USDA
United States Department of Agriculture

USDA Forest Service Direct Readout and Active Fire Mapping Update

NASA LANCE User Working Group Meeting
Boulder, Colorado
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Brad Quayle
Disturbance Assessment and Services Program
USDA Forest Service
Geospatial Technology and Applications Center (GTAC)

Presentation Outline

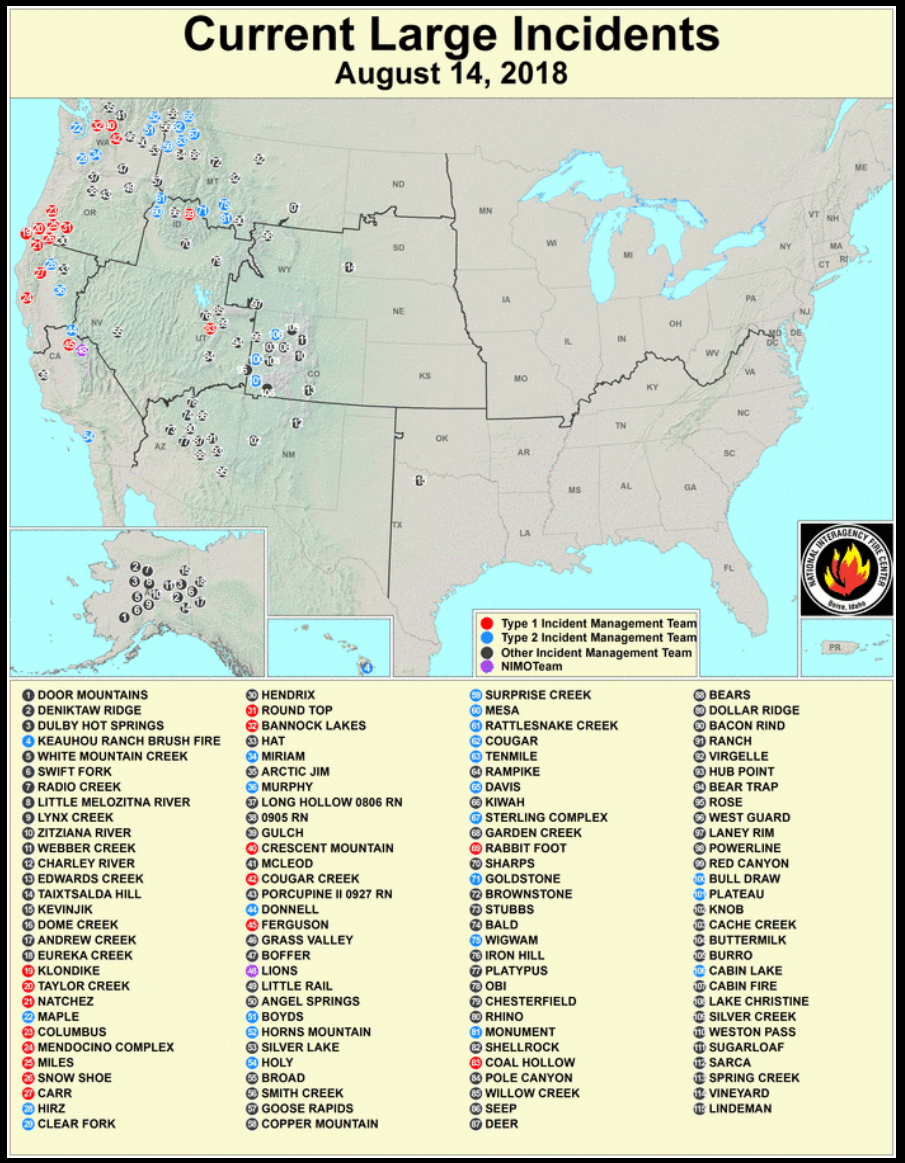
- Background:
  - What is GTAC?
  - Review of NRT satellite data processing and active fire mapping activities
- Current challenges and plans for mitigation
- Questions / considerations for LANCE

GTAC Geospatial Technology and Applications Center

- National Technical Center
- National Forest System Deputy Area; Engineering Staff
- Located in Salt Lake City, Utah
- Includes the former Remote Sensing Applications Center (RSAC)
  - Involved in NRT satellite data acquisition/processing since 2001
- Mission: Lead geospatial science implementation in the USDA Forest Service by exploring and developing emerging technologies, working with partners to demonstrate their application in land and resource management, providing solutions to inform decision making, and building capacity to support the Agency Mission.

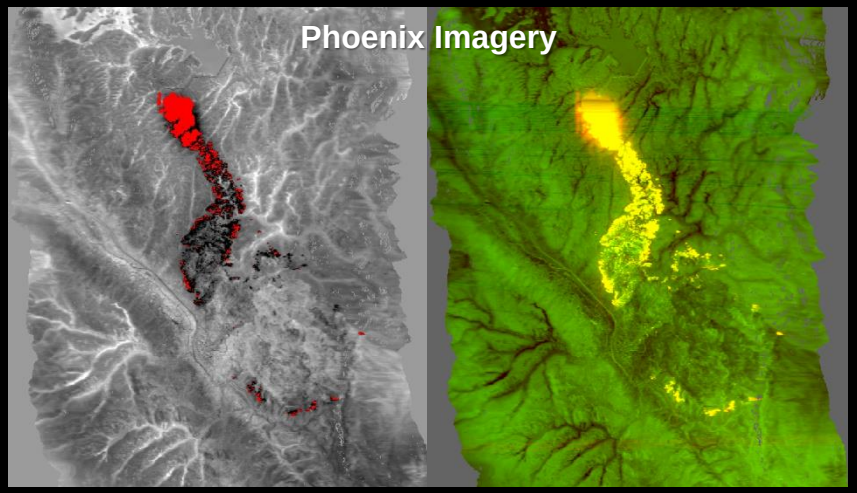
Tracking and Mapping Wildland Fires

- Wildland fire management is an interagency effort
- FS provides fire remote sensing services for mapping large incidents
  - Monitor location, intensity and progression of current large incidents
  - Provide at *tactical* and *strategic* scales

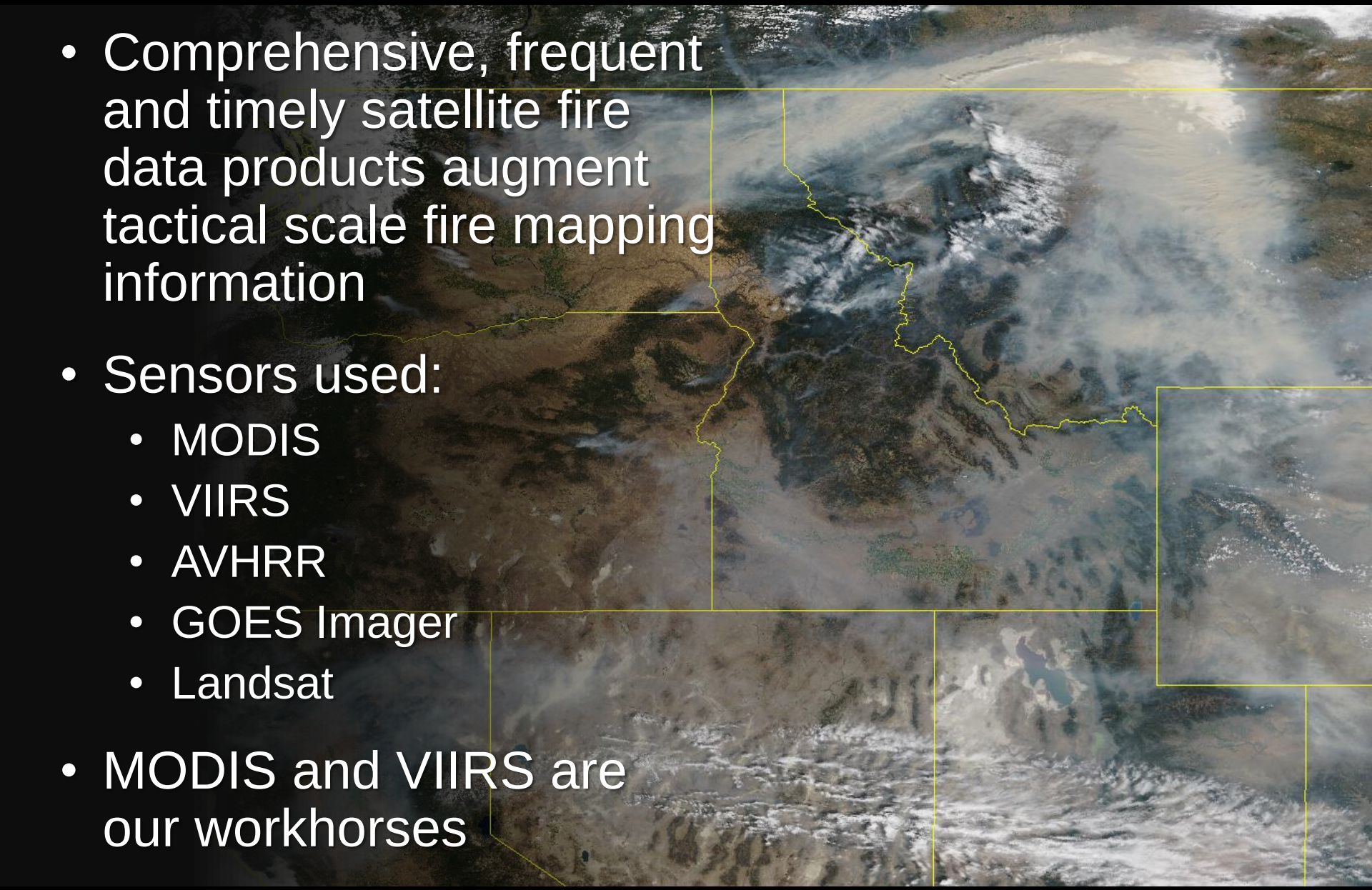


Tactical Scale Active Fire Mapping

- Nighttime airborne infrared imagery conducted for requesting incidents
- Ortho-corrected imagery delivered to interpreters in NRT
- Suite of large scale, daily fire products provided to IMTs w/in couple hours
  - Shapefiles, KMZs, maps
- Products inform suppression resource deployment decisions for upcoming operational period
- One daily flight per incident at best



Forest Service Strategic Scale Active Fire Mapping



- Comprehensive, frequent and timely satellite fire data products augment tactical scale fire mapping information
- Sensors used:
  - MODIS
  - VIIRS
  - AVHRR
  - GOES Imager
  - Landsat
- MODIS and VIIRS are our workhorses

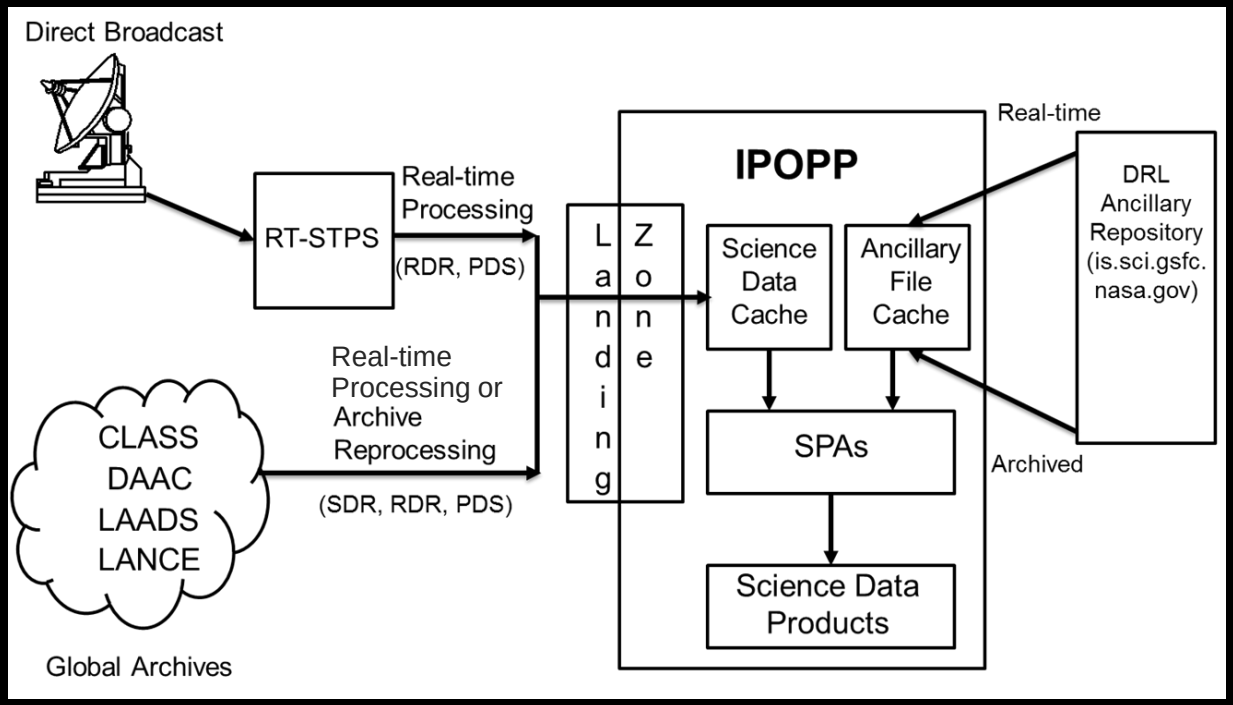
Forest Service NRT Satellite Data Processing Area of Interest

- Data collected for CONUS, AK, HI, PR and Canada
  - Active fire monitoring
  - Forest disturbance monitoring
- GTAC leverages direct readout data from select X-band ground stations
  - GTAC antenna decommissioned in December 2018 and transferred to NASA Ames
- NASA LANCE/FIRMS augments direct readout
  - Fills data coverage gaps

GTAC Direct Readout Data Processing

International Polar Orbiter Processing Package (IPOPP)

- Autonomous multi-mission, multi-sensor data processing framework
- Plug-and-play execution of Science Processing Algorithms (SPAs), or run stand alone
- Facilitates consistent SPA implementation and easy SPA use/maintenance
- Configurable/scalable to user needs

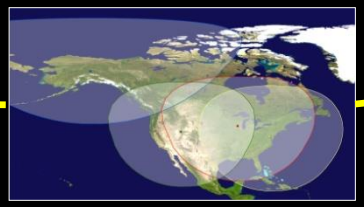


Recent/Ongoing SPA Examples

- VFIRE375
- VIIRS-AF
- MODIS & VIIRS burn scar
- MAIAC
- Landsat 8 active fire

GTAC NRT Data Ingest and Processing

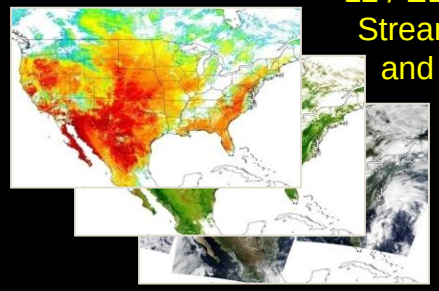
MODIS / VIIRS Direct Readout Network



Selected MODIS L0 & VIIRS RDR EDR Data

GTAC IPOPP Processing Systems

L2 / EDR Product Stream for U.S. and Canada



LAADS DAAC

Selected MODIS L0 Data

NASA LANCE MODIS / VIIRS Data

LANCE: NASA NEAR REAL-TIME DATA AND IMAGERY

MOD14 / VFIRE375 L2 ASCII Fire Data

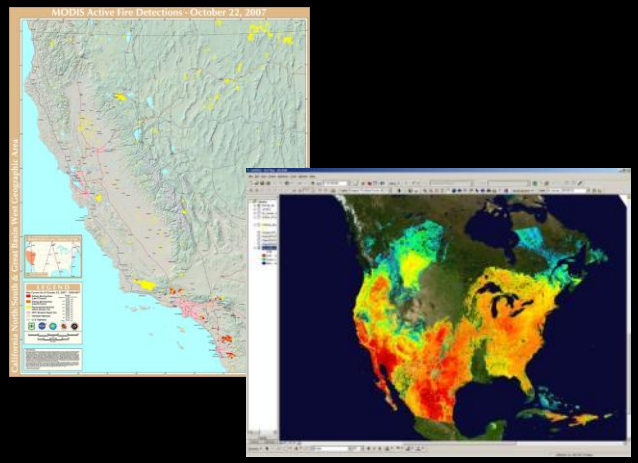
MOD14 / VIIRS-AF / VFIRE375 L2 HDF Fire Data

GTAC AFM Processing Systems

L8 L2 ASCII / GeoTiff Fire Data

GTAC Landsat Fire Processing System

Value-added Mapping / Visualization, Data & Analysis Products



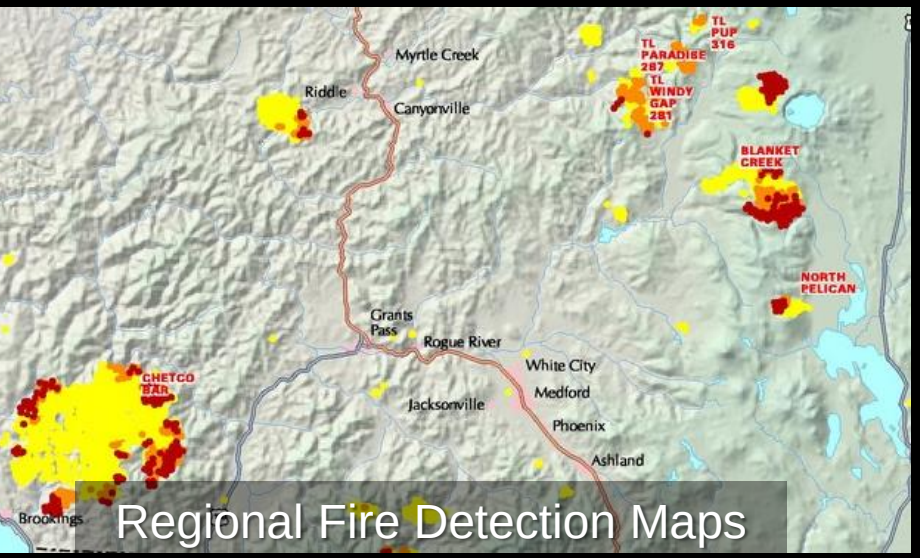
National Oceanic and Atmospheric Administration
U.S. Department of Commerce

WF-ABBA / FIMMA ASCII Fire Data

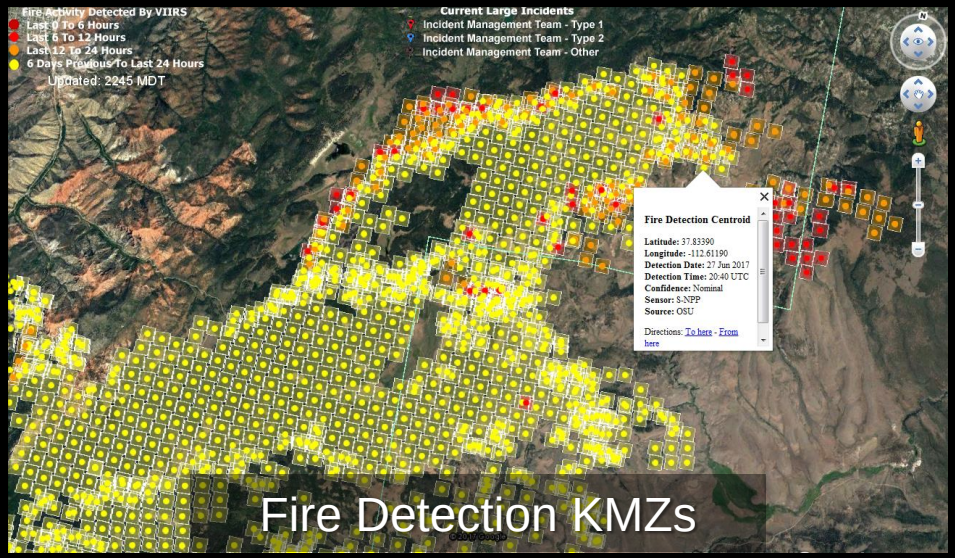
USGS science for a changing world

N.A. Landsat 8 LPGS L1T GeoTiffs

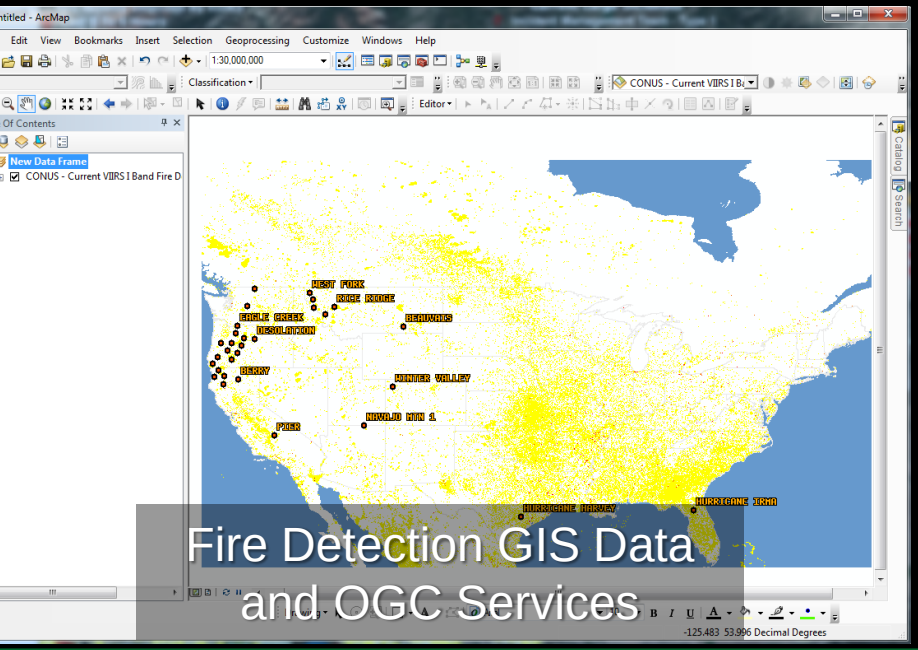
AFM “Value-Added” Products



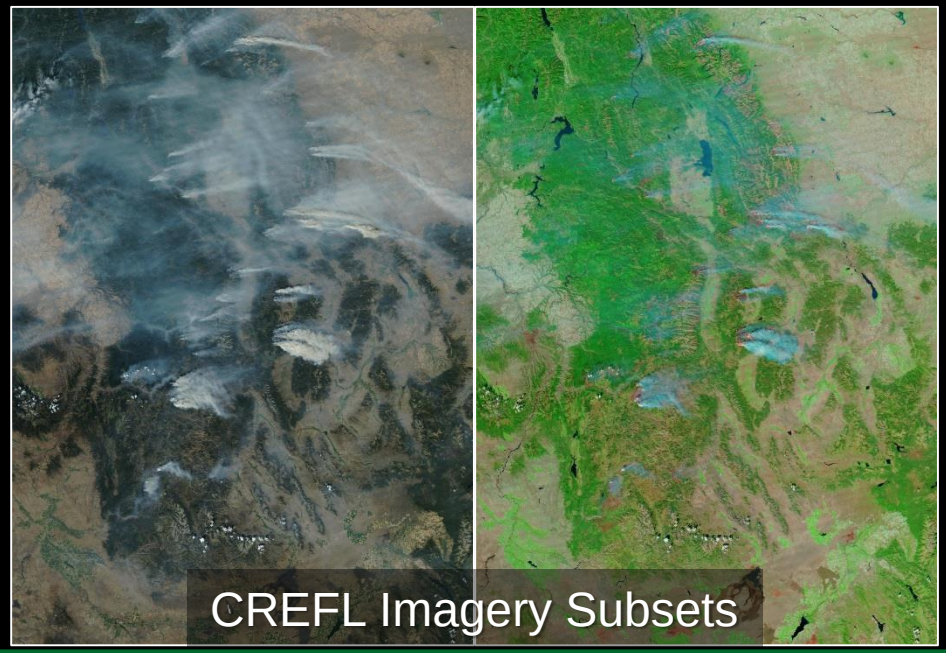
Regional Fire Detection Maps



Fire Detection KMZs



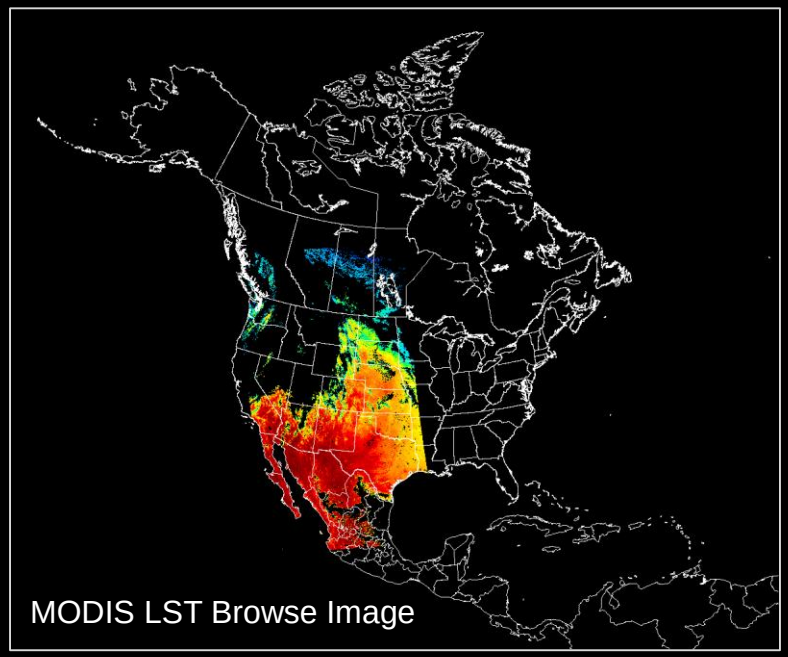
Fire Detection GIS Data and OGC Services

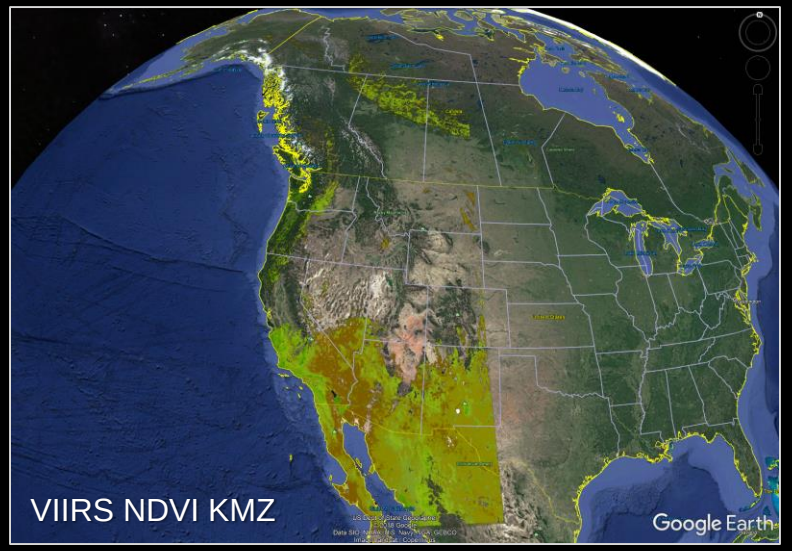


CREFL Imagery Subsets

GTAC MODIS / VIIRS Direct Readout Products

- Daily MODIS & VIIRS IPOPP direct readout swath data for N. America
- Land, atmosphere and ocean products available
  - Browse images
  - GeoTiff images
  - HDF 4/5 datasets
  - KMZs

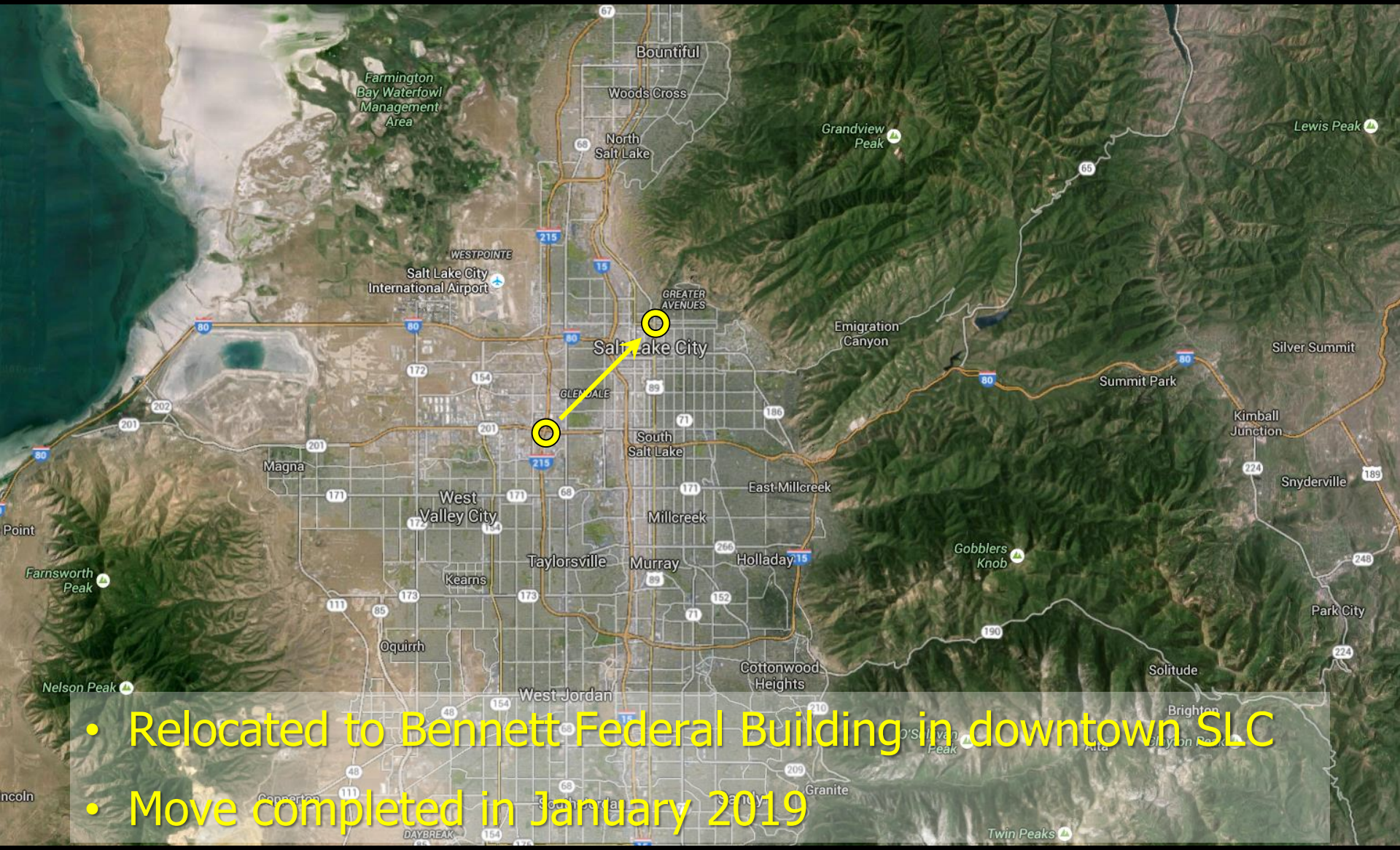

MODIS LST Browse Image



AFM End User Community

- CY 2018 Website Use Statistics
  - 5.12 million visits in CY2018
  - 687,000 unique visitors
  - > 10 TB download volume
- End Users
  - U.S. fire management and emergency response agencies
  - Canadian provincial / territorial fire management agencies
  - National Interagency Coordination Center
  - Geographic Area Coordination Centers
  - Predictive Services Program
  - General public
- Interagency Wildfire Decision Support Systems
  - Wildland Fire Decision Support System
  - Fire Enterprise Geospatial Portal
  - USGS GeoMAC

Challenges - GTAC Physical Relocation



- Relocated to Bennett Federal Building in downtown SLC
- Move completed in January 2019

Challenges - USDA Data Center Consolidation

- USDA in process to close and consolidate all data centers
- Requirement of FITARA and DCOI
- GTAC's data center scheduled to close by October 1, 2019
- All server-based applications must be migrated
  - Includes all satellite data processing and value-added processing activities
- Migration options:
  - USDA data center
  - Commercial cloud
  - Approved federal partner host

GTAC Mitigation Strategies

- Antenna
  - Transferred antenna to NASA Ames
  - Currently examining options to make it operational
- Data Processing and Application Continuity
  - Partnership with NASA GSFC-DRL
  - Effort ongoing to migrate targeted GTAC applications
    - NRT satellite data processing (MODIS, VIIRS, etc.)
      - Process DR data from available ground station sources
      - Swath-based, Level 2 land, atmosphere and ocean science datasets for the U.S. and Canada
    - U.S. and Canada active fire mapping
    - CONUS forest disturbance monitoring
  - Migration needs to be completed by October 1, 2019

Question / Consideration for LANCE UWG

- Accessibility of NRT Level 2 DR Data in LANCE
  - Interest by LANCE to access to the U.S. / Canada L2 NRT DR data?
    - Data stream provided from NASA GSFC-DRL and GTAC collaboration
    - Data products could possibly complement regular LANCE MODIS / VIIRS data stream
    - Could facilitate:
      - Science grade data as L2 swath products at lower latencies
      - Enable regional decision support systems tailored to particular end user needs
      - Capability to provide DR data products based on regionally-adapted algorithms

Question / Consideration for LANCE UWG

- Forest Service and LANCE / FIRMS Collaboration
  - Interest in calibrating an instance of FIRMS for the U.S. / Canada user community?
    - Investigate opportunities to customize current FIRMS data products and tools
      - DR source data complemented by LANCE data stream
      - Integrate relevant contextual data sources
      - Tune presentation of data within mapping and visualization tools
    - Could increase exposure of LANCE / FIRMS to more users
    - Facilitate opportunities to develop other region-specific DSS applications
    - Conduct via cost-share between NASA and the Forest Service

Thanks!

USDA Forest Service Geospatial Technology and Applications Center (GTAC)