STAR Algorithm and Data Products (ADP) Provisional Review

Suomi NPP Active Fires ARP Product

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Active Fires ARP Lead

8/22/2013

STAR ADP Active Fires
ARP Team Member Goals

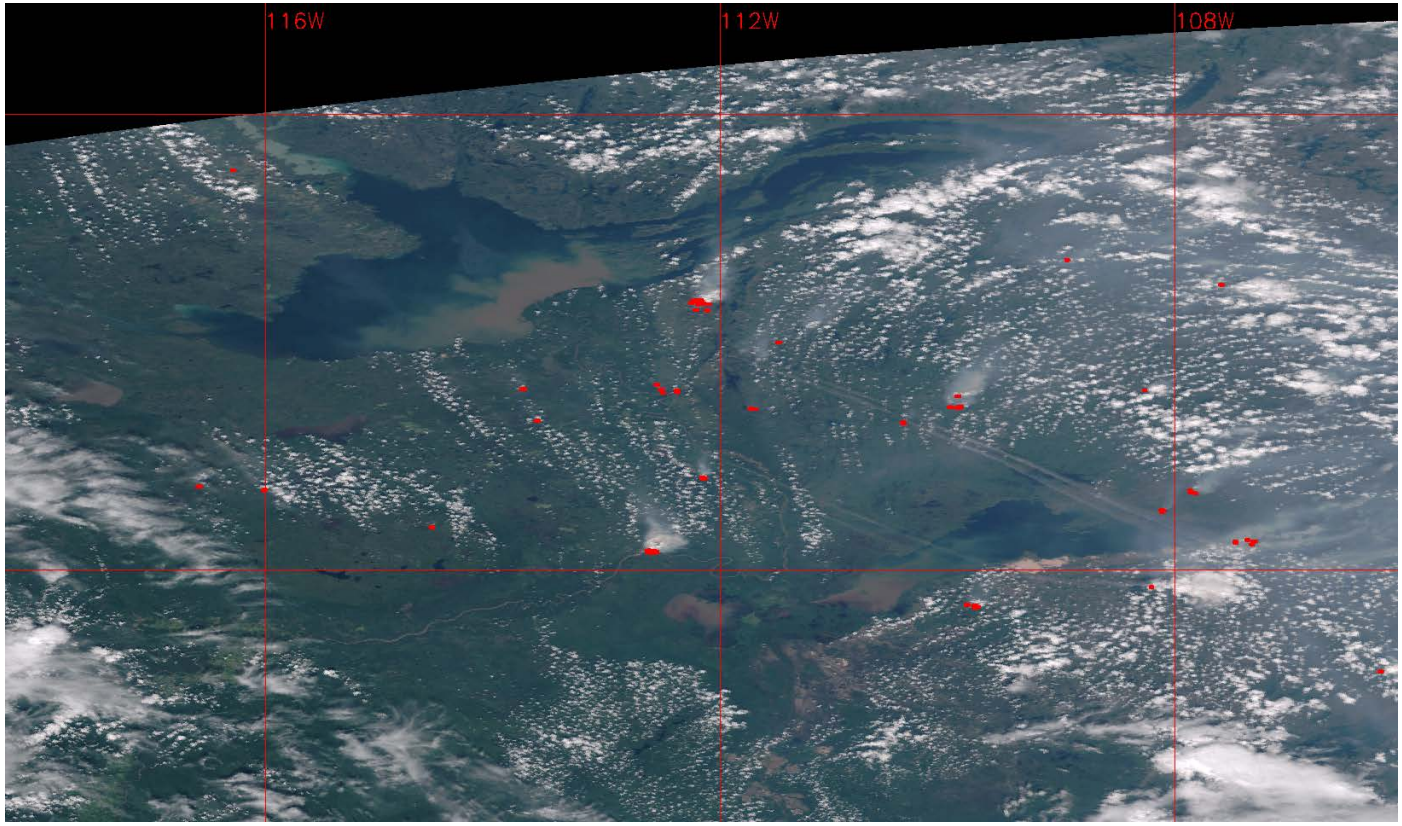
- Ivan Csiszar (NOAA/NESDIS/STAR)
  - STAR ARP lead, international outreach
- Wilfrid Schroeder (UMD/ESSIC)
  - product monitoring and validation; algorithm development
- Louis Giglio (UMD/Geography)
  - algorithm development
- Evan Ellicott (UMD/Geography)
  - user readiness
- Vacant
  - ADL
- Chris Justice (UMD/Geography)
  - program coordination, user readiness, MODIS continuity

Criteria for Provisional Maturity Status

- Product quality may not be optimal
  - Product accuracy is determined for a broader (but still limited) set of conditions.
  - No requirement to demonstrate compliance with specifications.
- Incremental product improvements still occurring
  - DR history and future planned efforts will be shown
- General research community is encouraged to participate in the QA and validation of the product, but need to be aware that product validation and QA are ongoing
- Users are urged to consult the EDR product status document prior to use of the data in publications
- Ready for operational evaluation

Background of Active Fires ARP Product

- Represents **continuity** with NASA EOS **MODIS** and NOAA POES **AVHRR** fire detection (and also international missions such as (A)ATSR
- VIIRS **design allows for radiometric measurements** to detect and characterize active fires over a wide range of observing and environmental conditions
- Product is expected to be used by **real-time resource and disaster management; air quality monitoring; ecosystem monitoring; climate studies** etc.



NW Canada
07 July 2013
20:14:55-20:20:34 UTC

Major Users of Active Fire Products (Point Of Contact)

- **Examples of Key U. S. Users:**
  - US Forest Service (Brad Quayle)
  - STAR – Center for Satellite Applications and Research (Shobha Kondragunta)
  - NESDIS – Hazard Mapping System (Mark Ruminski)
  - NOAA National Weather Service (Peter Roohr, Larry Van Bussum)
  - NASA Ames (Amber Soja)
  - NRL (Edward Hyer)

- **Examples of Key Foreign Users (coordinated by GOFC-GOLD – Global Observation of Forest and Landcover Dynamics):**
  - CONABIO, Mexico (Isabel Cruz)
  - INPE/CPTEC, Brazil (Alberto Setzer)
  - INTA, Argentina (Carlos di Bella, Nicolas Mari)
  - University of Alcalá, Spain (Emilio Chuvieco)
  - Space Research Institute, Moscow, Russia (Evgeny Lyupian)
  - King's College, London, UK (Martin Wooster)

Overview of the Suomi NPP Active Fires ARP

- Geolocation of pixels for which fires are detected (no spatially explicit fire/clear land/cloud/water mask)
  - The algorithm is a hybrid **thresholding and contextual** algorithm
  - Uses **radiometric signals** from M13 and M15, and tests spatial heterogeneity to identify candidate pixels.
  - Uses additional bands and a suite of tests for **internal cloud mask** and the rejection of **false alarms**.
  - Current IDPS product is based on the **MODIS Collection 4** algorithm

L1RD Requirements: prior to v2.7

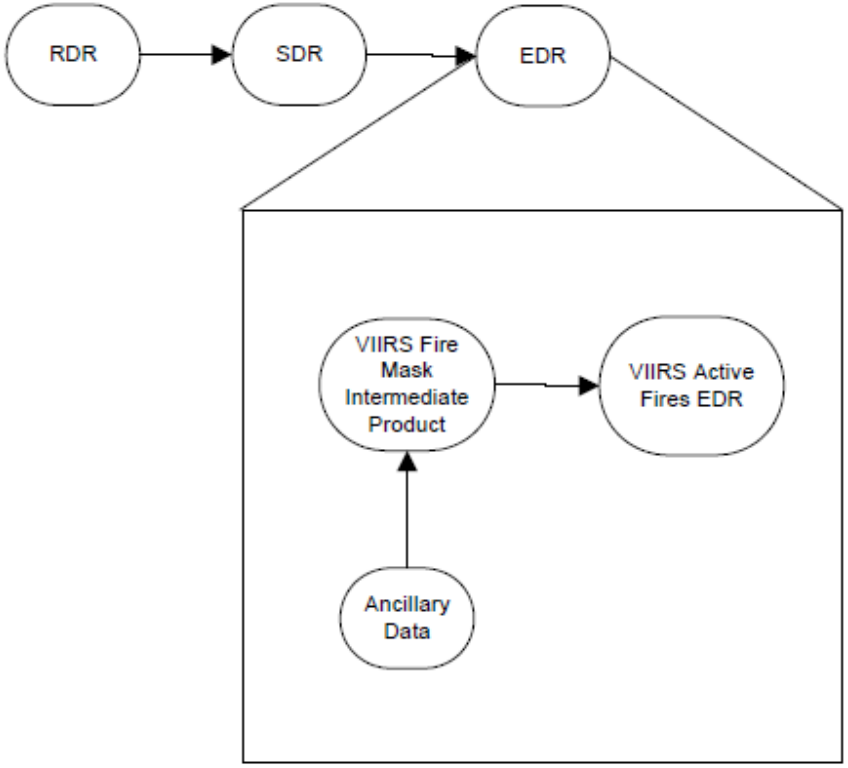
Active Fires		
ATTRIBUTE	**THRESHOLD**	**OBJECTIVE**
a. Horizontal Cell Size		
1. Nadir	0.75 km	0.25 km
2. Worst case	1.6 km	
b. Horizontal Reporting Interval	HCS	
c. Horizontal Coverage	Land Regions	Global
d. Mapping Uncertainty, 3 sigma	1.5 km	0.75 km
e. Measurement Range		
1. Fire Radiative Rower (FRP)	1.0 to 5.0 $(10)^3$ MW	1.0 to 1.0 $(10)^4$ MW
2. Sub-pixel Average Temperature of Active Fire	N/A	4.0 $(10)^2$ K to 1.2 $(10)^3$ K
3. Sub-pixel Area of Active Fire	N/A	From 100 m^2 to 50m times the Ground Sample Distance in Scan Direction
f. Measurement Uncertainty		
1. Fire Radiative Rower (FRP)	50%	20%
2. Sub-pixel Average Temperature of Active Fire	N/A	25K
3. Sub-pixel Area of Active Fire	N/A	30%
g. Refresh	At least 90% coverage of the globe every 12 hours (monthly average)	N/A
h. Latency	See L1S00015	15 min

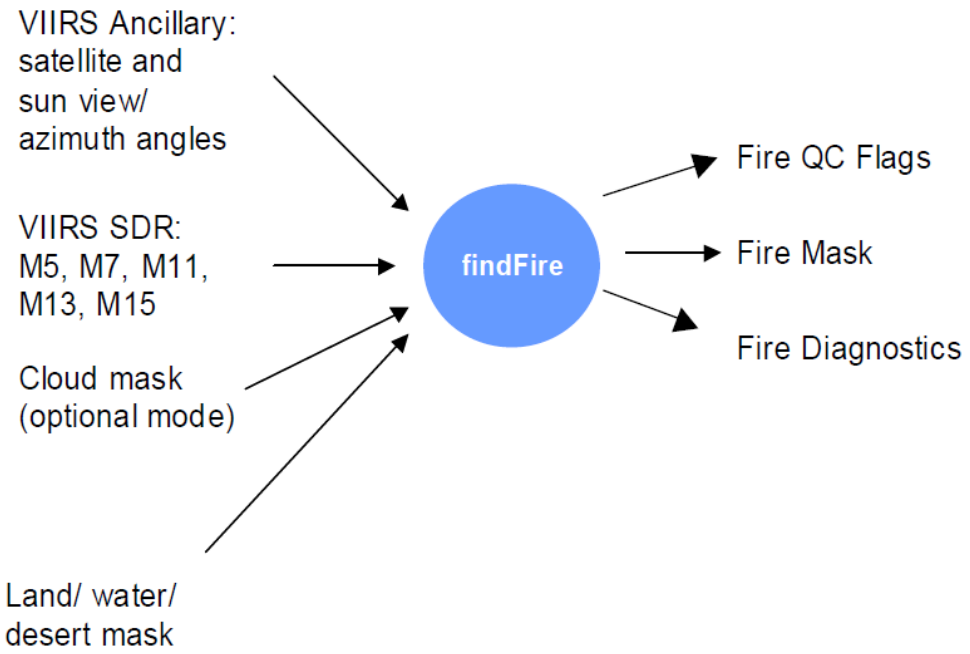
L1RD Requirements: current (v2.9)

Active Fires		
ATTRIBUTE	**THRESHOLD**	**OBJECTIVE**
a. Horizontal Cell Size		
1. Nadir	0.80 km	0.25 km
2. Worst case	1.6 km	
b. Horizontal Reporting Interval	HCS	
c. Horizontal Coverage	Global	Global
d. Mapping Uncertainty, 3 sigma	1.5 km	0.75 km
e. Measurement Range		
1. Fire Radiative Rower (FRP)	1.0 to 5.0 $(10)^3$ MW	1.0 to 1.0 $(10)^4$ MW
2. Sub-pixel Average Temperature of Active Fire	N/A	N/A
3. Sub-pixel Area of Active Fire	N/A	N/A
f. Measurement Uncertainty		
1. Fire Radiative Rower (FRP)	50%	20%
2. Sub-pixel Average Temperature of Active Fire	N/A	N/A
3. Sub-pixel Area of Active Fire	N/A	N/A
g. Refresh	At least 90% coverage of the globe every 12 hours (monthly average)	N/A
h. Latency	See L1S00015	15 min

Current IDP product was designed to meet heritage NPOESS requirements., which have been baselined according to L1RDS S-NPP Performance Exclusions (Appendix D). Spatially explicit fire mask and fire characterization are "uppers" in the JPSS L1RD for J1 and beyond.

Active Fire ARP Dataflow





OAD VIIRS Active Fires 474-00064 May 14, 2013; Figure 1 (Processing Chain Associated with VIIRS Active Fires ARP)

ATBD VIIRS Active Fires 474-00030 April 22, 2011; Figure 5 (Algorithm Context Diagram)

Beta Assessment and Remaining Issues

- **Overall performance** of the Suomi NPP VIIRS fire product is **good**
- Strong dependence on input **VIIRS SDR quality**.
  - Team provided **feedback to SDR team** that helped identify SDR issues
    - Lower than expected VIIRS detection rates – traced back **to incorrect M13 aggregation**; fixed in Mx 5.3
- **Problems involving primary (M13) band used in fire algorithm persisted after implementation of Mx5.3**
  - Spurious detections along scanlines 1-2 times a day – partly traced back to **VIIRS Dual Gain Switching Sequence Anomaly**; to be fixed in Mx 6.3
  - Dual gain switching causing (random) data anomalies resulting in abnormally high brightness temperatures
    - Associated SDR quality flags may leave corrupted pixels unmarked (QA=0)
  - Fire team will continue to provide feedback to SDR team
  - Fire team currently working on ADL → fire code bypassing bad SDR
- More work is needed to implementation of **new MODIS algorithm components** (implemented in Version 6) and **sensor-specific tuning**
- Explicit **validation** remains crucial

Key DRs prior to Beta maturity review

Date	Update/DR#	Reason	Status
2-2-2012	DR 4547	Spurious Fire Pixels	3-8-2012; worked through VIIRS SDR DR 4620
1-31-2012	DR 4543	M13 Low Gain SDR Calibration Mismatch with High Gain SV	Implemented in Mx5.3 on 4/3/2012
2-9-2012	DR 4568	M13 LG Calibration Coefficients Incorrect	Closed; implementation included in DR 4591
2-19-2012	DR 4591	Update delta C LUT and G coefficients	Implemented on 2/29/12
2-7-2012	DR 4563	VIIRS M13 SDR Aggregation in Temperature Domain	Implemented in Mx5.3 on 4/3/2012
Beta maturity cutoff			
3-6-2012	DR 4620	Dual Gain Calibration OBC States Mismatch	Implemented in Mx6.3 on 10/15/2012
4-6-2012	DR 4655	Dual Gain Bands Cal Sequence Anomaly	Implemented in Mx6.3 on 10/15/2012

SPURIOUS DETECTIONS AND SDR QUALITY FLAGS

Spurious Fire Detections after Beta

Main anomalies identified:

- Block of corrupted M13 brightness temperature values (>450K) along a single scan
  - SDR QA flags do not show the anomaly – spurious fire pixels produced
  - SDR QA flags correctly identify anomaly – fire algorithm still generates false detections
- Alternating omission of fire pixels between successive scans
  - SDR data and QA flags for omitted fire pixels look normal
  - QA flags for adjacent scans indicating calibration errors
- Block of spurious fire pixels coinciding with terminator
  - No anomalies were found in the associated SDR data and QA flags

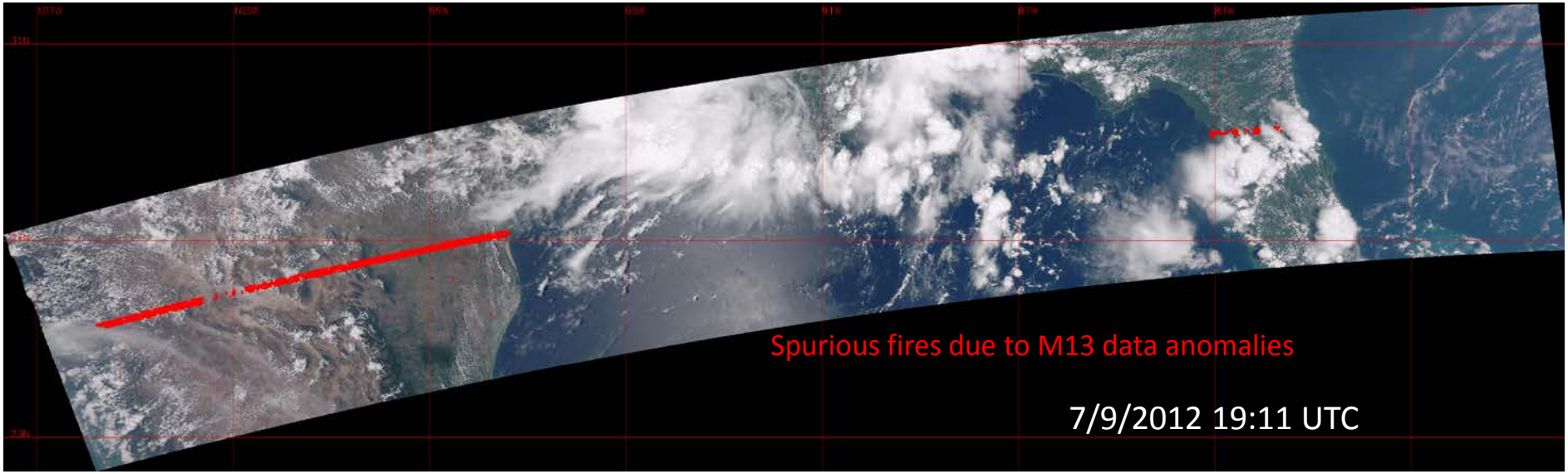
Identification of root cause of fire data anomalies is often compromised by the data archive management

- Single data repository can have multiple versions of the same data granule
- Data granules obtained form different archives (CLASS, GRAVITE, NESDIS-SCDR, LandPEATE) show unique processing times

Imperative to be able to trace the generation of the L2 AVAFO (Active Fire) data back to the input SDR&RDR files used during processing

- Data archives must contain those files and reduce/eliminate ambiguities

Spurious Fire Detections in Beta version



- ***after the Beta effectivity date (April 3, 2012) scanlines with spurious fire detections were observed approximately once a day***

- ***the current active fire code excludes non-land pixels and pixels flagged as cloud by the internal cloud mask – issues are detected only for a fraction of the granules***

- ***it is imperative to improve the quality and quality flagging of the input SDR data***

Reference Table for QA bits

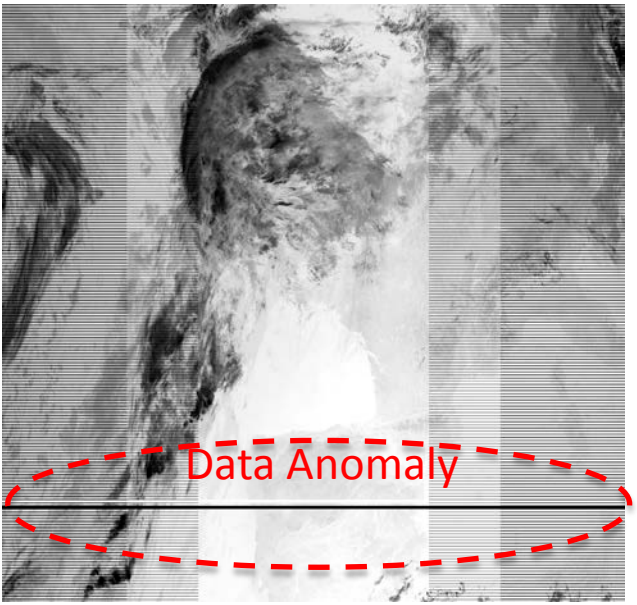
QF1_VIIRSMBANDSDR 1 byte(s) 768 3200	Description	Datum Offset	Data Type	Legend Entries	
	Quality - Indicates calibration quality due to bad space view offsets, OBC view offsets, etc or use of a previous calibration view	0	2 bit(s)	Name	Value
				Good	0
				Poor	1
				No Calibration	2
				Not Used	3
	Saturated Pixel - Indicates the level of pixel saturation	2	2 bit(s)	Name	Value
				None Saturated	0
				Some Saturated	1
				All Saturated	2
				Not Used	3
	Missing Data - Data required for calibration processing is not available for processing	4	2 bit(s)	Name	Value
				All data present	0
				EV RDR data missing	1
				Cal data (SV, CV, SD, etc.) missing	2
				Thermistor data missing	3
	Out of Range - Calibrated pixel value outside of LUT threshold limits	6	2 bit(s)	Name	Value
				All data within range	0
				Radiance out of range	1
				Reflectance or EBBT out of range	2
				Both Radiance and Reflectance/EBBT out of	3

QA	Definition
5	Poor Cal - Some saturated
18	No Calibration - None Saturated - EV RDR Data Missing
33	Poor Cal - None Saturared - Cal Data Missing
34	No Calibration - None Saturated - Cal Data Missing
50	No Calibration - None Saturated - Thermistor Data Missing
129	Poor Cal - None Saturated - All Data Present - Reflectance or EBBT Out of Range

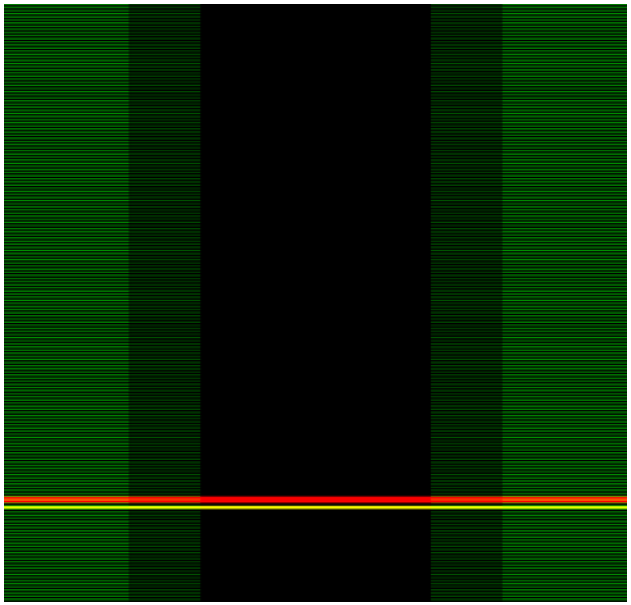
M13 - QA33 Issue

VIIRS_20120817_t0211442_e021724

5min Swath – Nighttime Data

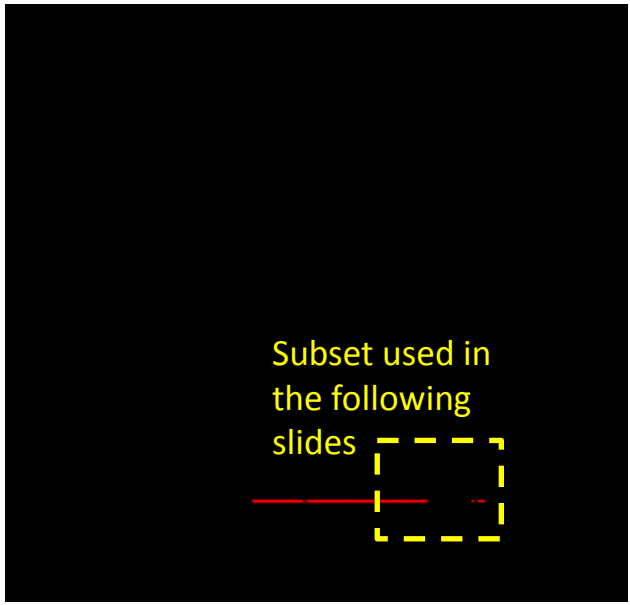


M13 brightness temperature data



M13 QA layer

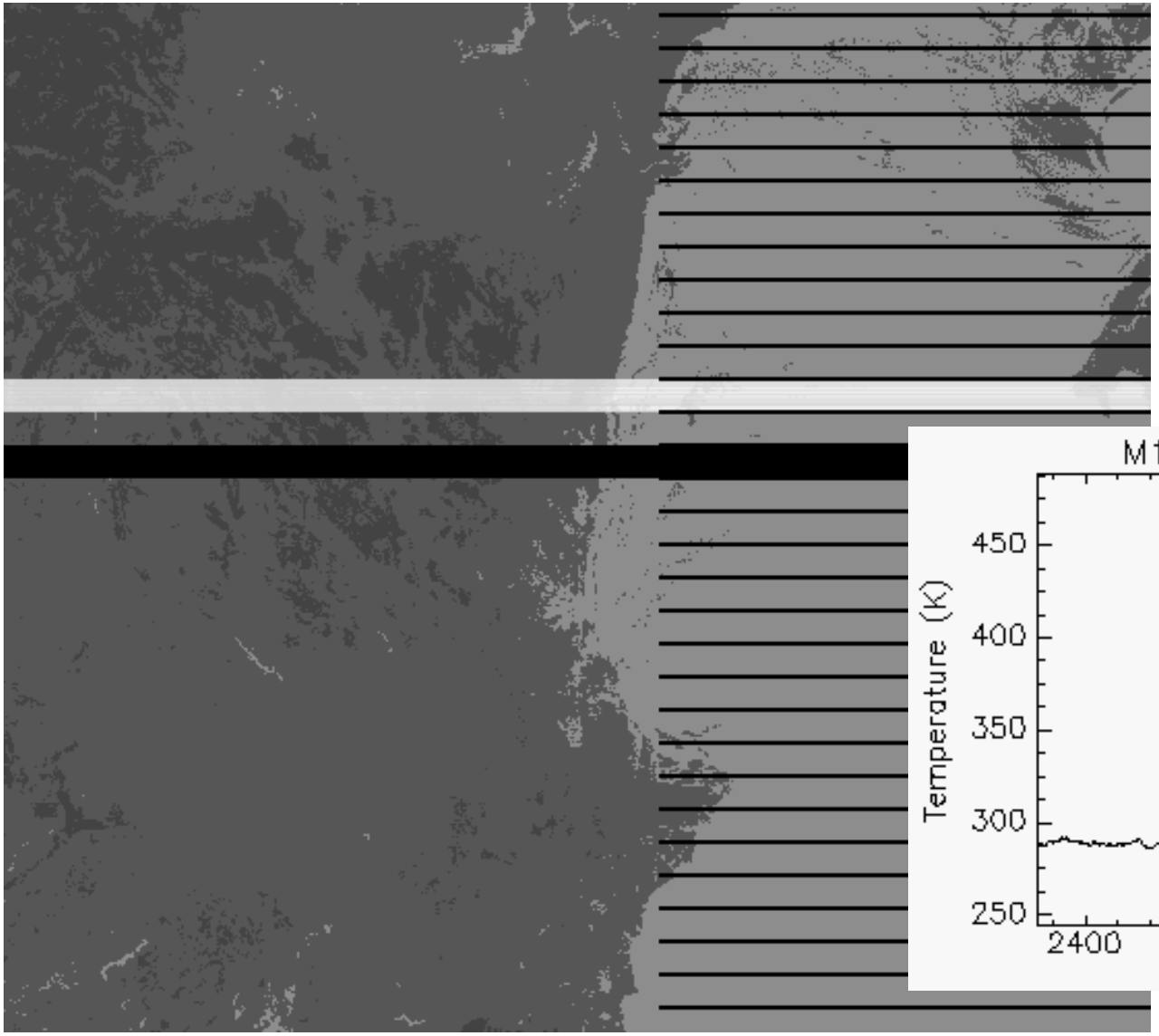
Black = 0
Green = 2
Red = 33 (*Poor Calibration - Cal data missing*)
Yellow = 34 (*No Calibration - Cal data missing*)



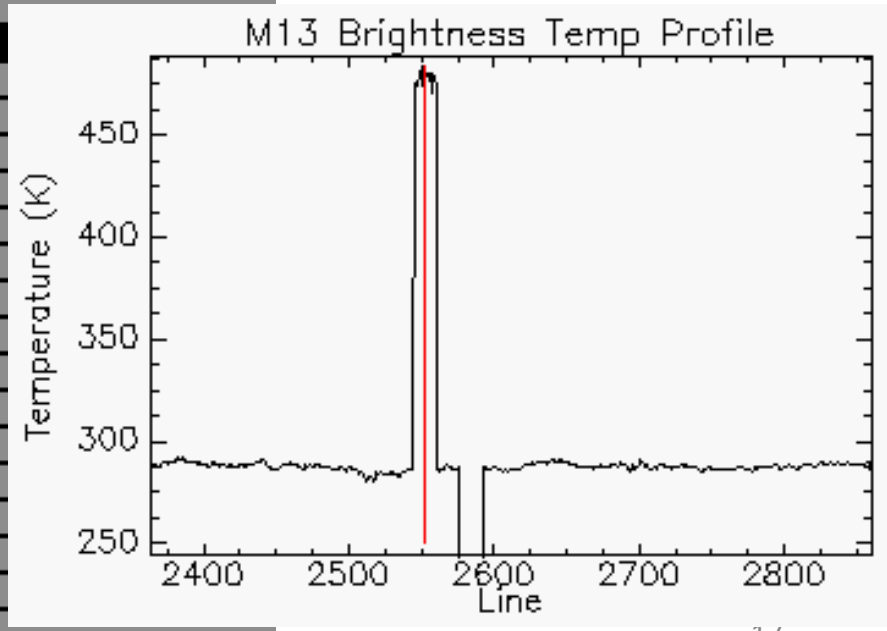
Active Fire Product

Black = no fire
Red = fire

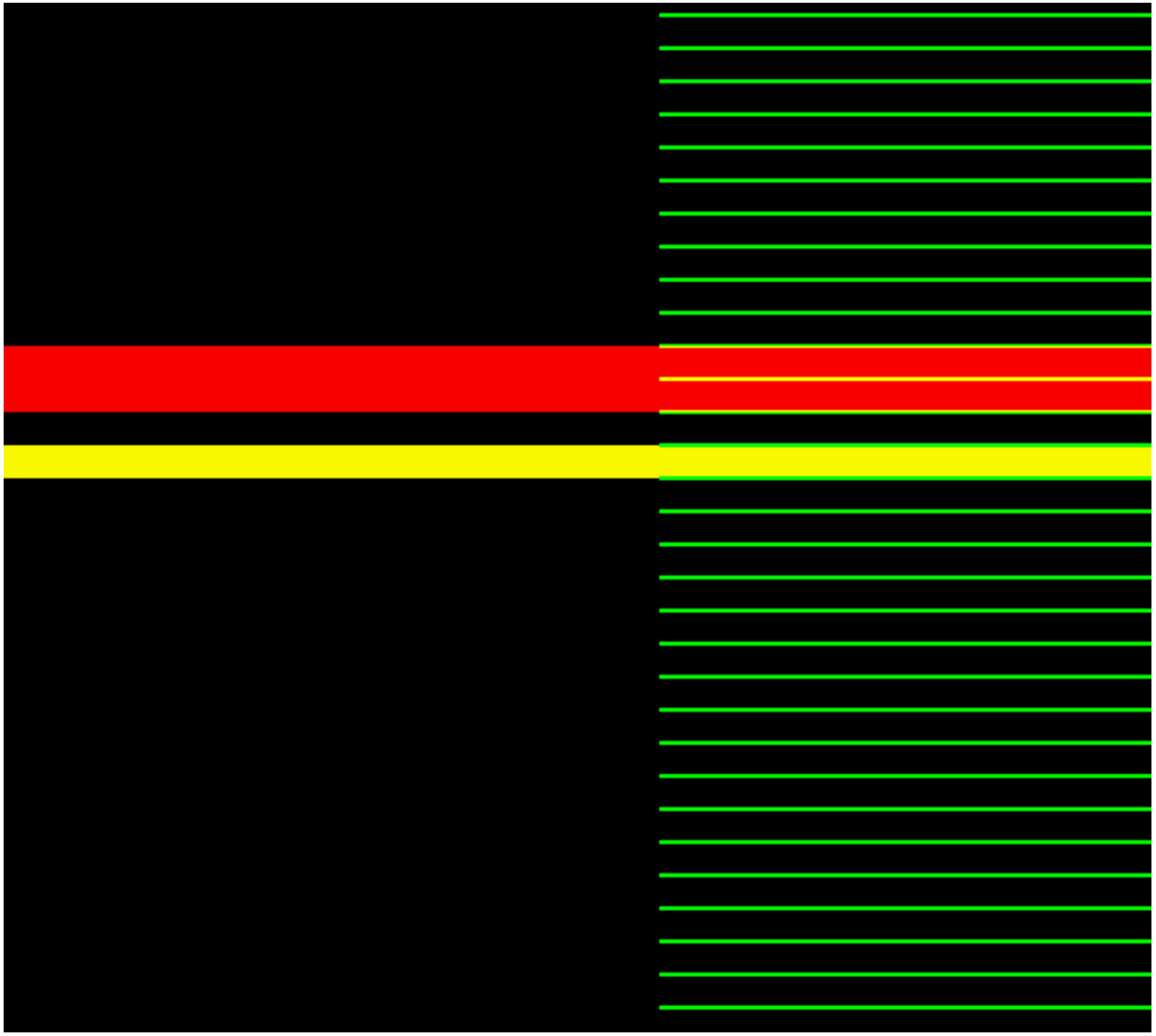
M13 - QA33 Issue



M13 Brightness Temp
Color-enhanced to
show features



M13 - QA33 Issue



QA M13

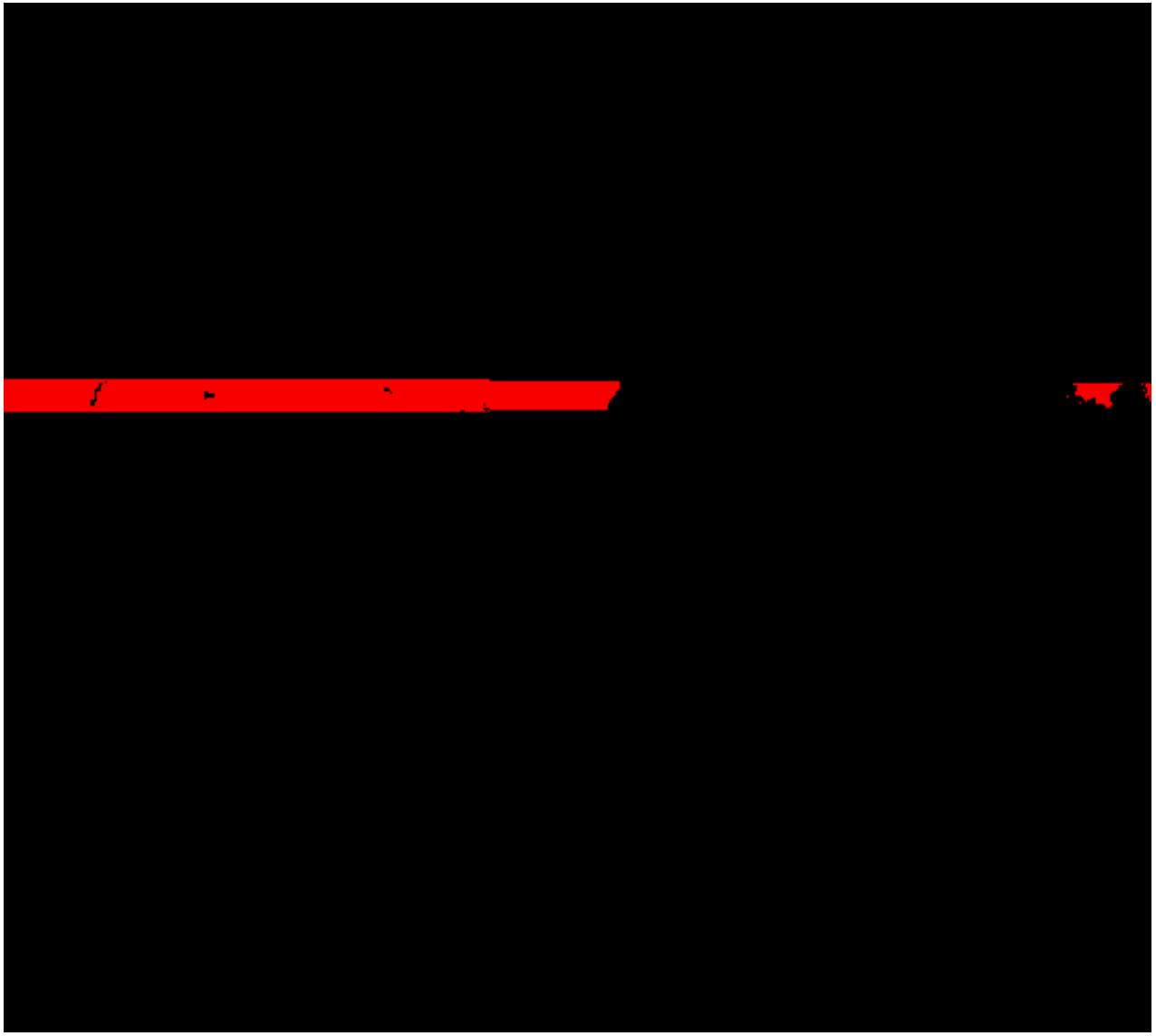
Black = 0

Green = 2

Red = 33 (Cal data missing)

Yellow = 34 (EVR data missing)

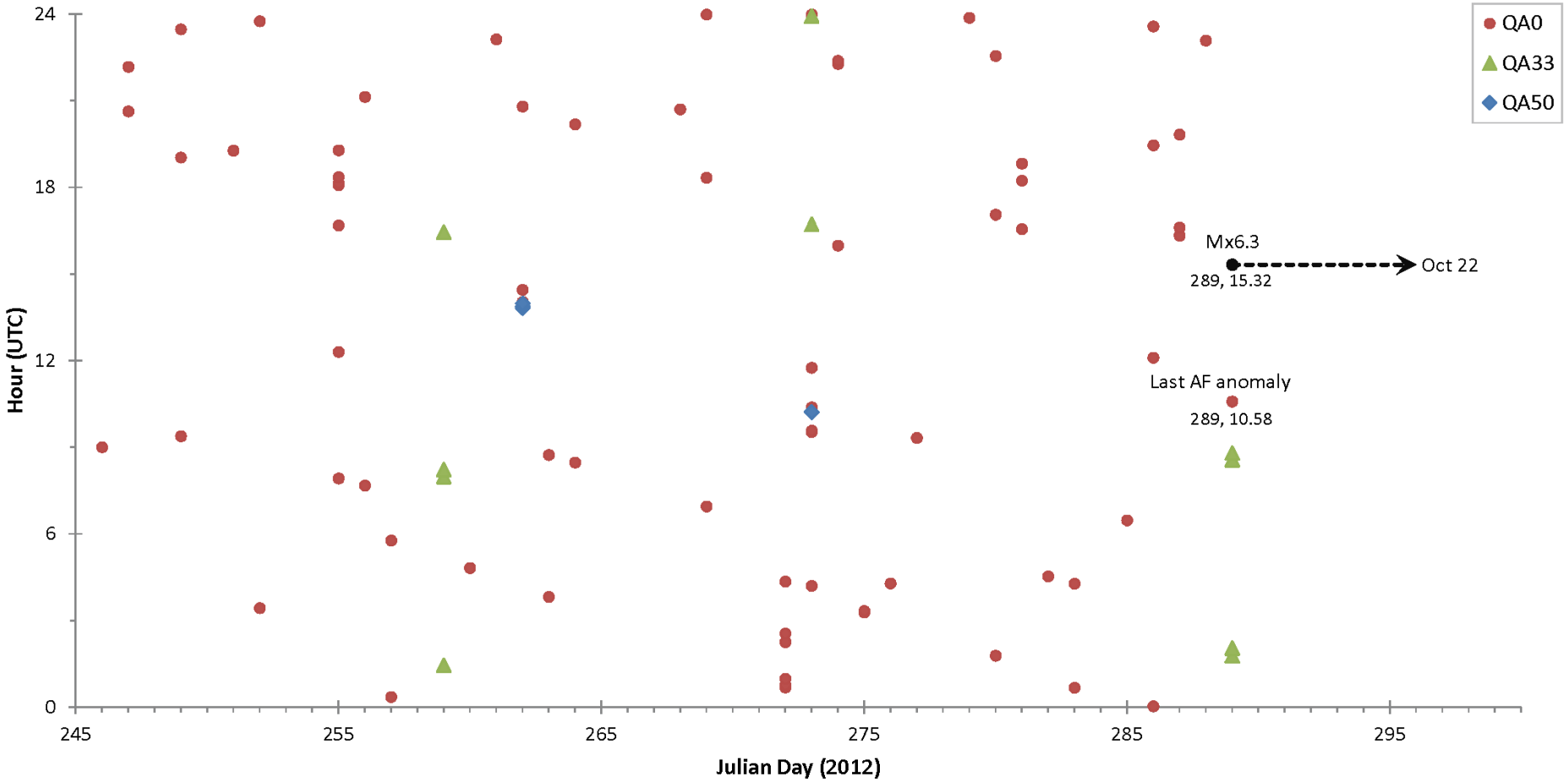
M13 - QA33 Issue



Active Fire
Black = no fire
Red = fire

Discontinuities
caused by clouds

Impact of M13 SDR dual gain fix on active fire product performance



Proposed effectively date for Provisional Maturity: October 16, 2012 (first full day after the implementation of Mx6.3 on October 15)

A few examples of remaining spurious data after Mx6.3 and SDR team evaluation

- 25 Oct 07:04:58 scan selected for **calibration substitution** was also actually defective.
- 29 Nov 18:04:11 **calibration substitution** was not done properly.
- 24 Dec 07:07:37, this granule occurred during a **major sync loss**
- 31 Jan 18:21:12-18:26:52 large data gap after which the first scan has elevated offset; **calibration substitution**.

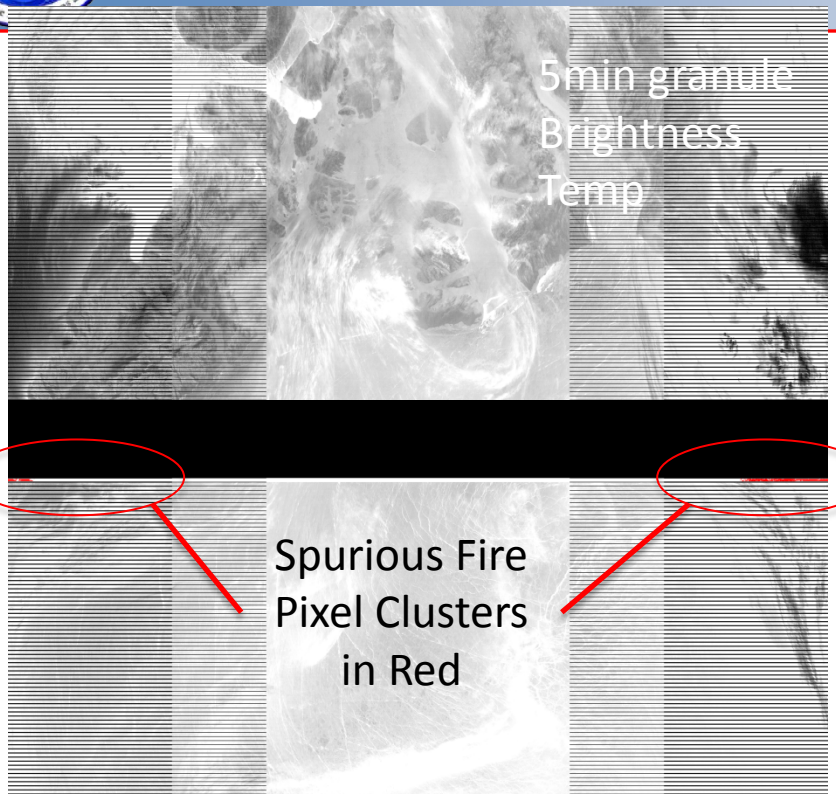
Comments/evaluation by Lushalan Liao, NGAS.

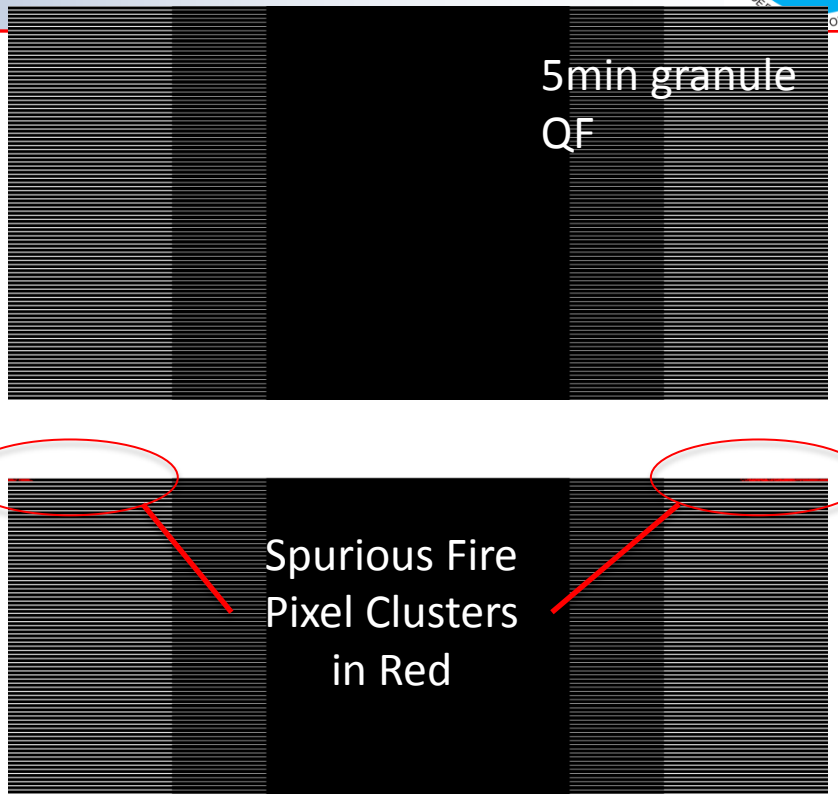
Example of calibration substitution

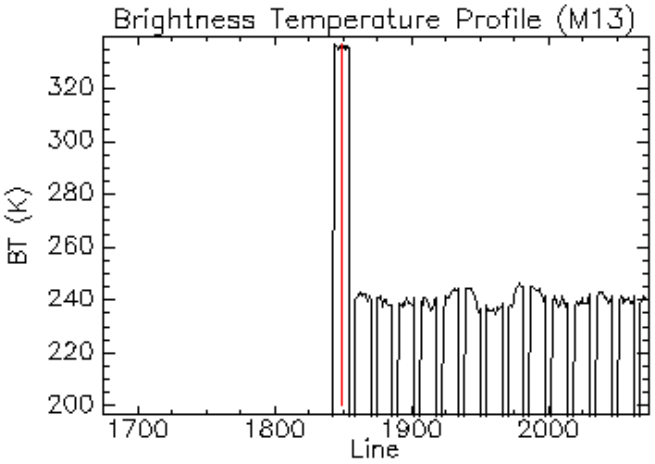
Persisting bad SDR data with QF = 0 following implementation of Mx6.3 (dual-gain switch fix) leading to spurious fire pixel clusters

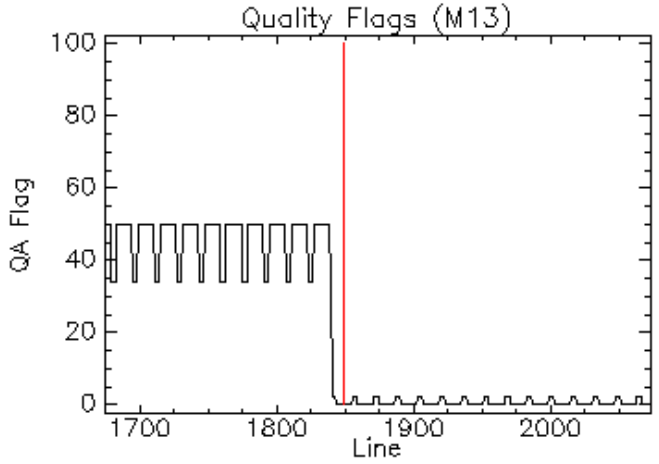
Only a handful of granules showing this anomaly

VIIRS M13: 20130131_t1821124_e1826528









Example of detections with non-zero SDR quality flag

Nominal M13 and M15 SDR data
Showing fire detection and QF <> 0

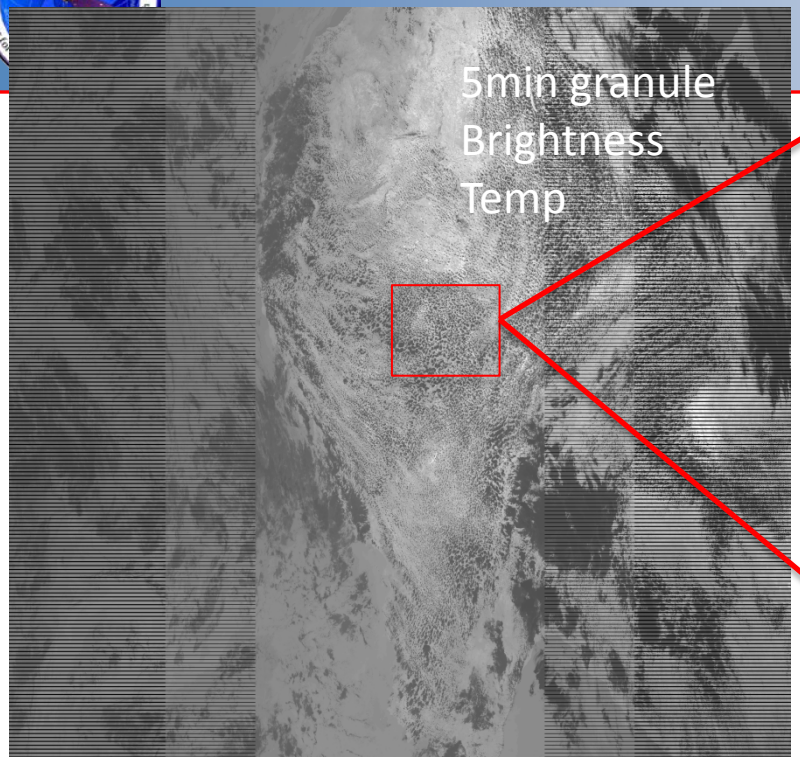
Image analyses suggesting one or more saturated pixels being mixed during data aggregation

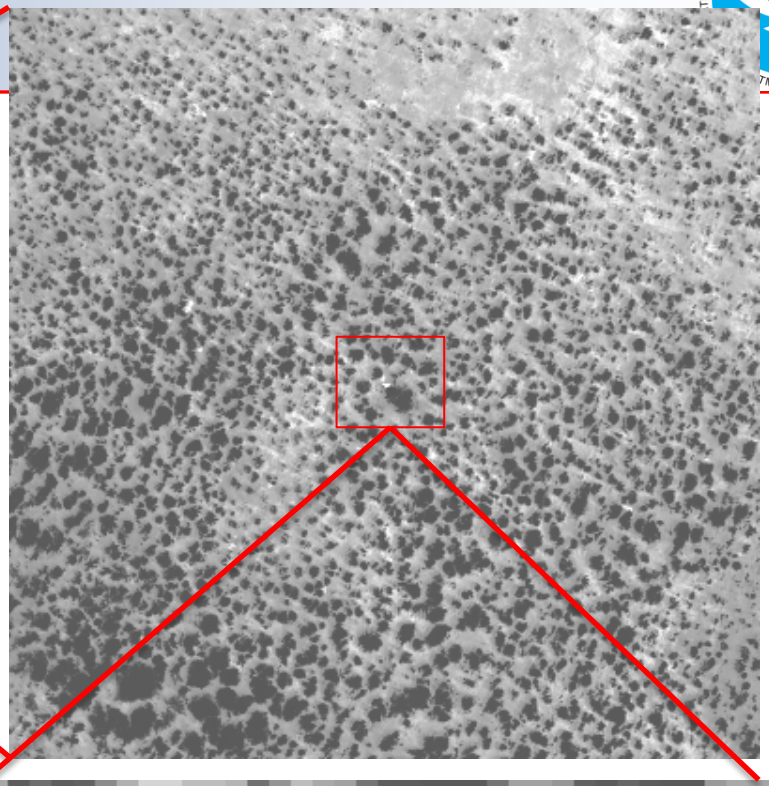
Most commonly found QFs:

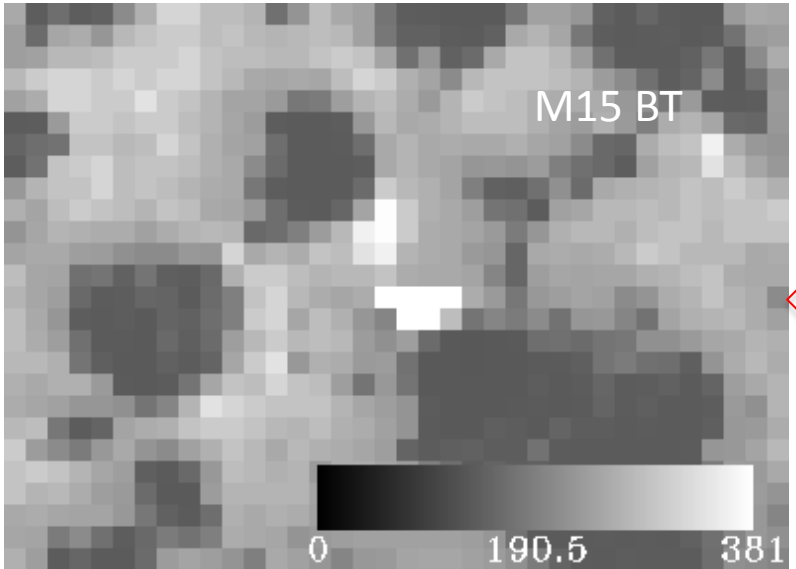
1 – Poor Calibration -> ??
9 – Poor Calibration -> All saturated
65 – Poor Calibration -> Radiance out of range

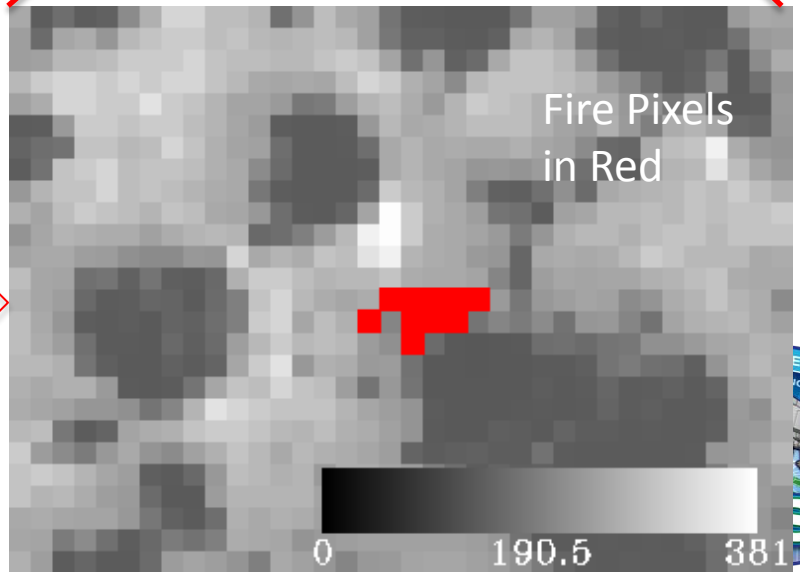
Only a few (<5) pixels per calendar date compared to ~10-15K fire pixels detected daily

VIIRS M15: 20130207_t0347369_e0353173

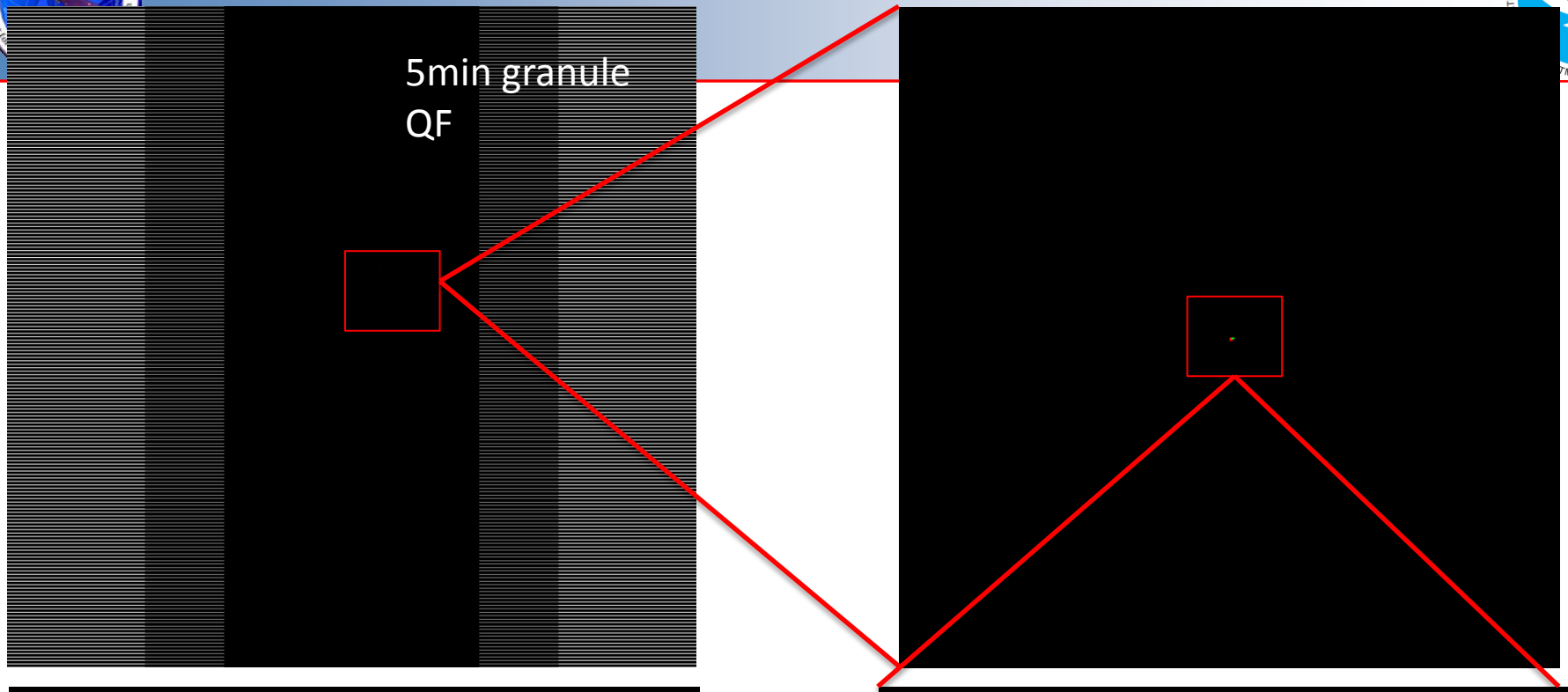


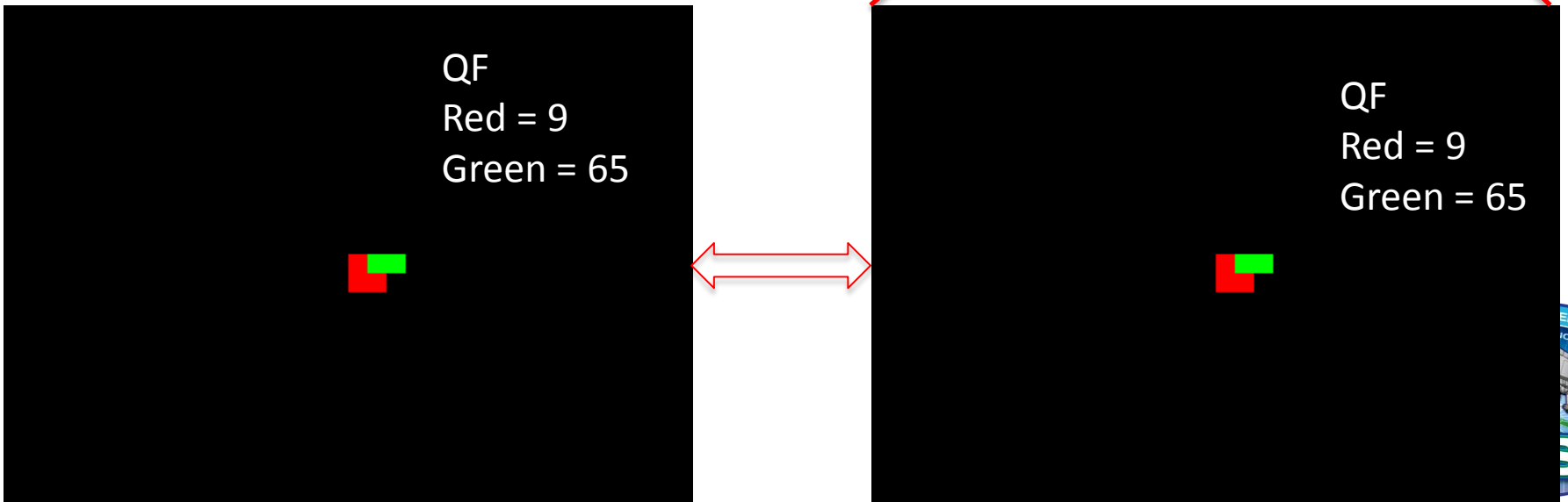






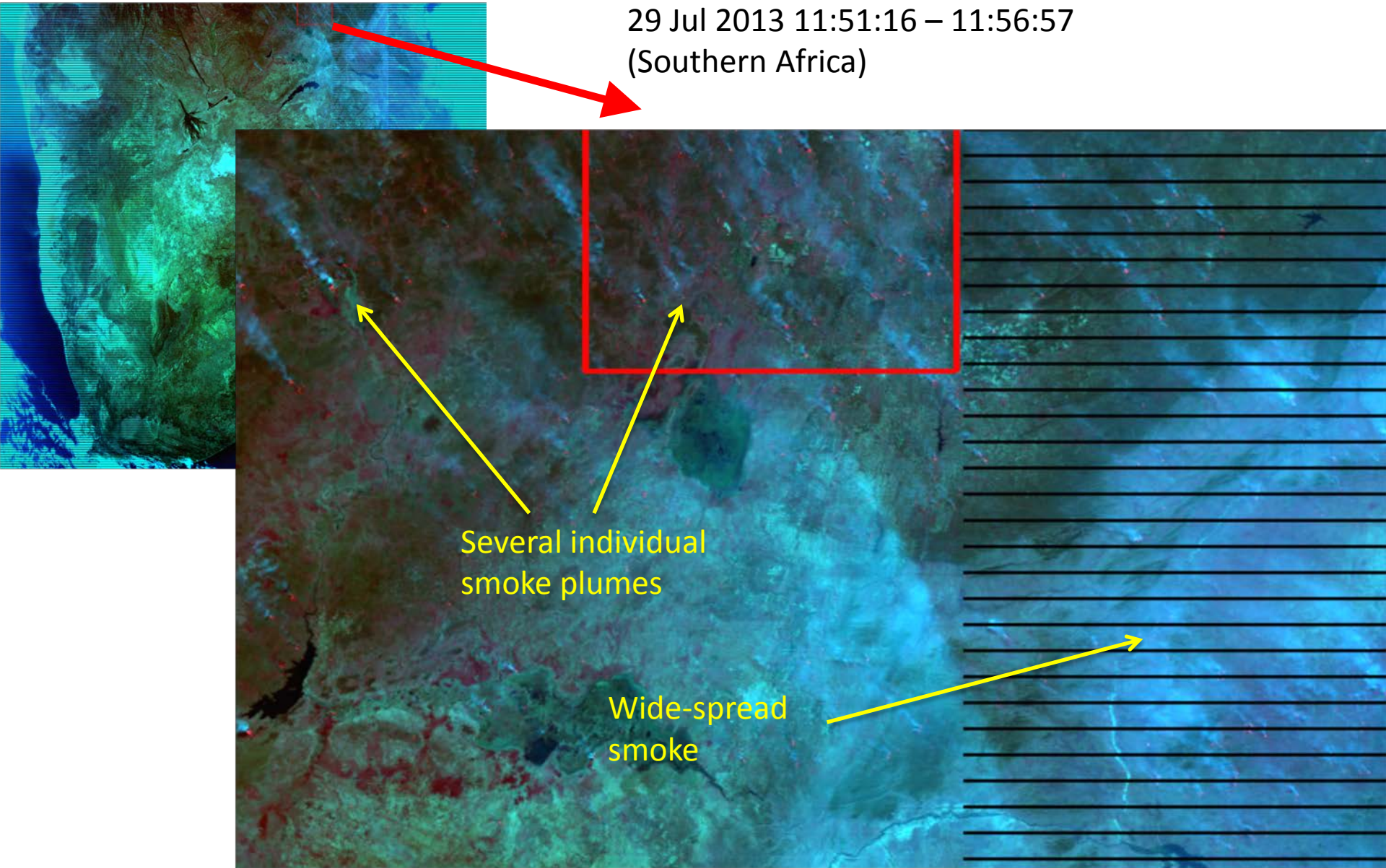
VIIRS M15: 20130207_t0347369_e0353173



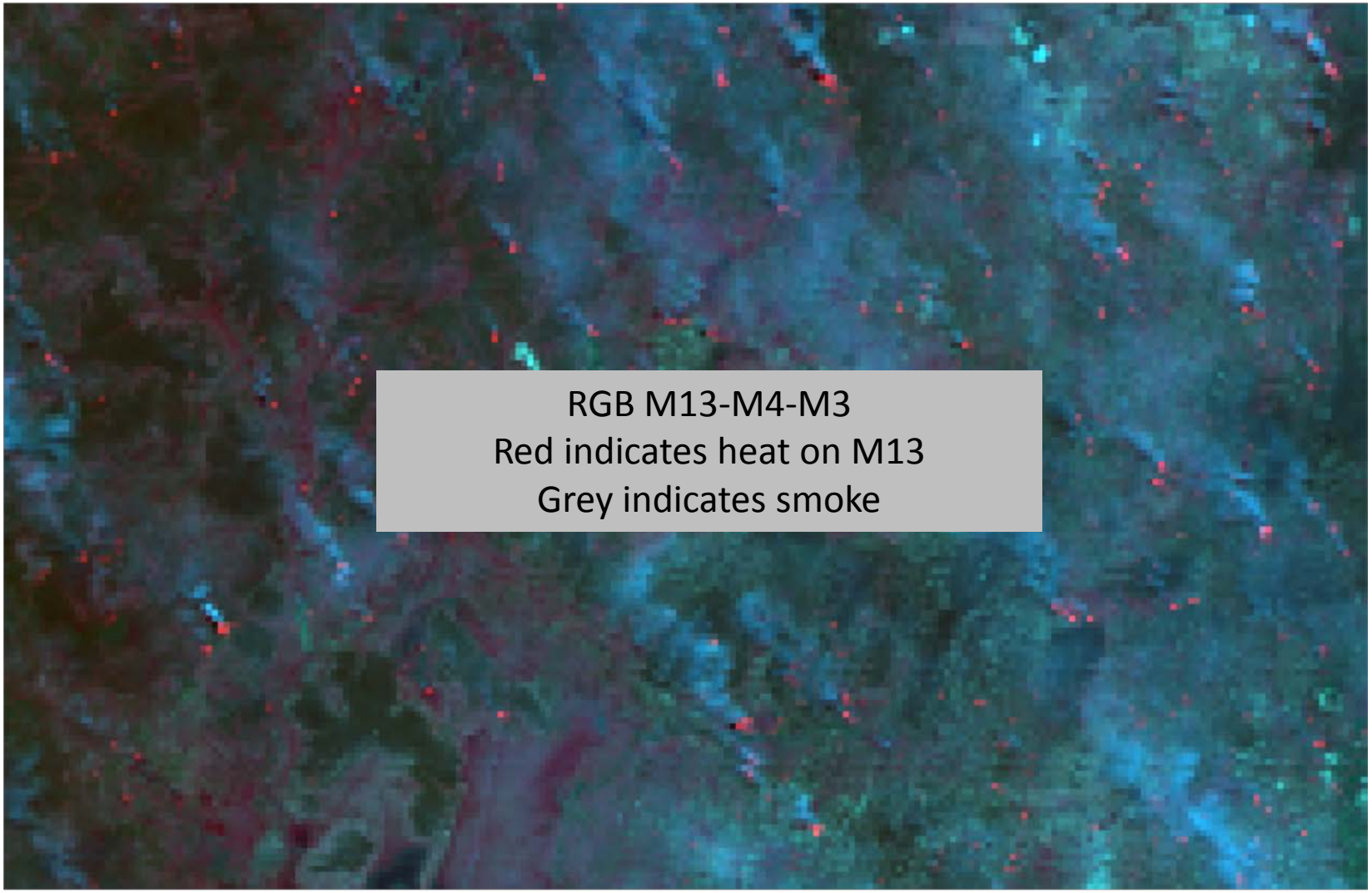


Valid fire detections with M13 QA33

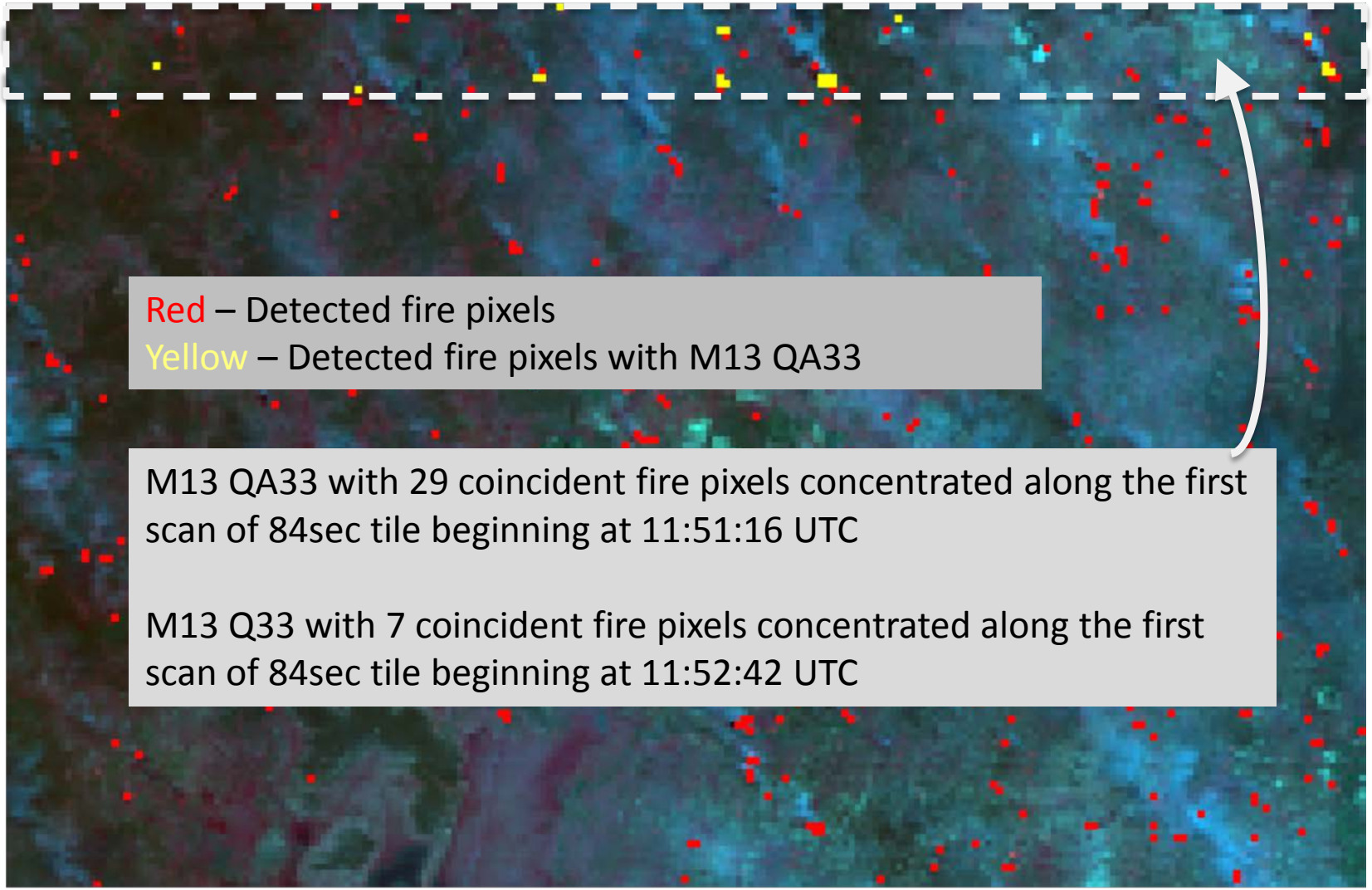
29 Jul 2013 11:51:16 – 11:56:57
(Southern Africa)



Valid fire detections with M13 QA33

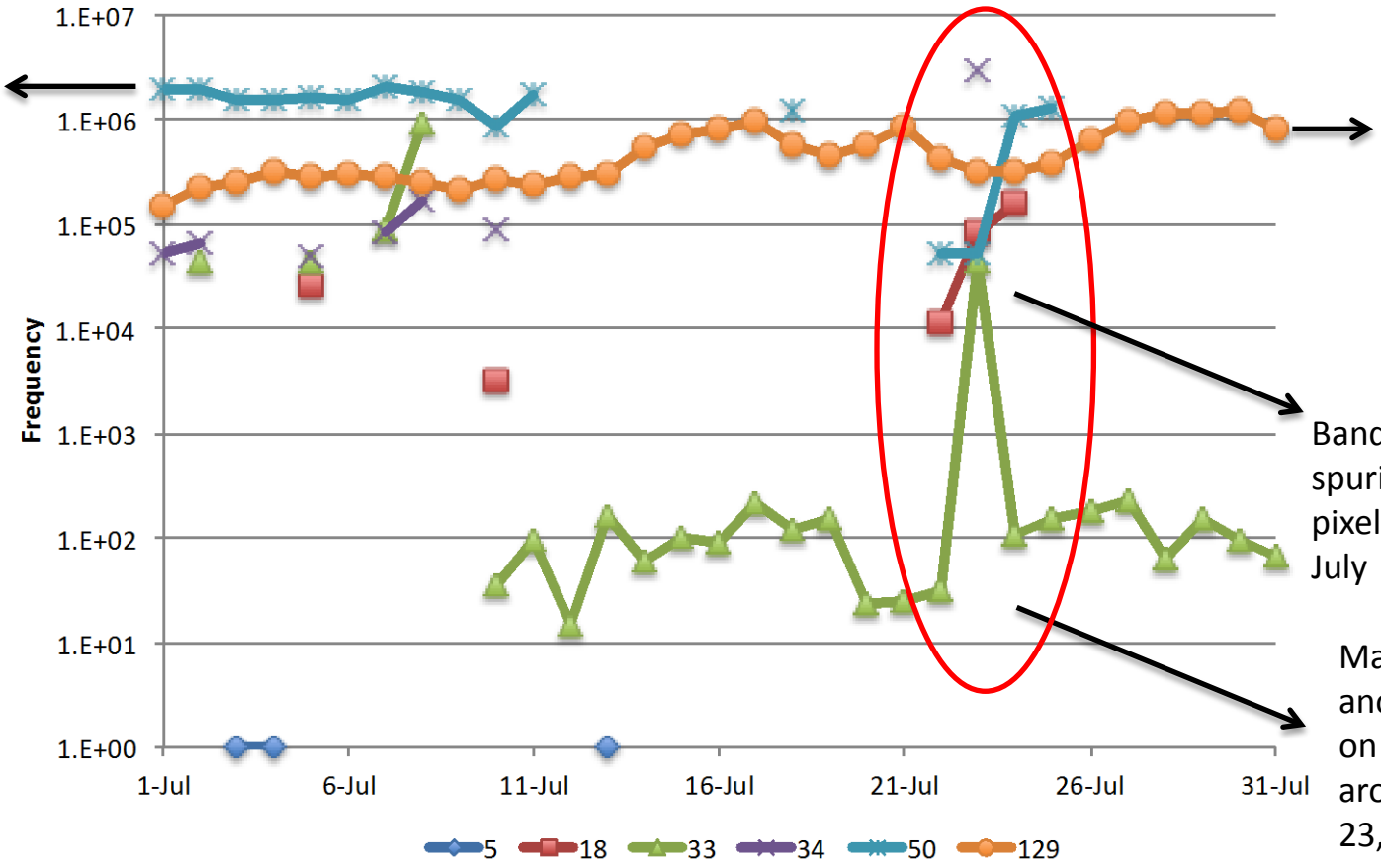


Valid fire detections with M13 QA33



M13 Non-Zero QA Frequency

Image gap; adjacent bad scan (spurious BT13) found with QA = 0 (11 July 18:03:11UTC). Spurious fire pixels likely avoided due to very low BT15.



Usually associated with cold targets (cloud tops)

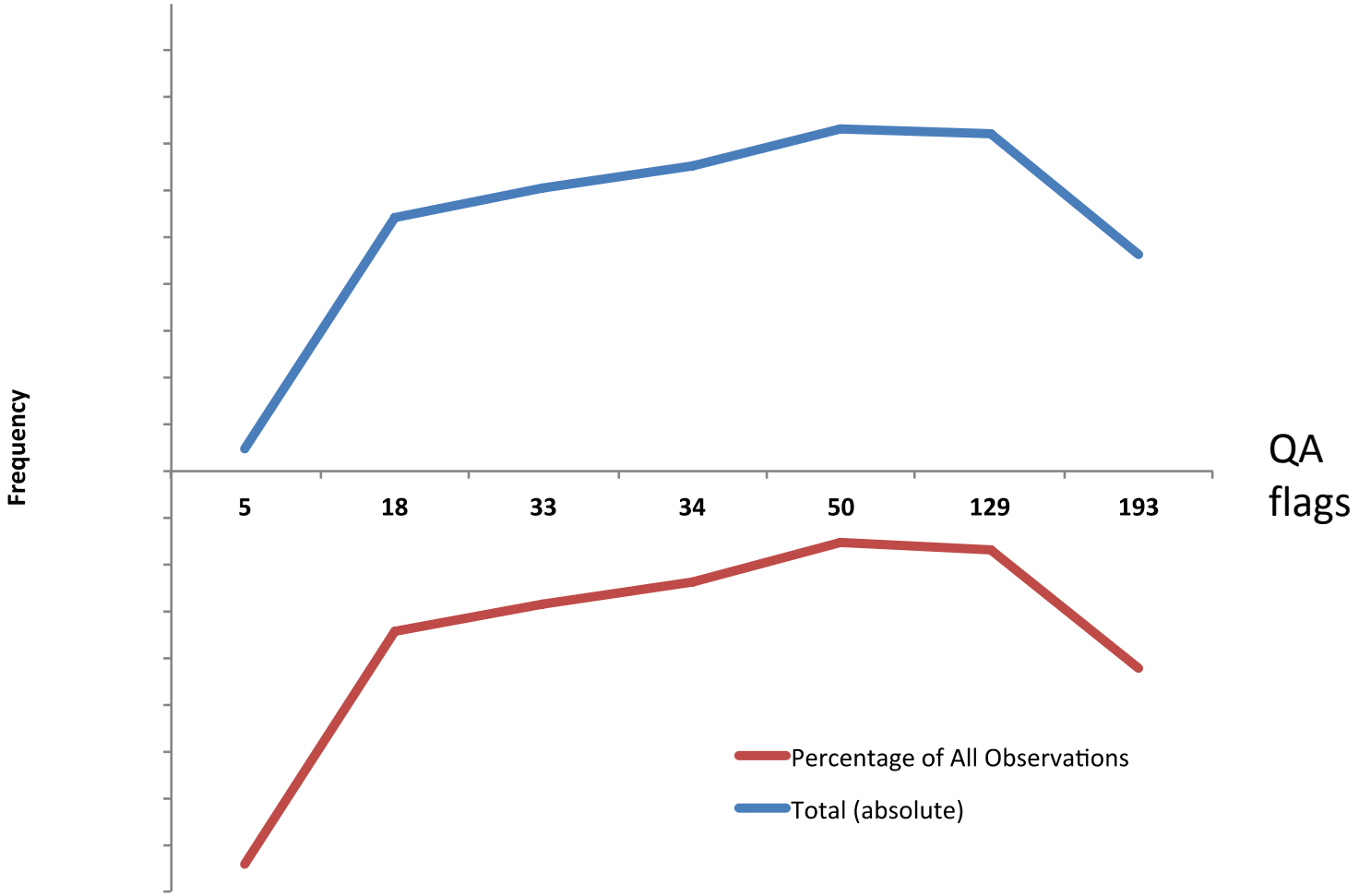
Band of spurious fire pixels on 23 July

Major anomalies on and around July 23, 2013

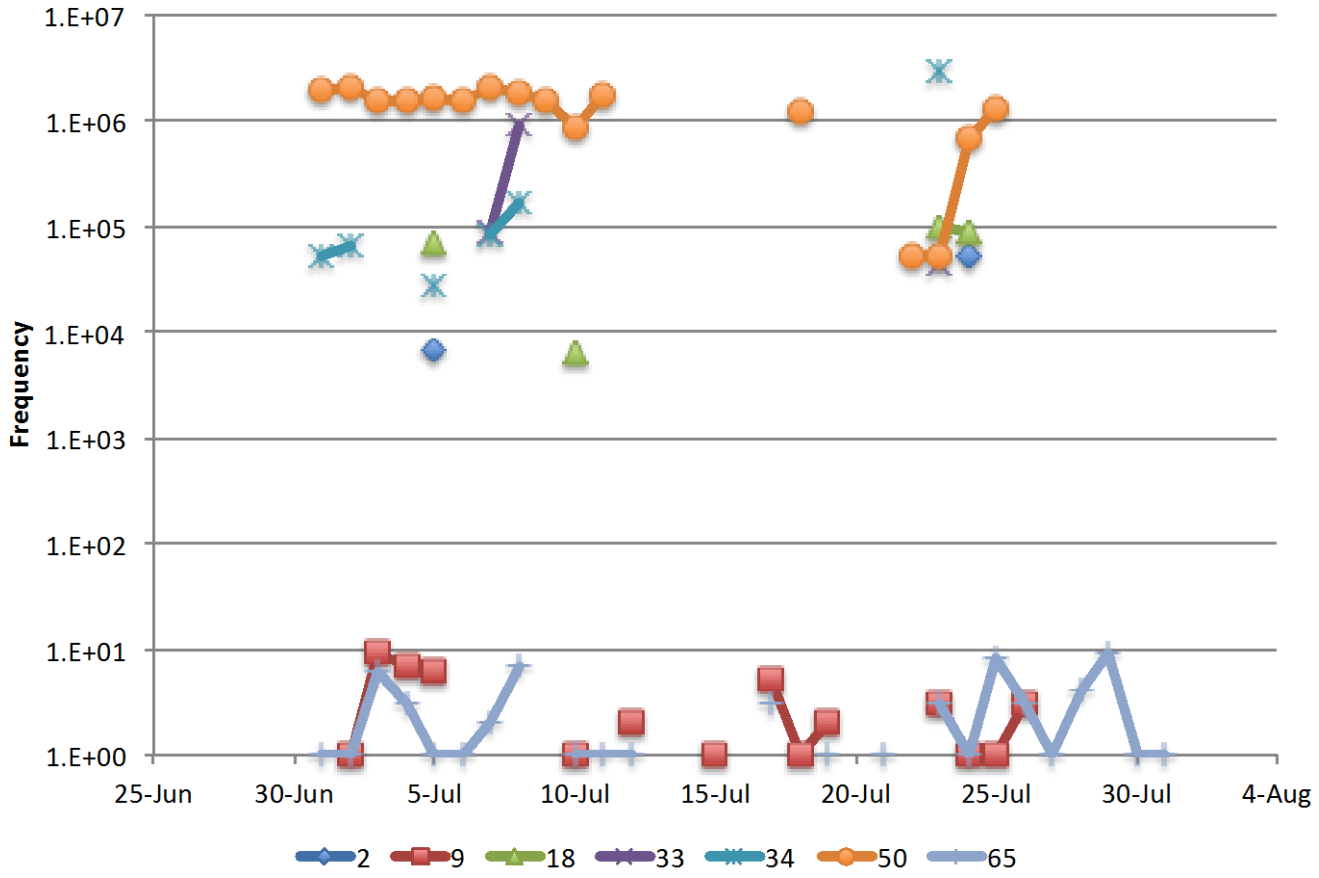
QA	Definition
5	Poor Cal - Some saturated
18	No Calibration - None Saturated - EV RDR Data Missing
33	Poor Cal - None Saturared - Cal Data Missing
34	No Calibration - None Saturated - Cal Data Missing
50	No Calibration - None Saturated - Thermistor Data Missing
129	Poor Cal - None Saturated - All Data Present - Reflectance or EBBT Out of Range

Note drop on July 10: implementation of SDR sync loss correction in Mx7.1 (CCR-12-0730; DR 4767, 4776, 4777, 4795, 4981, 4992)

M13 Non-Zero QA Frequency (Period sampled: 01-31 July 2013)

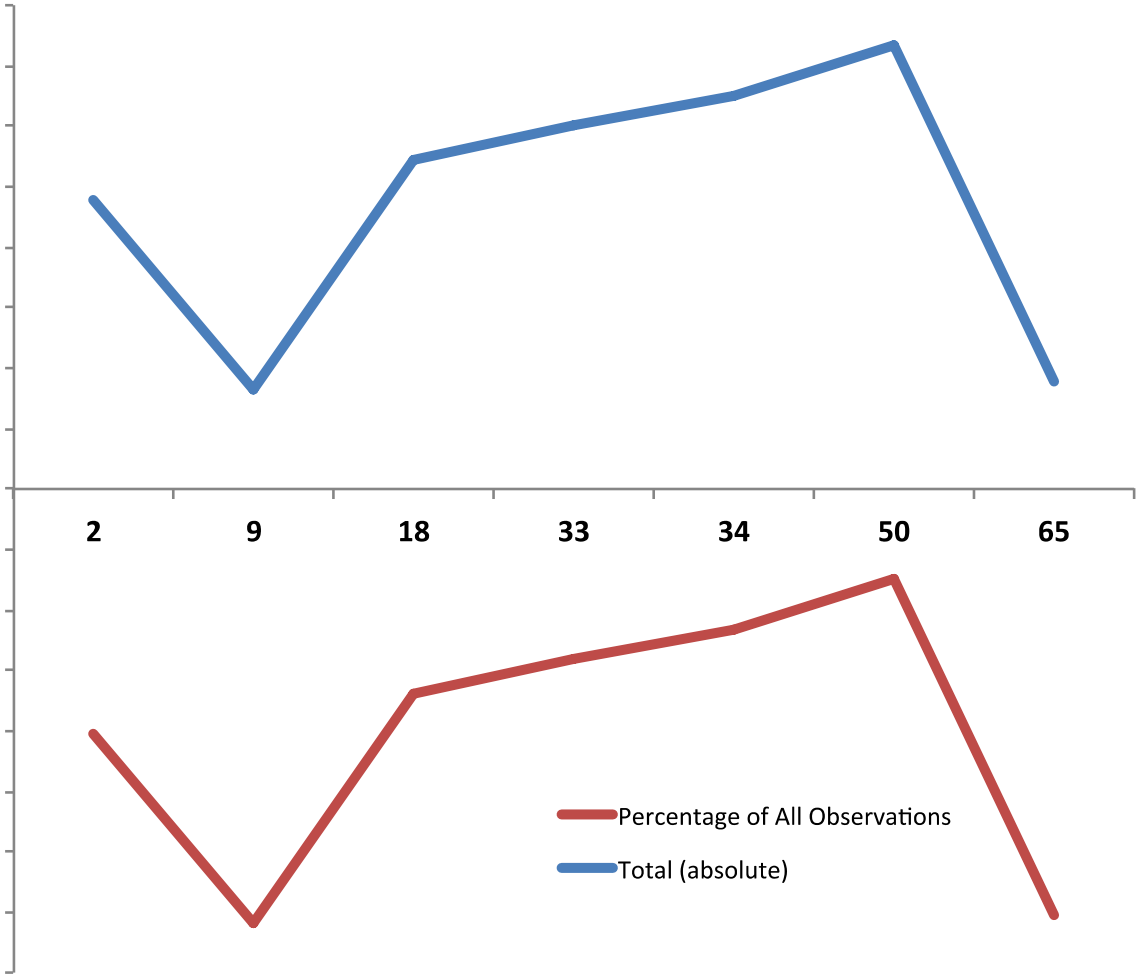


M15 Non-Zero QA Frequency

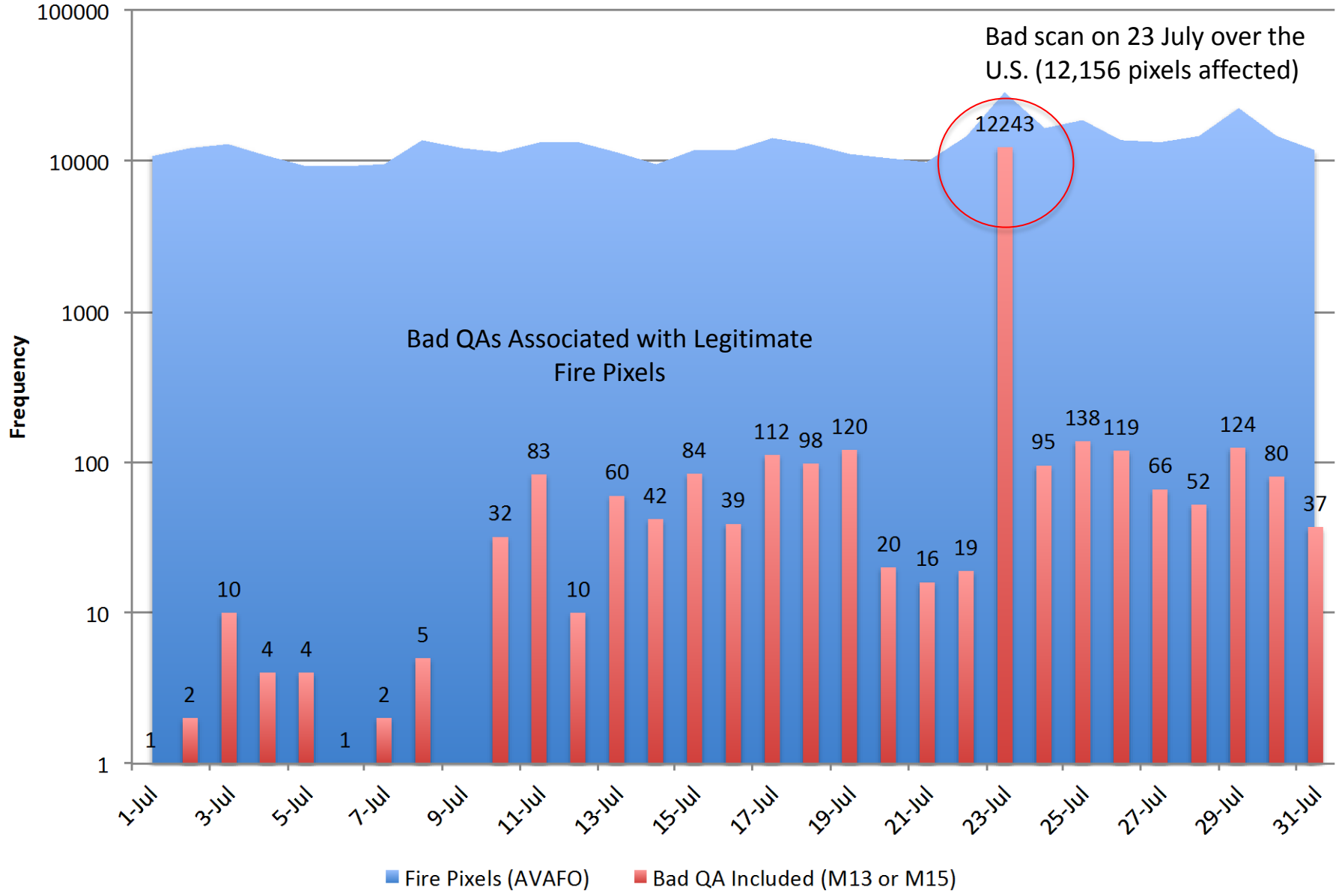


QA	Definition
2	No Calibration
9	Poor Cal - All Saturated
18	No Calibration - None Saturated - EV RDR Data Missing
33	Poor Cal - None Saturared - Cal Data Missing
34	No Calibration - None Saturated - Cal Data Missing
50	No Calibration - None Saturated - Thermistor Data Missing
65	Poor Cal - None Saturated - All Data Present - Radiance Out of Range

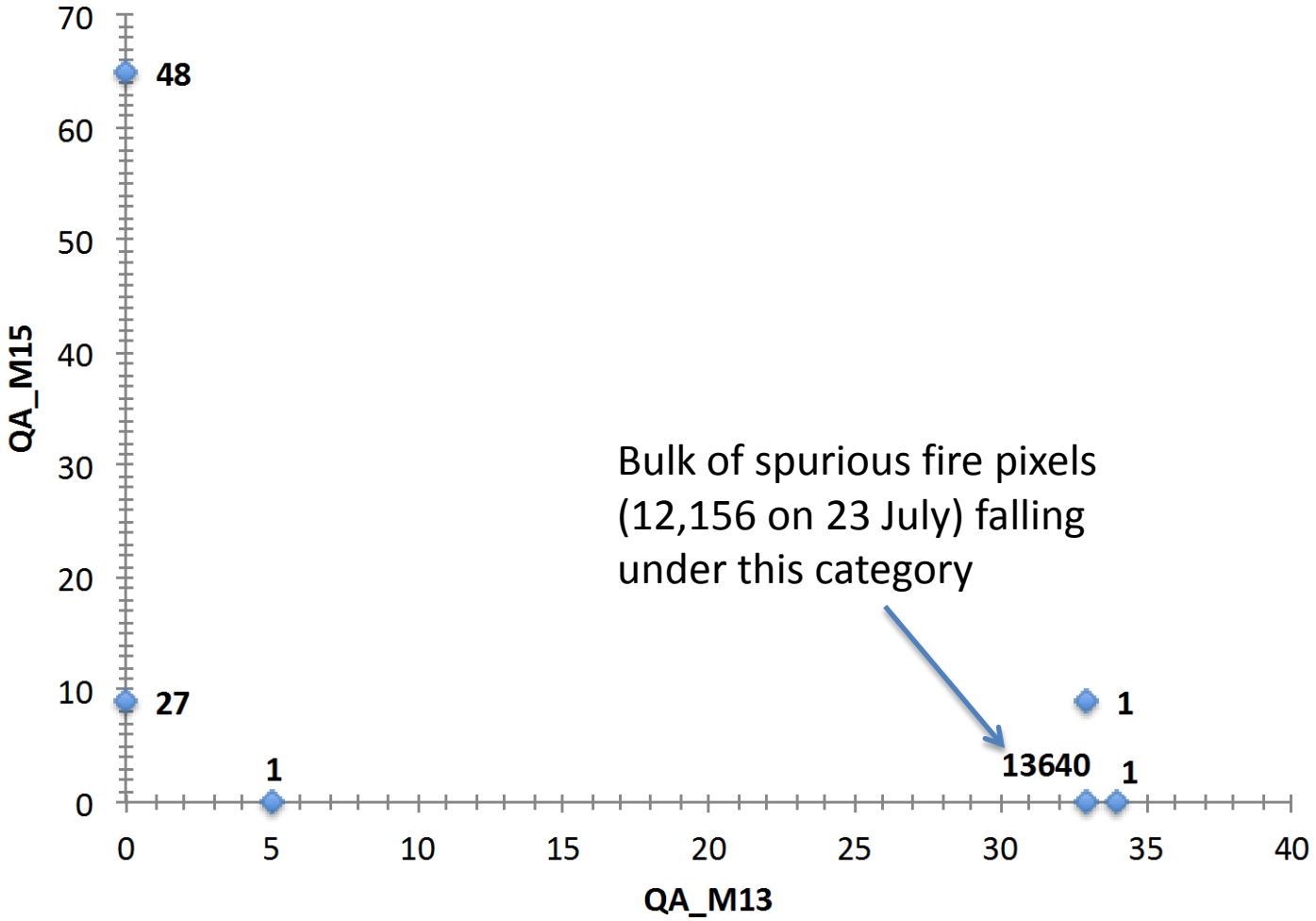
M15 Non-Zero QA Frequency (Period sampled: 01-31 July 2013)



Sum of Daily AVAFO Fire Pixels Including Those with Bad QA on M13 and/or M15

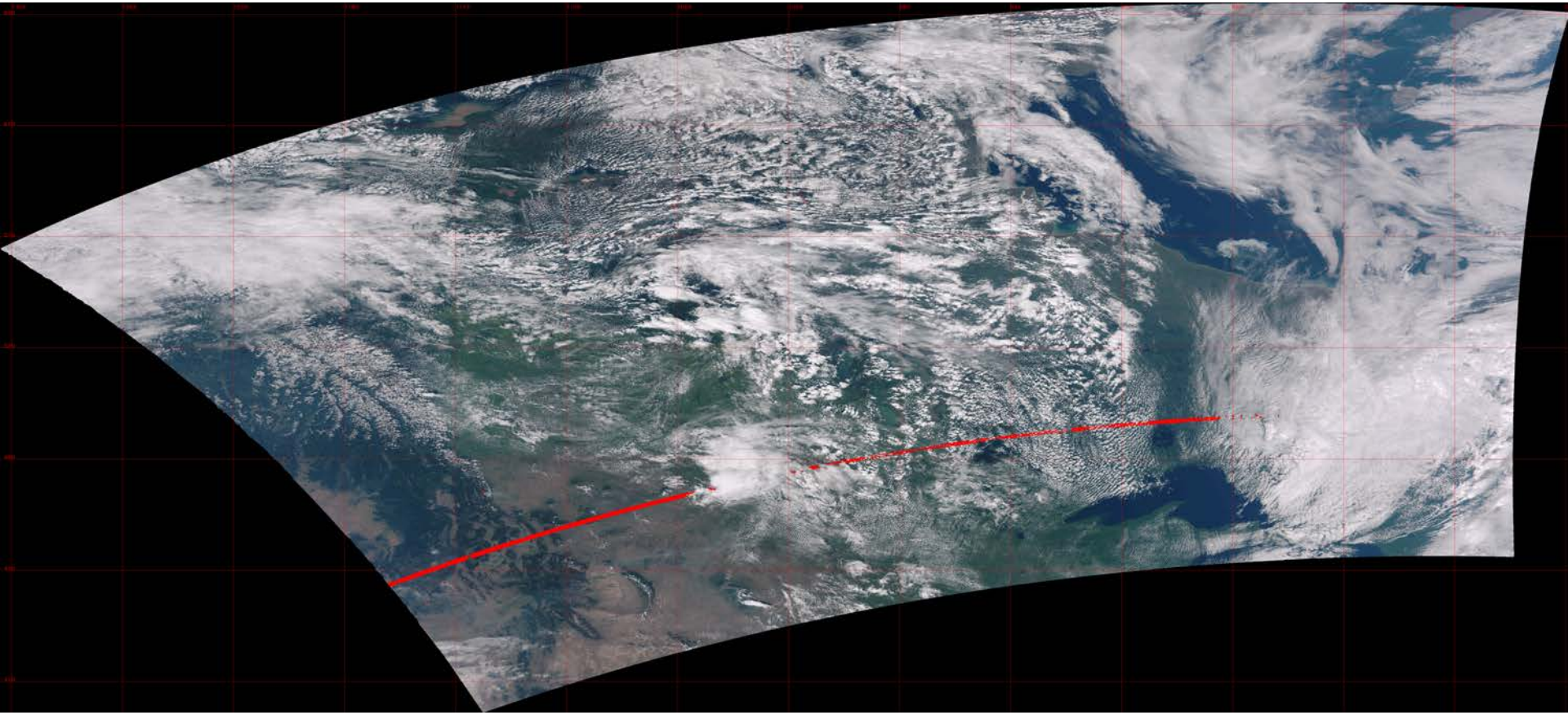


Frequency of M13 and M15 Bad QA Flag Combinations for AVAFO Fire Pixels



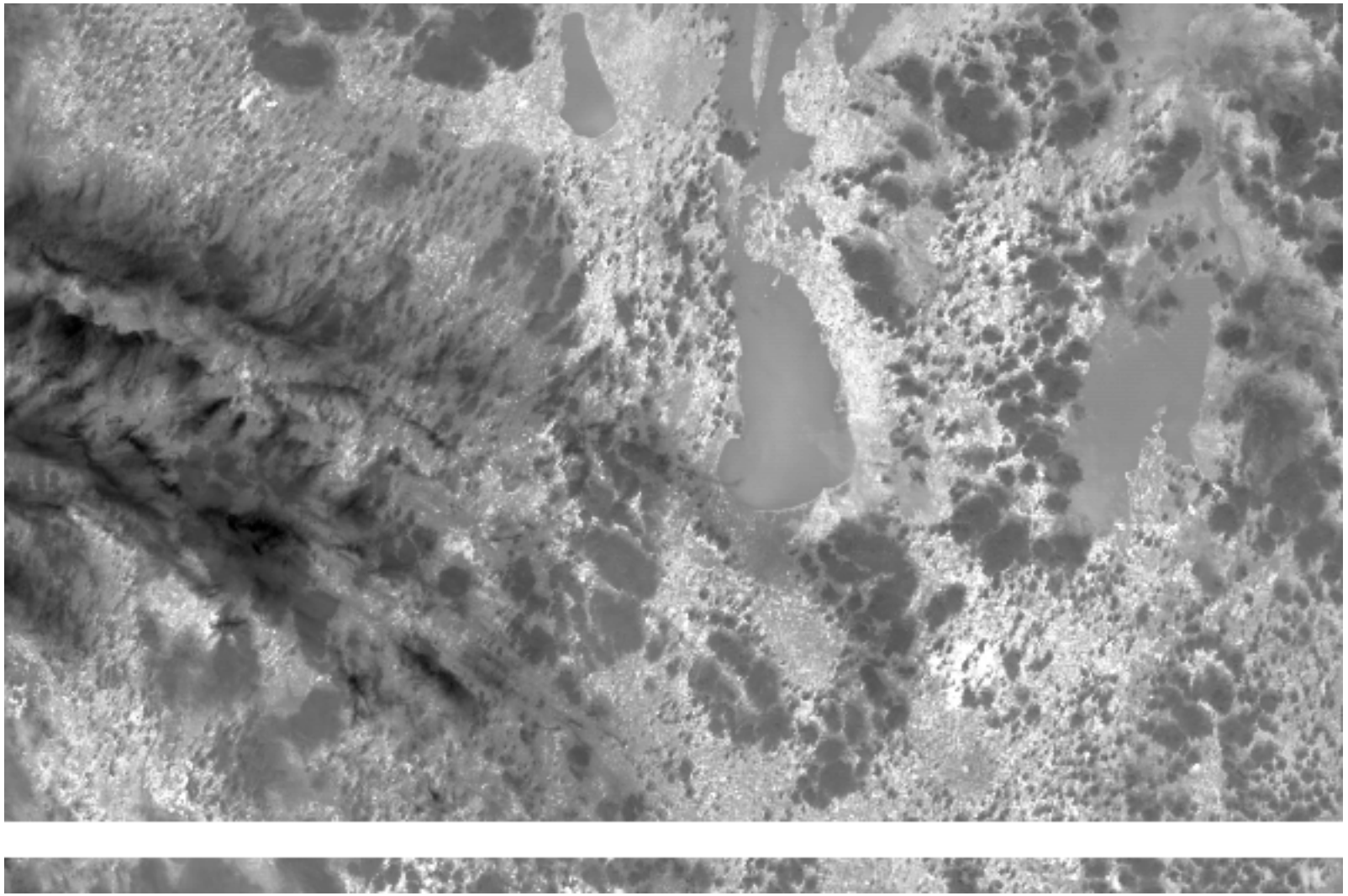
Non-zero SDR quality flags and for both real and spurious fires can be the same.

What happened on July 23, 2013?



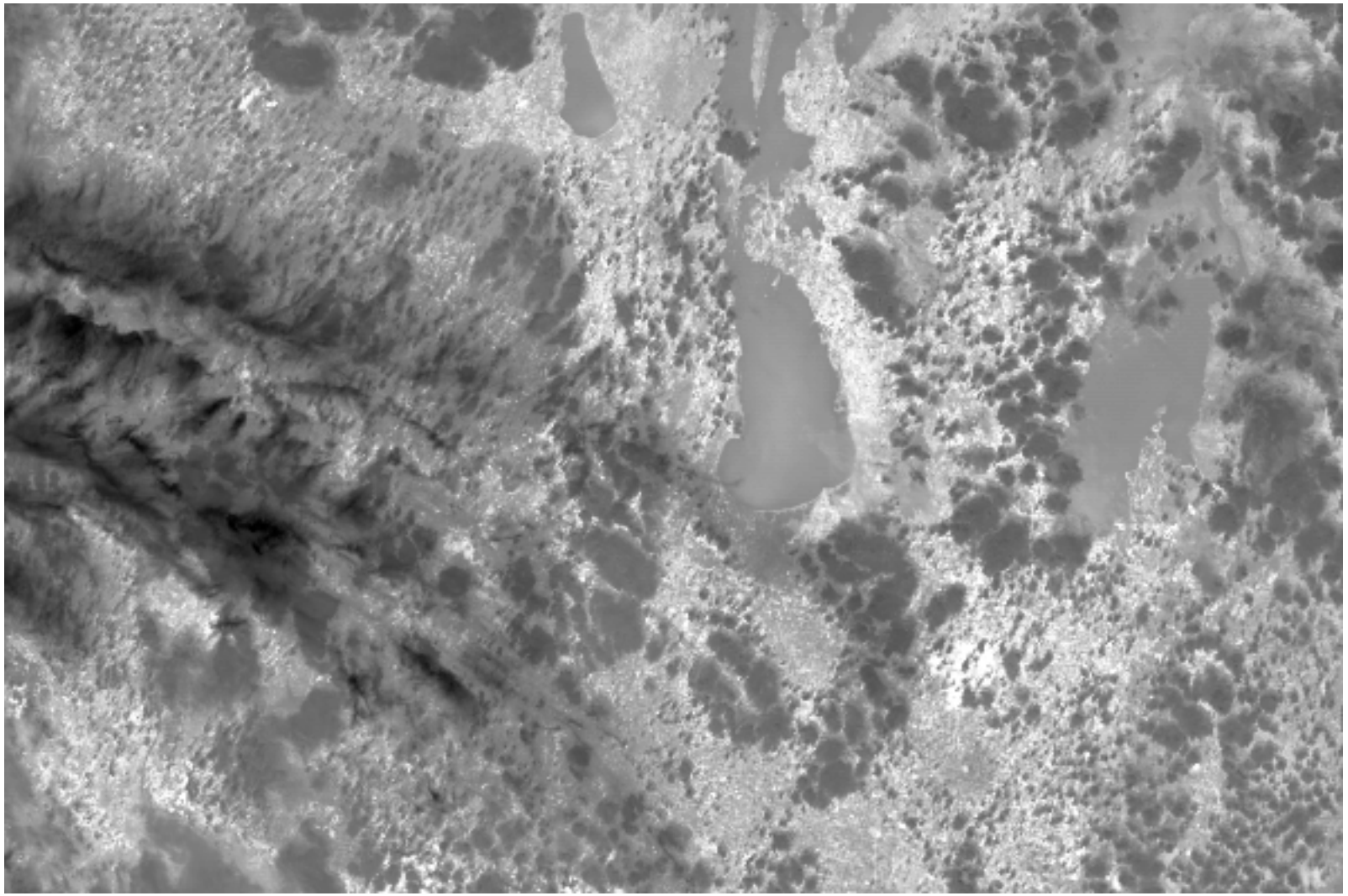
IDPS product, 19:11:59-19:17:40 UTC; viirsfire.geog.umd.edu

What happened on July 23, 2013?



IDPS SDR M13 brightness temperature; QA=33 for bad data

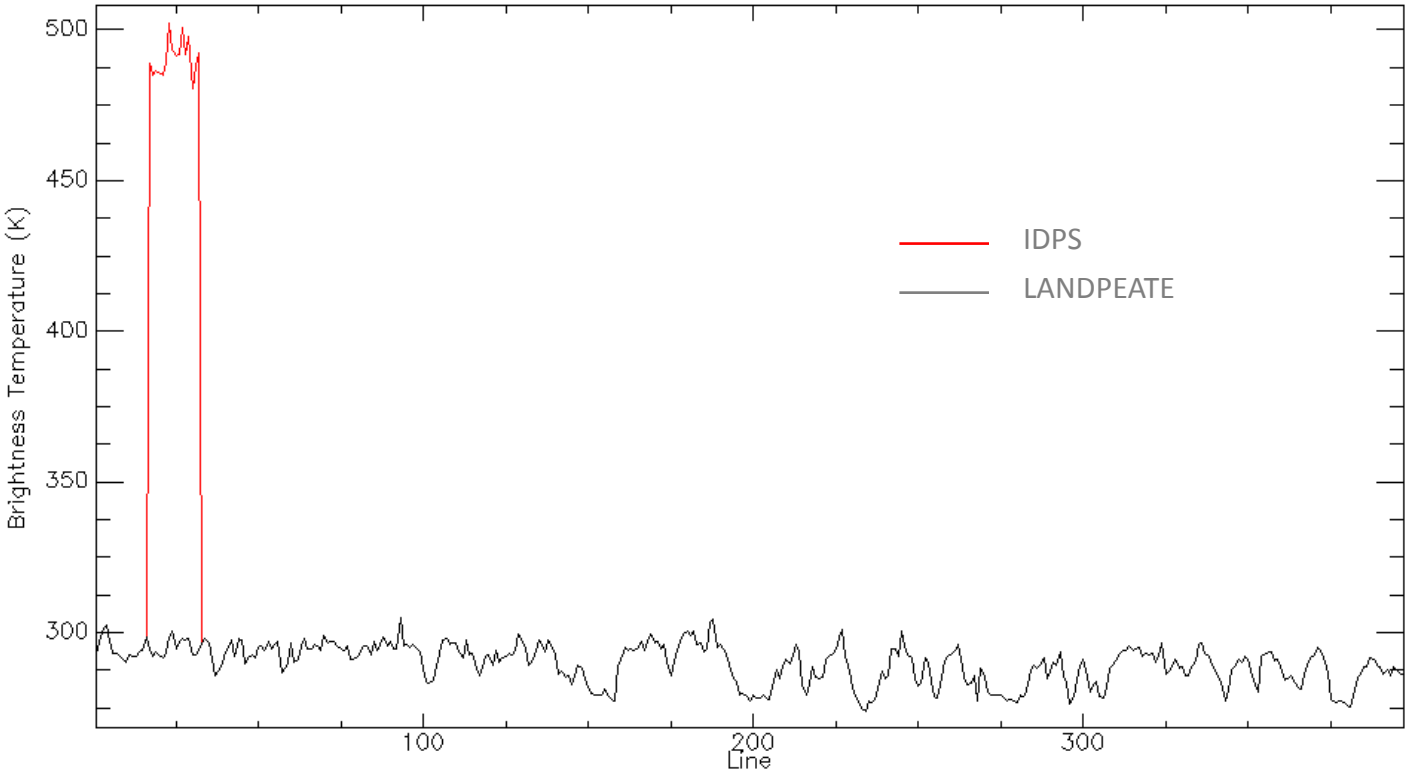
What happened on July 23, 2013?



LandPEATE SDR M13 brightness temperature; no bad data; QA=0

AS 3001 (Products produced by Land PEATE using the IDPS software). This should match the corresponding product from IDPS in AS 3000.

What happened on July 23, 2013?



IDPS and LandPEATE input SDR data are different; the data anomaly is absent from the LandPEATE SDR

What happened on July 23, 2013?

- Sync loss anomaly at ~12:40 UTC (100 seconds)
  - over the Arctic, no spurious fire pixels
  - apparently unrelated to spurious fire detections later that day
- Testing of FBKS ground station transmission
  - Mission notice: “Data Latency during FBKS testing “; “Data Delayed to AFWA and NESDIS IDPs”
- Data backlog in IDPS SDR processing
  - Missing data pockets in IDPS SDR as input
- Spurious fire detections at 19:13 UTC
  - Granule produced before previous granule was produced; no calibration data
  - SDR software did not find substitution calibration information for M13 from current granule
- SDR in LandPEATE processing contains correct data
  - No spurious detections in LandPEATE fire code

Mission notice: Data Latency during FBKS testing

TITLE: Data Latency during FBKS testing

ID: 21662 DATE/TIME: 2013-08-07 15:03:55

DESCRIPTION:

Status: Closed

Impact: Data Delayed to AFWA and NESDIS IDPs

Site/Spacecraft Affected: NPP

Date/Time Start: 07/23/13 12:30 GMT

Date/Tim e Stop: 07/24/13 21:00 GMT

Duration:7.5 hrs

Associated WR#:

Associated MTR#:

Details: During FBKS testing mission data will be delayed starting at REV 8997 ending at REV 9000

Update 2: 7/31/13 C3S Problem WRRP - George Rankin and Delonte Jenkins approved MN to be closed. Update 1: 7/ 23 1912z WA - AFWA still requires Orbit 8999 and 9000 reflowed due to ground system issue with flowing data from FCDAS and SVAL 7/23 1921z WA - Expected data delays to also occur on the first 3 FCDAS contacts on Day 2

Update 2: 7/ 23 Results Orbit 8997 - experienced data dropouts due to low elev. Still under investigation. P/B start:123956z Orbit 8998 - successful shadow. Switch to FCDAS approved. P/S start: 142014z Orbit 8999 - successful but encountered issue with AFWA and DMR due to Sval SMD PPS shadow misconfiguration. WR21670. P/B st art: 155950z Orbit 9000 - successful but cannot use DMR due to backlog from previous anomaly. P/B start: 174014z Orbit 9001 - successful but cannot use DMR du e to backlog from previous anomaly. P/B start: 192314z Orbit 9002 - successful but cannot use DMR due to backlog from previous anomaly. P/B start: 210415z Decision made to reattempt checkout using 7/24 contacts 7/24 Results Orbit 90 11 - successful shadow. Switch to FCDAS approved. P/S start: 122055z Orbit 9012 - experienced data drops at beginning and end of playback. FCDAS and MST MP con firmed elevations well above 5 deg. Still under investigation. WR21685. P/B star t: 140115z Orbit 9013 - loss SMD data due to antenna fiber cable issue at FCDAS . WR21684. Data recovered via SVAL. P/B start: 154115z Orbit 9014 - successful. P/B start: 172015z Orbit 9015 - successful. Switched to SVAL. P/B start: 19031 5z Orbit 9016 - converted to shadow pass. Already back on SVAL as prime. P/B start: 204515z

Duration:

Consequence:

Cause:

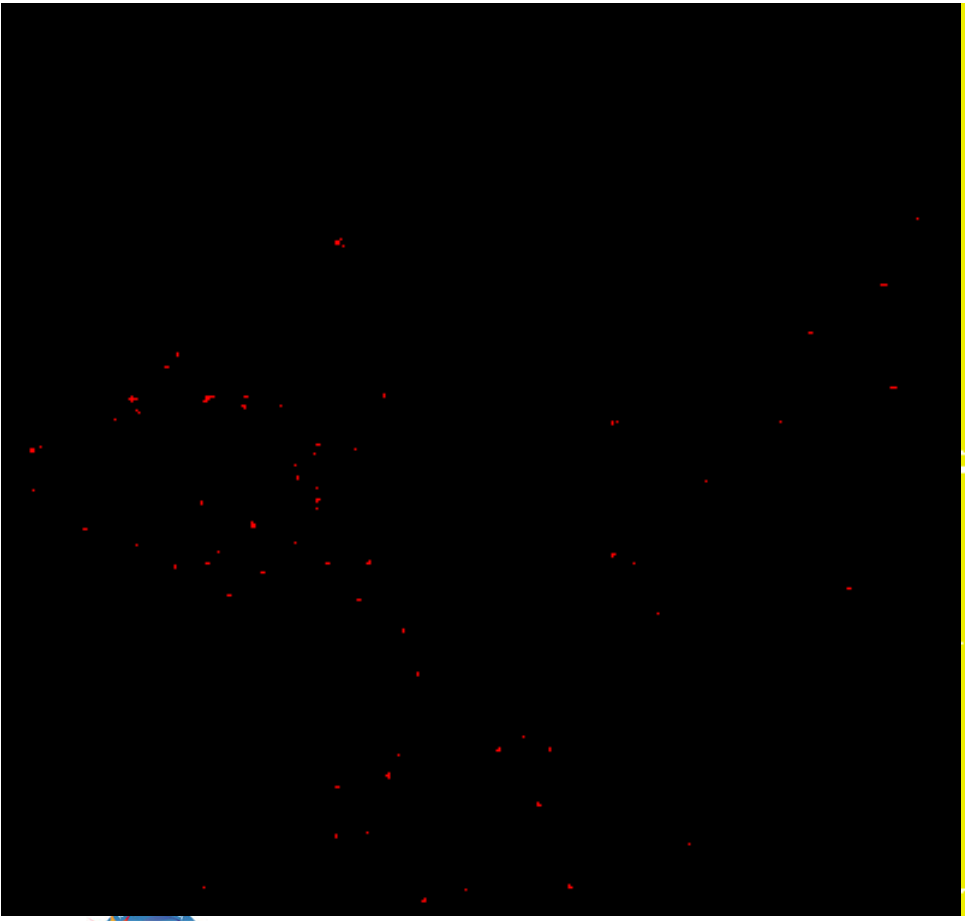
DR 7313

The second scan in the granule acquired on July 23, 2013 at 19:13 UTC (NPP000552788052) is **incorrectly calibrated for the dual-gain bands** (even in the dataset currently distributed by CLASS). Radiometric errors are smaller than 10% for the reflective bands, but the brightness temperature errors are close to 60% for the emissive band M13 (see attached image). The incorrectly calibrated scan was detected by the Active Fire product team. Pixels in this scan are **flagged as poor quality and missing Cal data for band M13**, but they are not flagged for the reflective bands. Cal data for that scan were measured at Low gain, but the M13 Earth View data were measured at High gain, and the Cal data from the last scan of the previous granule (NPP000552787198, acquired at 19:11 UTC) were needed to subtract correct SV measurements.

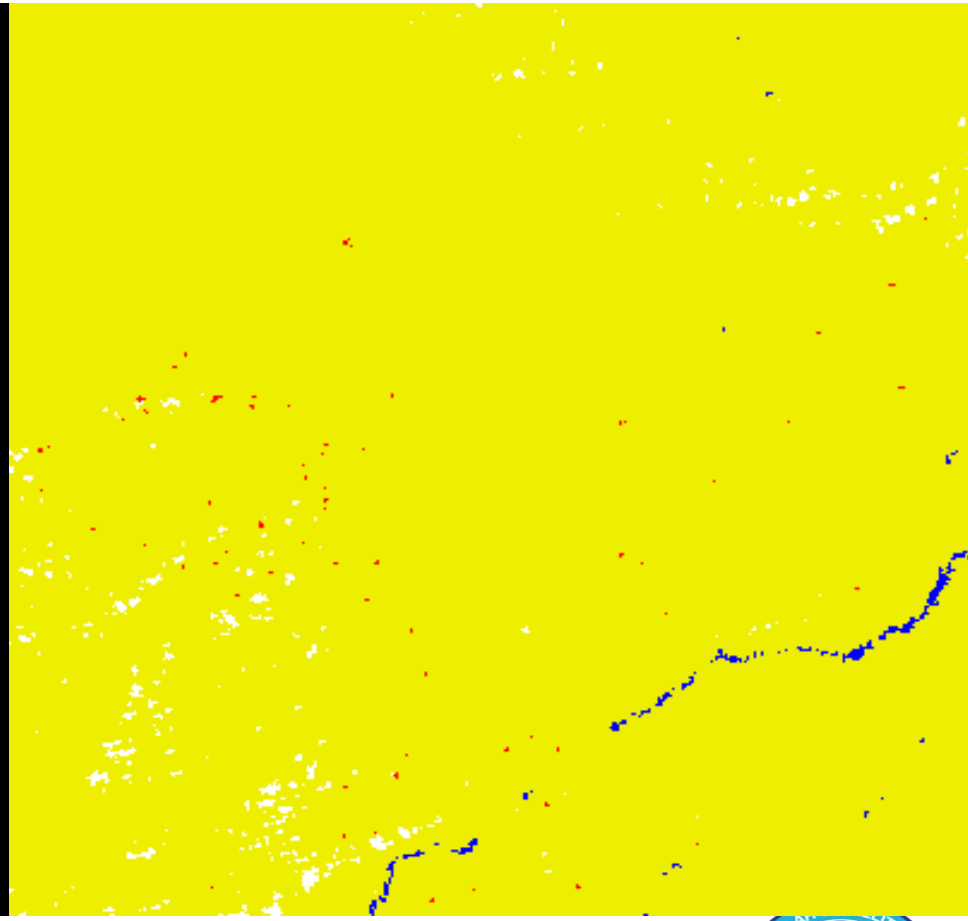
The **previous, 19:11 granule was processed multiple times**, as shown by the existing OBC IP files. In the **original version (A1), which was the only one created before the 19:13 granule was processed, the Cal data are missing for the last scan and are replaced with Fill Values.** It seems that the Find_SV_Scan_Index function did not handle the Fill Values correctly. After searching for a scan with substitute Cal data, it apparently **pointed to a scan in the previous granule that has Cal data measured with Low gain, not the needed High gain**. That accidently triggered the quality flags for M13, but not for RSBs. Instead of invalidating the dual-gain data for that scan (since the required SV data were indeed missing), the incorrect SV measurements were subtracted from the EV data.

Impact on downstream products: Surface Type

Surface Type EDR Fire Map



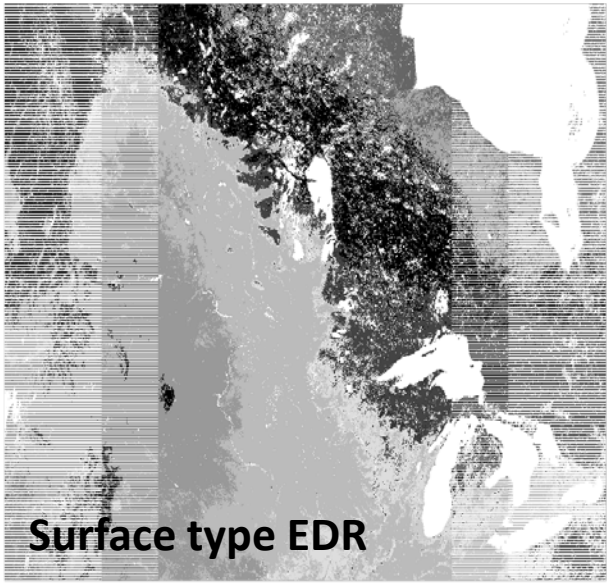
Active Fire ARP Fire Map

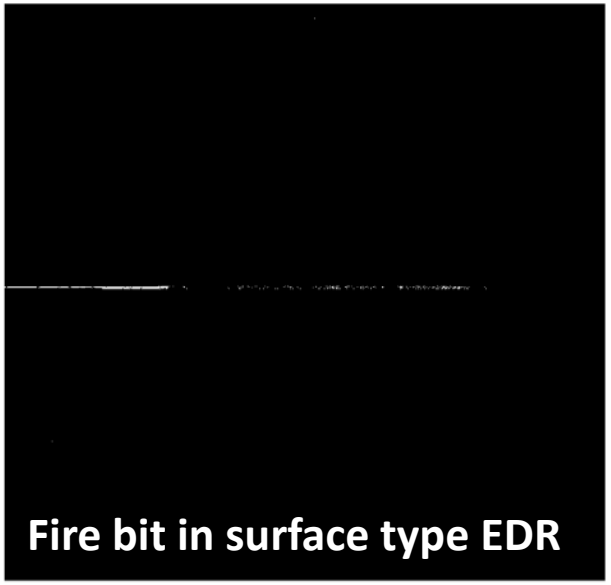


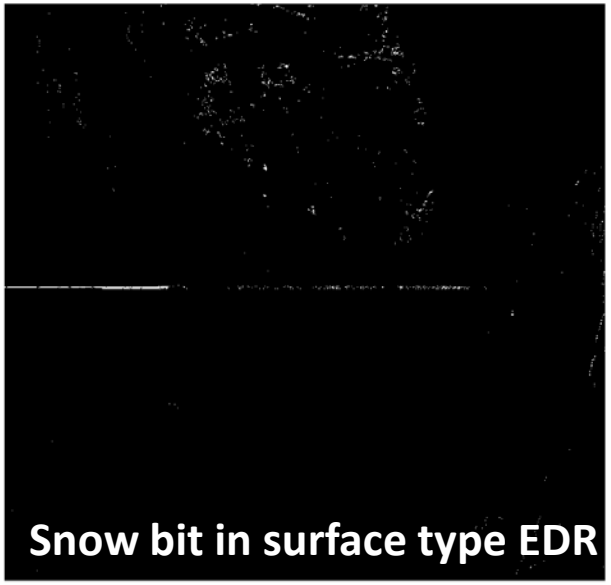
Fire binary map of ST EDR is consistent with Active Fire EDR (red pixels). Fires from weak to strong are all included under a single label in Surface Type QC.

courtesy of JPSS ST team

Impact on downstream products: Surface Type







courtesy of JPSS ST team

AS 3000 (Products from IDPS, aggregated to ~5min granules at Land PEATE in HDF4 file format.)

/allData/3000/NPP_VSUT_L2/2013/204/NPP_VSUT_L2.A2013204.1910.AGG_03000.2013205130257.hdf

Unfiltered bad quality SDR in snow mask also? (Out side the scope of this review…)

Spurious detections status summary

- The implementation of MX6.3 on October 15, 2012 **eliminated the vast majority** of spurious detections due to incorrect SDR data and their handling by the fire code
  - **October 16, 2012** is the proposed Provisional Effectivity Date
- Spurious detections related to SDR quality issues have occurred at a rate of **once a month**
  - Rate considered to be low enough for Provisional Status
  - DR 5029 needs to be completed by Validated 1 status
- Issues to be further investigated
  - Should **all detections with non-zero SDR quality flags** be excluded? (Can a selective set of QA flags be used instead?)
    - Current decision is to **implement a conservative filter**
  - Are there **any bad SDR data incorrectly labeled as "good"**?
  - **Current experimental code** (LandPEATE, IPOPP) excludes **all non-zero SDR pixels**

QA recommendations

- SDR
  - Implement VIIRS SDR **quality flag monitoring system** (ICVS?)
  - **Eliminate ambiguities** from quality flags
    - Apparently the same flags are triggered for different reasons
  - **Eliminate incorrect "good" flagging** of bad data
    - EDR code cannot account for such cases
- EDR
  - Implement **conservative screening of quality flags**
    - Exclude all non-zero pixels (DR 5029)
    - Trade-off between losing valid fire detections and false alarms
    - Pseudo-role as diagnostic tool for M13/M15 SDR will finish

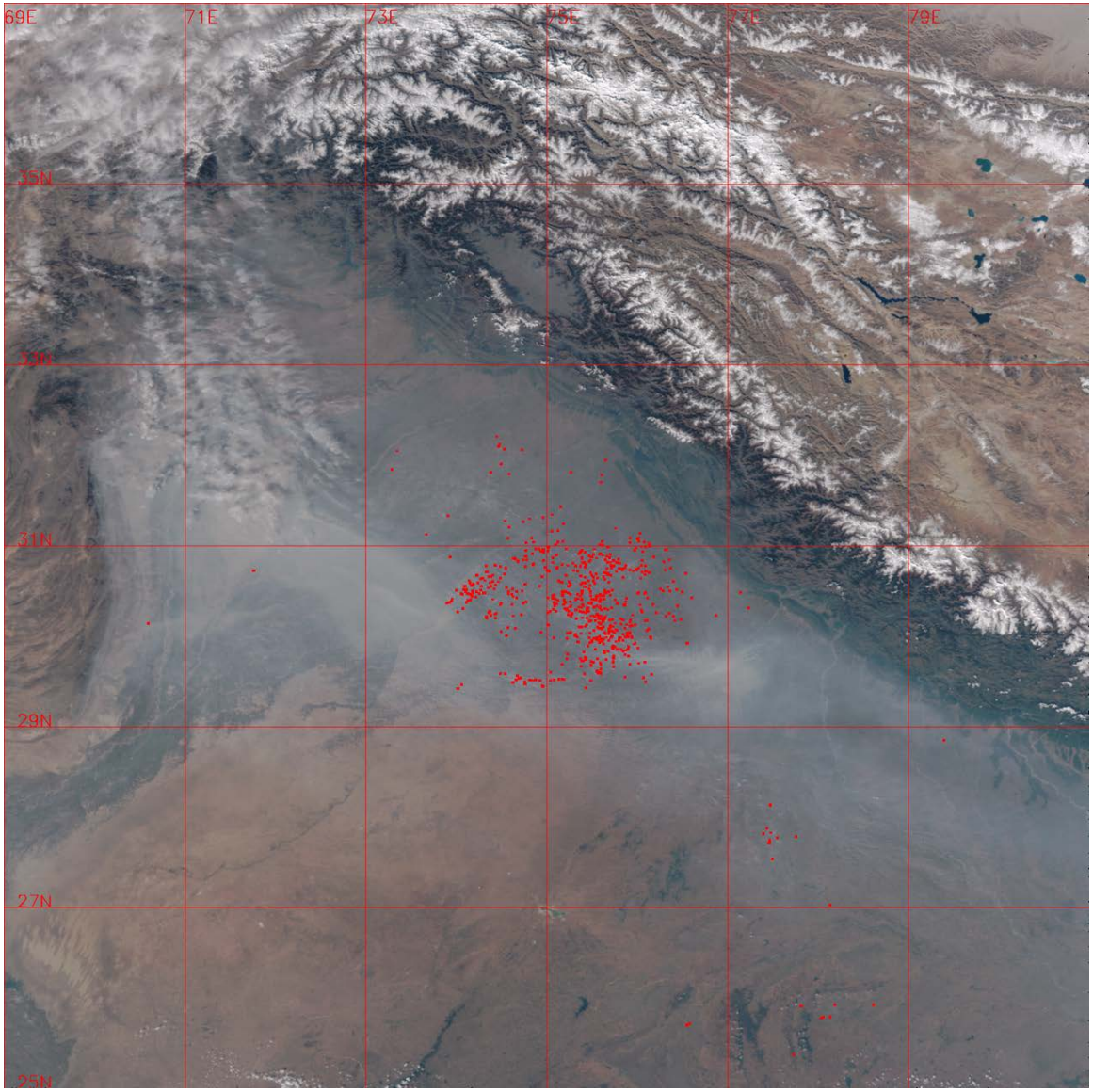
VALIDATION

Validation overview

- Continuing correlative analysis with Aqua MODIS
  - Comparisons reflect expected differences in detections
  - No noticeable change between 2012 (post-beta) and 2013, excluding spurious VIIRS detections
- Airborne fire observations
  - Ongoing efforts with USFS and NASA assets
- High resolution satellite data
  - Continuing collaboration with DLR on TET-1
  - First sample data received
  - NOAA-DRL MOU is reaching completion
- End user feedback
  - Outreach through proving ground and GOFC-GOLD Fire

Comparison with Aqua MODIS

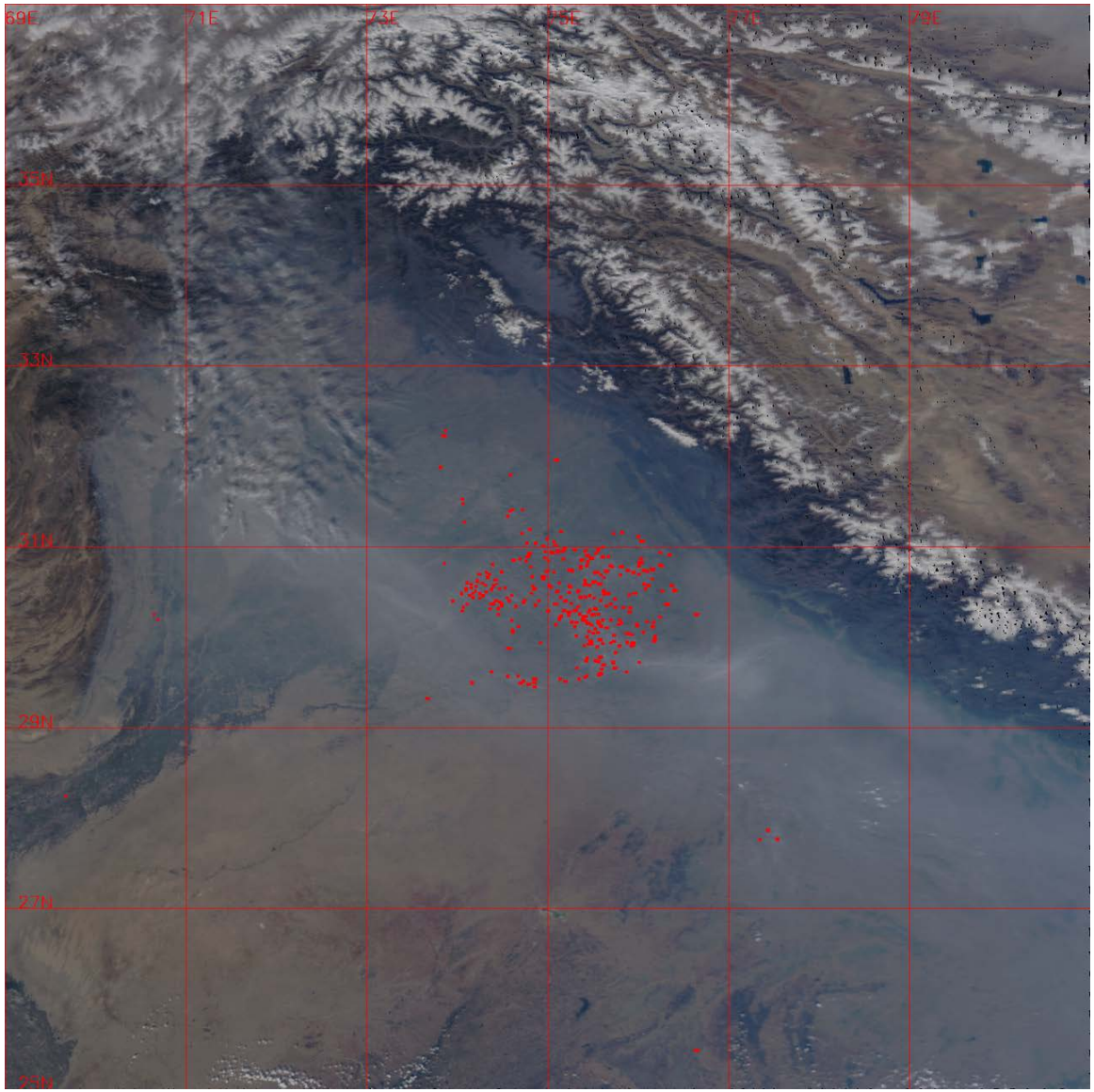
Near-nadir



VIIRS; November 12, 2012

Comparison with Aqua MODIS

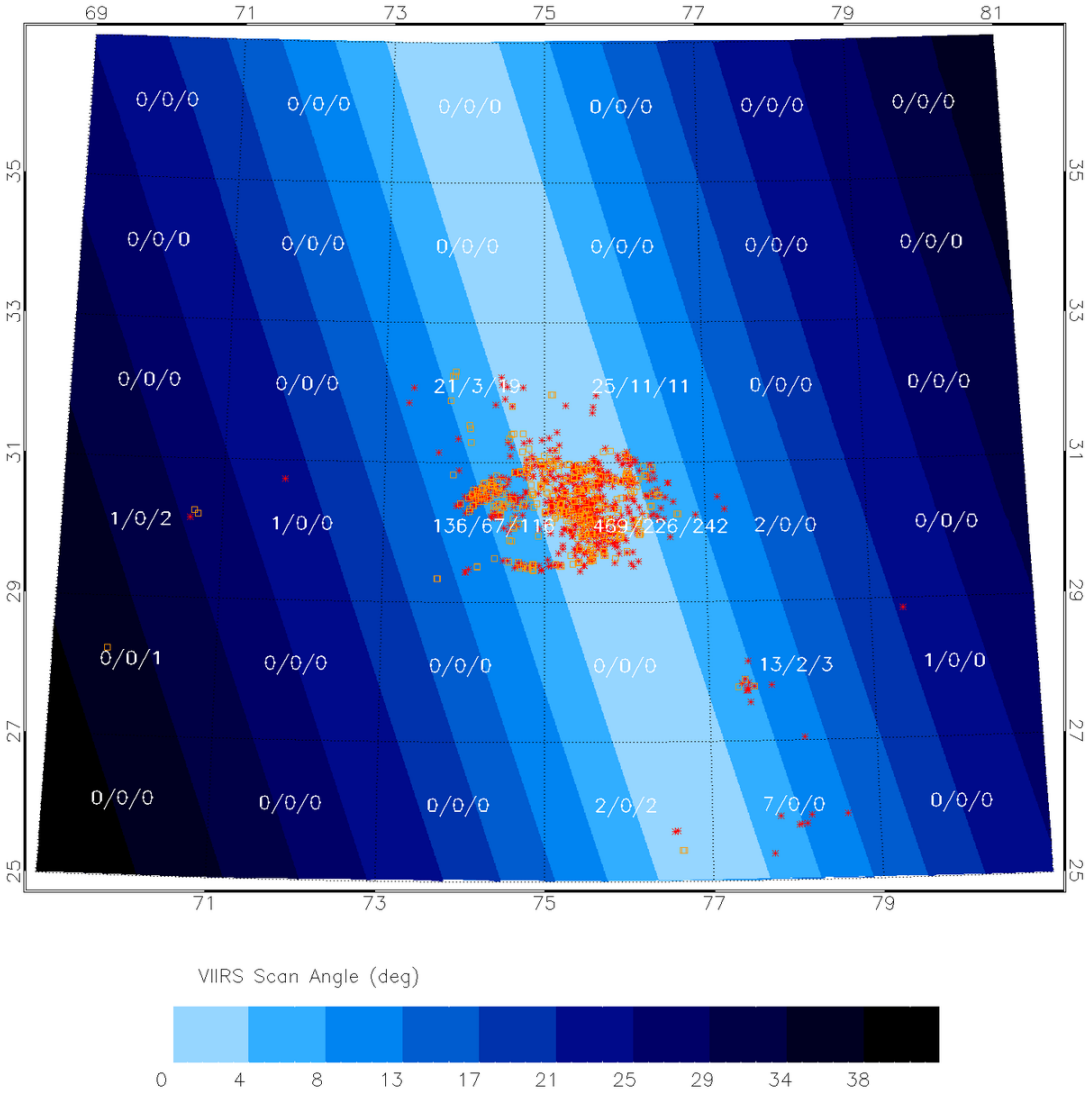
Middle of swath



MODIS; November 12, 2012 0800 UTC

Comparison with Aqua MODIS

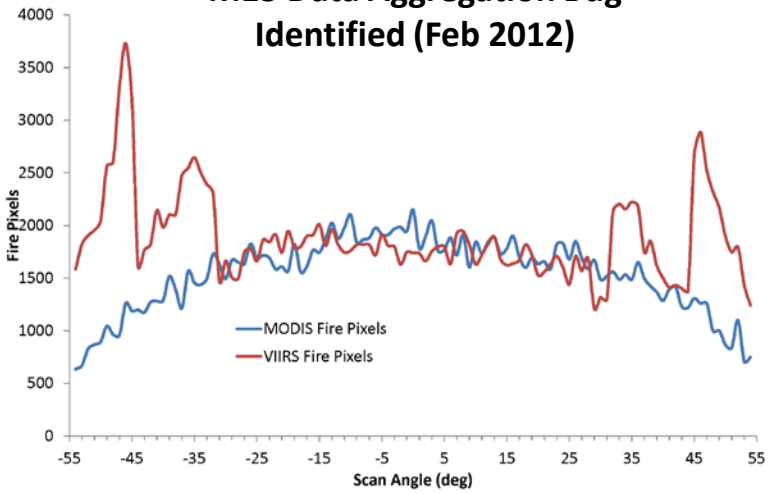
Higher number of VIIRS detections, as expected



VIIRS/overlap/MODIS 0800 UTC

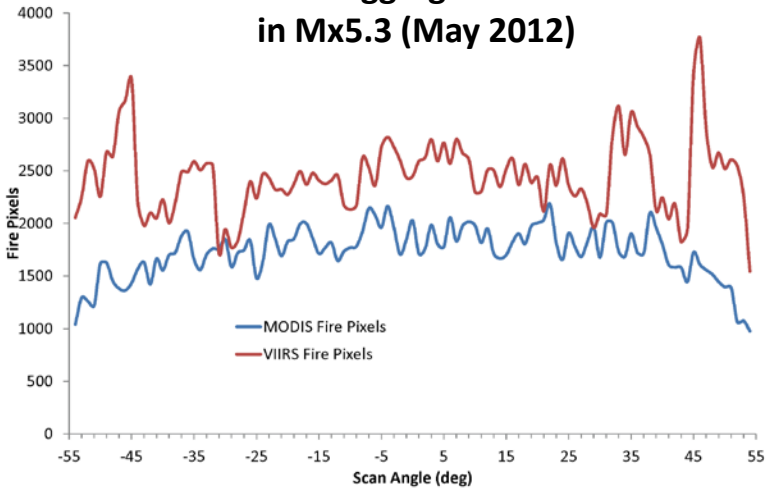
Comparison with Aqua MODIS

M13 Data Aggregation Bug Identified (Feb 2012)



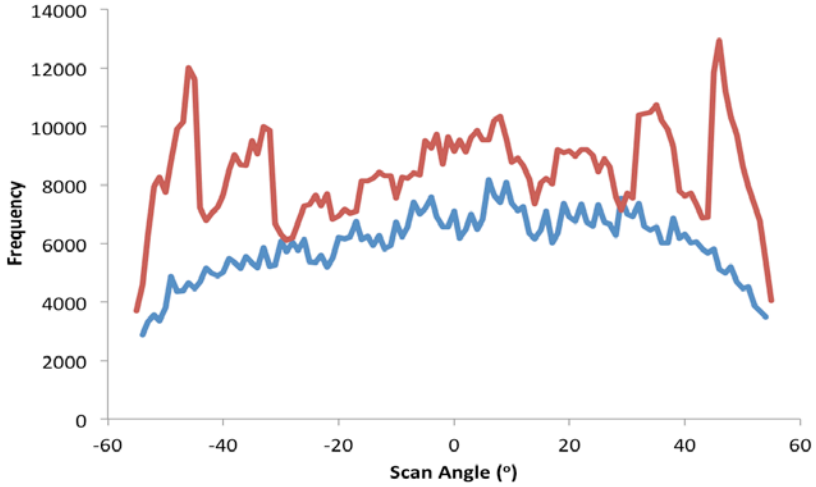
19 Jan - 13 Feb 2012

M13 Data Aggregation Revised in Mx5.3 (May 2012)



11 May - 10 Jun 2012

The <u>overall features</u> of the Aqua MODIS and S-NPP functional dependence on scan angle <u>remained the same a year later</u> and over a longer time period

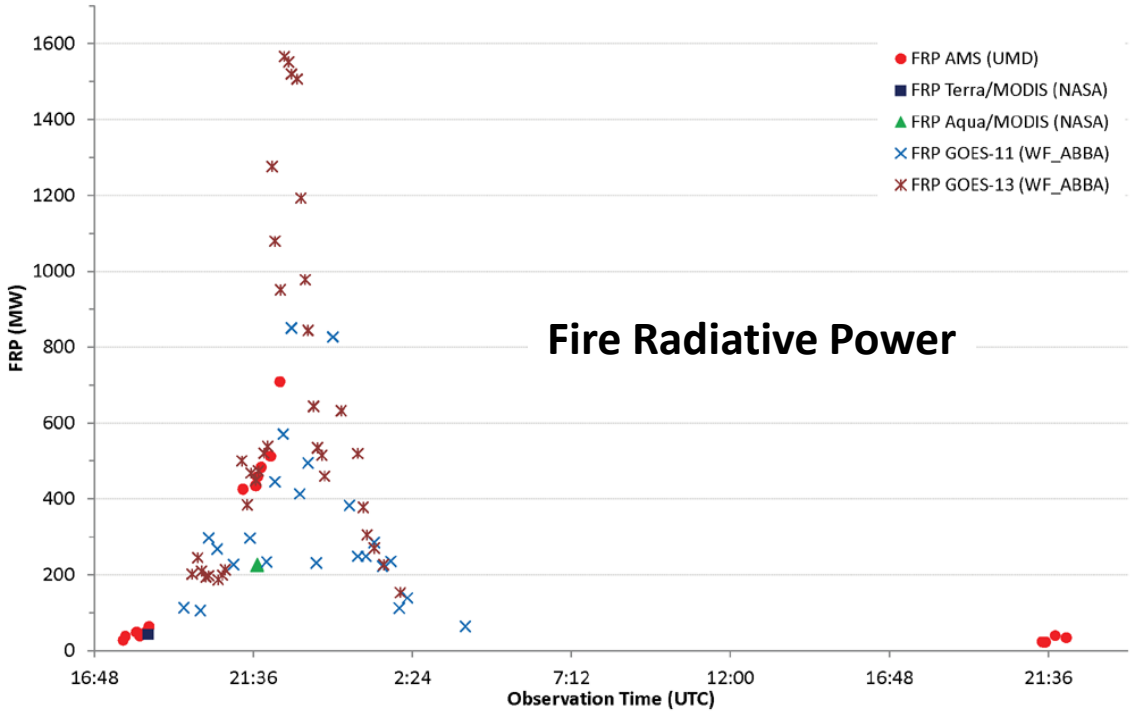


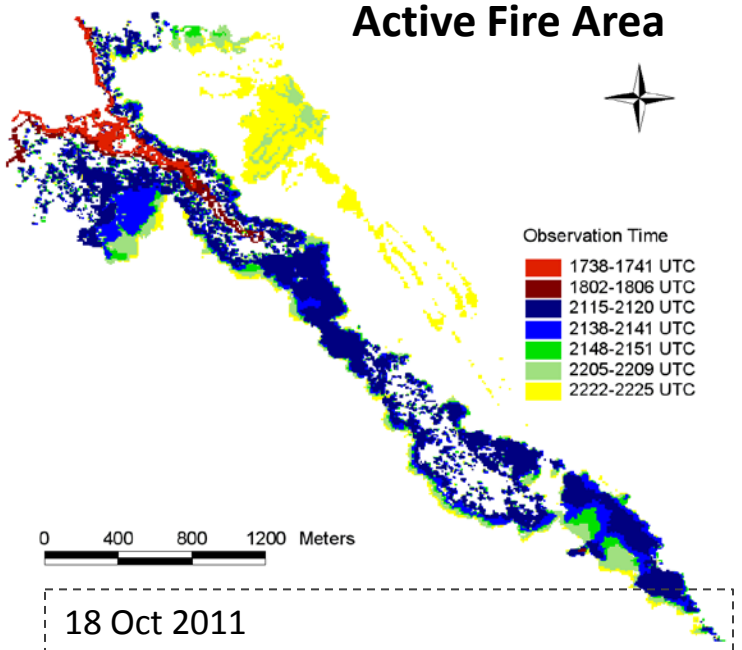
Feb - Jun 2013

Validation: remote sensing data

Airborne

•USDA Forest Service, NASA





18 Oct 2011
450 ha Rx fire at Henry Coe State Park/CA

Aerial coverage provided by NASA/Ames AMS airborne sensor @10 m resolution

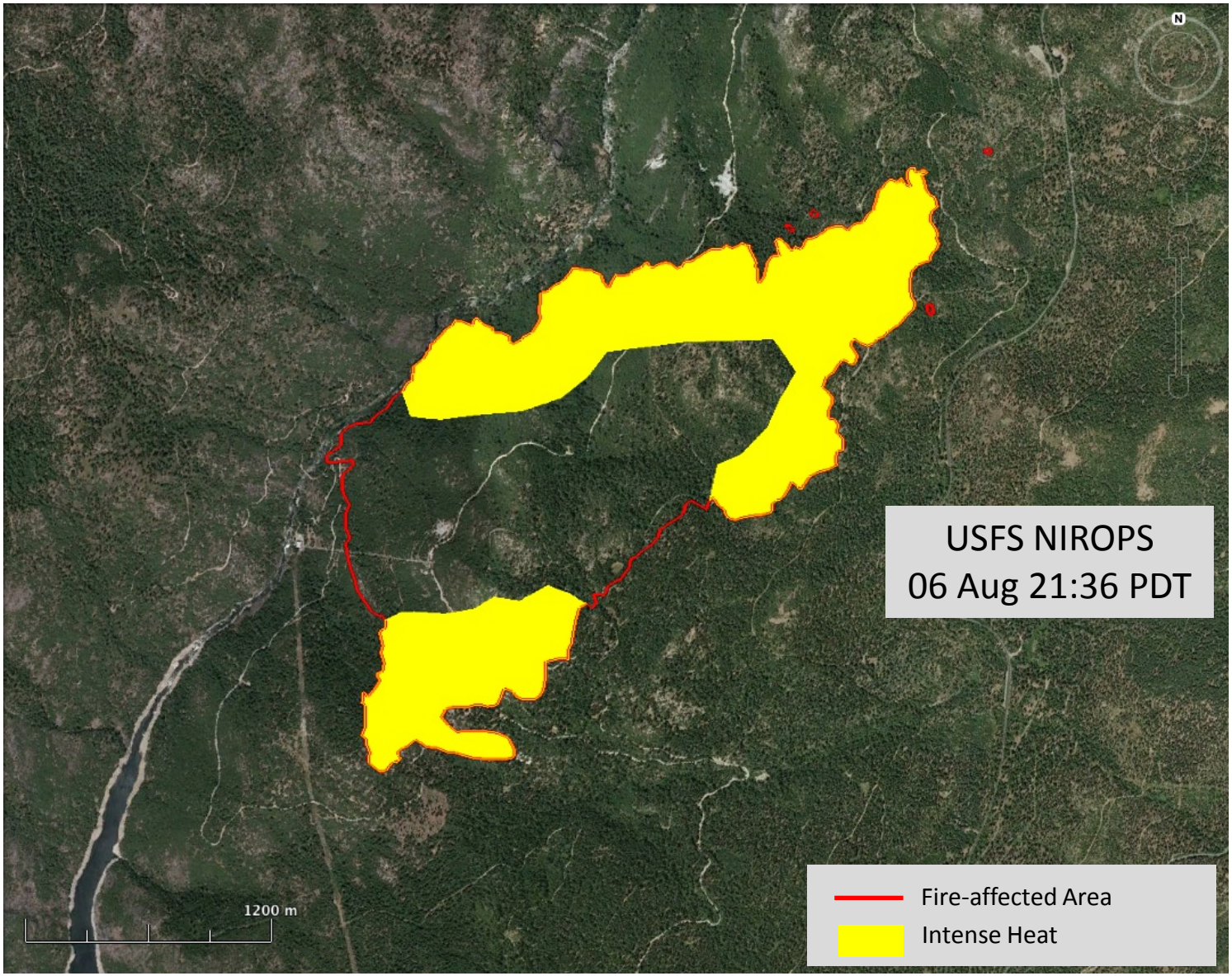
Coincident acquisition from MODIS (Terra and Aqua) and GOES East/West

Spaceborne

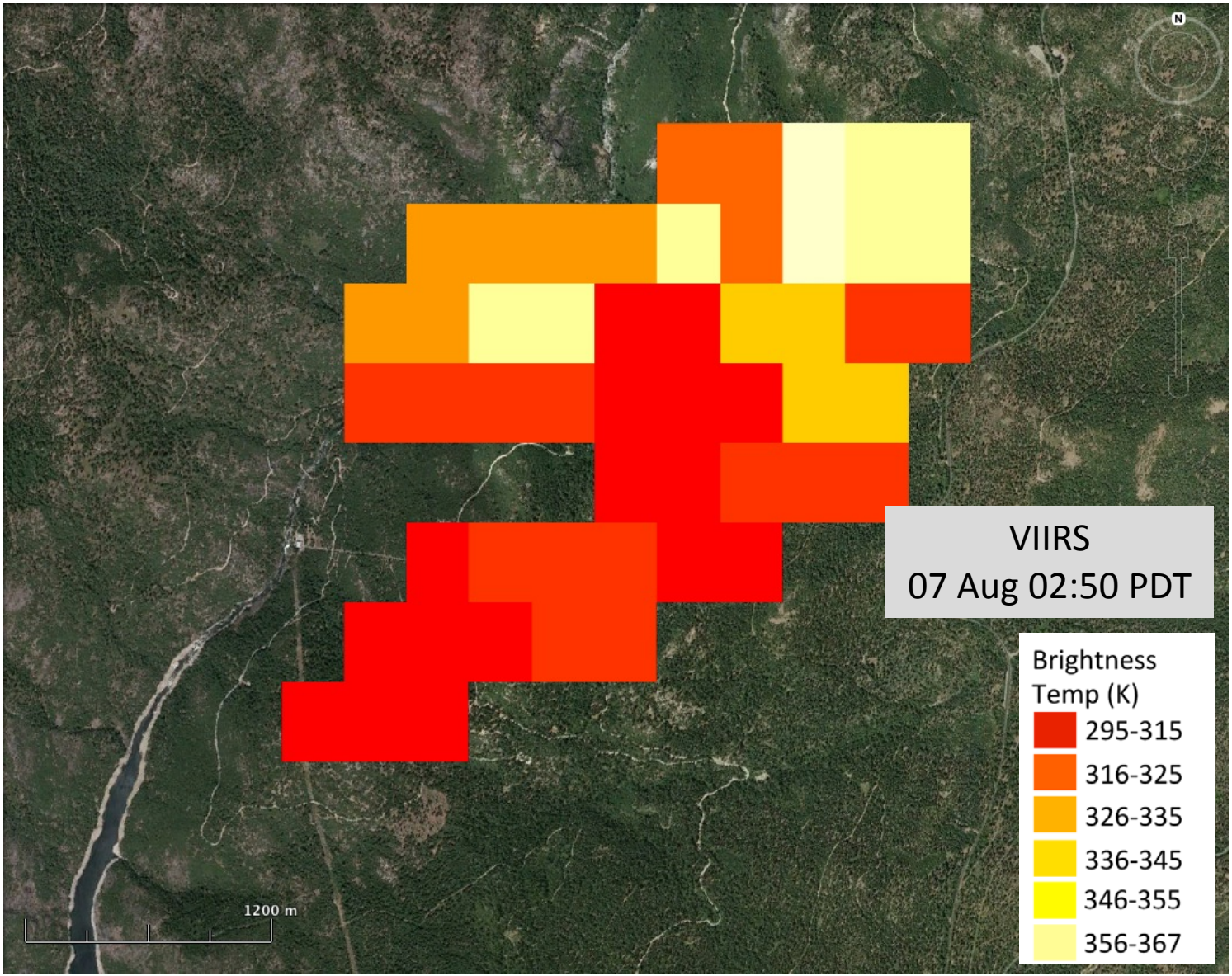
•DLR: Technology Experimental Probe (TET-1) and Berlin Infrared Optical System (BIROS)

•Use I-band to validate M-band

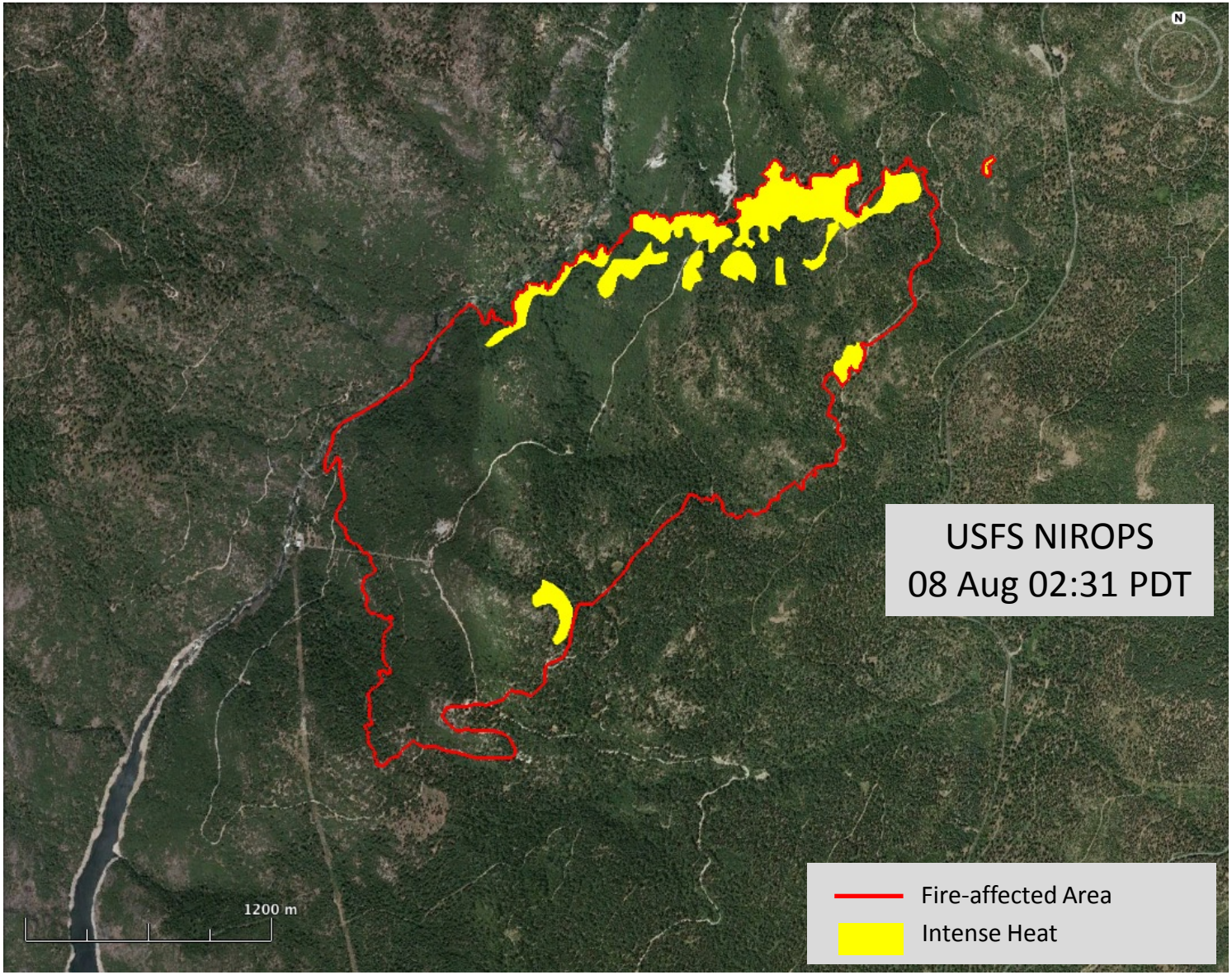
Validation Using Near-Coincident Airborne Reference Data



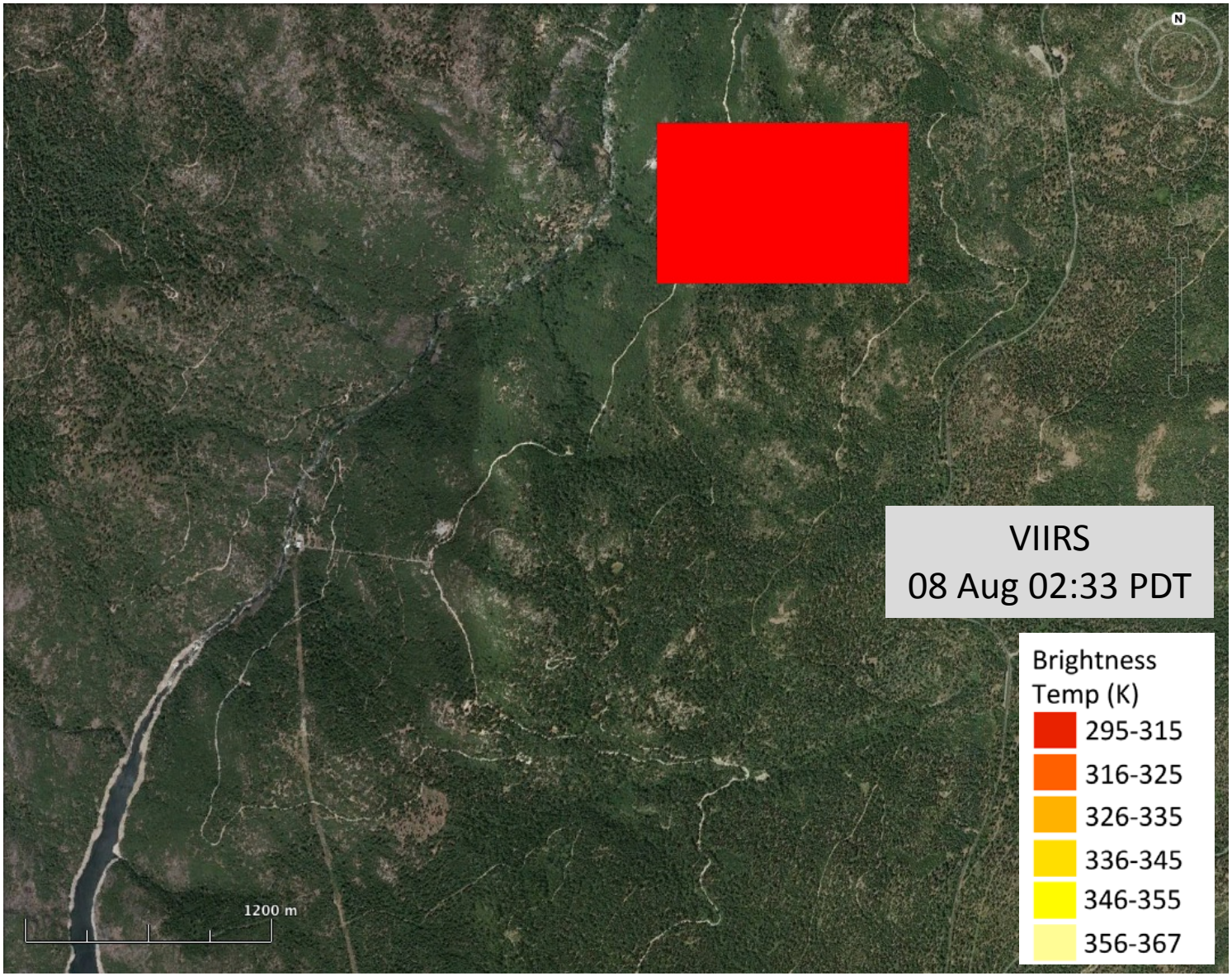
Validation Using Near-Coincident Airborne Reference Data



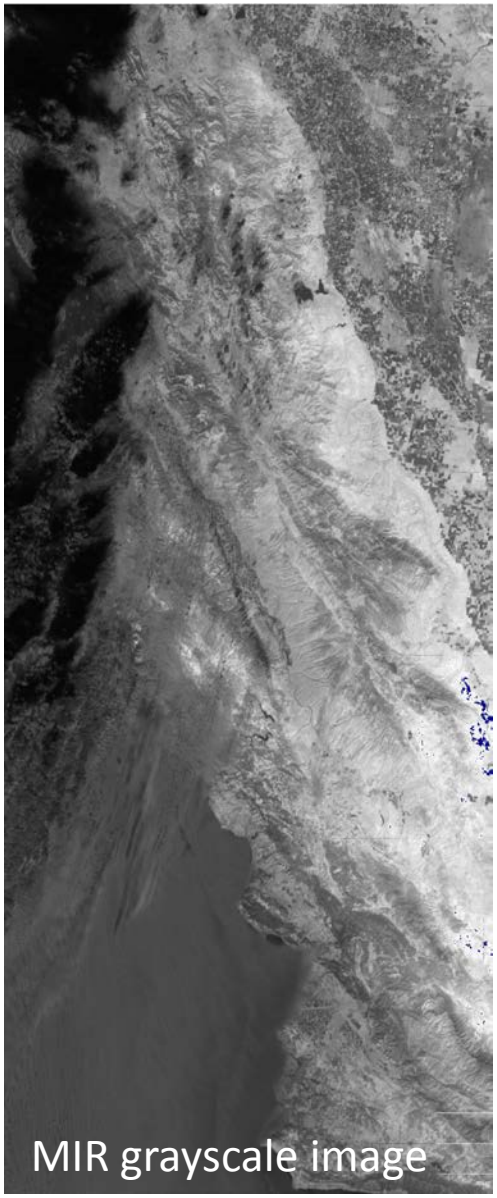
Validation Using Near-Coincident Airborne Reference Data

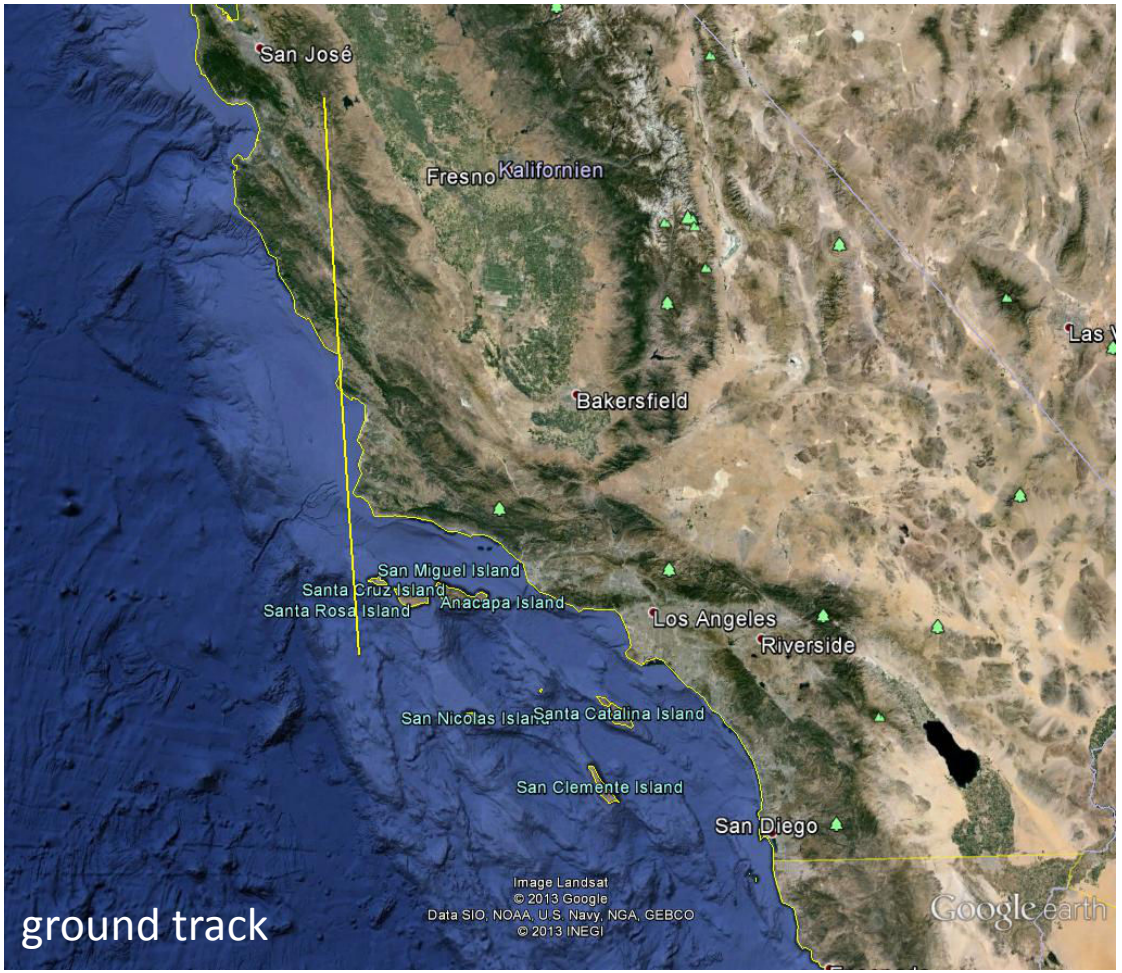


Validation Using Near-Coincident Airborne Reference Data



Validation: satellite-based reference data





July 17, 2013 19:23 UTC

DRL TET-1: 42m (SW, NIR), 370m (MIR, LWIR), high saturation

courtesy E. Lorentz et al., DLR

PRODUCT IMPROVEMENTS

VIIRS active fire product development

NOAA: "real-time NOAA operational applications"

- Operational product generated by IDPS (Interface Data Processing Segment)
- Part of integrated processing chain
- Low latency
- Detections only
- Locations only (no fire mask)

NASA: "science, long-term continuity + added value NRT"

- Experimental MODIS continuity product a at the Land PEATE (Product Evaluation and Test Element)
- Detections, Fire Mask and Fire Radiative Power, CMG
- Spatially explicit fire mask
- Spatial and temporal aggregates – heritage deliver systems (RR, FIRMS)

VIIRS Fire Team

Algorithm updates

Upstream processing updates

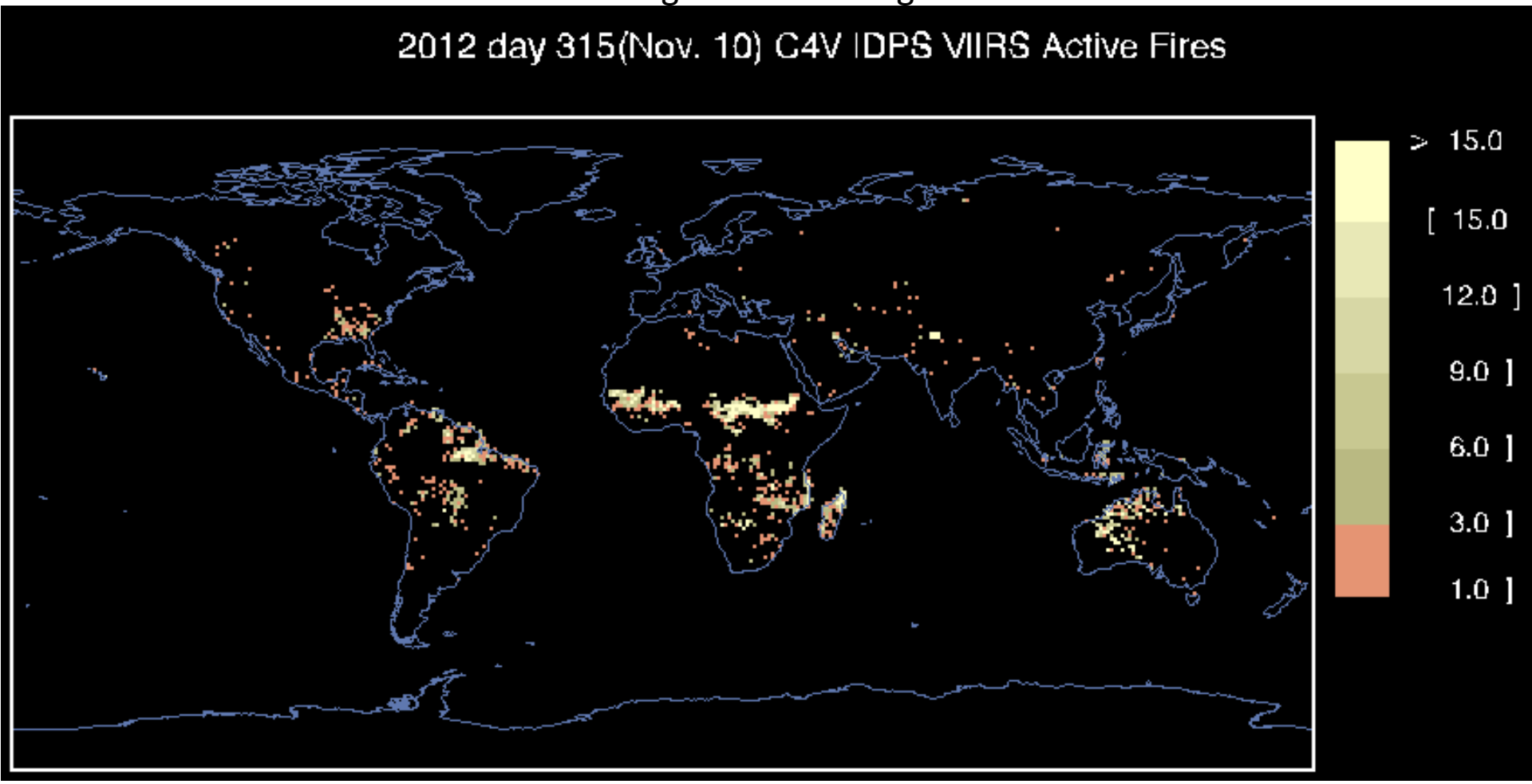
algorithm synchronization, end user feedback

DIRECT READOUT

- **Can run IDPS, NASA or locally developed code**
- **Stand-alone**

IDPS algorithm (MODIS C4)

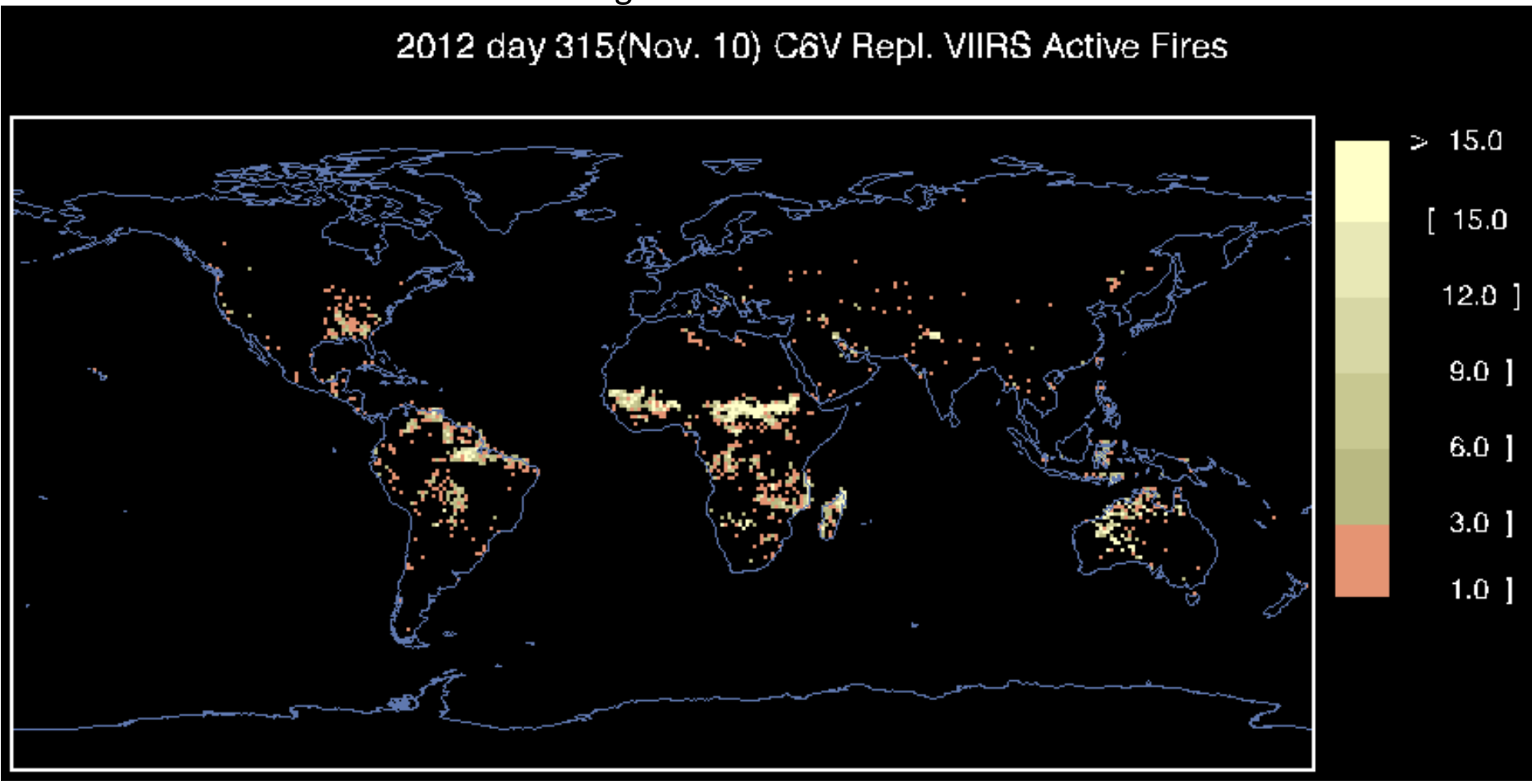
MODIS Version 4 algorithm running on VIIRS data



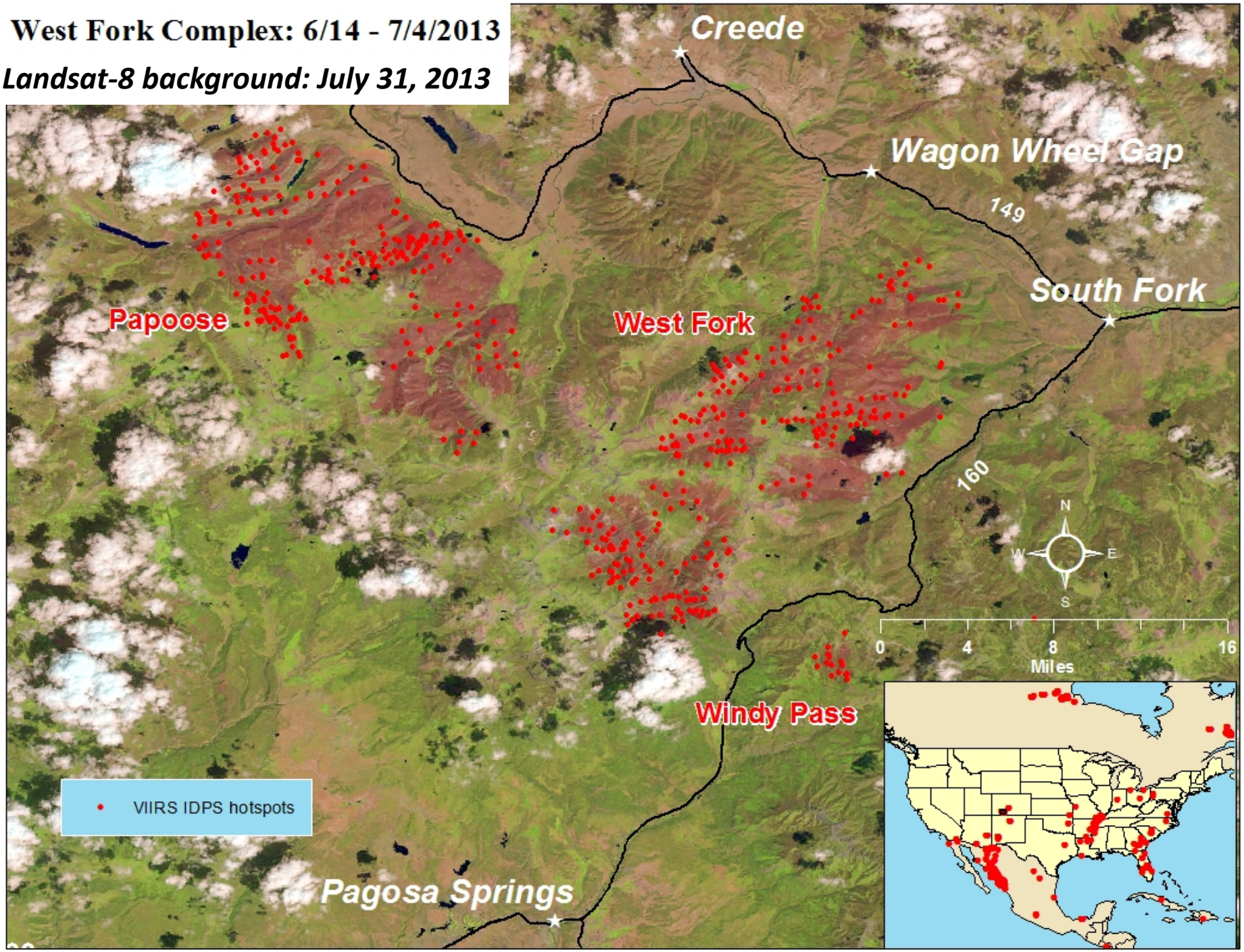
- ***Sparse array of fire pixels – no spatially explicit fire mask***
- ***No FRP***
- ***Land-only processing***

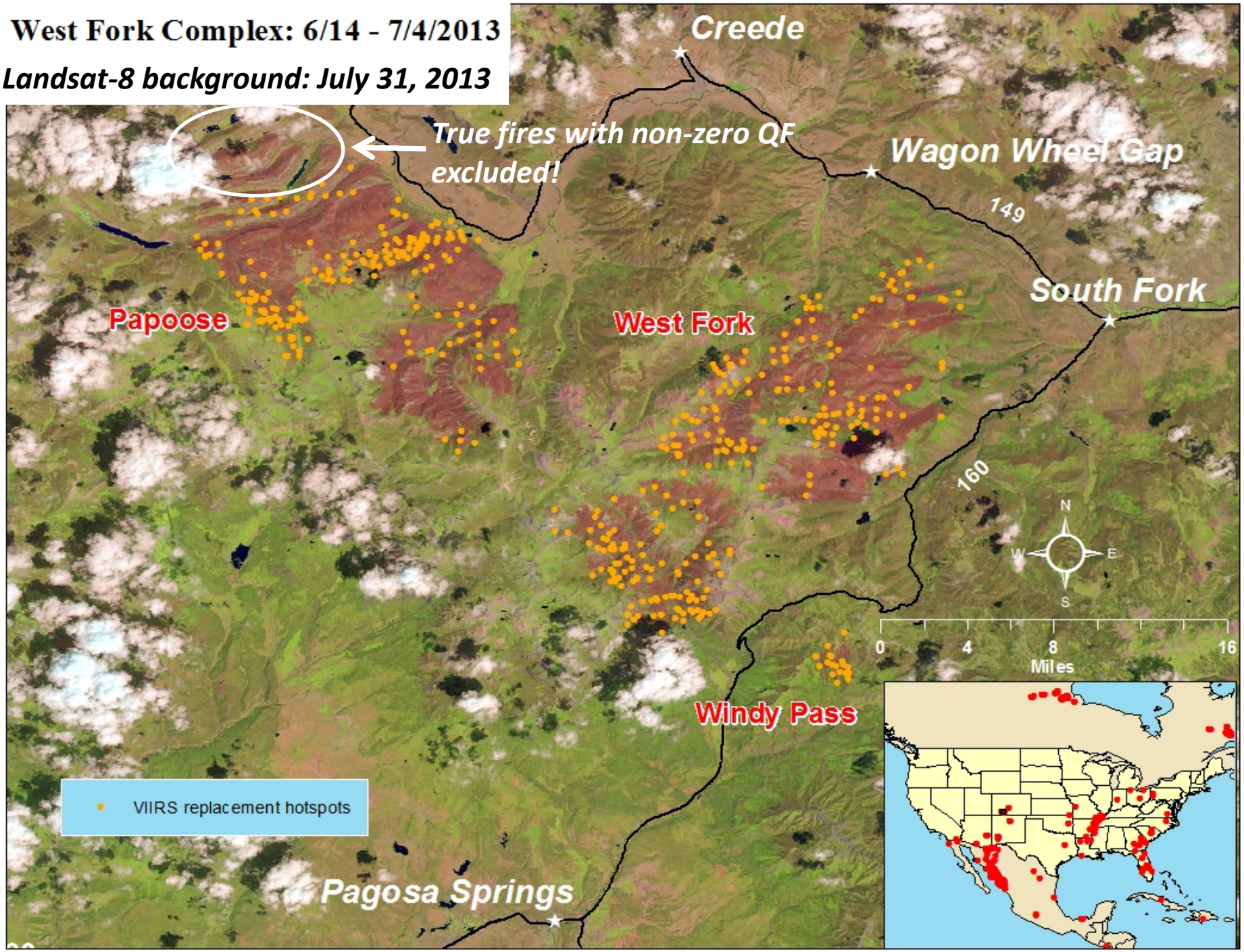
Replacement algorithm (MODIS C6)

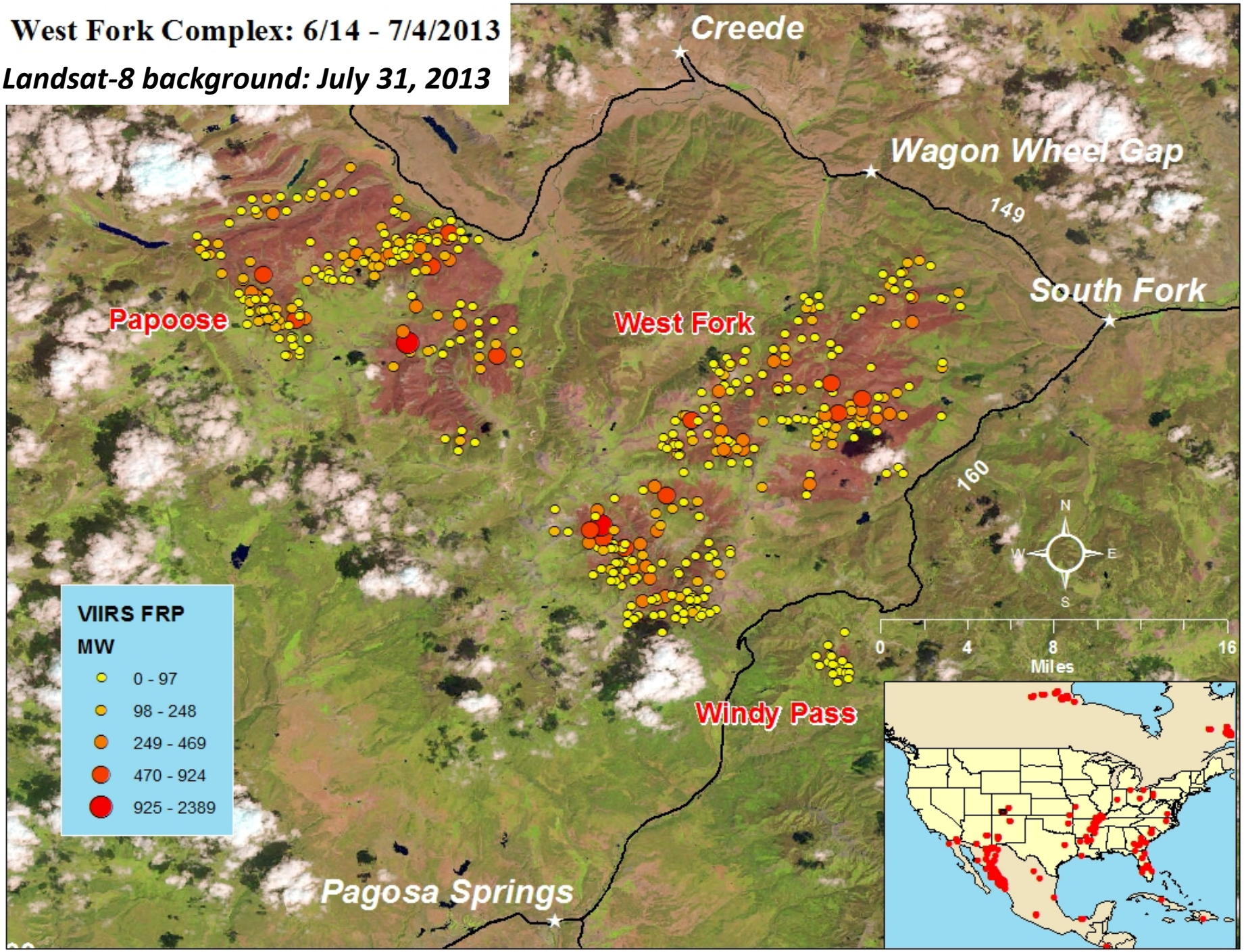
MODIS V6 code running on VIIRS data at LCF and in LandPEATE



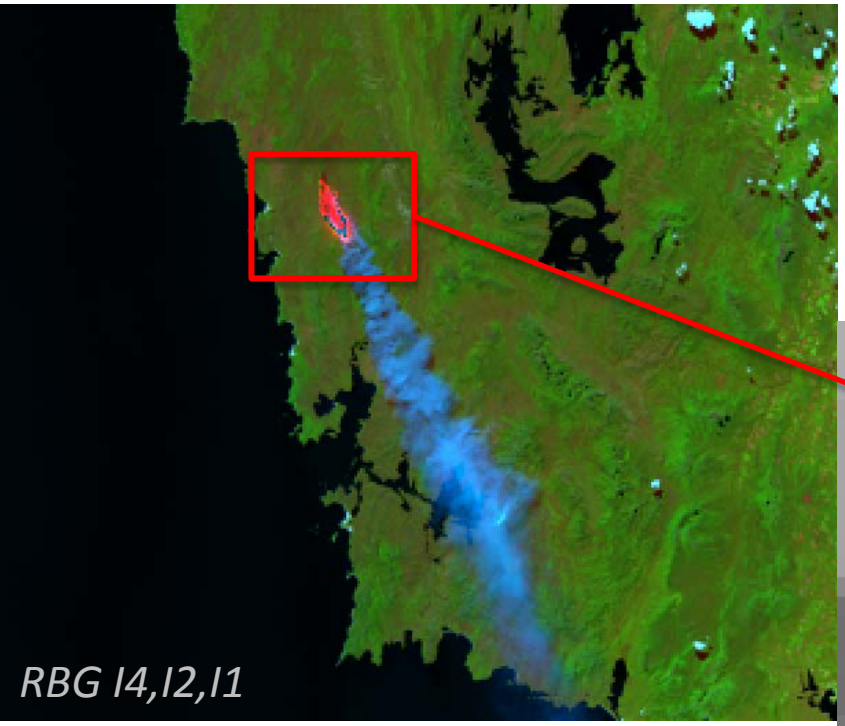
- ***Spatially explicit fire mask and FRP - > new JPSS L1 Requirements Supplement***
- ***Additional data layers for CMG***
- ***Ocean processing for gas flares, a new false-alarm rejection test over tropical regions, and dynamic potential fire thresholds***


West Fork Complex: 6/14 - 7/4/2013
Landsat-8 background: July 31, 2013
Creede
Wagon Wheel Gap
149
South Fork
Papoose
West Fork
160
N
W
E
S
0
4
8
16
Miles
Windy Pass
VIIRS IDPS hotspots
Pagosa Springs


West Fork Complex: 6/14 - 7/4/2013
Landsat-8 background: July 31, 2013
True fires with non-zero QF excluded!
Creede
Wagon Wheel Gap
149
South Fork
Papoose
West Fork
160
N
W
E
S
0
4
8
16
Miles
Windy Pass
VIIRS replacement hotspots
Pagosa Springs

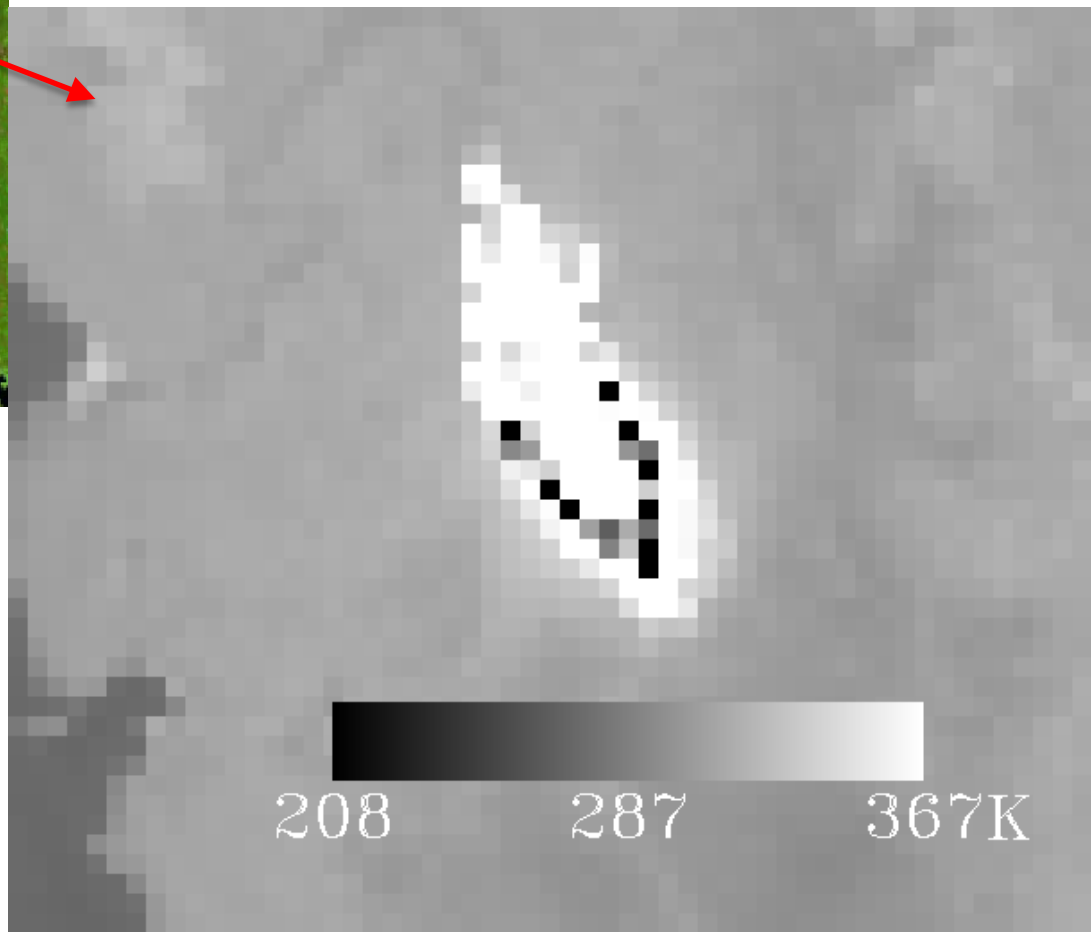

West Fork Complex: 6/14 - 7/4/2013
Landsat-8 background: July 31, 2013
Creede
Wagon Wheel Gap
149
South Fork
Papoose
West Fork
160
Windy Pass
Pagosa Springs
VIIRS FRP
MW
0 - 97
98 - 248
249 - 469
470 - 924
925 - 2389
N
W
E
S
0
4
8
16
Miles

I-band detection: great potential, but sub-optimal sensor



An example of the folding of I04 BT values over pixels exceeding saturation temperature

Zoom I04 – Brightness Temp



Abnormally low BT (208<>300K) within active fire perimeter and coinciding with outline of head fire where highest temperatures typically occur

208K prevailing among those pixels although higher/intermediate values are also found

Open / deferred DRs

Date	DR#	Reason	Status
8/3/2010	DR 4047	Extend Fire Algorithm to Offshore Areas	Deferred; upper for J1
12/6/2011	DR 4482	Incomplete output for cal/val purposes	Deferred; upper for J1
12/7/2011	DR 4483	Baseline of Active Fire Coefficients	Work not under PCR
12/7/2011	DR 4486	AVAFO files delivered aggregated	New submission
4/9/2012	DR 4656	Duplicate Fire Locations Reported in Trim Area	Analysis
9/14/2012	DR 4905	Active Fires Beta Maturity	Work not under PCR; to be closed
12/13/2012	DR 5029	Bad SDR data in Active Fires code	Work not under PCR
6/14/2013	DR 7245	JPSS-1 Algorithm Improvements: Mandated: Active Fires EDR	Analysis
8/12/2013	DR7313	Incorrect dual-gain calibration due to missing Cal data in adjacent granule	New submission

EDR Provisional Criteria

Provisional Definition	Artifacts (Deliverables)	Active Fires ARP
Product quality may not be optimal	**Product accuracy** is determined for a broader (but still limited) set of conditions. No requirement to demonstrate compliance with specifications.	**Performance was evaluated for input SDR quality and detection performance.**
Incremental **product improvements** are still occurring	Narrative, listing and discussing **known errors**. All DRs are identified and prioritized (1-5). Provisional readiness will address priorities 1-2. Pathway towards algorithm improvements to meet specifications is demonstrated.	**Spurious detections due to bad SDR data still occurring, but at a much lower frequency than Beta DR 5029 will be completed ASAP.**
Version control is in affect	Description of the development environment, algorithm version (IDPS build number), and LUTs/PCTs versions used to generate the product validation materials. **ATBDs** are accurate, up-to-date and consistent with the product running.	**ATBD is up-to-date, as is all other documentation**
General research community is encouraged to participate in the QA and validation of the product, but need to be aware that product validation and QA are ongoing	ADP STAR will request feedback from **appropriate users** for the product. The notification letter will include a Provisional Maturity disclaimer. DPA will send request to Project Science to post Provisional Maturity disclaimer on CLASS. DPA will submit readme document (#3 below) to CLASS.	**Extensive domestic and international user community; feedback is provided from DB users. User outreach through Proving Ground and GOFC-GOLD.**
Users are urged to consult the **EDR product status document prior** to use of the data in publications	**Warning of potential non-reproducibility** of results due to continuing calibration and code changes. **Identify known deficiencies** regarding product quality.	**Common NOAA-NASA baseline input SDR needs to be established.**
Ready for **operational evaluation**	**Key NOAA and non-NOAA end users** are identified and **feedback requested**	**Multiple ongoing partnerships.**

Summary

- The IDPS Active Fires products **meets the criteria for provisional status**
- The proposed effectivity date is **October 16, 2012**
  - First full day after implementation of Mx6.3; drop in spurious detections
- Work towards **Validated 1** status:
  - Further reduction of errors due to improper **SDR QA**
    - Further **reduce bad SDR** and incorrect flagging
    - Implement **upfront filter** for bad SDR data (DR 5029)
  - Continuing **validation**
    - rigorous validation remains a challenge due to suboptimal product specification and scarcity of in-situ/airborne/satellite reference data
- Work towards J1 readiness:
  - Migration of **L1RDS-compliant LandPEATE code** into NOAA operations (IDPS? NDE?)
  - Evaluation of **J1 sensor** test results (primarily saturation)
- Other product and algorithm work:
  - Testing and evaluation of experimental **I-band product**
  - **J2 VIIRS** specifications and performance