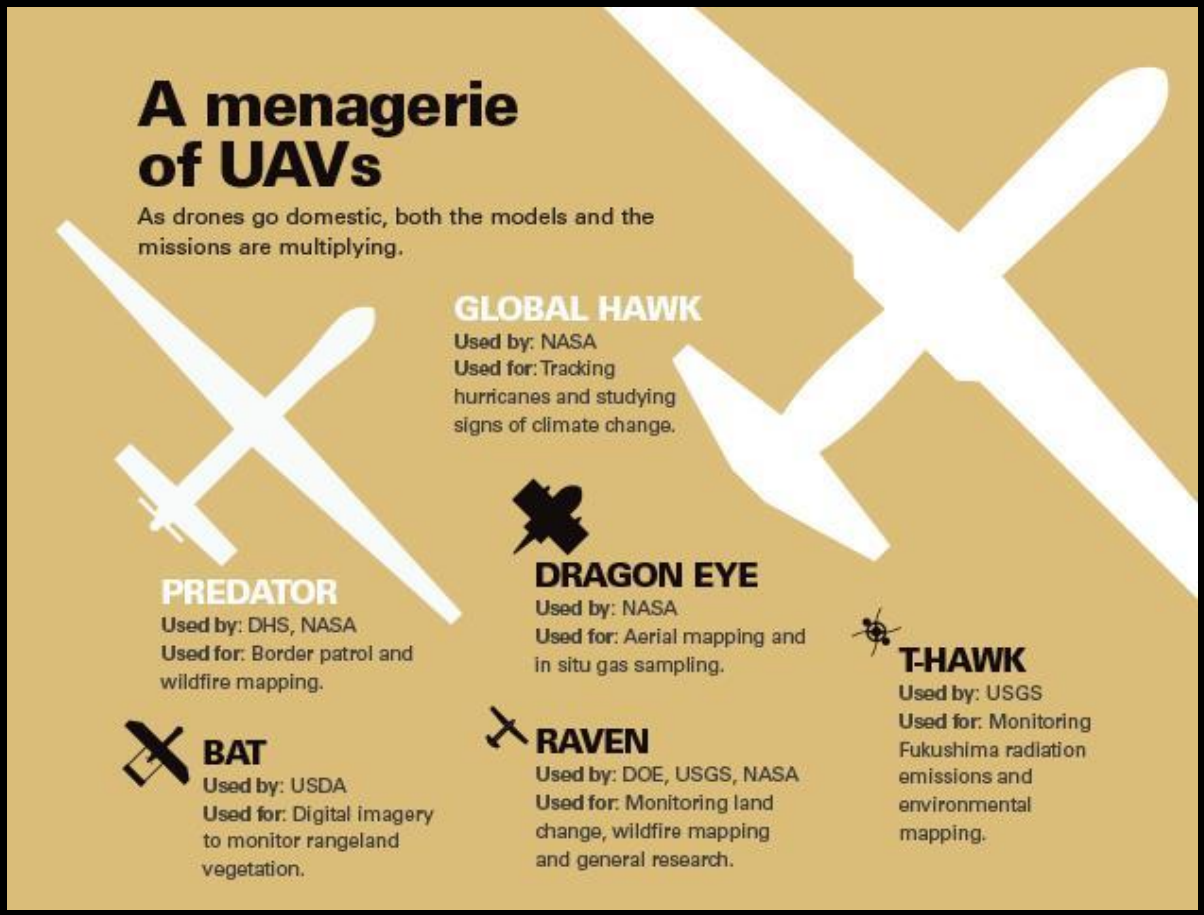
Programmatic Activities

- Work closely with Geospatial Technology Applications Center (GTAC) and Program Leads at GTAC on national remote sensing issues and opportunities. Provide leadership, guidance and support.
- Work with business areas within the Forest Service to gain a full understanding of geospatial information needs followed by developed requirements.
- Provide leadership to regional remote sensing coordinators - Coordinate and moderate special topics calls where appropriate.
- Partnerships – Cultivate internal and external partners on initiatives of mutual interest & benefit

Technology - Examples

- UAS - Fully participate in national conversation on the utility and application of Unmanned Aircraft Systems to support Forest Service mission needs.
- LIDAR - Lead discussion and direction on LiDAR contracting, acquisition, training, data management, etc.
- EO/IR Sensors – Hosted on satellites, aircraft platforms, and UAS
- GPS / GNSS – Keep Forest Service and USDA apprised of developments, concerns and notices relating to the GPS utility.

Technology – Unmanned Aircraft Systems



Technology – UAS Application Areas

- Wildfire
  - Near real-time, high resolution fire detection and characterization
  - Tactical scale imagery and geospatial mapping/visualization products
- Resource Management
  - General remote sensing – hi res imagery, LiDAR and others….
  - Forest inventory
  - Resource mapping (fuels, forest health, etc.)
  - Rangeland Monitoring (grazing permits)
- Law Enforcement & Investigations
  - Detection/mapping of illegal activities on Federal Lands
- Precision Agriculture
  - Mapping and managing cropland

UAS PLATFORM

A higher order data collection tool.

Technology – Lidar: Light Detection And Ranging

- What is Lidar?
- What makes lidar unique?
- Are all lidar data of equal quality?
- What is the status of lidar in the FS?
- Partnering opportunities and issues…

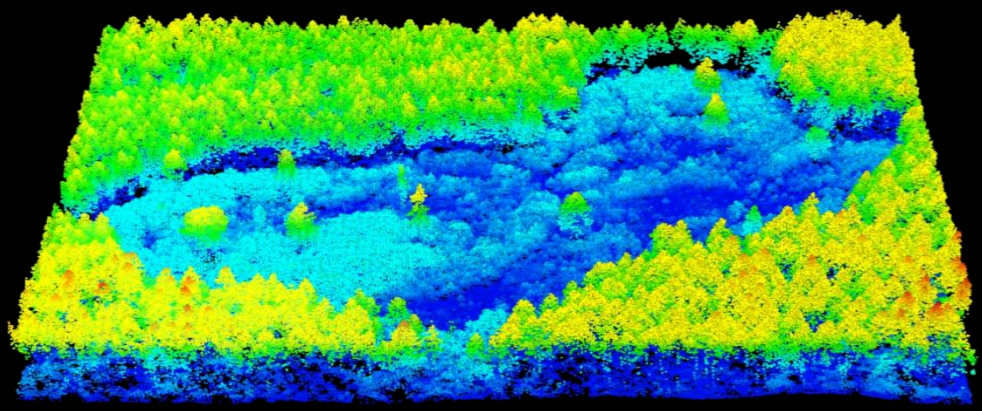


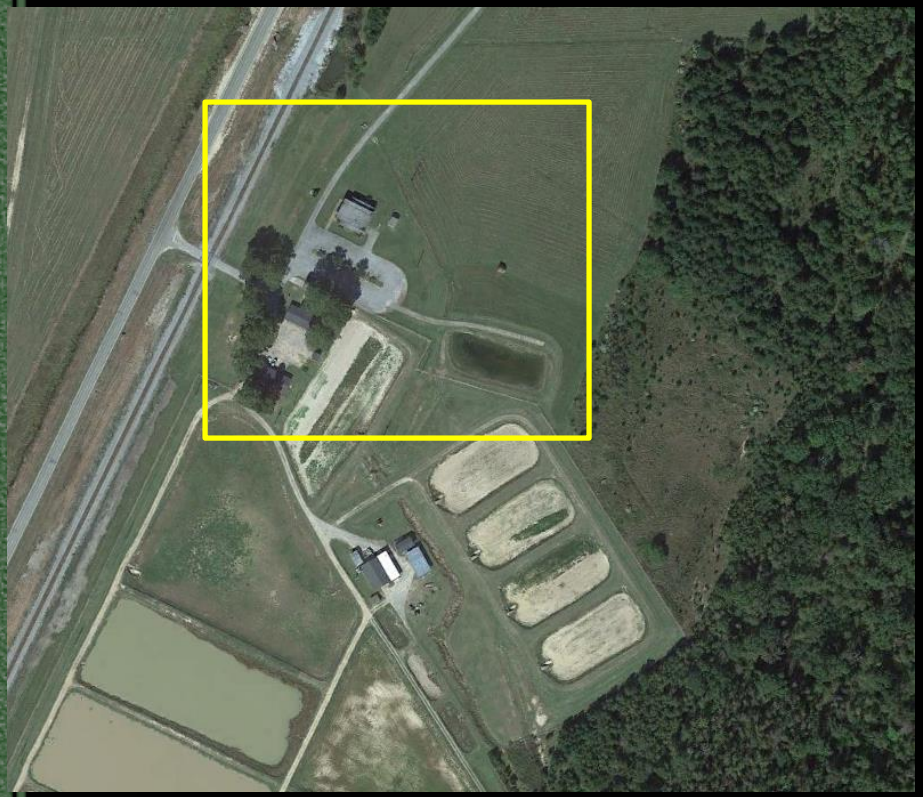
Figure 1: a color-coded (by height) LIDAR image.

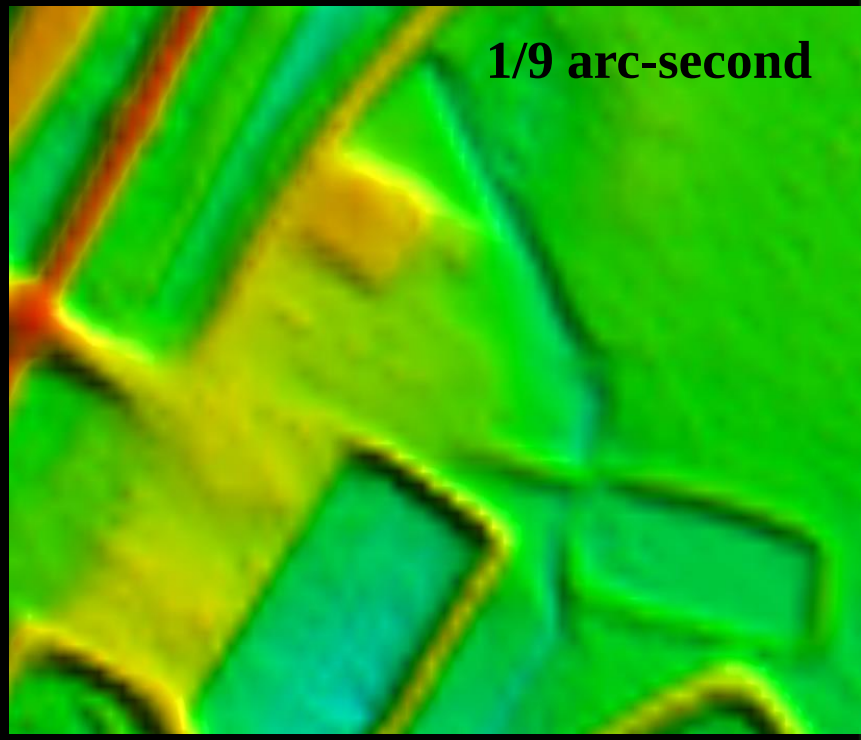
Technology - LIDAR Use in Forest Service

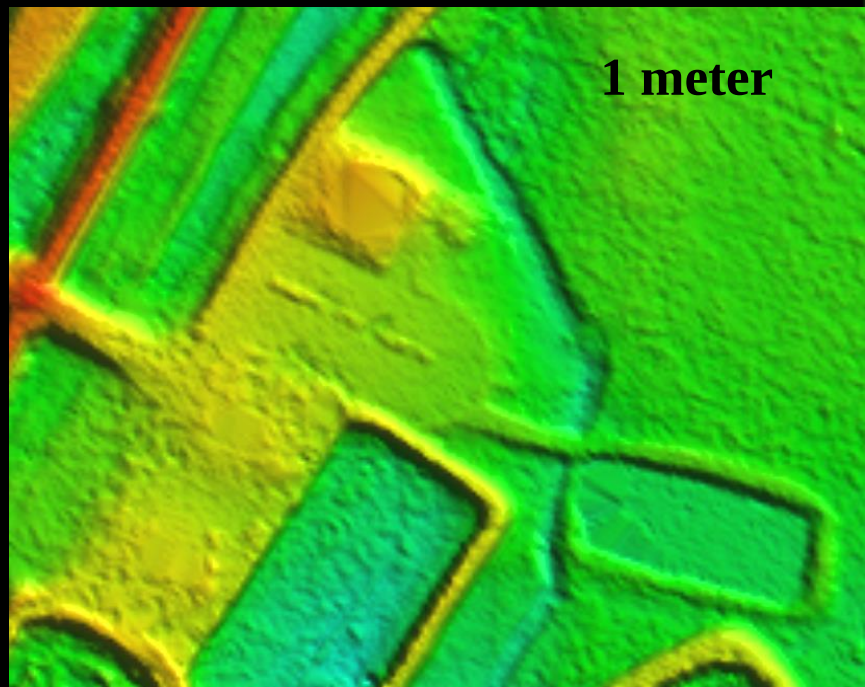
LIDAR plays an important role for the Forest Service in two categories: vegetation classification and mapping and topographic analysis: Some important applications include:

- Vegetation Mapping
  - Forest inventories
  - Wildland Fuel Assessments
  - Wildlife habitat assessments
  - Monitoring canopy change
- Topographic Mapping
  - Engineering
  - Floodplain – watershed mapping and flood risk assessment
  - Landslide hazard assessment
  - Stream channel mapping Geological mapping

1 Meter vs 1/9 arc-sec DEM at full resolution







Digital Aerial Sketchmapping

FHTET
Forest Health Technology Enterprise Team

DIGITAL AERIAL SKETCHMAPPING SYSTEM

PROVIDING TECHNOLOGY FOR FOREST HEALTH PROTECTION

Aerial sketchmapping is the geo-location of features on the ground as observed from an aerial platform and the subsequent recording of these features on maps or photographs. Forest health surveys are conducted each year over much of the U.S. by trained aerial observers to locate and map insect, disease, and other forest disturbance. Historically, the observer maps and attributes areas of disturbance on paper maps. The information is later transcribed and digitized for use by land managers in geographic information systems.

FHTET, in cooperation with the **Remote Sensing Applications Center (RSAC)**, and the Federal and State aerial survey communities have developed a **Digital Aerial Sketchmapping System** that provides for the direct recording of sketched features on a moving map display into a GIS environment.

Digital Aerial Sketchmapping System
in single-engine Cessna aircraft

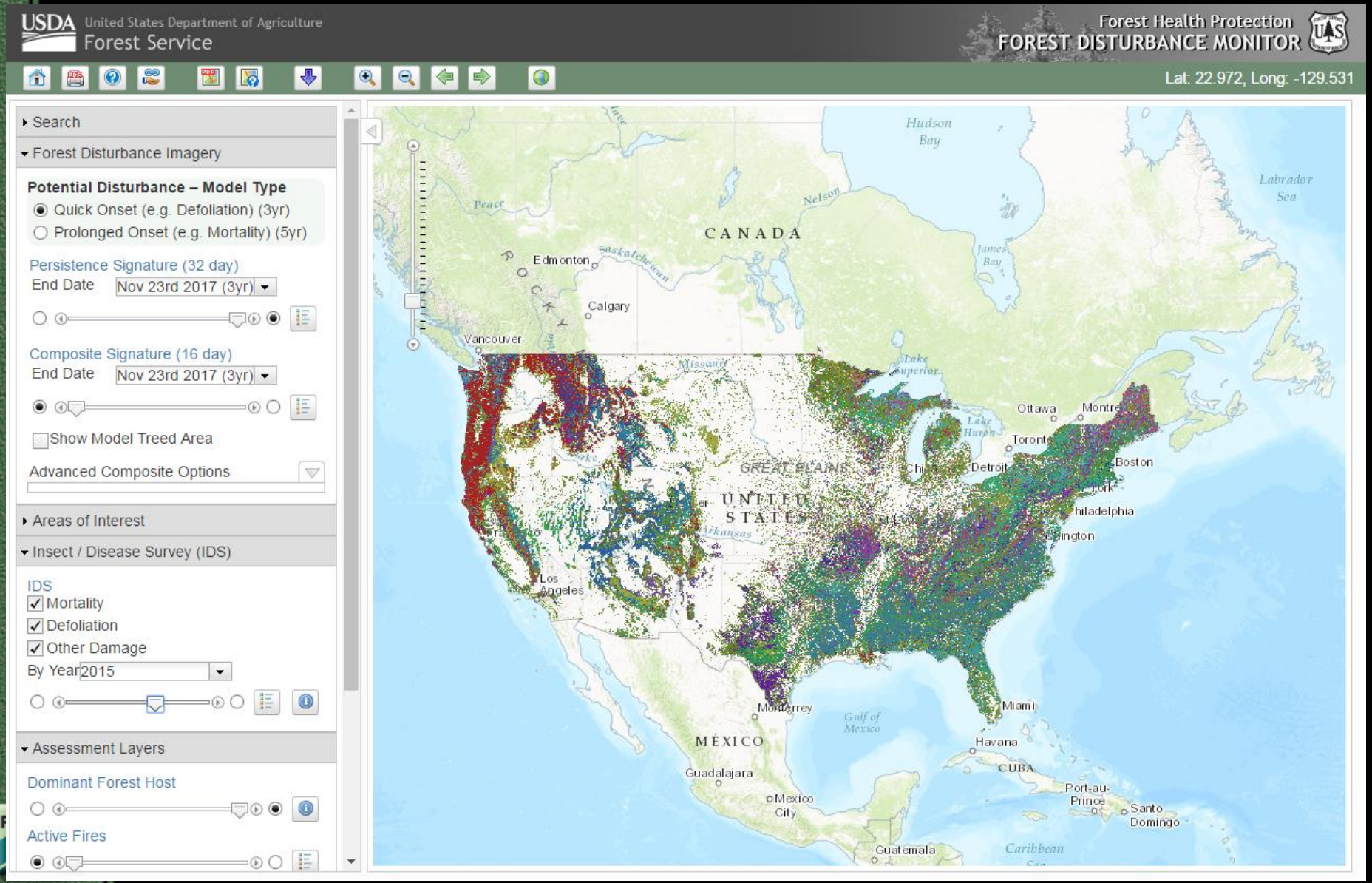
Digital Aerial Sketchmapping

The Digital Aerial Sketchmapping System offers several advantages over conventional paper maps.

- Relieves the surveyor of having to track aircraft position, allowing more time to observe and map damage.
- Wide array of base map options that may lead to more accurate mapping of features.
- Data available for immediate use in a GIS environment
- Data easily downloaded to GPS units for field checking or management action.

Digital Aerial Sketchmapping

Forest Disturbance Mapping

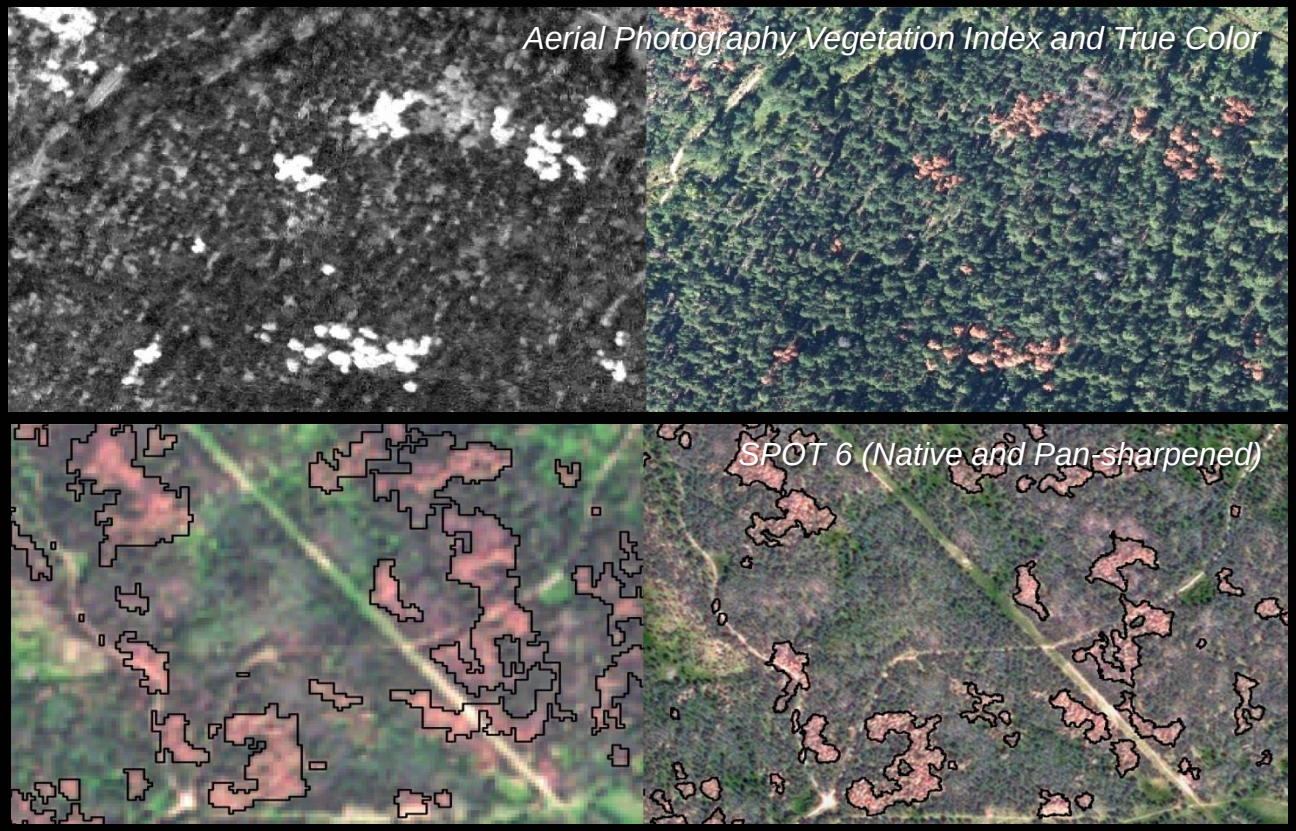


Using High Resolution Satellite Imagery
Early Detection of Mountain Pine Beetle

- Objective: Determine the feasibility of identifying MPB-infested trees prior to the onset of visual symptoms of stress using WorldView-2 imagery
  - Retrospective analysis (Jewel Cave)
  - Live test (Buck Mountain)
  - Develop protocol to map red trees (if early detection fails)

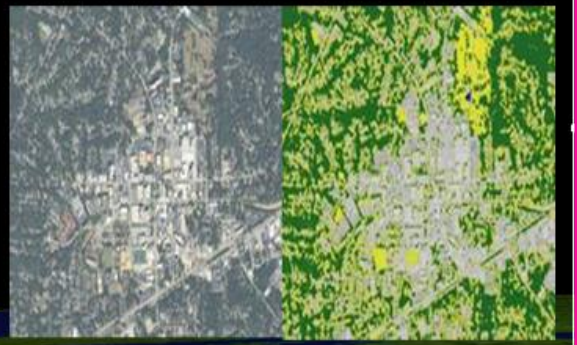
Mapping Red-attack Trees

- SPOT 6 and Aerial Photography
  - eCognition software used to find and segment affected stands



Ecosystem Analysis

Hi-Resolution Classification



Urban Ecosystem DBF

Ancillary Data

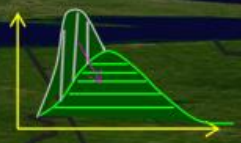
Ecosystem Analysis

Applications
Decision Making Tools

Green Infrastructure Statistics

Stormwater Calculations

- Curve Numbers
- Runoff Volume
- Economic Values



Carbon Storage & Sequestration

- UFORE Model (local)
- GeoCarbon (regional)

Air & Water Pollution

- UFORE Model
- L-THIA Model

Scenario Modeling

- Green & Gray Infrastructure

In Closing

Every one of the processes and activities shown in this presentation is critically dependent on a reliable and precise global positioning system.

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