

USFS AMS Operations 2014

TFRSAC Spring Meeting

NASA - Ames

Moffett Field, CA 29 April 2014



USDA Forest Service, Remote Sensing Applications Center,
FSWeb: <http://fsweb.rsac.fs.fed.us>
WWW: <http://www.fs.fed.us/eng/rsac/>

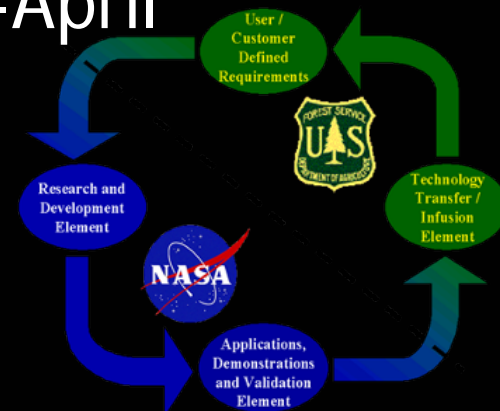
Outline

- 2013 tech transfer and support operations review
- AMS sensor review
- USFS Citation Bravo (N144Z) review
- 2014 tech transfer and support operations
- Looking Forward



Inter-Agency Tech Transfer/Support 2013

- AMS transferred to the Forest Service in February
- Installed in N144Z in late March
- Initial test flights in late March
 - Local area flights to check integration of AMS with Applanix, AirCell and tech training
 - NASA GSFC IPM testing
- NASA/ARS vineyards flight in Mid-April
- AMS removed in mid-May due to increase in fire activity



AMS Wildfire Instrument

AMS Wildfire Sensor

<u>Band</u>	<u>Wavelength μm</u>
1	0.42 - 0.45
2	0.45 - 0.52 (TM1)
3	0.52 - 0.60 (TM2)
4	0.60 - 0.62
5	0.63 - 0.69 (TM3)
6	0.69 - 0.75
7	0.76 - 0.90 (TM4)
8	0.91 - 1.05
9	1.55 - 1.75 (TM5) (high gain)
10	2.08 - 2.35 (TM7) (high gain)
11	3.60 - 3.79 (VIIRS M12) (high gain)
12	10.26 - 11.26 (VIIRS M15) (high gain)
13	1.55 - 1.75 (TM5) (low gain)
14	2.08 - 2.35 (TM7) (low gain)
15	3.60 - 3.79 (VIIRS M12) (low gain)
16	10.26 - 11.26 (VIIRS M15) (low gain)

Total Field of View: 42.5 or 85.9 degrees
(selectable)

IFOV: 1.25 mrad or 2.5mrad

Spatial Resolution: 3 – 50 meters (variable)



N144Z Specifications



Cessna Citation Bravo

- Primary Mission – Infrared Fire Mapping (April – October)

AirCell Datalink

- Average 204 Kbs downlink
- Continuous coverage CONUS at 10,000 AGL

Sensor Bay

- Port Side blister
- Opening 18 in long 15 wide
- Sensor bay 24 in long 17 wide

Flight Rate - \$1710 per hour
Contact Dan Johnson
dejohnson@fs.fed.us

Citation Specifications

- Cruise Speed 380 kts
- Max Altitude 45,000 ft
- Min Safe Acquisition 120 kts
 - This creates limitations with using the AMS
 - Max AMS Height/Velocity= 11.1
 - Minimum 10,000 ft. AGL
 - 7.6 meter pixel
 - 3.07 nautical mile swath width (3.5 statute miles)

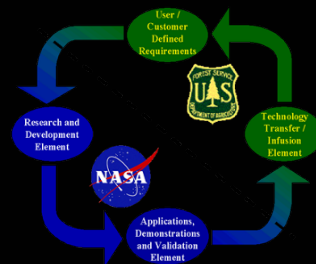


144Z AMS Installation



Inter-Agency Tech Transfer/Support 2014

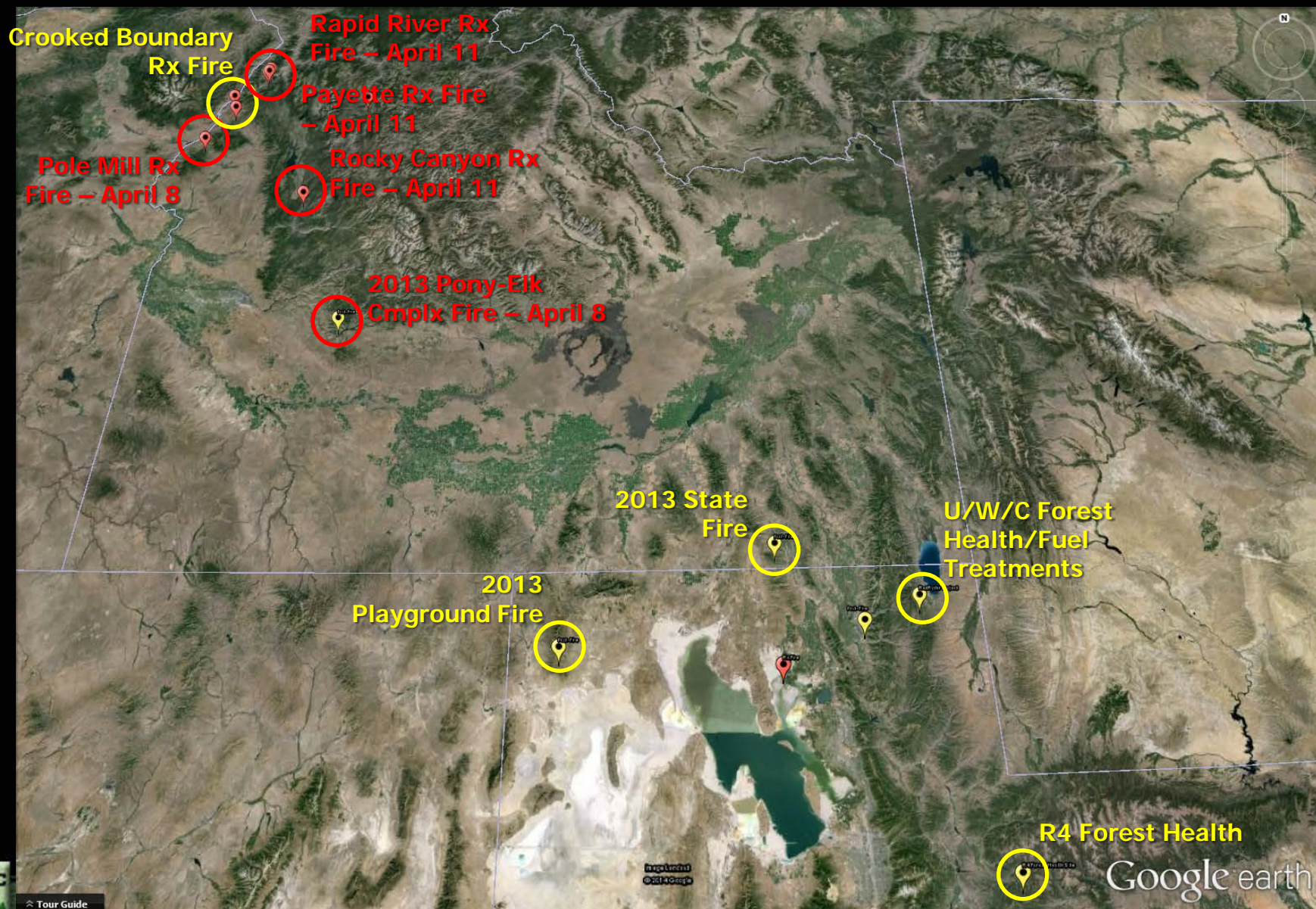
- Purchase of new ground station laptop
 - Update of Linux OS
- Updates of the OBP
 - User interface, mission planning software and documentation (users guide)
- FS Technician training
 - Simulations of imagery acquisition and processing workflow
- AMS installed in N144Z in late March
 - Initial bore site and integration test missions
 - Ortho-rectification improved with Applanix physically over the AMS



Completed and Proposed Spring 2014 Missions



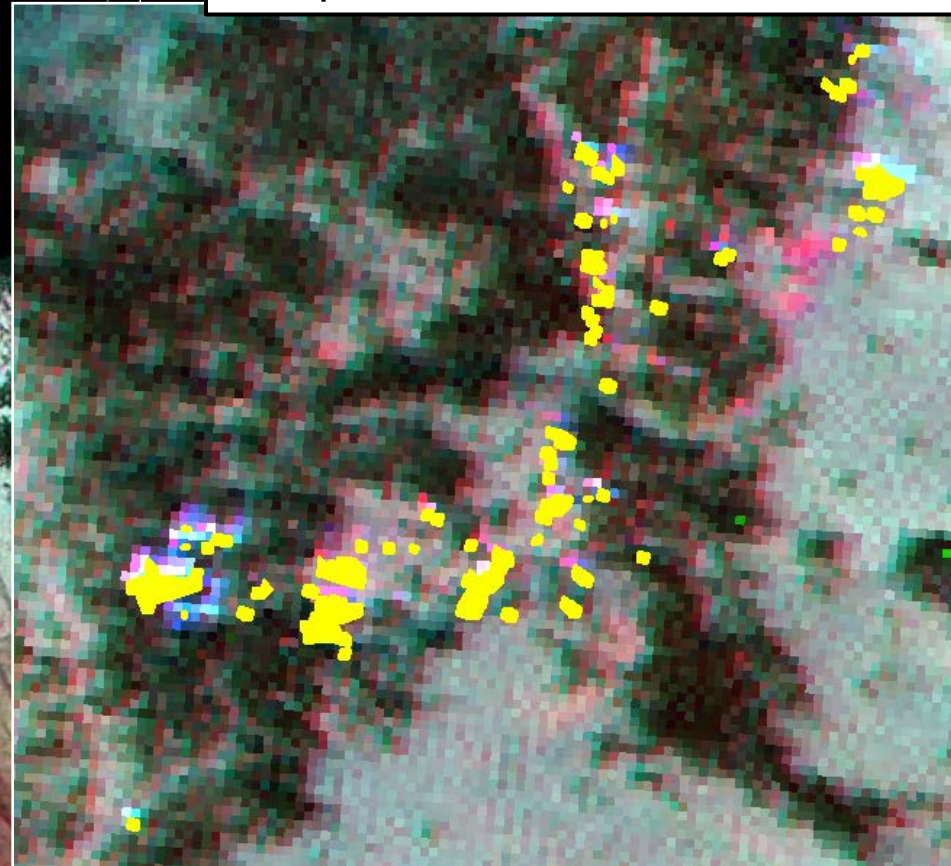
Completed and Proposed Spring 2014 Missions



Tour Guide

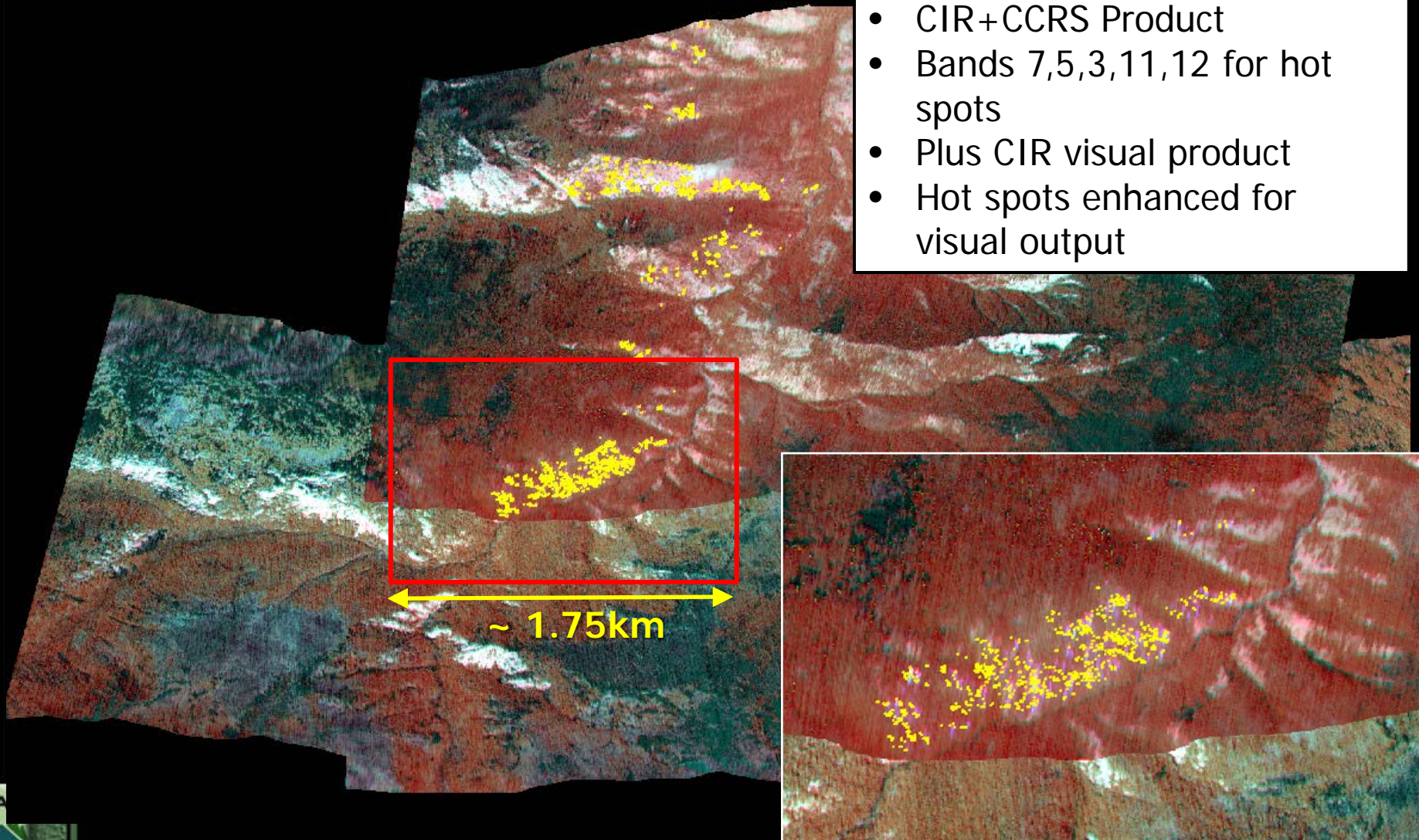
Prescribed Fire: Rapid River, Payette NF

- Planned 1,600 acre burn
- CIR+CCRS Product
- Bands 7,5,3,11,12 for hot spots
- Plus CIR visual product
- Hot spots enhanced for visual output



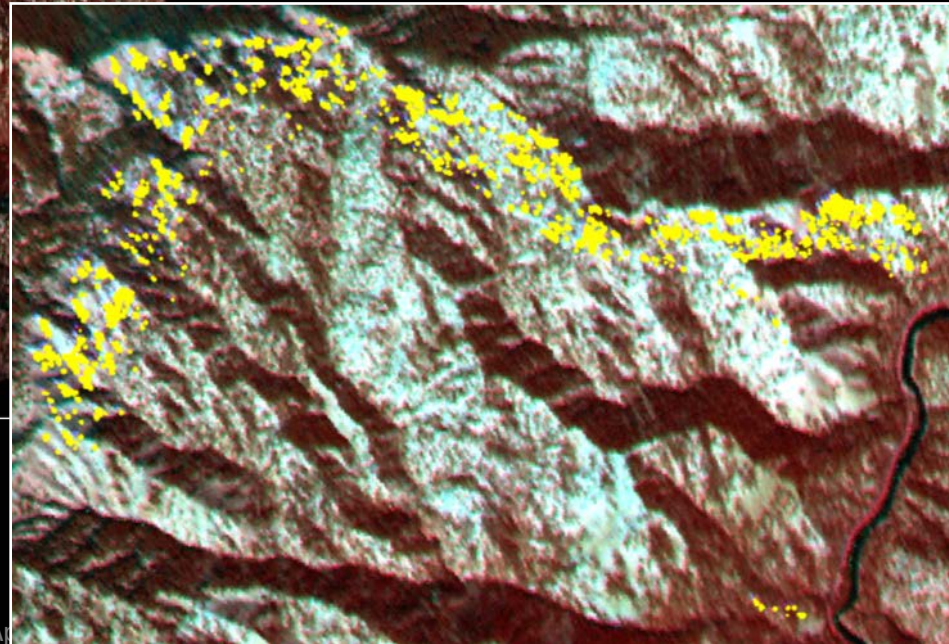
Prescribed Fire: Payette NF

- Planned 500-700 acre burn
- CIR+CCRS Product
- Bands 7,5,3,11,12 for hot spots
- Plus CIR visual product
- Hot spots enhanced for visual output



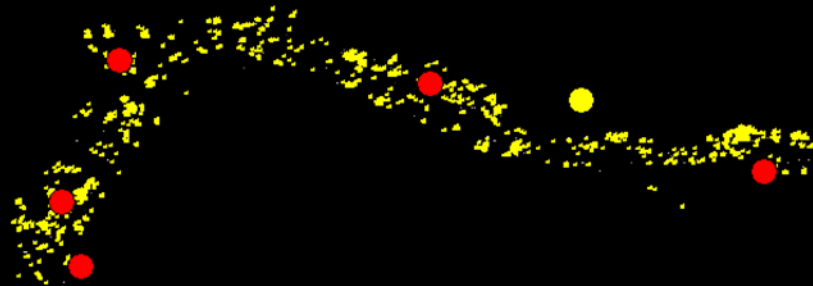
Prescribed Fire: Rocky Canyon, Boise NF

- Planned ~1,500 acre burn
- CIR+CCRS Product
- Bands 7,5,3,11,12 for hot spots
- Plus CIR visual product
- Hot spots enhanced for visual output



Prescribed Fire: Rocky Canyon, Boise NF

- Planned ~1,500 acre burn
- CCRS Product
- Bands 7,5,3,11,12 for hot spots
- Hot spots enhanced for visual output



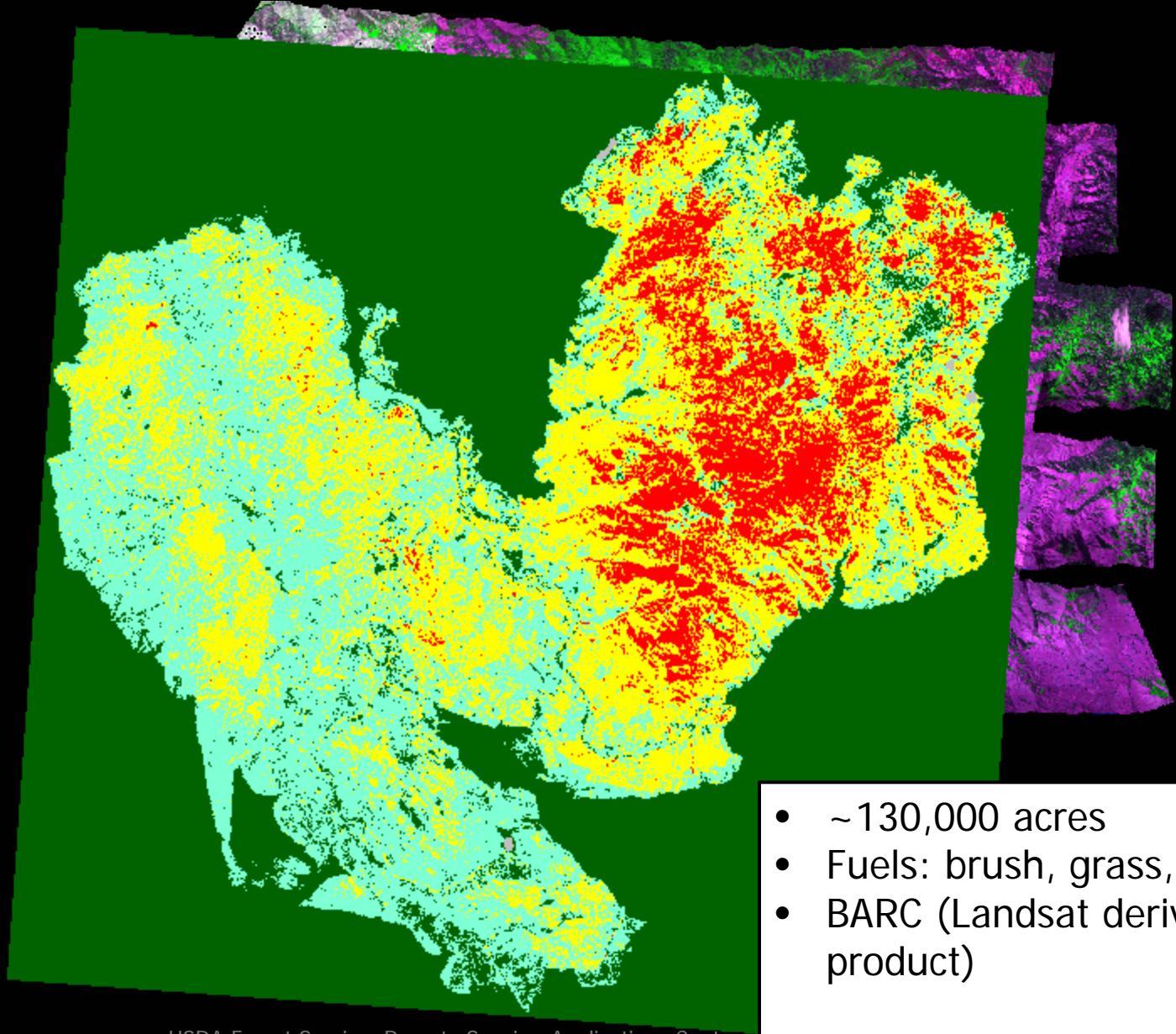
AMS Overflight at ~2045 UTC

VIIRS Overpass at ~2046 UTC

VIIRS I-Band 375m Product (Schroeder)

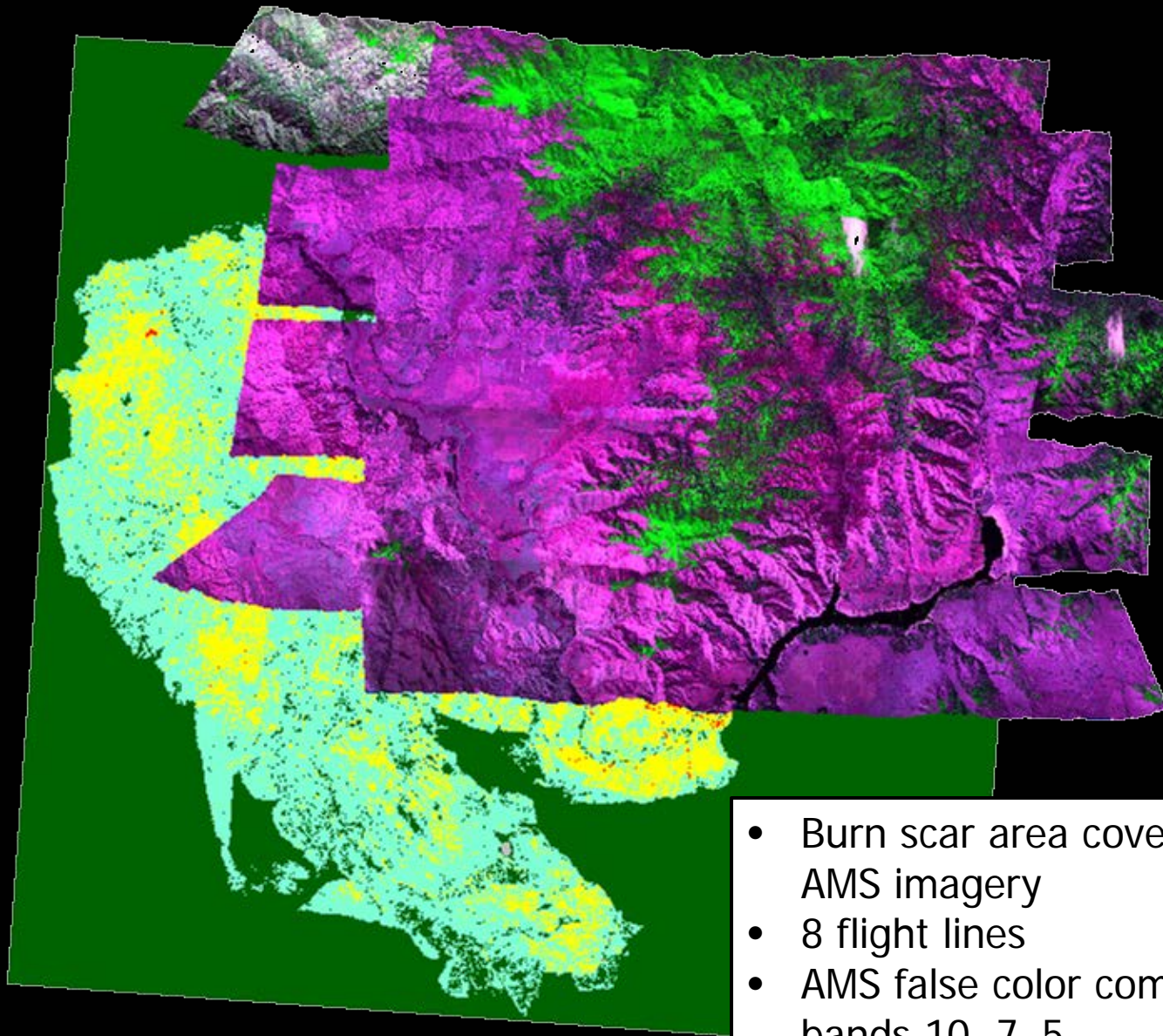
**VIIRS-AF 750m Product (NASA-Direct
Readout Lab)**

Post-Fire BARC: Pony-Elk Complex



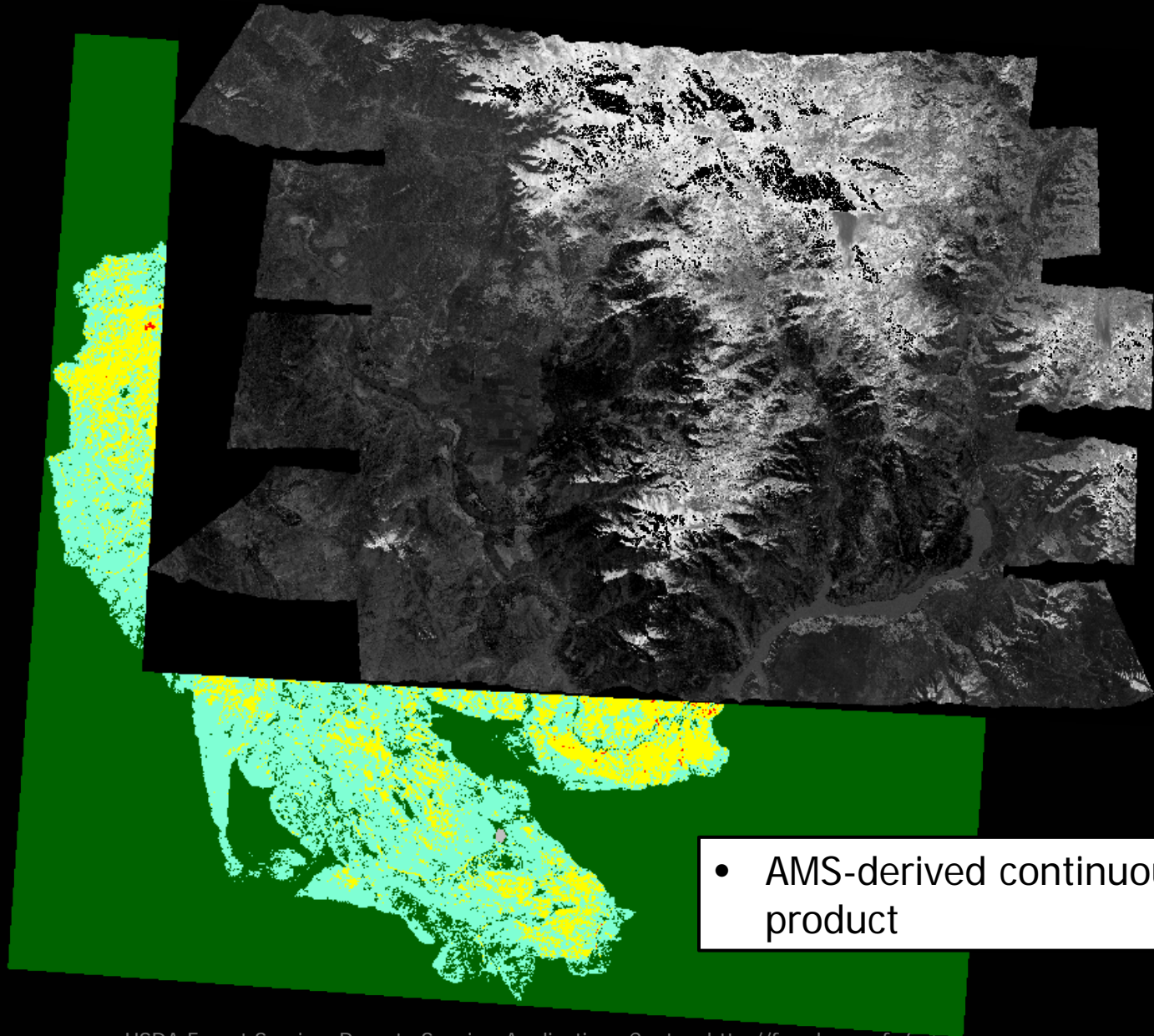
- ~130,000 acres
- Fuels: brush, grass, timber
- BARC (Landsat derived dNBR product)

Post-Fire BARC: Pony-Elk Complex



- Burn scar area covered by AMS imagery
- 8 flight lines
- AMS false color composite bands 10, 7, 5

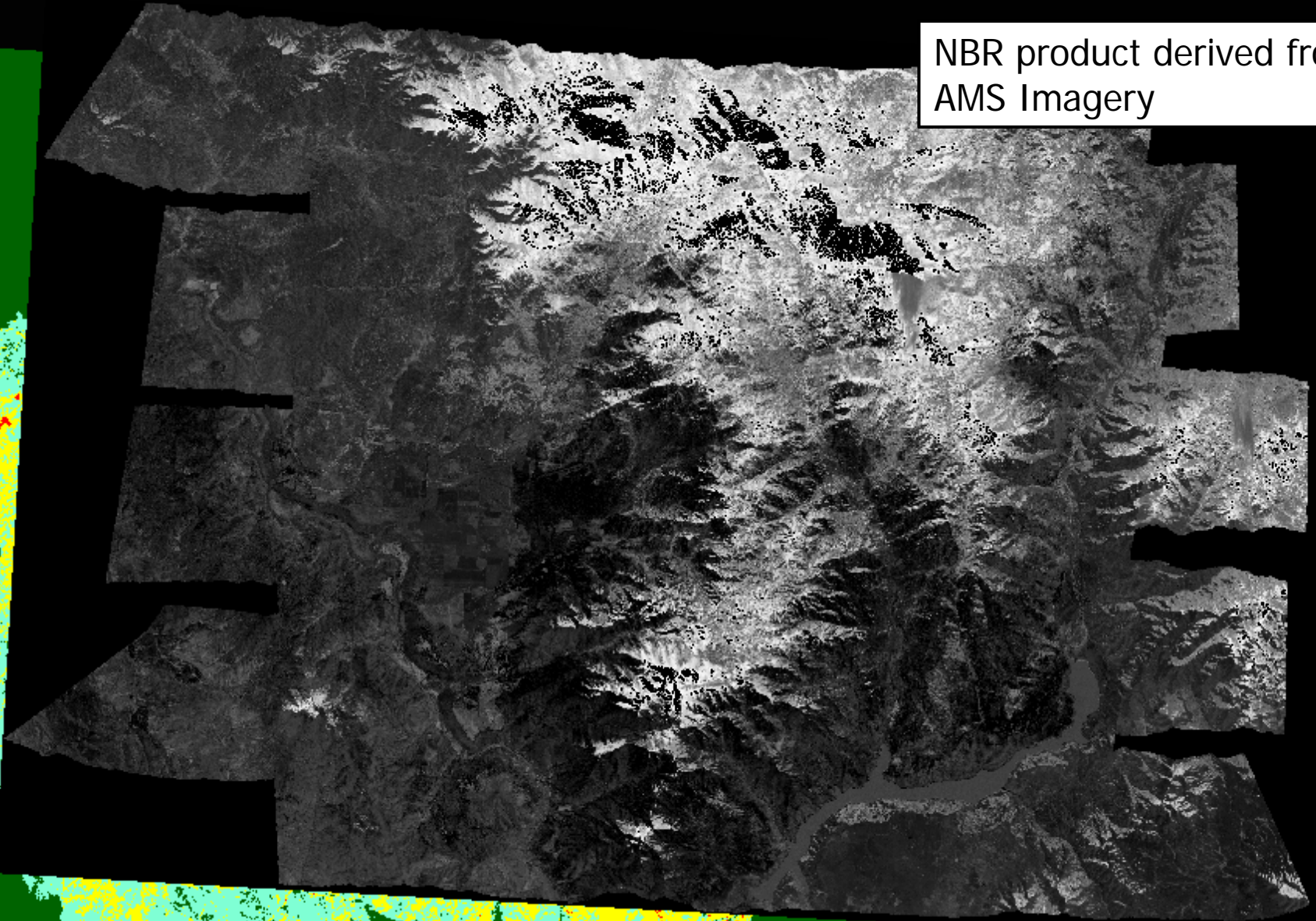
Post-Fire BARC: Pony-Elk Complex



- AMS-derived continuous NBR product

Post-Fire BARC: Pony-Elk Complex

NBR product derived from
AMS Imagery

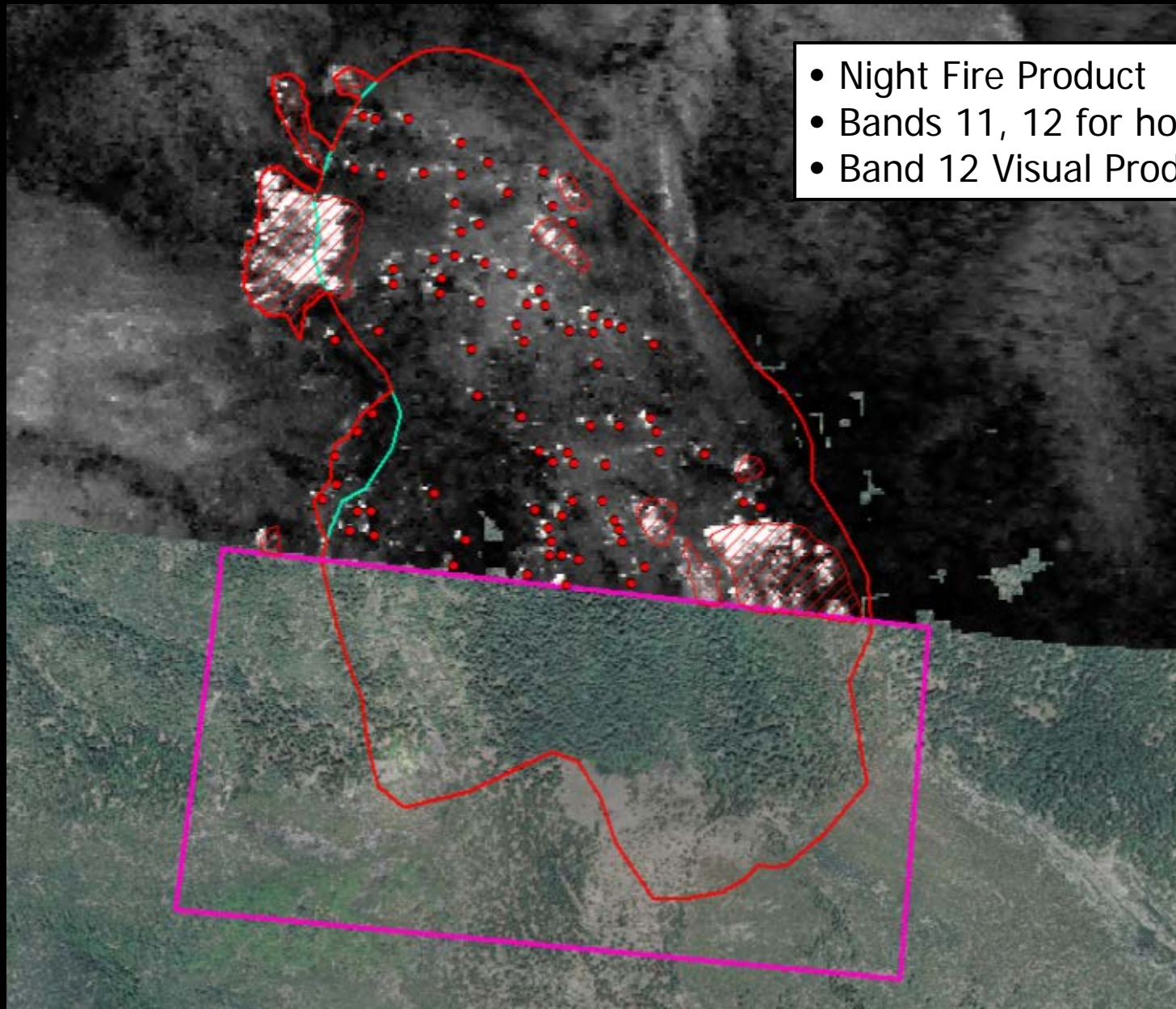


Wildland Fire Support

- Brown Fire, AZ
 - Coronado NF
 - SW of Sierra Vista, AZ
 - Same area impacted by Monument Fire in 2011
 - ~250 acres
 - Type 1 IMT assigned
- Acquired AMS data on two nights
 - April 15 & 16



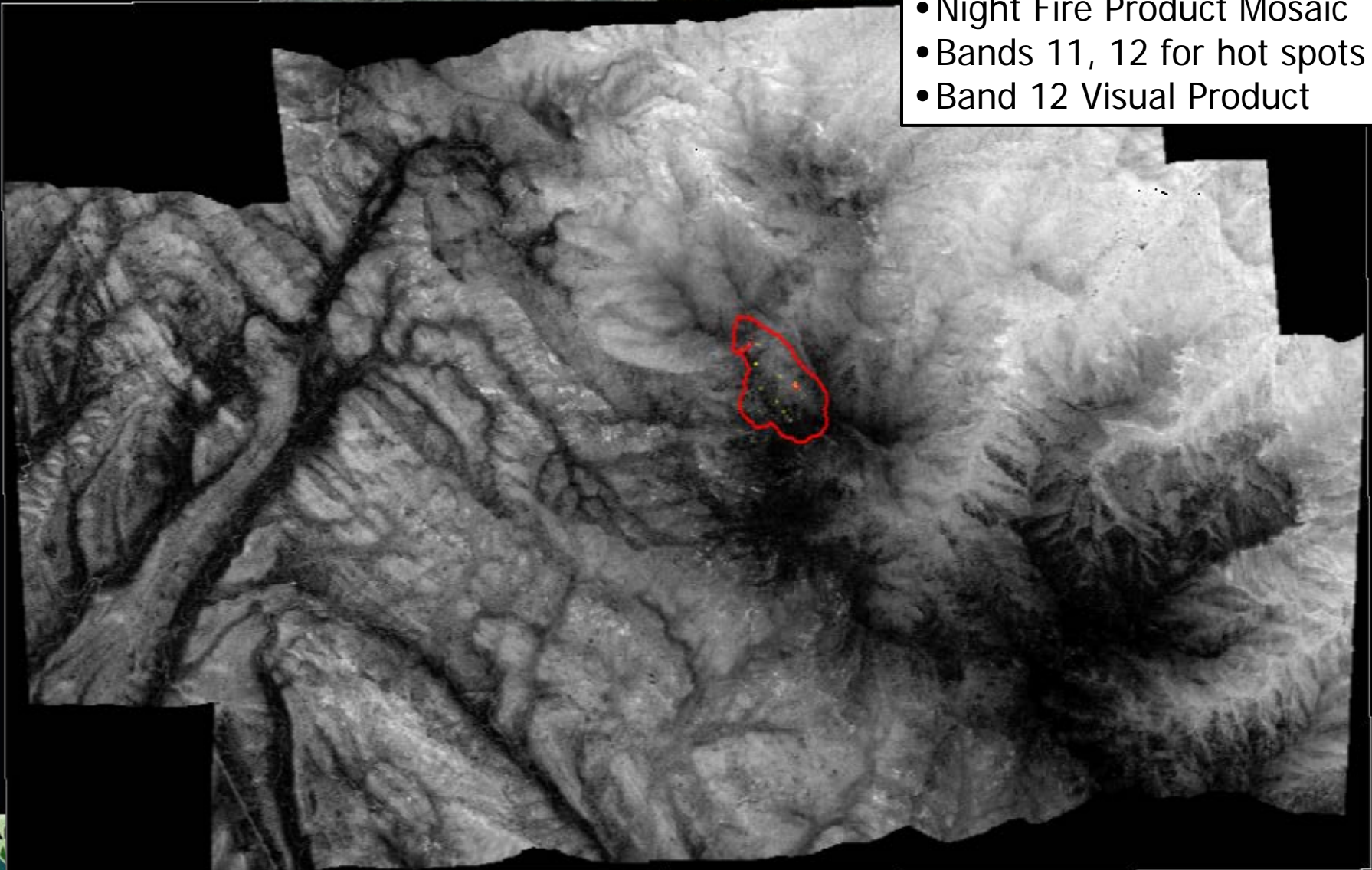
Brown Fire - April 15, 2014



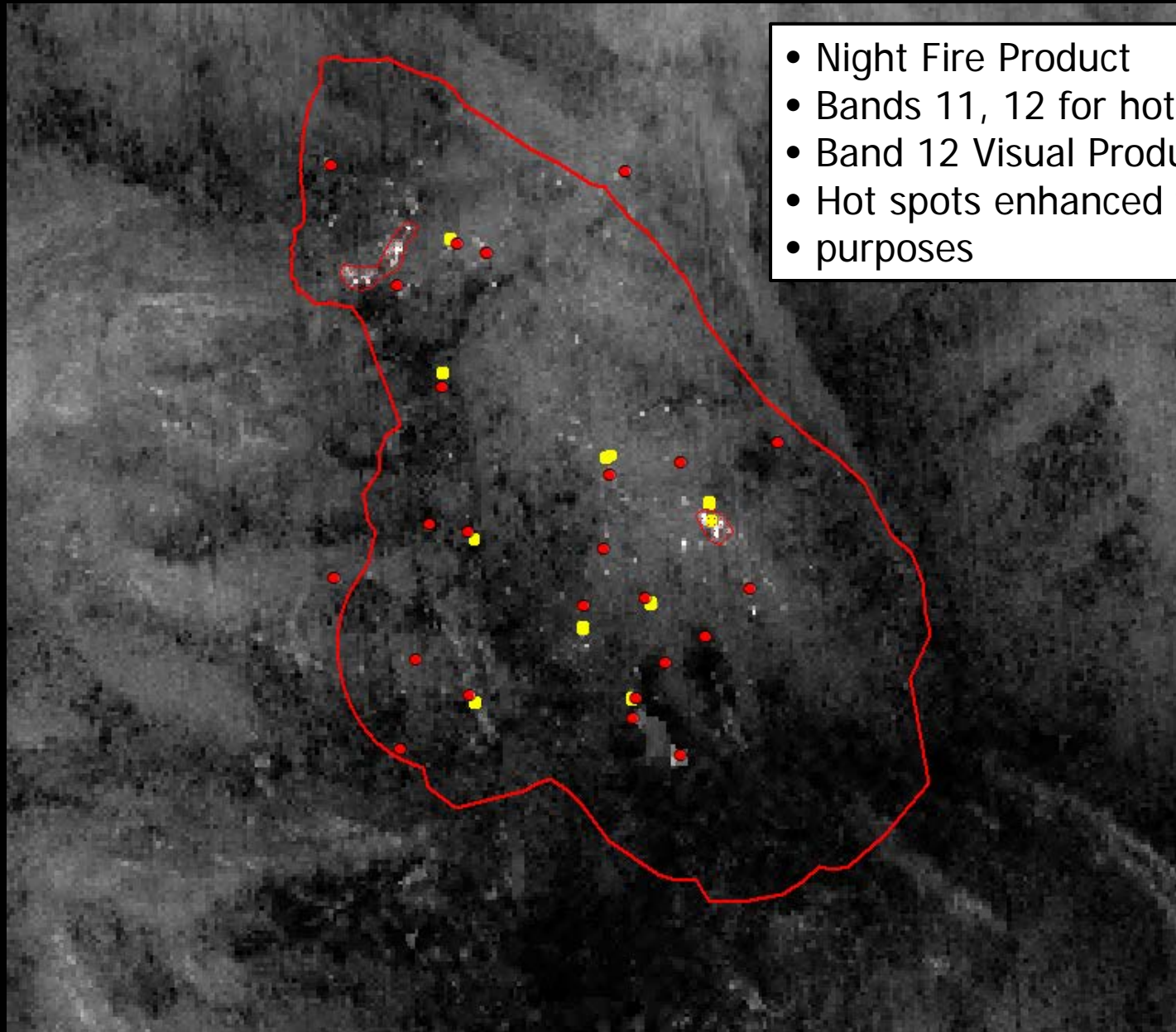
- Night Fire Product
- Bands 11, 12 for hot spots
- Band 12 Visual Product

Brown Fire – April 16, 2014

- Night Fire Product Mosaic
- Bands 11, 12 for hot spots
- Band 12 Visual Product



Brown Fire – April 16, 2014



- Night Fire Product
- Bands 11, 12 for hot spots
- Band 12 Visual Product
- Hot spots enhanced for visual purposes

USFS AMS Activities – Looking Forward

- Complete additional pre- and early fire season missions
 - Anticipate keeping AMS on N144Z into mid-May
 - Fly additional missions over wildfire incidents
 - Coincident collects with Phoenix
 - Demonstrate daytime mission capabilities
- AirCell/AMS configuration to facilitate control of sensor from ground
 - Need fixed IP for ground station and access through BLM/FS firewall



USFS AMS Activities – Looking Forward

- Identify third platform for most efficient use of the AMS
 - Working with F&AM on access to N182Z (King Air B200)
 - Submit a proposal to F&AM in June 2014
 - Feasibility for use to support fire, forest health, R&D, etc.
 - Address requisite platform upgrades
- AMS and WAI testing/integration mission reports
 - To be compiled by RSAC and available on NIROPS website in mid-summer



USFS AMS Activities – Looking Forward

- NASA/USFS Collaboration???
 - Utilize AMS onboard NASA JSC WB-57 in summer 2014
 - Provide “surge” support capacity for NIROPS, if needed





Thanks

Comments/Questions?



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WWW: <http://www.fs.fed.us/eng/rsac/>