NEW BIOMASS BURNING OBSERVING CAPABILITIES FROM SUOMI NPP VIIRS FOR CONTINUING REGIONAL FIRE MONITORING IN NORTHERN EURASIA

Ivan Csiszar[1], Christopher O. Justice[2], Krishna Vadrevu[2], Wilfrid Schroeder[2], Louis Giglio[2], Evan Ellicott[2]

[1]NOAA/NESDIS Center for Satellite Applications and Research, Camp Springs, MD

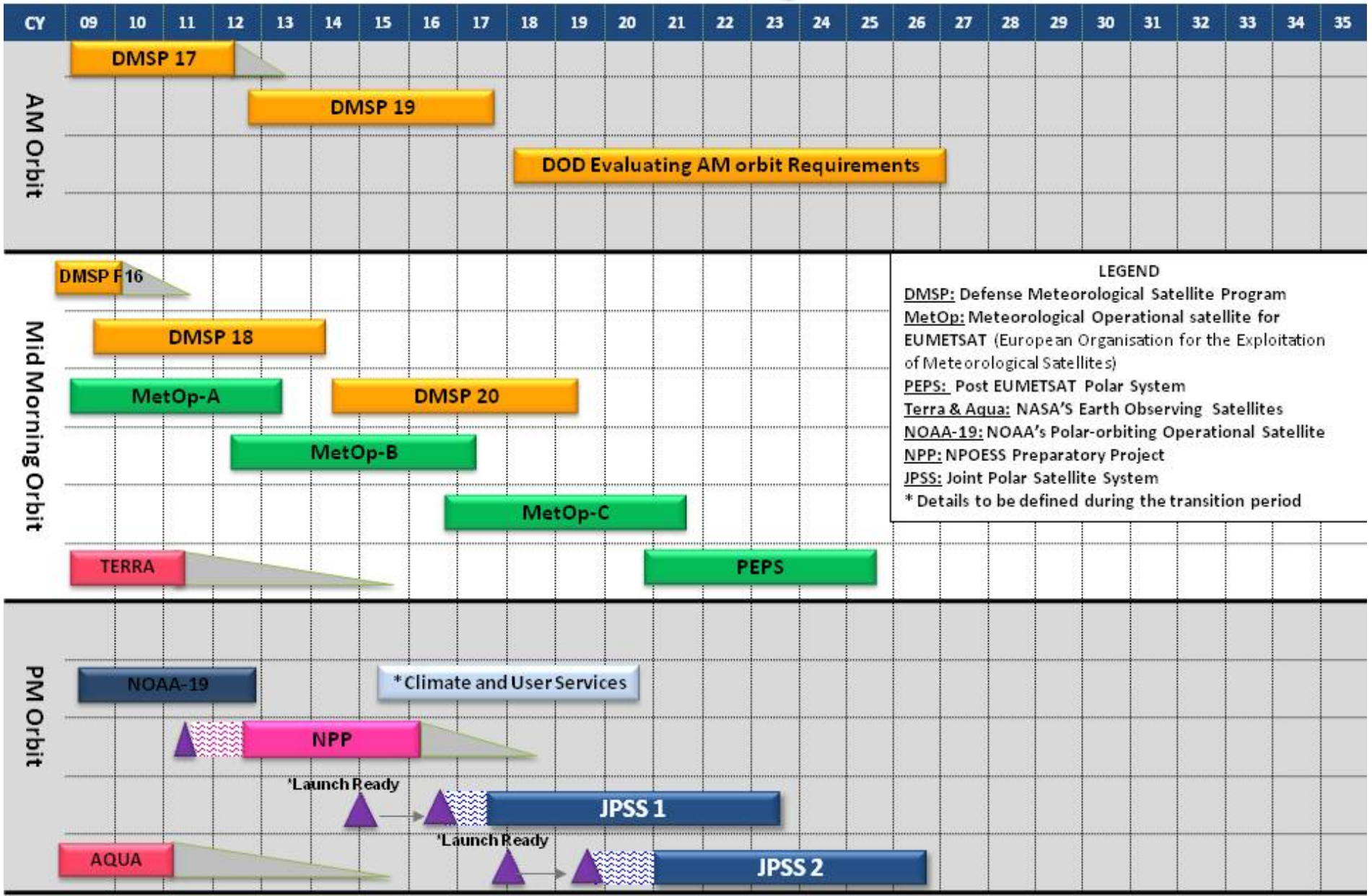
[2]University of Maryland, College Park, MD

This work was supported by the NOAA JPSS and NASA Suomi NPP programs

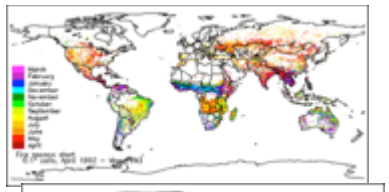
Outline

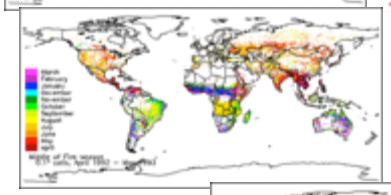
- The Suomi NPP satellite
- Fundamental Suomi NPP VIIRS sensor characteristics related to fire detection
- Examples of Suomi NPP VIIRS fire data
- Product status
- Data continuity with MODIS
- Conclusions

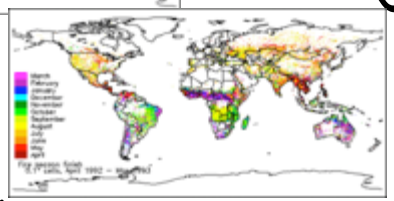
Continuity of Polar Operational Satellite Programs



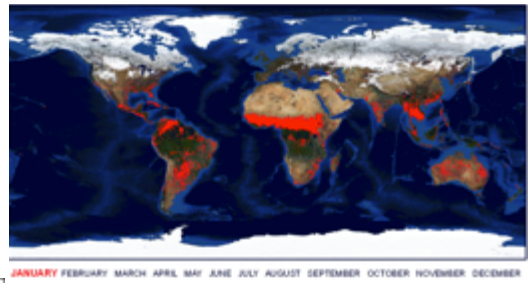
THE GLOBAL FIRE PRODUCT (1992-93)







bioval.jrc.ec.europa.eu/



1980s

AVHRR production

AVHRR global analyses

1990s

GOES production

GOFC-GOLD Fire

2000s

MODIS production

MODIS validation

MODIS CMG

GCOS Fire ECV

GOES reprocessing

2010s

NPP VIIRS

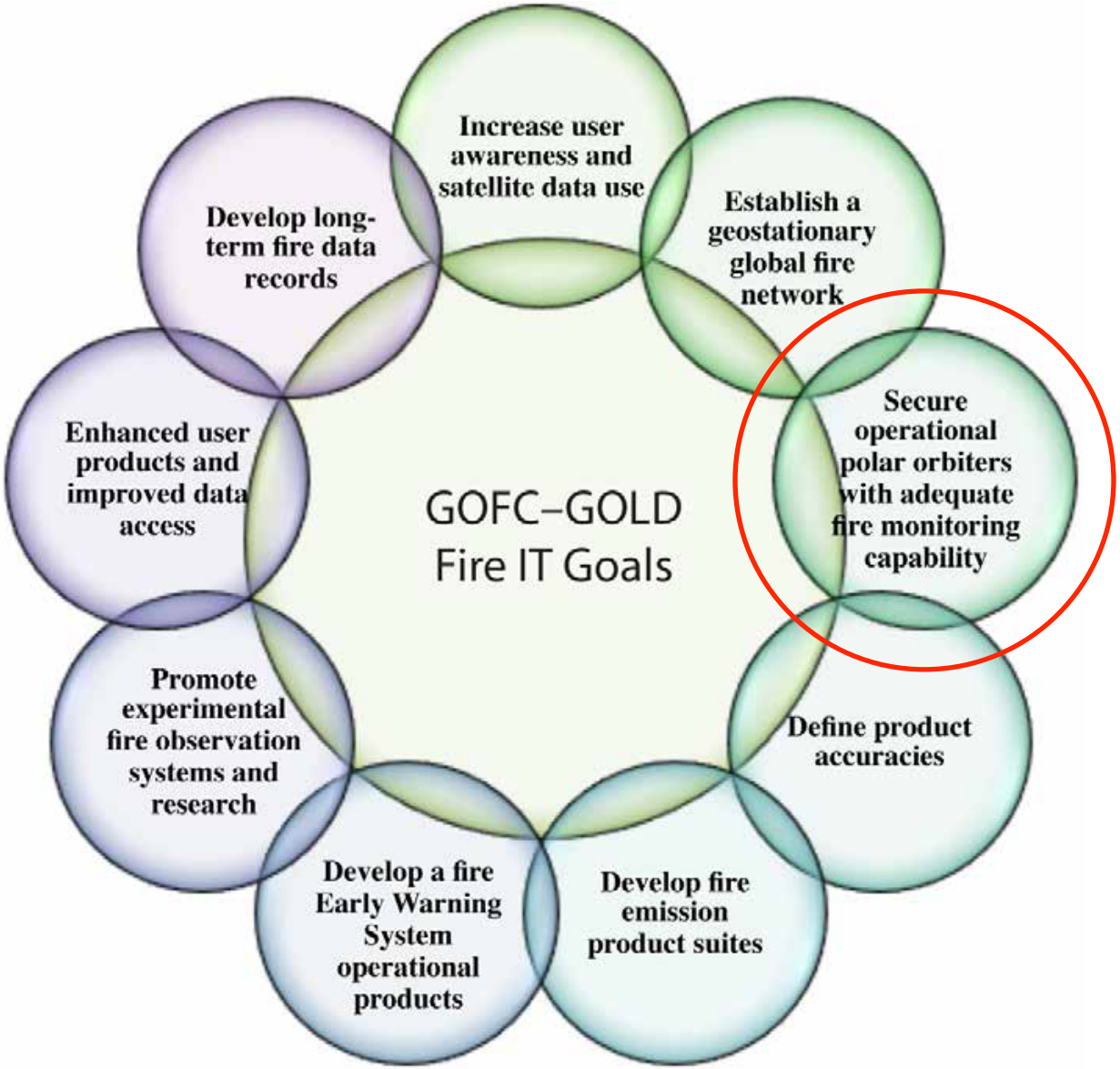
JPSS VIIRS

GOES-R ABI

PRESENT

Fraction of GOES clear-sky observations with fire

Global Observation of Forest and Landcover Dynamics (GOFC-GOLD)



Fire Mapping and Monitoring is of the three thematic areas of GOFC-GOLD.

Suomi NPP (National Polar-orbiting Partnership) Earth-Observing Mission

Suomi NPP provides data continuity for NASA, and NOAA, and risk reduction for JPSS instruments, algorithms, ground system, and archive.

Suomi NPP will continue critical climate and weather data from polar orbit:

NASA EOS	NOAA POES
AIRS > CrIS	HIRS > CrIS
AMSU > ATMS	AMSU > ATMS
MODIS > VIIRS	AVHRR > VIIRS
OMI > OMPS	SBUV2 > OMPS
CERES > CERES	

Anticipated Benefits

Tracking Our Changing Climate (measurements to understand climate and the health of our planet)
A Vigilant Eye on Ozone (daily measurements to assess recovery of the ozone layer)
A Sentinel When Disaster Strikes (wildfires, volcanic eruptions, snowstorms, droughts, floods, hurricanes)
Watching the Weather (soundings of atmospheric temperature and moisture, cloud cover)

Suomi NPP Instruments

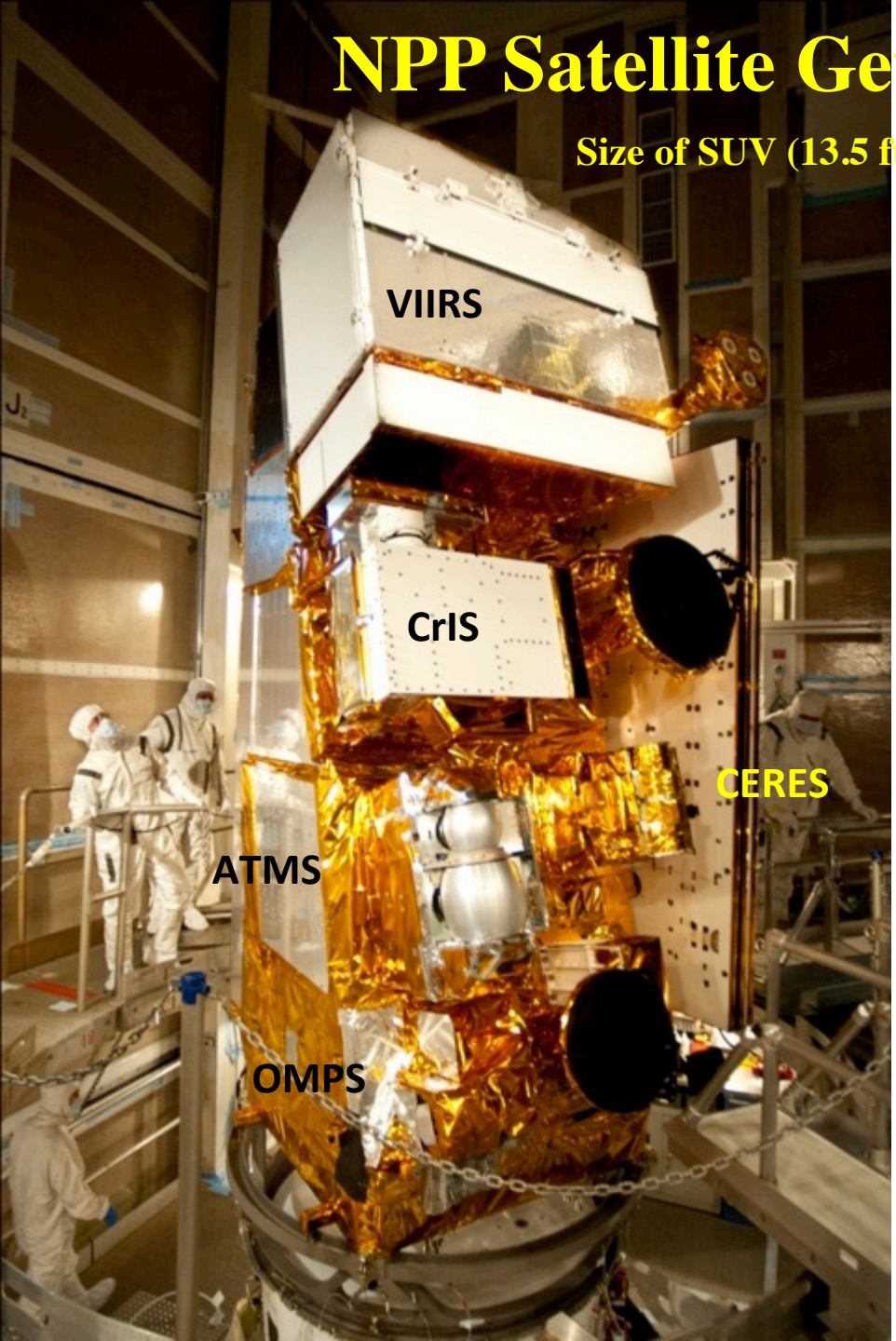
- Visible Infrared Imaging Radiometer Suite (VIIRS)
- Cross-track Infrared Sounder (CrIS)
- Advanced Technology Microwave Sounder (ATMS)
- Ozone Mapping and Profiler Suite (OMPS), and
- Clouds and the Earth's Radiant Energy System (CERES)

→ Only CERES has flown in space before, the other four instruments are new designs.

Launch: October 28, 2011

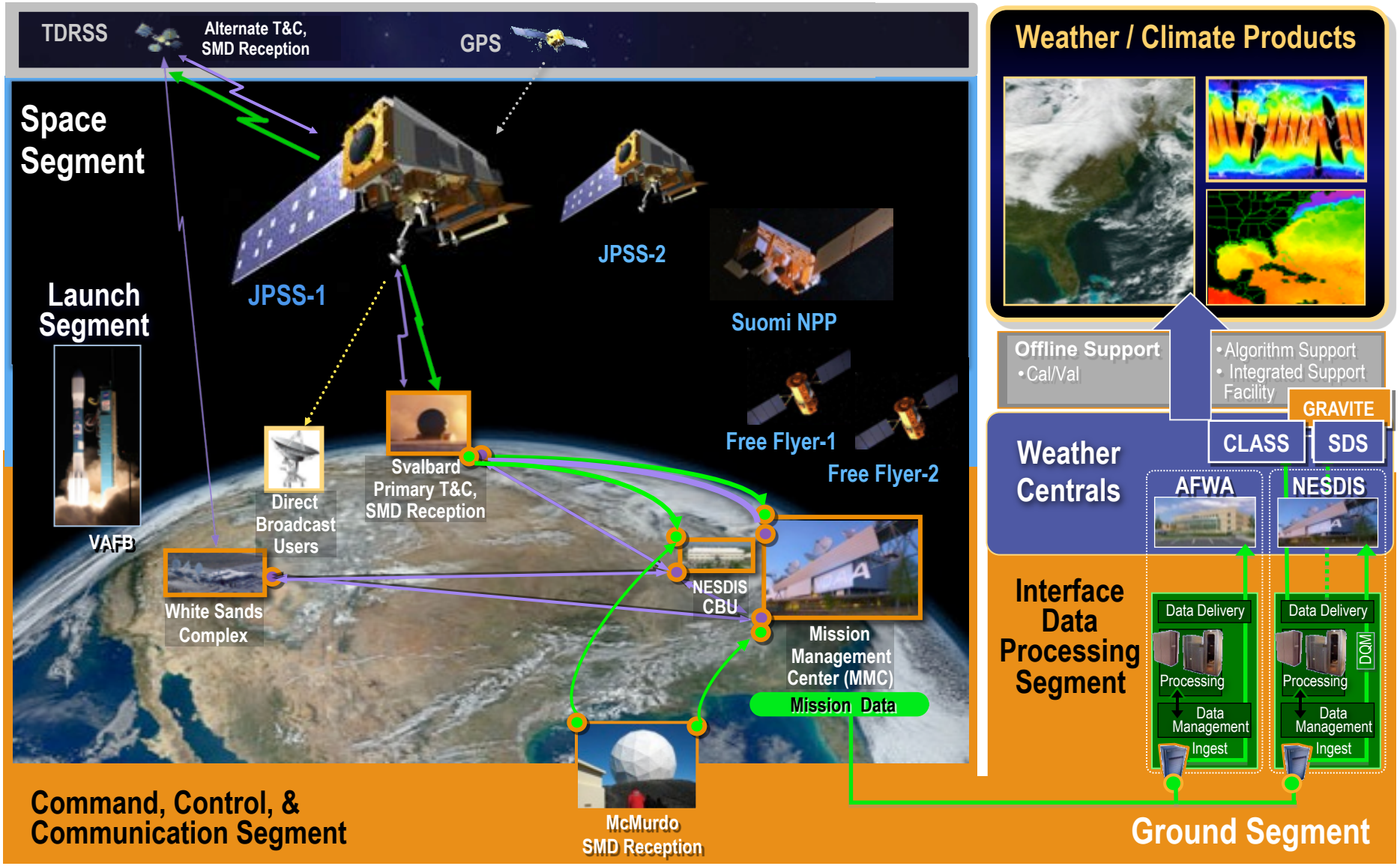
NPP Satellite Getting Ready for Launch

Size of SUV (13.5 ft tall & 4,500 lbs); 512 mile orbit

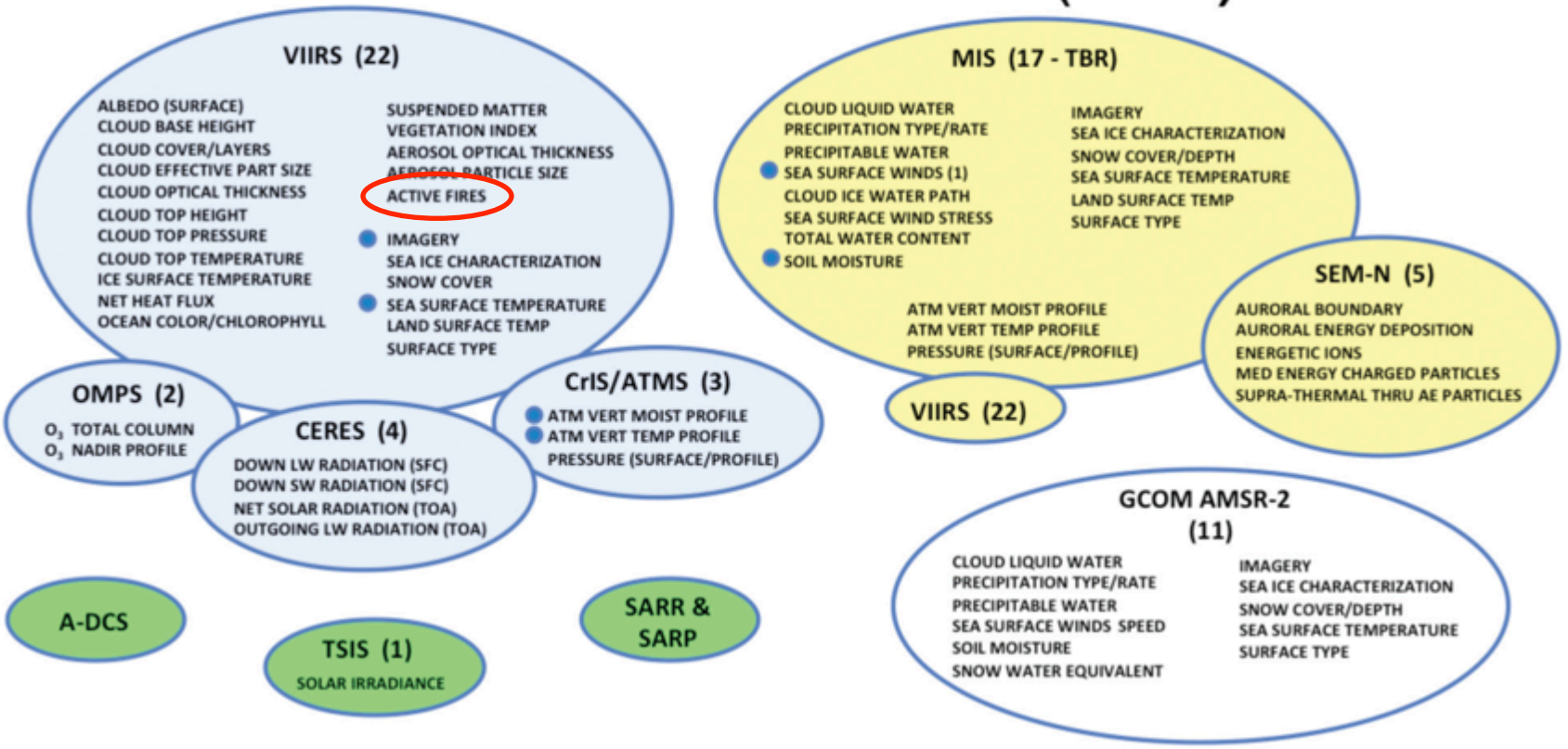


Suomi NPP Launch: October 28, 2011

Joint Polar Satellite System High Level Overview



JPSS L1RD Defined Environmental Data Records (EDRs)



Notes:

(1) Delivered as two MIS products – Speed (Key EDR) and Direction

PSE v1 2/28/11

SUOMI NPP VIIRS AND FIRE MONITORING

- NPP (Suomi National Polar-orbiting Partnership) was **launched** on October 28, 2011)

- The Visible Infrared Imager Radiometer Suite (VIIRS) sensor was developed to allow for the **detection and characterization of hot targets**

- The community expects and **society needs** the continuation of these high quality observations from VIIRS on NPP (launched on October 28, 2011) and future JPSS satellites

Visible Infrared Imaging Radiometer Suite

- Purpose:
  Global observations of land, ocean, and atmosphere parameters at high temporal resolution (~ daily)
- Predecessor Instruments:
  AVHRR, OLS, MODIS, SeaWiFS
- Approach:
  Multi-spectral scanning radiometer (22 bands between 0.4μm and 12μm)
  12-bit quantization
- Swath width:
  3000 km

Spatial Resolution

- 16 bands at 750m
- 5 bands at 325m
- DNB

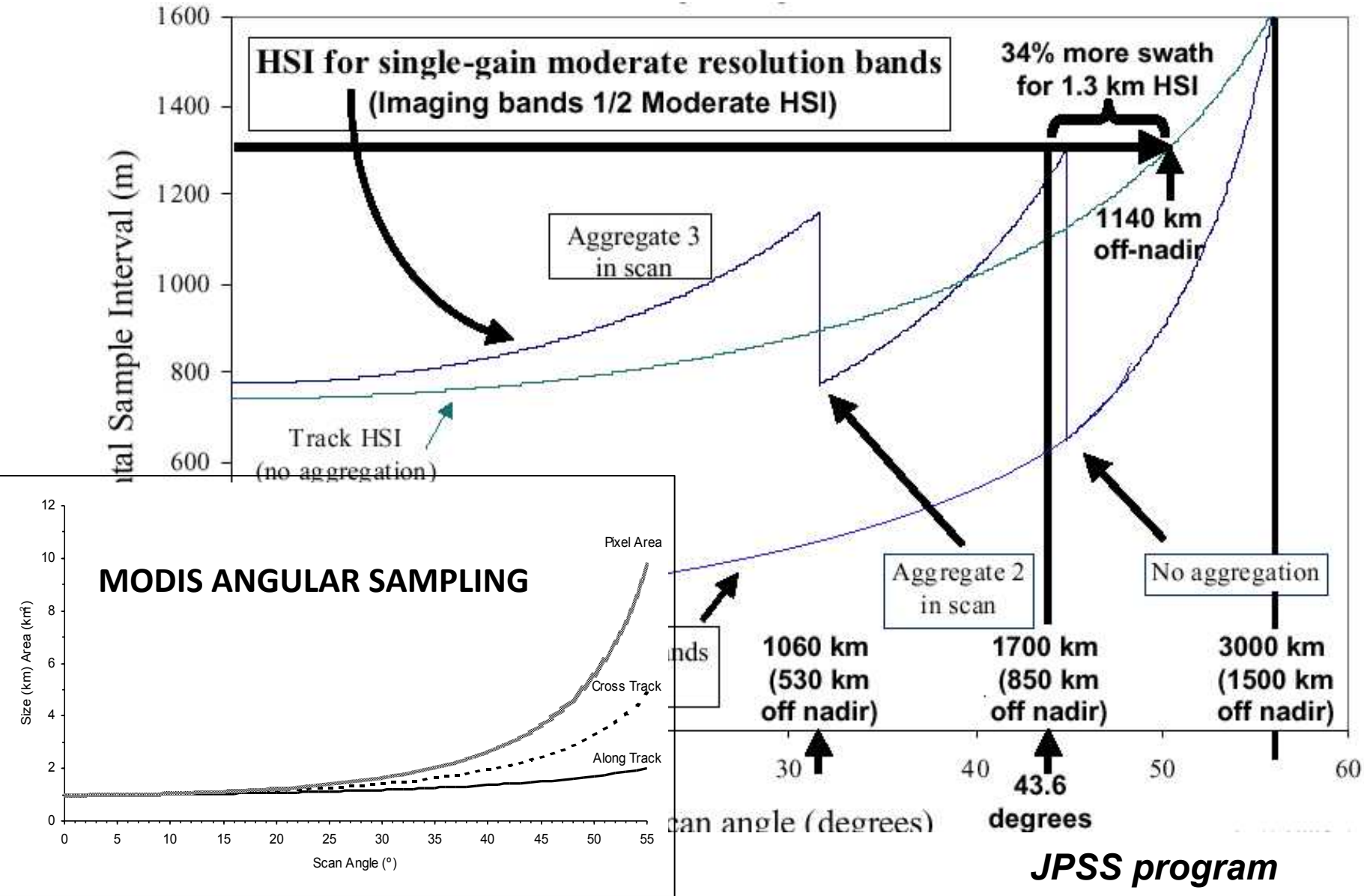
VIIRS: Visible Infrared Imager Radiometer Suite

		Band No.	Wave-length (μm)	Horiz Sample Interval (km Downtrack x Crosstrack)		Driving EDRs	Radi-ance Range	Ltyp or Ttyp
				Nadir	End of Scan			
VIS/NIR FPA	Silicon PIN Diodes	M1	0.412	0.742 x 0.259	1.60 x 1.58	Ocean Color Aerosols	Low High	44.9 155
		M2	0.445	0.742 x 0.259	1.60 x 1.58	Ocean Color Aerosols	Low High	40 146
		M3	0.488	0.742 x 0.259	1.60 x 1.58	Ocean Color Aerosols	Low High	32 123
		M4	0.555	0.742 x 0.259	1.60 x 1.58	Ocean Color Aerosols	Low High	21 90
		I1	0.640	0.371 x 0.387	0.80 x 0.789	Imagery	Single	22
		M5	0.672	0.742 x 0.259	1.60 x 1.58	Ocean Color Aerosols	Low High	10 68
		M6	0.746	0.742 x 0.776	1.60 x 1.58	Atmospheric Corr'n	Single	9.6
		I2	0.865	0.371 x 0.387	0.80 x 0.789	NDVI	Single	25
		M7	0.865	0.742 x 0.259	1.60 x 1.58	Ocean Color Aerosols	Low High	6.4 33.4
CCD		DNB	0.7	0.742 x 0.742	0.742 x 0.742	Imagery	Var.	6.70E-05
S/MWIR	PV HgCdTe (HCT)	M8	1.24	0.742 x 0.776	1.60 x 1.58	Cloud Particle Size	Single	5.4
		M9	1.378	0.742 x 0.776	1.60 x 1.58	Cirrus/Cloud Cover	Single	6
		I3	1.61	0.371 x 0.387	0.80 x 0.789	Binary Snow Map	Single	7.3
		M10	1.61	0.742 x 0.776	1.60 x 1.58	Snow Fraction	Single	7.3
		M11	2.25	0.742 x 0.776	1.60 x 1.58	Clouds	Single	0.12
		I4	3.74	0.371 x 0.387	0.80 x 0.789	Imagery Clouds	Single	270 K
		M12	3.70	0.742 x 0.776	1.60 x 1.58	SST	Single	270 K
		M13	4.05	0.742 x 0.259	1.60 x 1.58	SST Fires	Low High	300 K 380 K
LWIR	PV HCT	M14	8.55	0.742 x 0.776	1.60 x 1.58	Cloud Top Properties	Single	270 K
		M15	10.763	0.742 x 0.776	1.60 x 1.58	SST	Single	300 K
		I5	11.450	0.371 x 0.387	0.80 x 0.789	Cloud Imagery	Single	210 K
		M16	12.013	0.742 x 0.776	1.60 x 1.58	SST	Single	300 K

VIIRS Heritage: MODIS and AVHRR

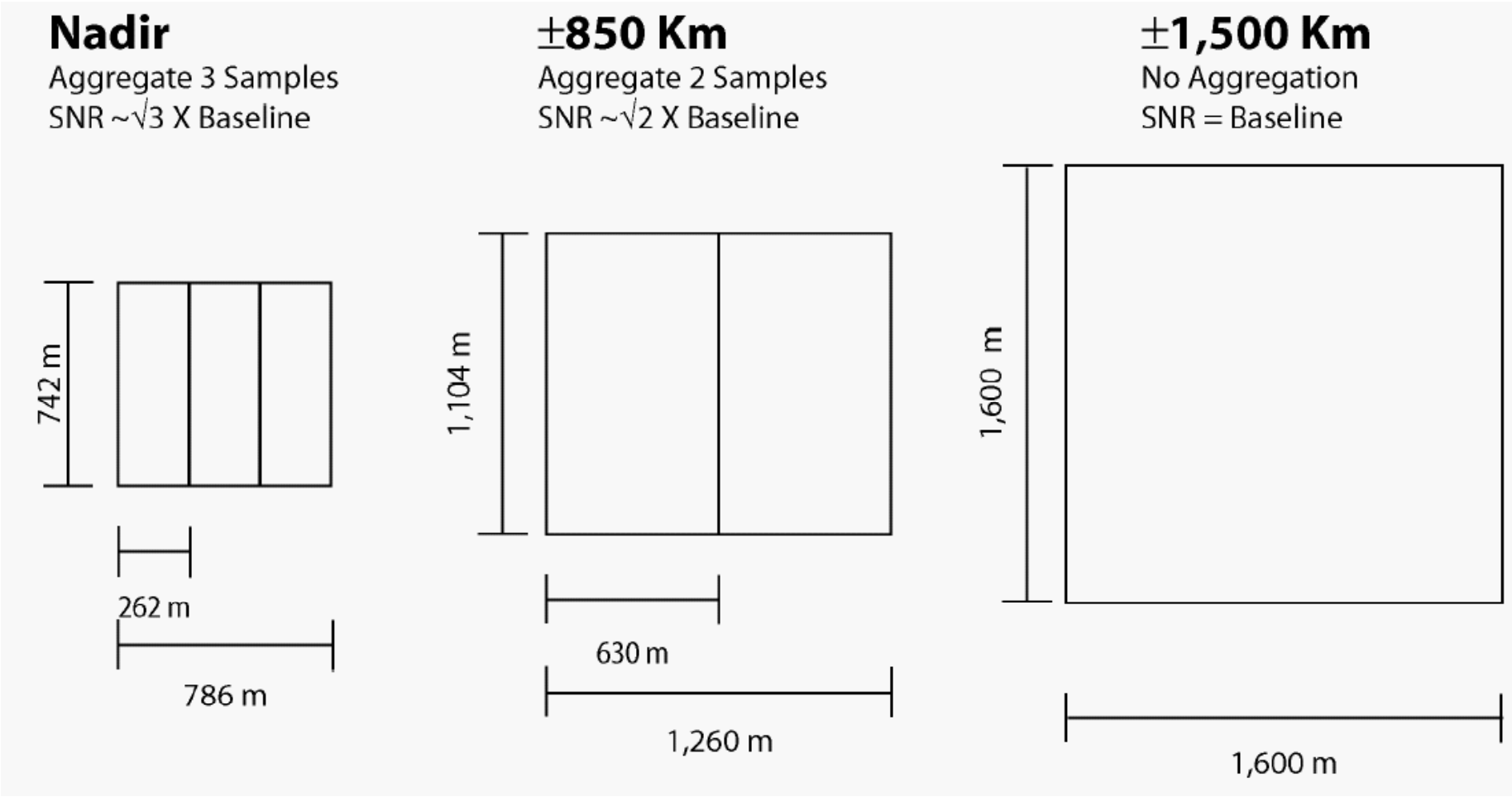
VIIRS			MODIS Equivalent			AVHRR-3 Equivalent			OLS Equivalent		
Band	Range (um)	HSR (m)	Band	Range	HSR	Band	Range	HSR	Band	Range	HSR
DNB	0.500 - 0.900								HRD PMT	0.580 - 0.910 0.510 - 0.860	550 2700
M1	0.402 - 0.422	750	8	0.405 - 0.420	1000						
M2	0.436 - 0.454	750	9	0.438 - 0.448	1000						
M3	0.478 - 0.498	750	3 10	0.459 - 0.479 0.483 - 0.493	500 1000						
M4	0.545 - 0.565	750	4 12	0.545 - 0.565 0.546 - 0.556	500 1000						
I1	0.600 - 0.680	375	1	0.620 - 0.670	250	1	0.572 - 0.703	1100			
M5	0.662 - 0.682	750	13 14	0.662 - 0.672 0.673 - 0.683	1000 1000	1	0.572 - 0.703	1100			
M6	0.739 - 0.754	750	15	0.743 - 0.753	1000						
I2	0.846 - 0.885	375	2	0.841 - 0.876	250	2	0.720 - 1.000	1100			
M7	0.846 - 0.885	750	16	0.862 - 0.877	1000	2	0.720 - 1.000	1100			
M8	1.230 - 1.250	750	5	SAME	500						
M9	1.371 - 1.386	750	26	1.360 - 1.390	1000						
I3	1.580 - 1.640	375	6	1.628 - 1.652	500						
M10	1.580 - 1.640	750	6	1.628 - 1.652	500	3a	SAME	1100			
M11	2.225 - 2.275	750	7	2.105 - 2.155	500						
I4	3.550 - 3.930	375	20	3.660 - 3.840	1000	3b	SAME	1100			
M12	3.660 - 3.840	750	20	SAME	1000	3b	3.550 - 3.930	1100			
M13	3.973 - 4.128	750	21 22 23	3.929 - 3.989 3.929 - 3.989 4.020 - 4.080	1000 1000 1000						
M14	8.400 - 8.700	750	29	SAME	1000						
M15	10.263 - 11.263	750	31	10.780 - 11.280	1000	4	10.300 - 11.300	1100			
I5	10.500 - 12.400	375	31 32	10.780 - 11.280 11.770 - 12.270	1000 1000	4 5	10.300 - 11.300 11.500 - 12.500	1100 1100	HRD	10.300 - 12.900	550
M16	11.538 - 12.488	750	32	11.770 - 12.270	1000	5	11.500 - 12.500	1100			

VIIRS Detector Aggregation Scheme



JPSS program

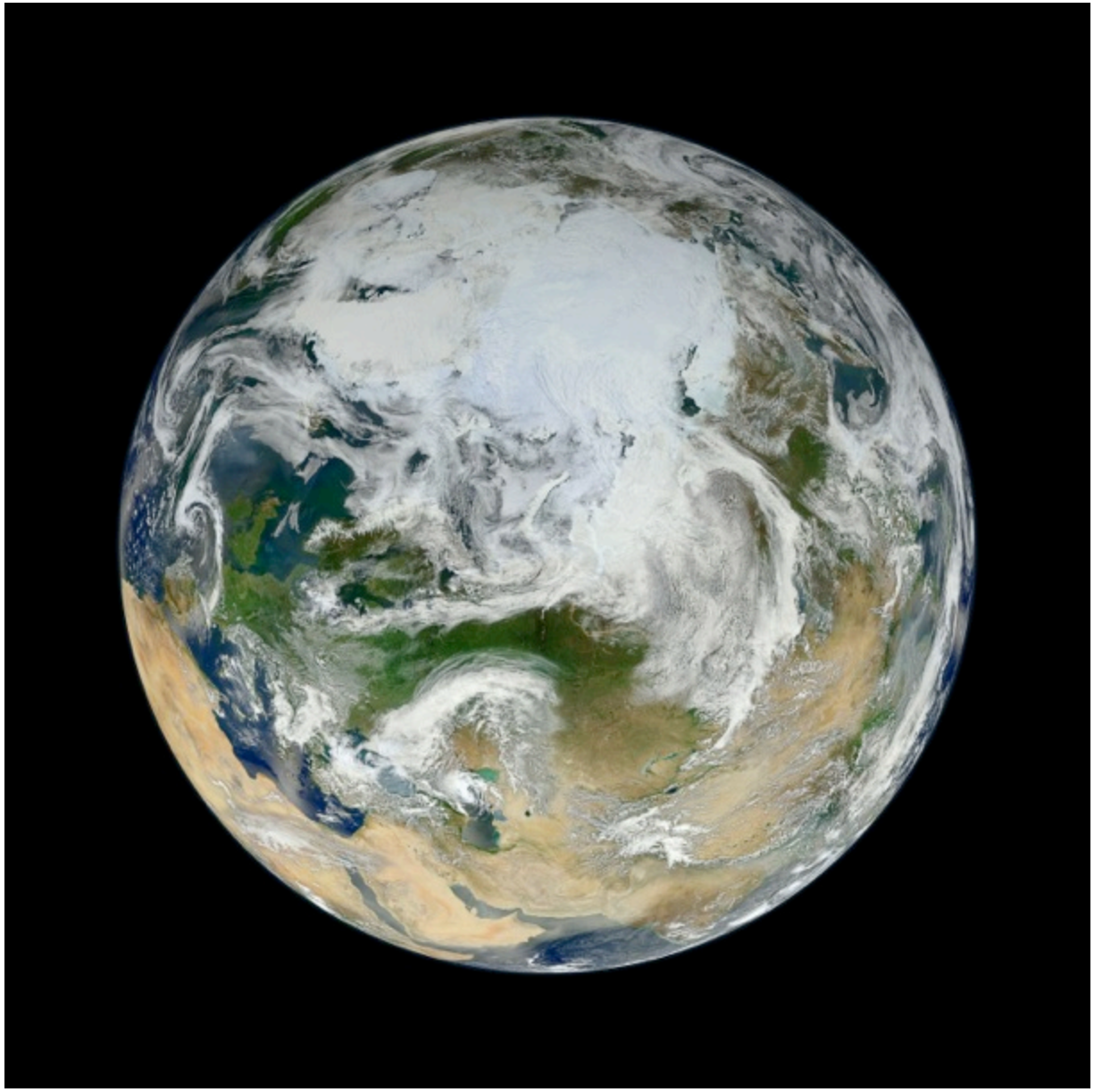
VIIRS Detector Aggregation Scheme



VIIRS GLOBAL COMPOISITE IMAGE

NO GAPS AT LOW LATITUDES; MORE OVERLAPS AT HIGH LATITUDES; REDUCED PIXEL DEGRADATION

VIIRS BLUE MARBLE



earthobservatory.nasa.gov

Image by Norman Kuring, NASA/GSFC/Suomi NPP. Caption by Michael Carlowicz.

Fires: pre-launch pruduct evaluation

- **Theoretical simulations**
- ***Evaluate effects of sensor design***
- ***Estimate of expected product perfomance***
- **Use of MODIS as proxy**
- ***Test of algorithm and processing chain***

BACKGROUND
Main Input:
90m AST_08

30m AST_08 (resampled)

Account for Point Spread Function

Account for Solar+Atm Components

↓

Top of Atmosphere background radiances

ACTIVE FIRE
Main Input: 30m Fire Mask

Account for VIIRS spectral response (Planck)

Iterate with MODIS/Terra L1B Channel 21&22

Account for Point Spread Function

↓

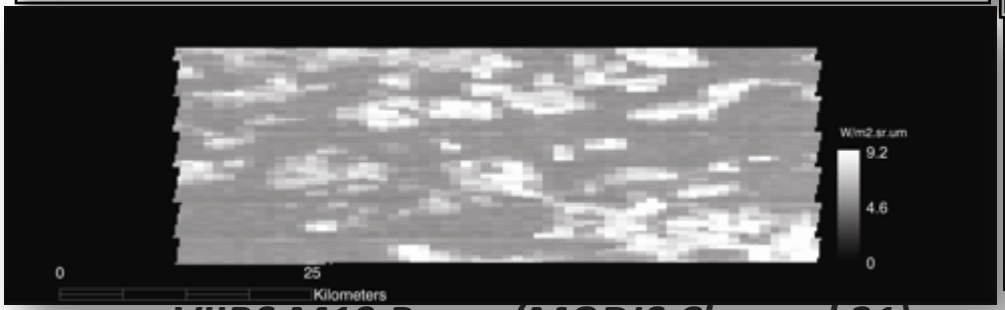
Top of Atmosphere fire radiances

Main Input:
ASTER Channel 13

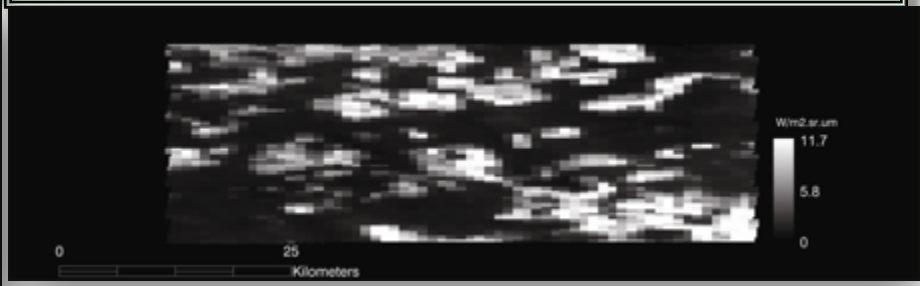
Account for Point Spread Function

↓

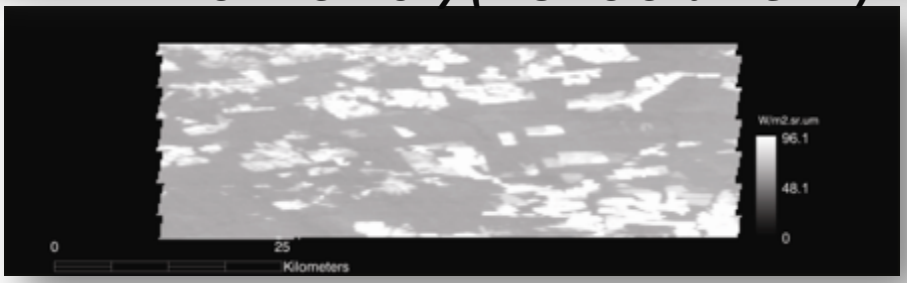
TOA background and fire radiances



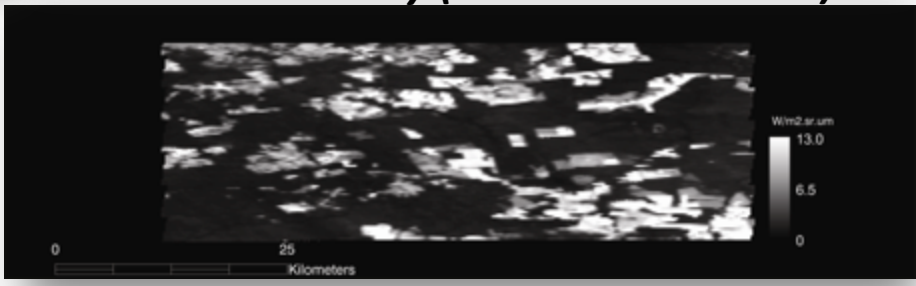
VIIRS M13 Proxy (MODIS Channel 21)



VIIRS M15 Proxy (MODIS channel 31)



Simulated VIIRS M13

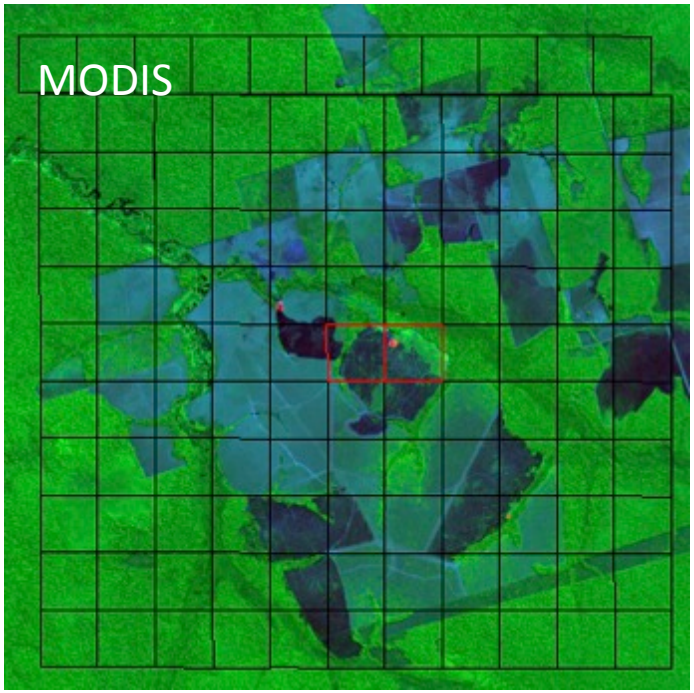


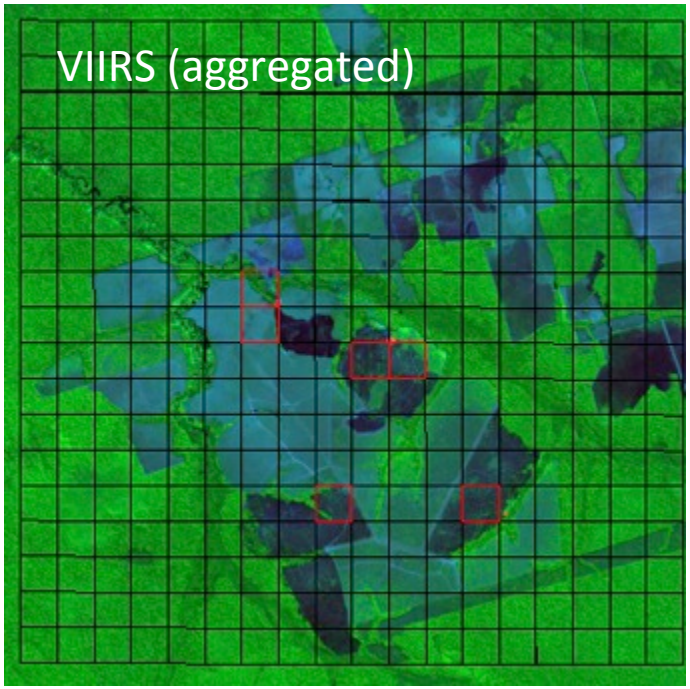
Simulated VIIRS M15

MODIS and VIIRS fire detections at nadir: modeling

VIIRS spatial resolution is higher that of MODIS; in general,
VIIRS is expected to detect smaller fires at nadir

(based on modeling using ASTER fire masks)





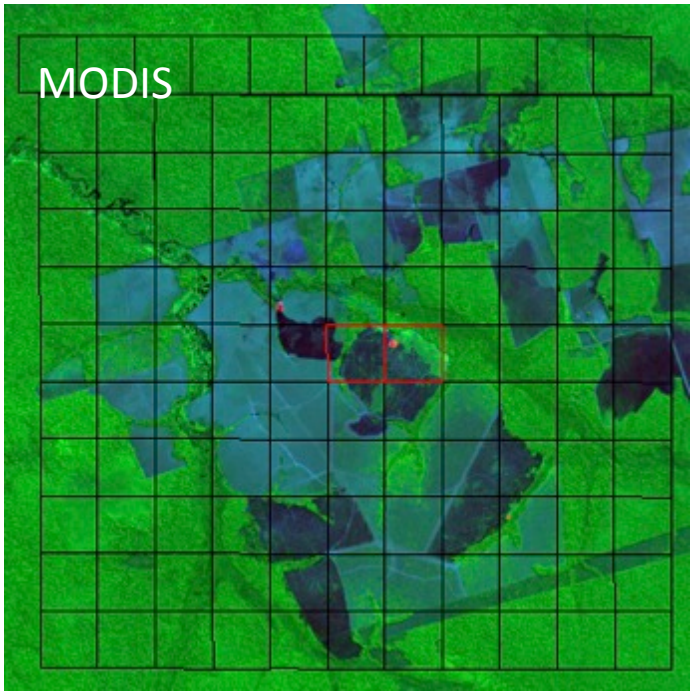
7 Aug 2004 1405 UTC
~11.7° S 56.6° W
(Brazil)

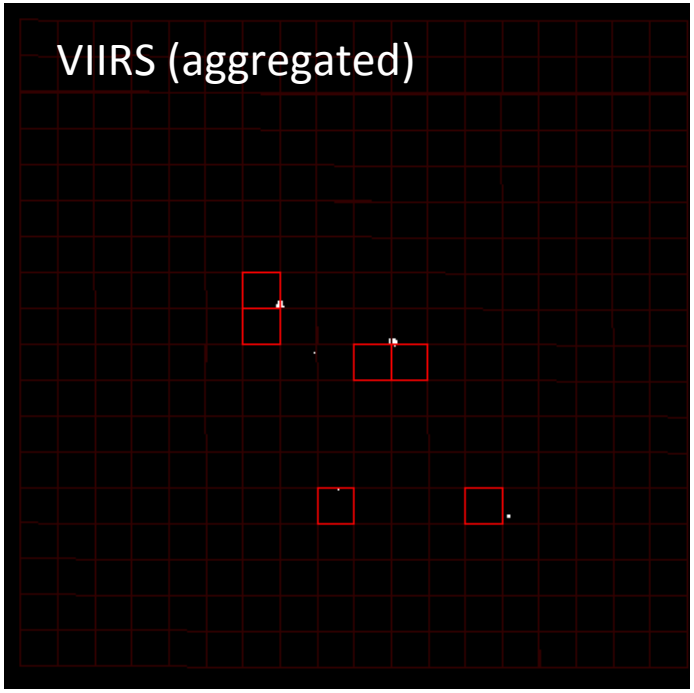
I. Csiszar (NOAA), W. Schroeder, L. Giglio, E. Ellicott and C. Justice (UMD)

MODIS and VIIRS fire detections at nadir: modeling

VIIRS spatial resolution is higher that of MODIS; in general,
VIIRS is expected to detect smaller fires at nadir

(based on modeling using ASTER fire masks)



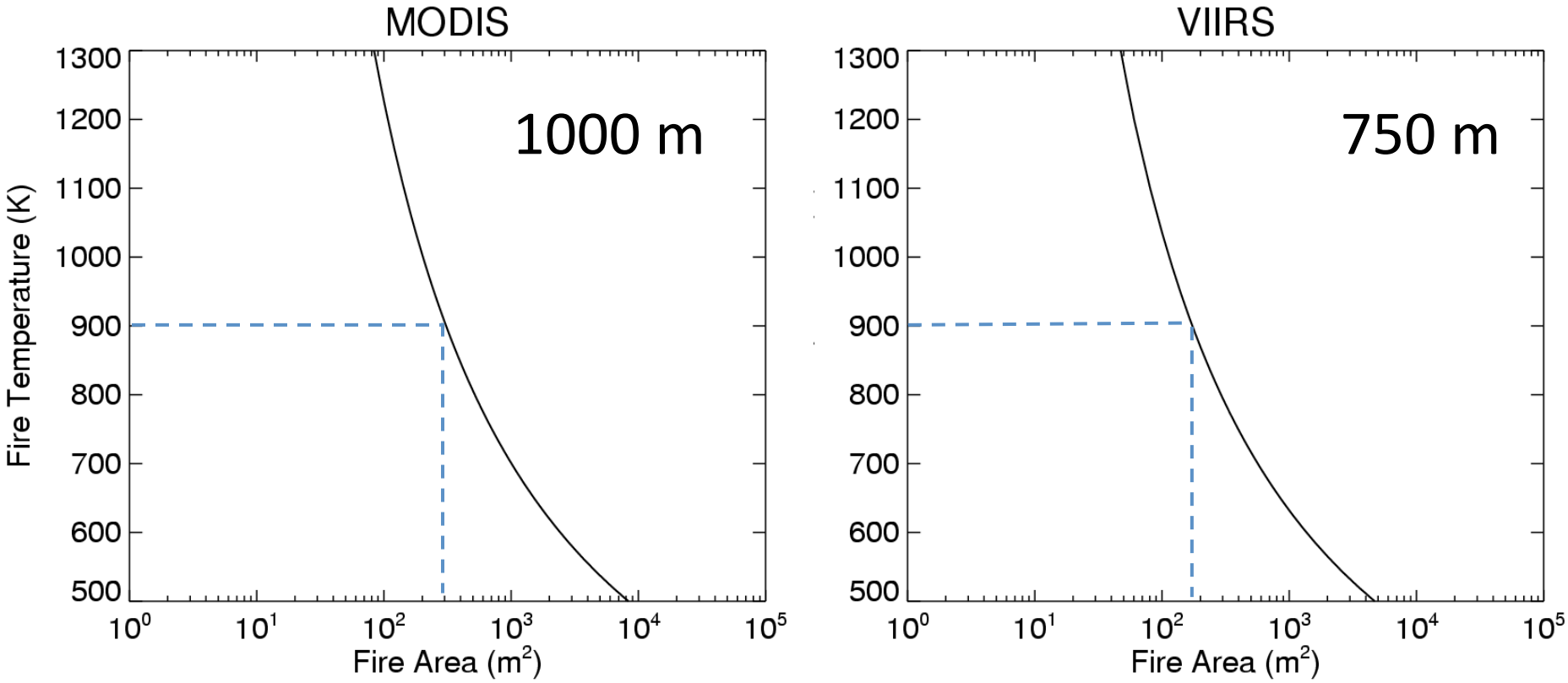


7 Aug 2004 1405 UTC
~11.7° S 56.6° W
(Brazil)

I. Csiszar (NOAA), W. Schroeder, L. Giglio, E. Ellicott and C. Justice (UMD)

MODIS and VIIRS fire detections at nadir: modeling

VIIRS spatial resolution is higher that of MODIS; in general,
VIIRS is expected to detect smaller fires at nadir



90% probability of detection; boreal forest; nadir view

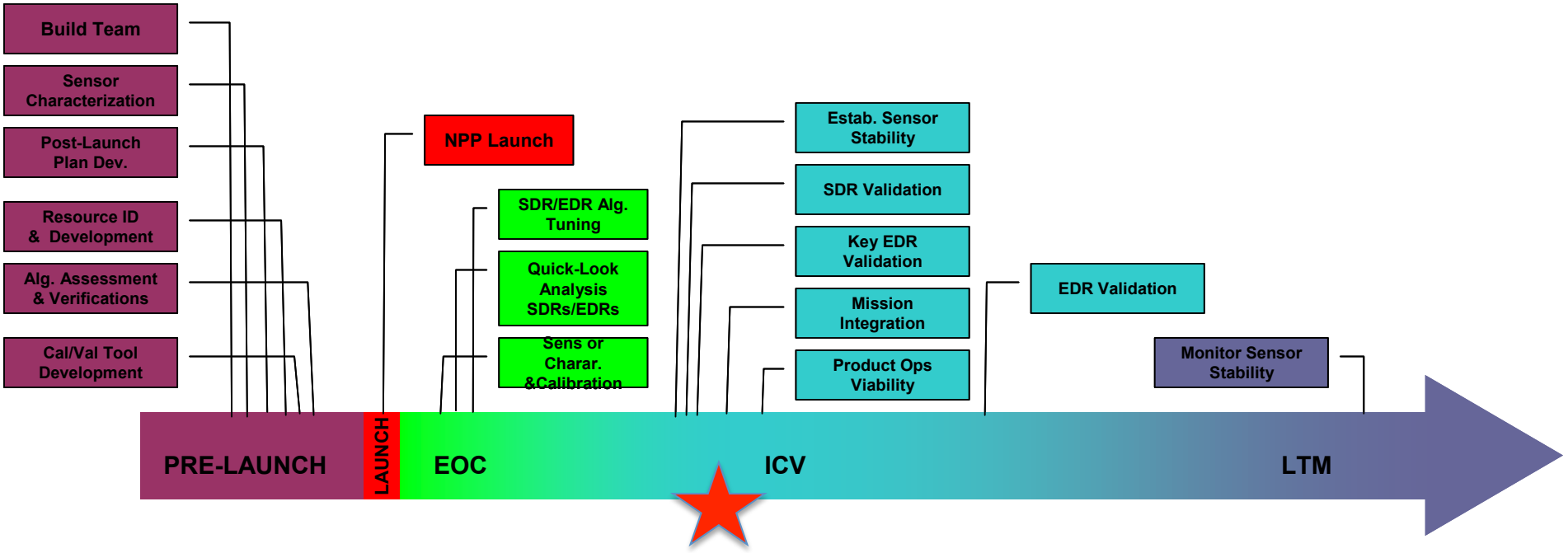
L. Giglio

I. Csiszar (NOAA), W. Schroeder, L. Giglio, E. Ellicott and C. Justice (UMD)

Cal/Val Phase Activities Defined for Each Product

Four Phases of Cal/Val:

1. Pre-Launch; all time prior to launch – Algorithm verification, sensor testing, and validation preparation
2. Early Orbit Check-out (first 30-90 days) – System Calibration & Characterization
3. Intensive Cal/Val (ICV); extending to approximately 24 months post-launch – xDR Validation
4. Long-Term Monitoring (LTM); through life of sensors

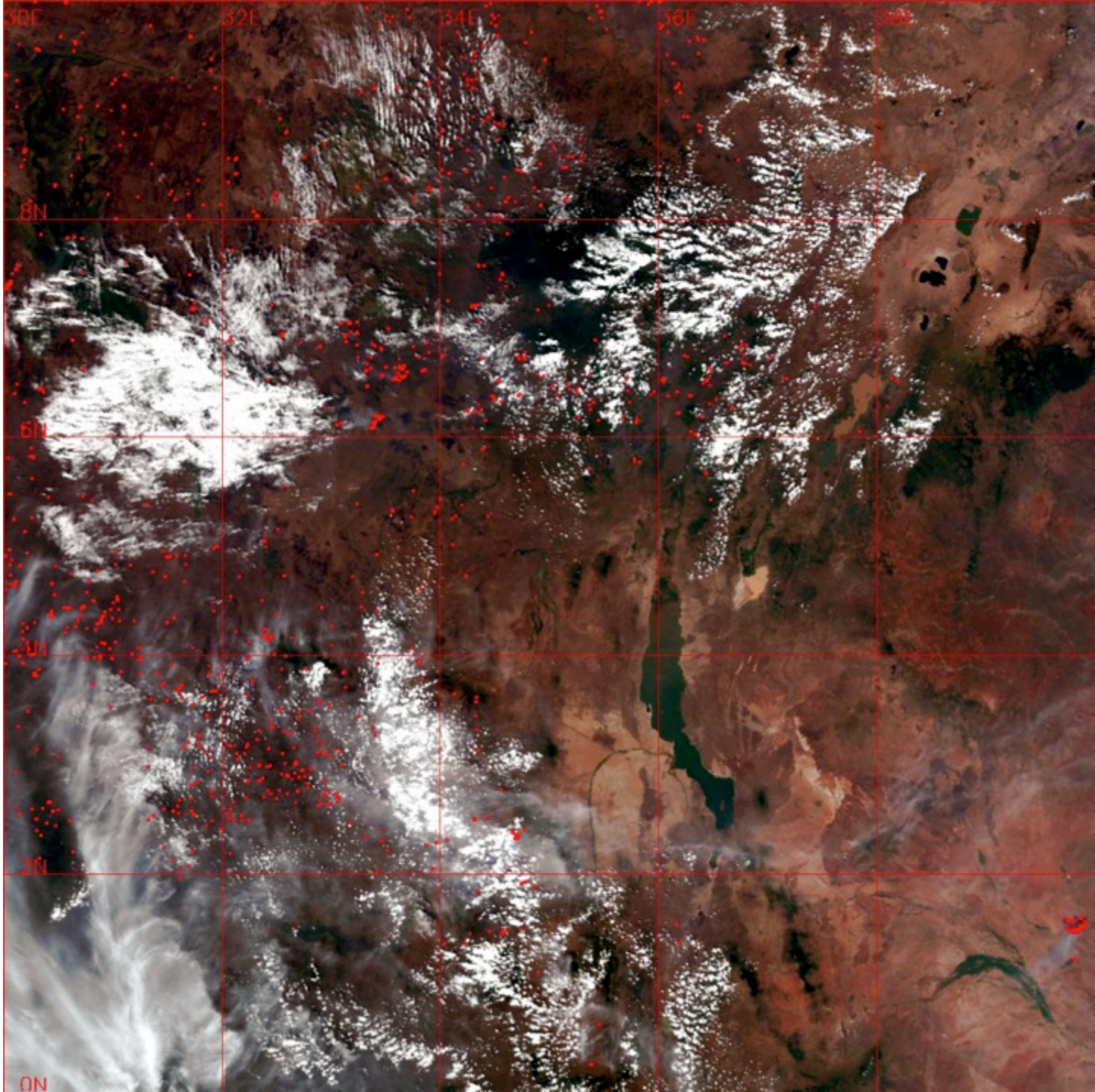


We Are Here

First light NPP VIIRS fire data

M5-M4-M3 RGB
+
IDPS Active Fire ARP

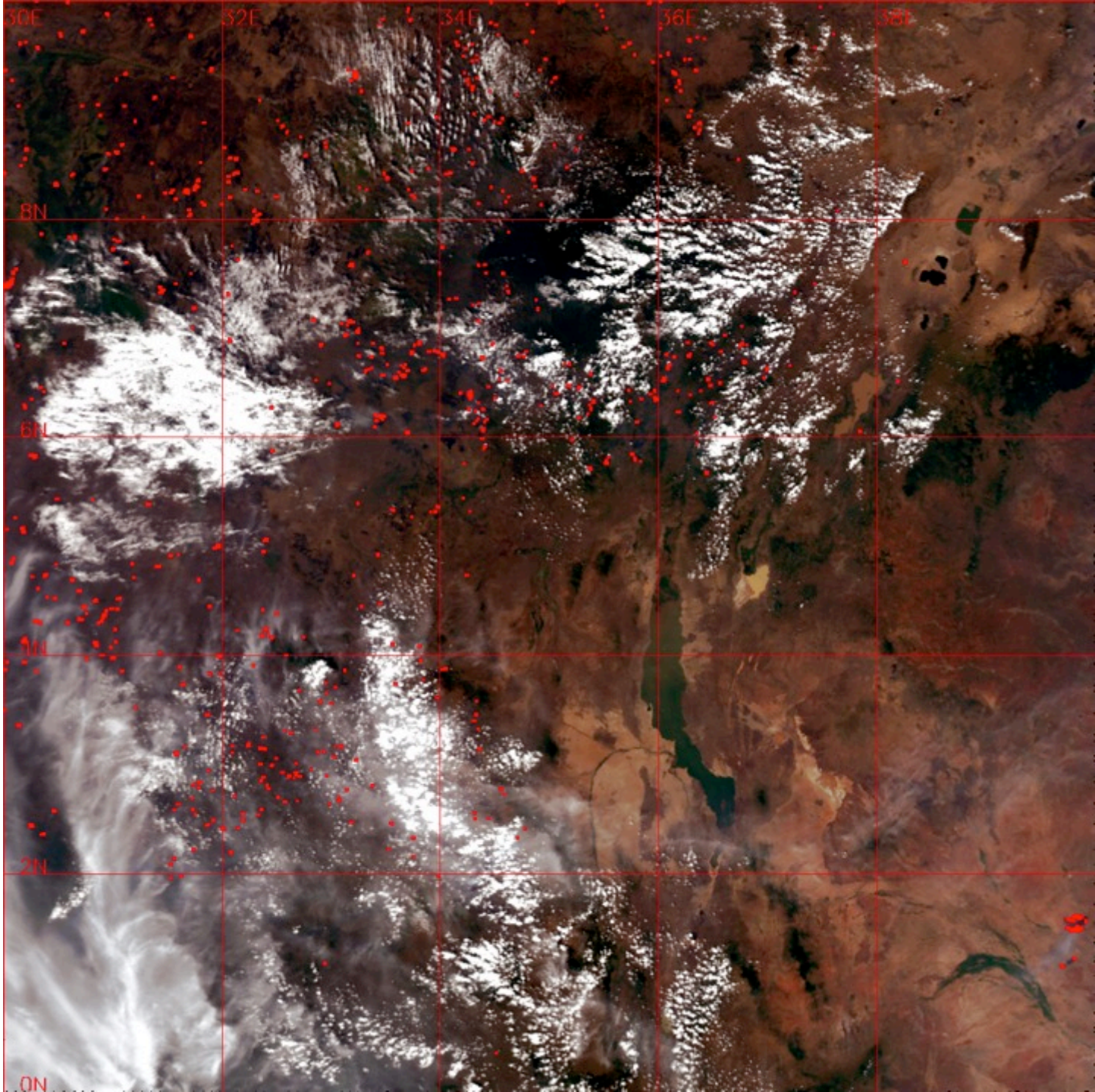
January 19, 2012
~11:05 UTC



…followed by Aqua MODIS five minutes later

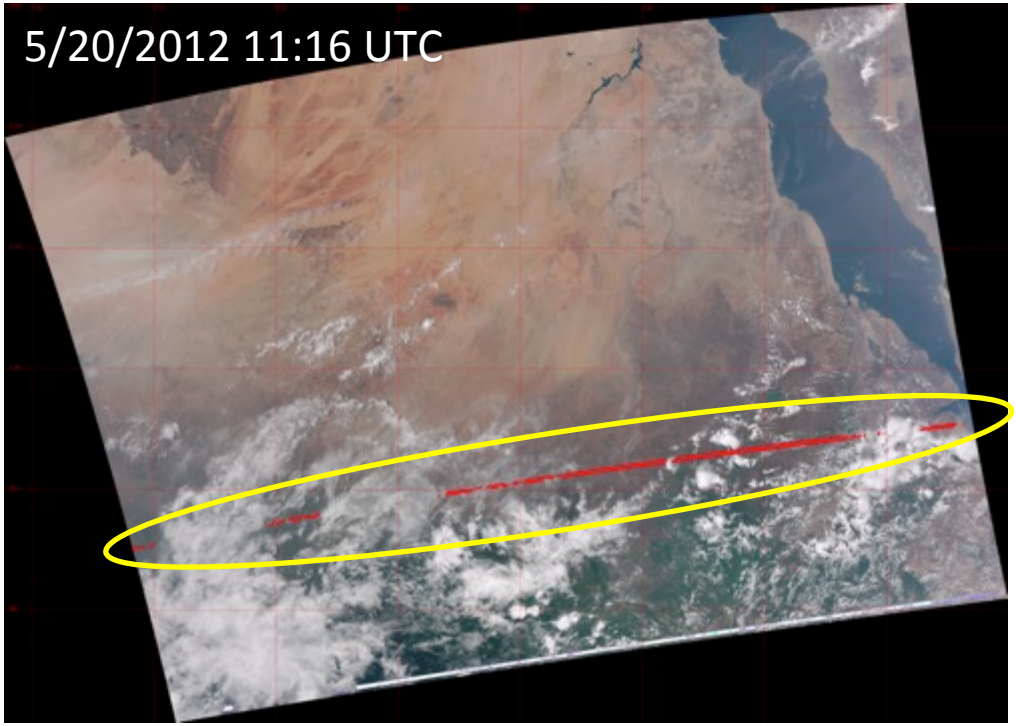
Band 1-4-3 RGB
+
MYD14

January 19, 2012
~11:05 UTC

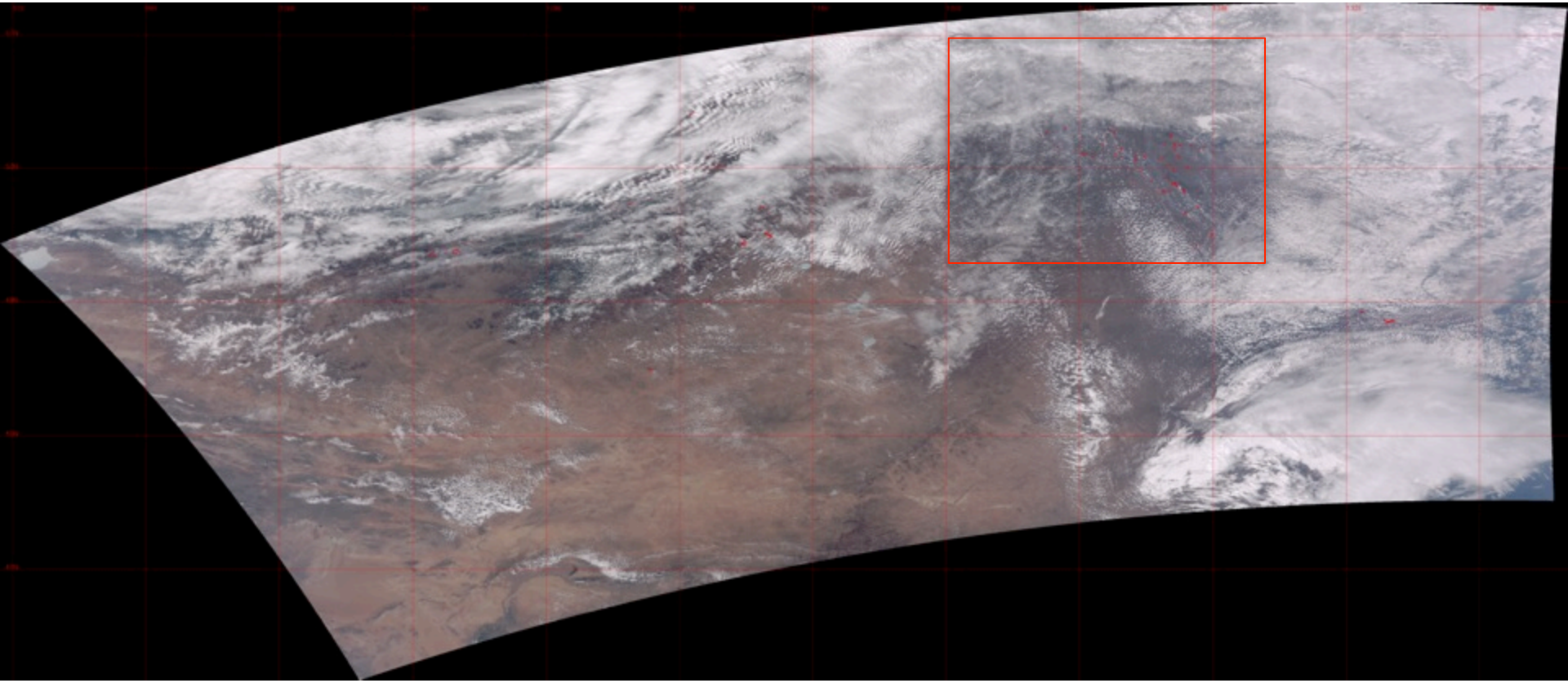


Post-launch product evaluation

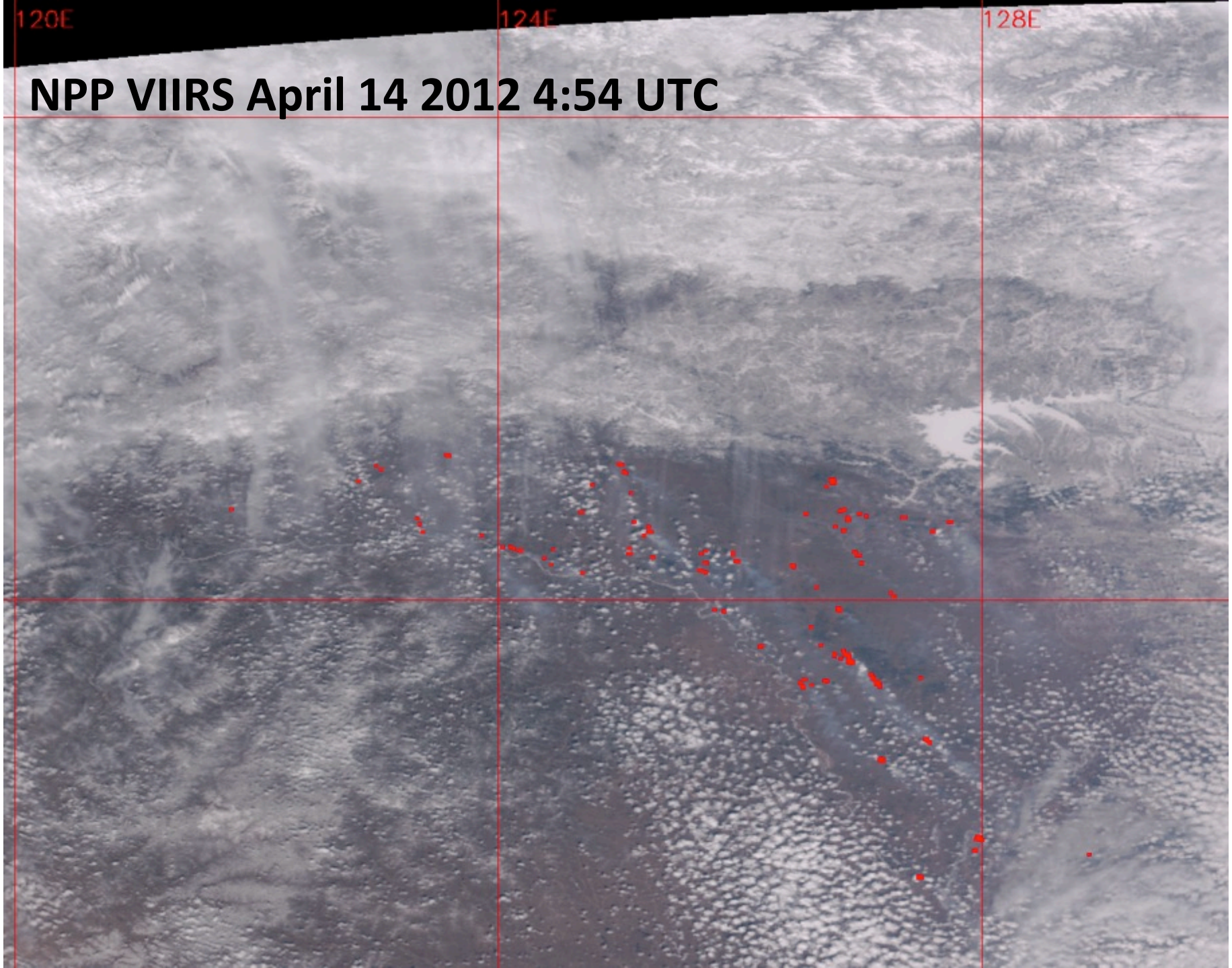
- **24/7 script for data visualization**
  - ***Designed for qualitative assessment of fire data***
  - ***Used to identify major anomalies in data***
- **VIIRS x Aqua/MODIS intercomparison**
  - ***Designed for qualitative assessment of VIIRS fire detection using near-coincident Aqua/ MODIS data***
  - ***Verify active fire product consistency on a per-pixel and/or grid basis***
- **Detailed data inspection tool**
  - ***Used to assess quality of individual bands and the corresponding quality flags***
- **Collection and analysis of in-situ and airborne data**
  - ***Explicit validation***
- **M13 SDR feedback**
  - ***Aggregation, low/high gain***
- **Product improvements**
  - ***Spatially explicit fire mask***
  - ***FRP***
  - ***VIIRS-specific algorithm changes***



Onset of 2012 fire season in Siberia



NPP VIIRS April 14 2012 4:54 UTC

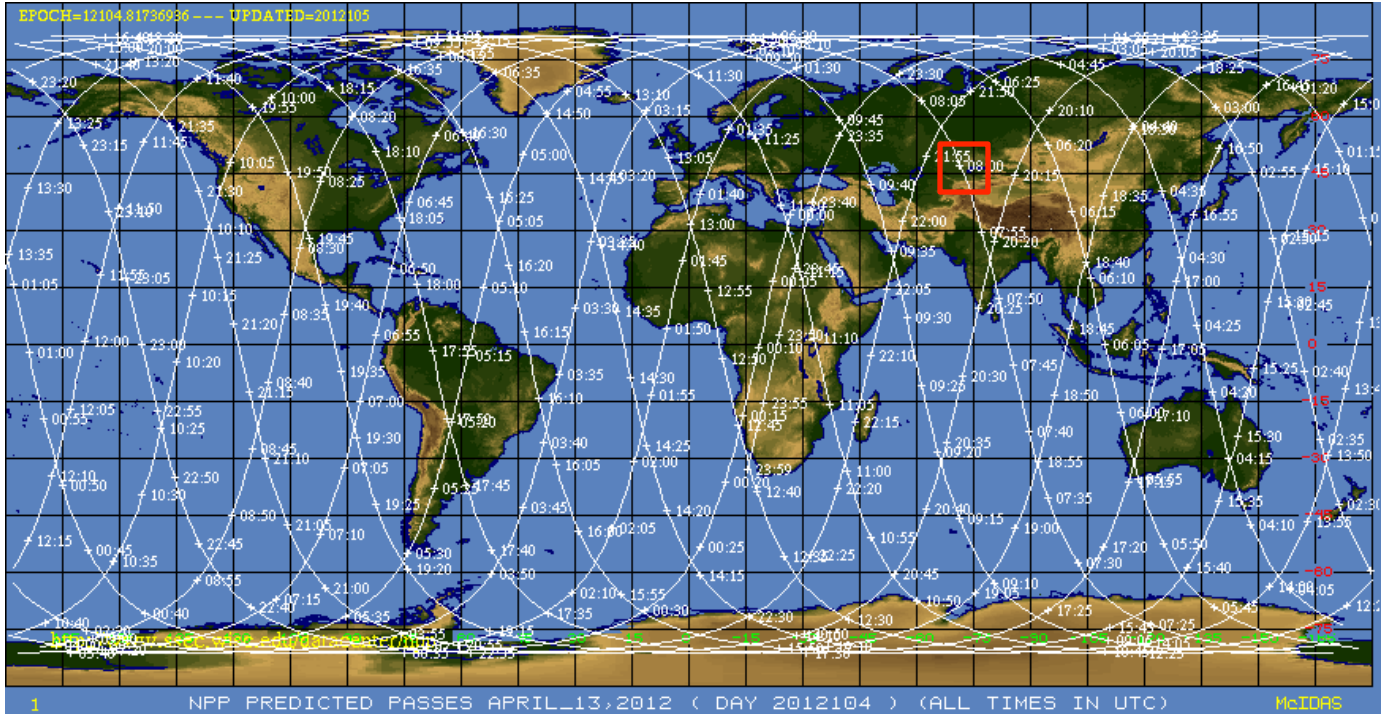

120E
124E
128E
NPP VIIRS April 14 2012 4:54 UTC

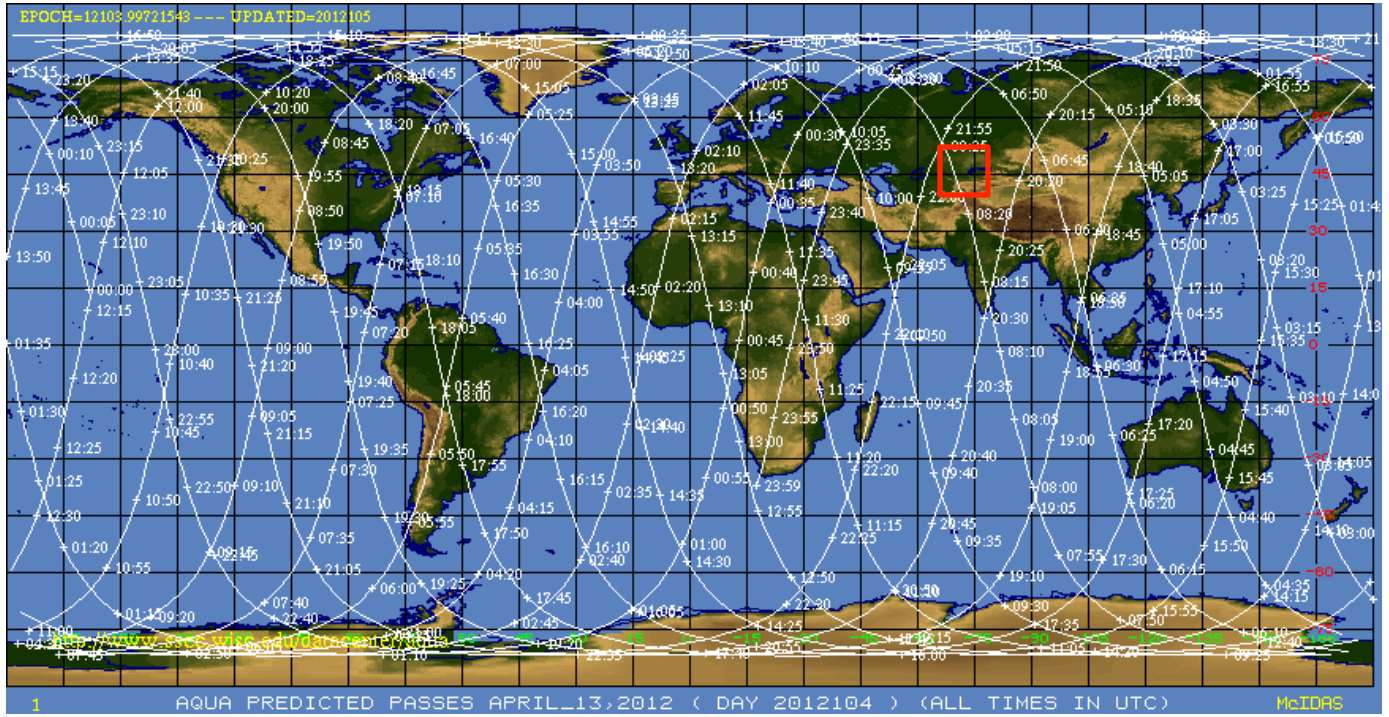
NPP

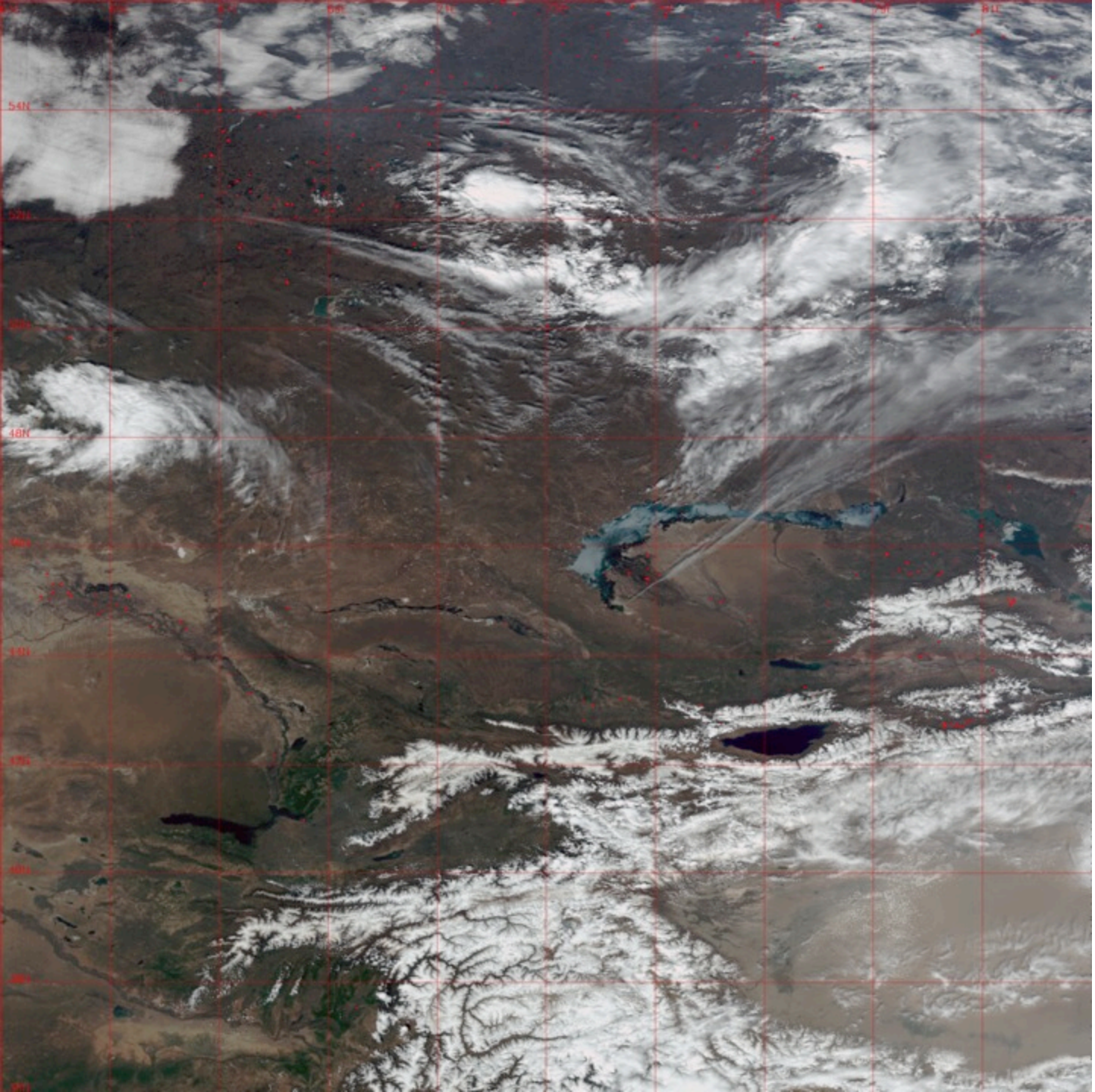
Satellite orbit tracks

April 13, 2012

Aqua







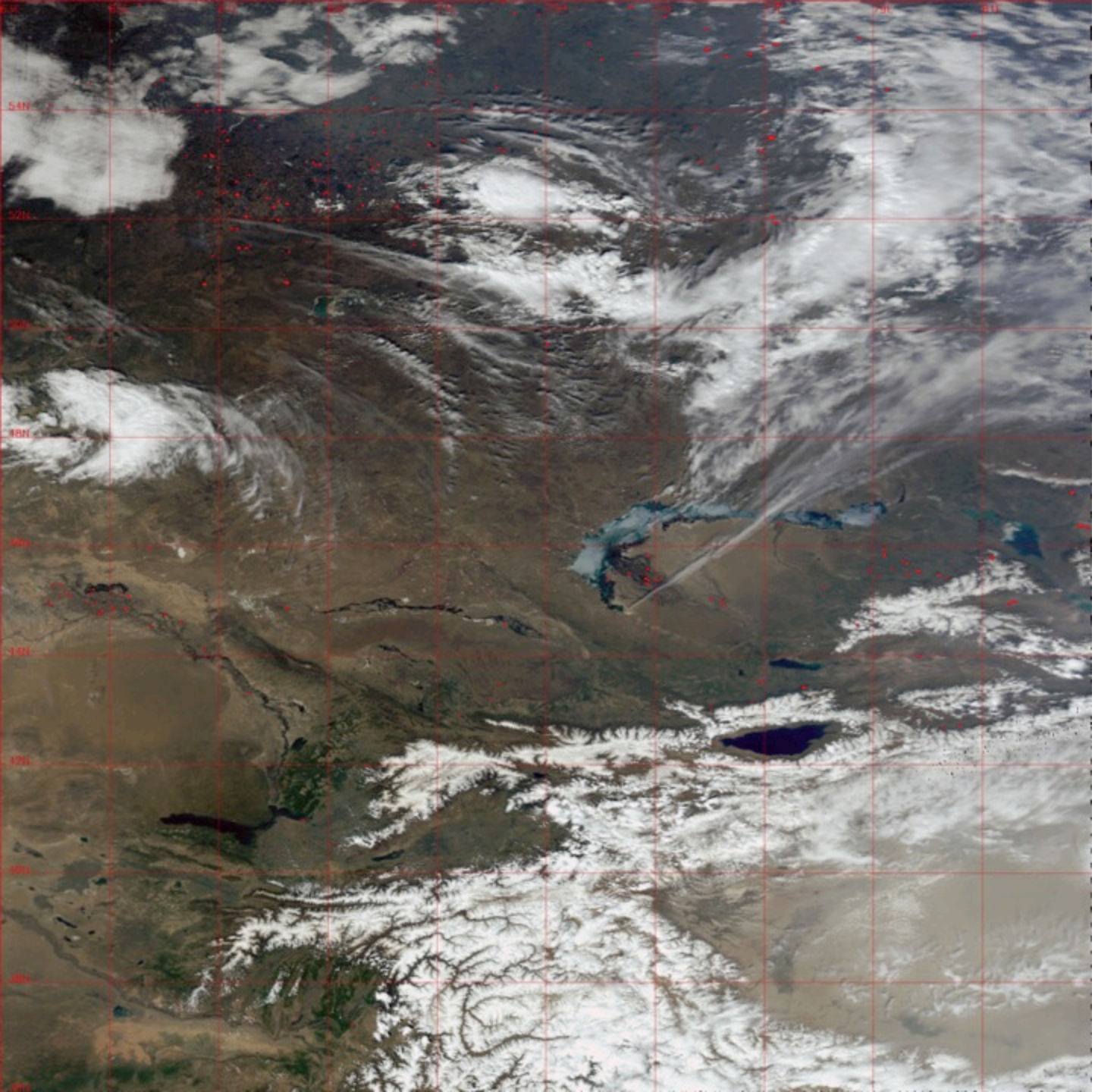
NPP VIIRS

Central Asia

April 13 2012

7:53 UTC

M5-M4-M3 RGB
+
IDPS Active Fire ARP



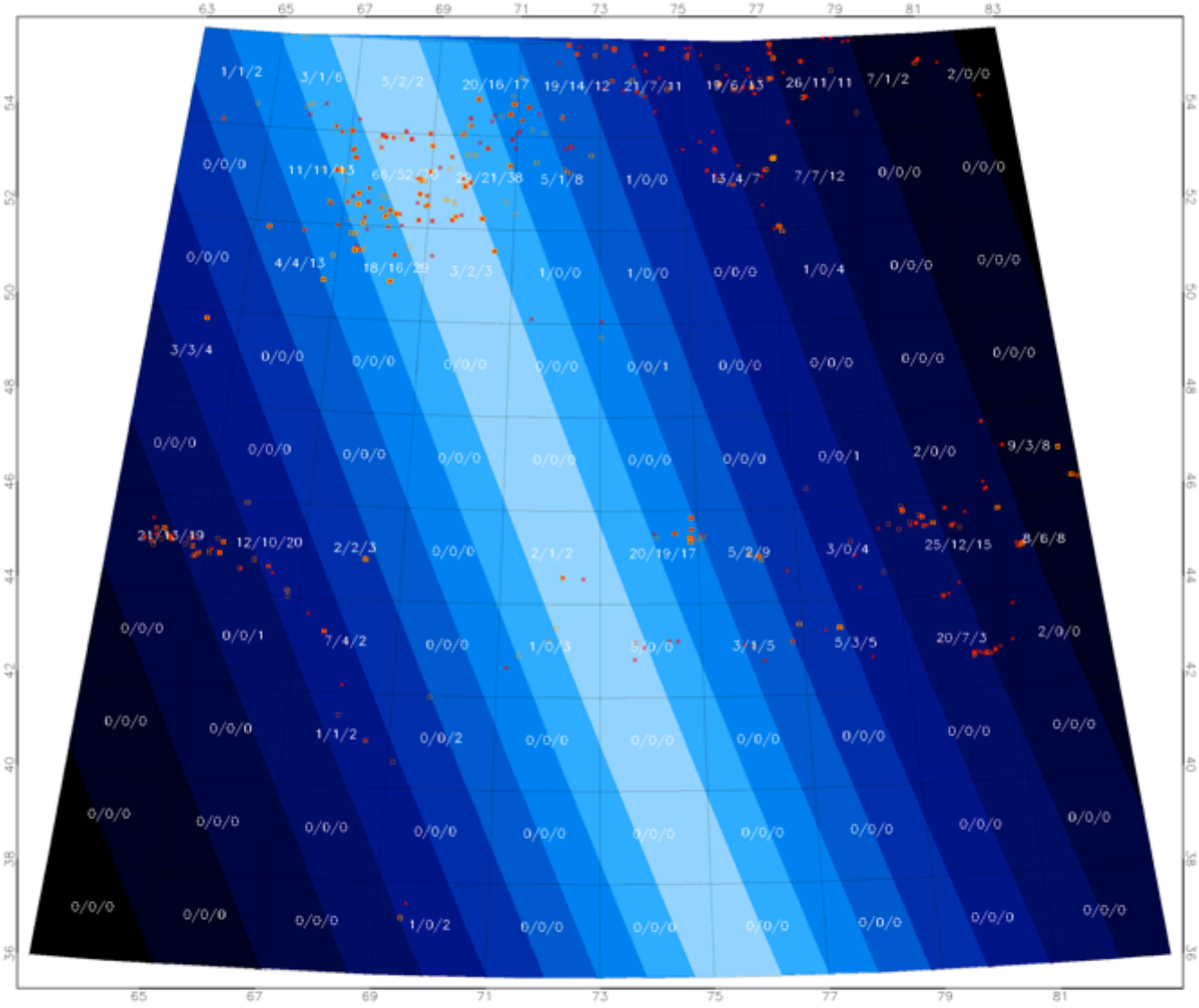
Aqua MODIS

Central Asia

April 13 2012

8:18 UTC

Band 1-4-3 RGB
+
MYD14



VIIRS/overlap/MODIS

VIIRS

vs.

MODIS

Central Asia

April 13 2012

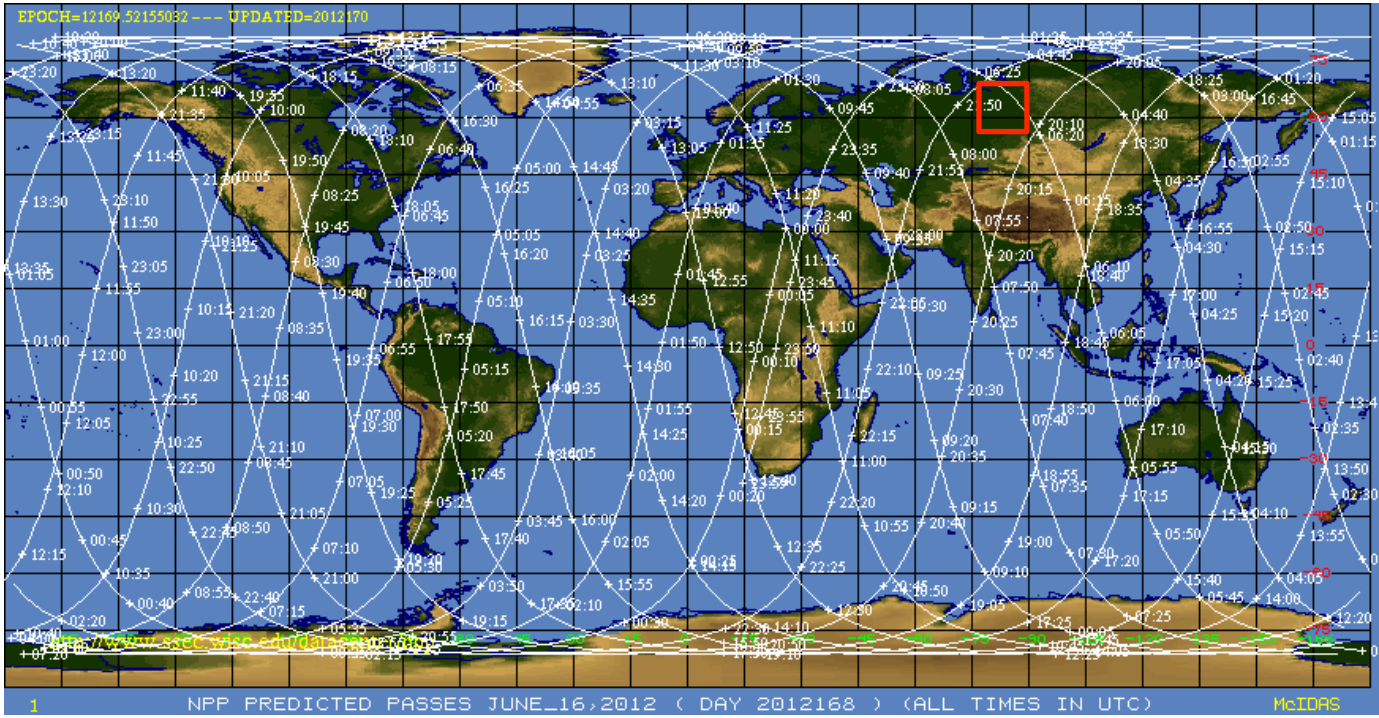
Gridded statistics: AA/BB/CC
AA – number of VIIRS fire pixels (red symbols)
BB – number of VIIRS fire pixels with overlapping Aqua/MODIS fire pixels
CC – number of Aqua/MODIS fire pixels (orange symbols)

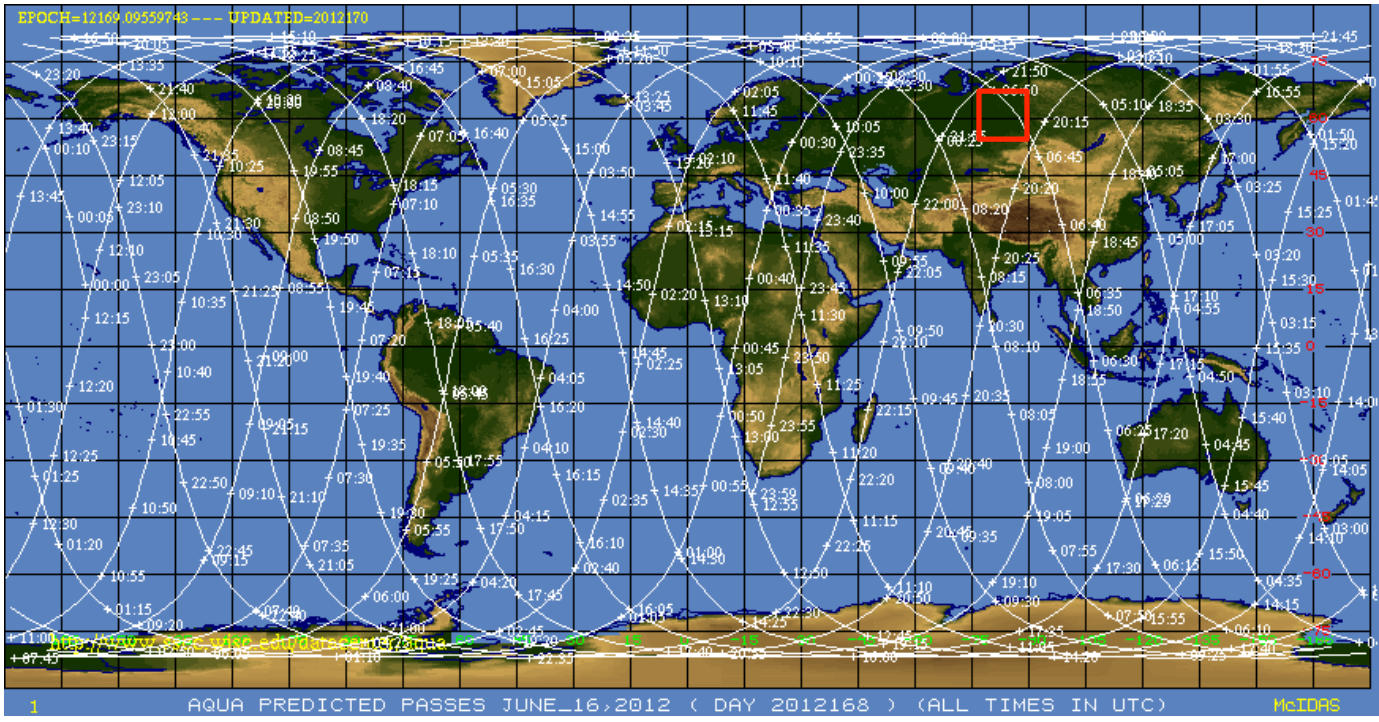
NPP

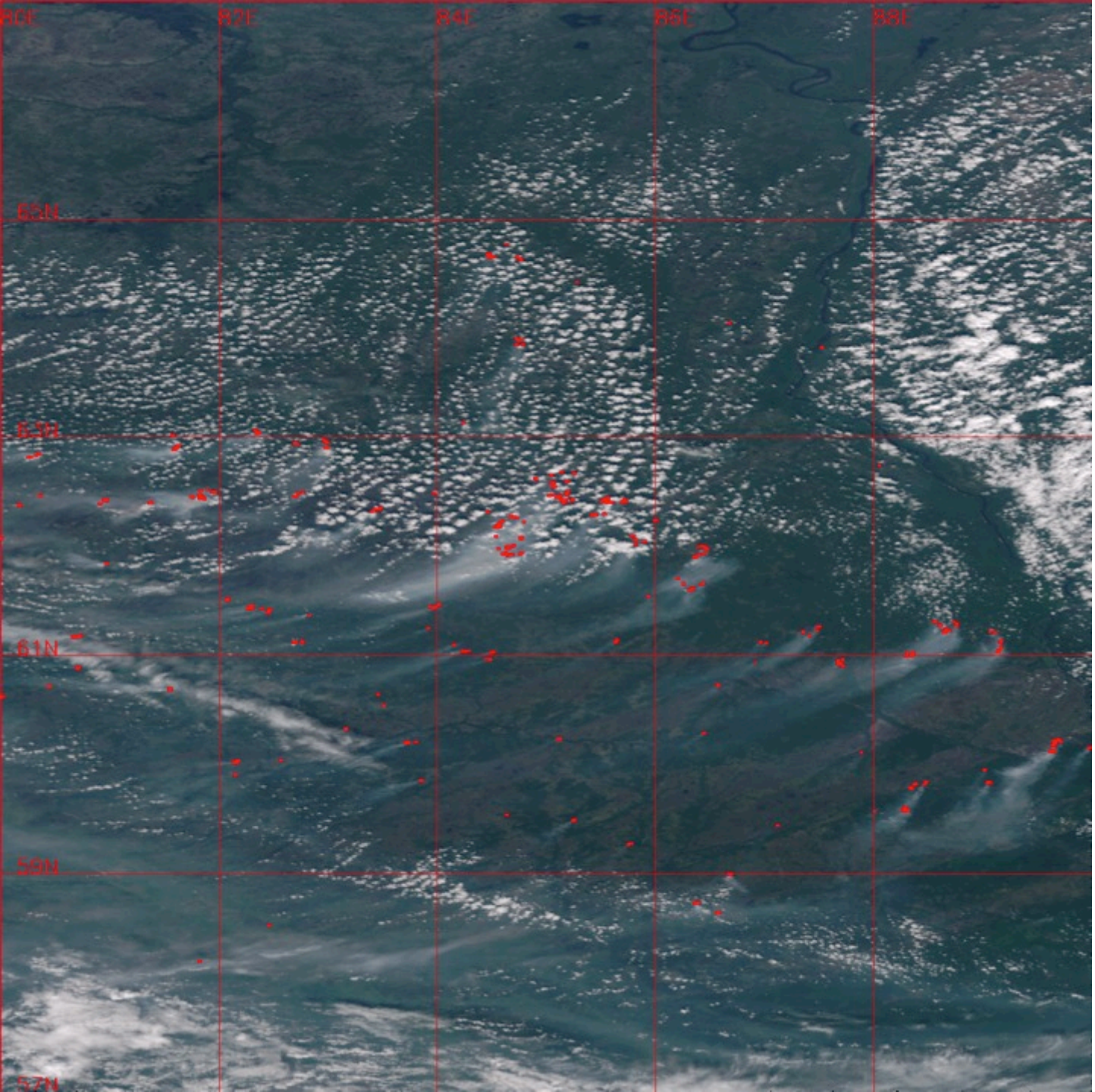
Satellite orbit tracks

June 16, 2012

Aqua







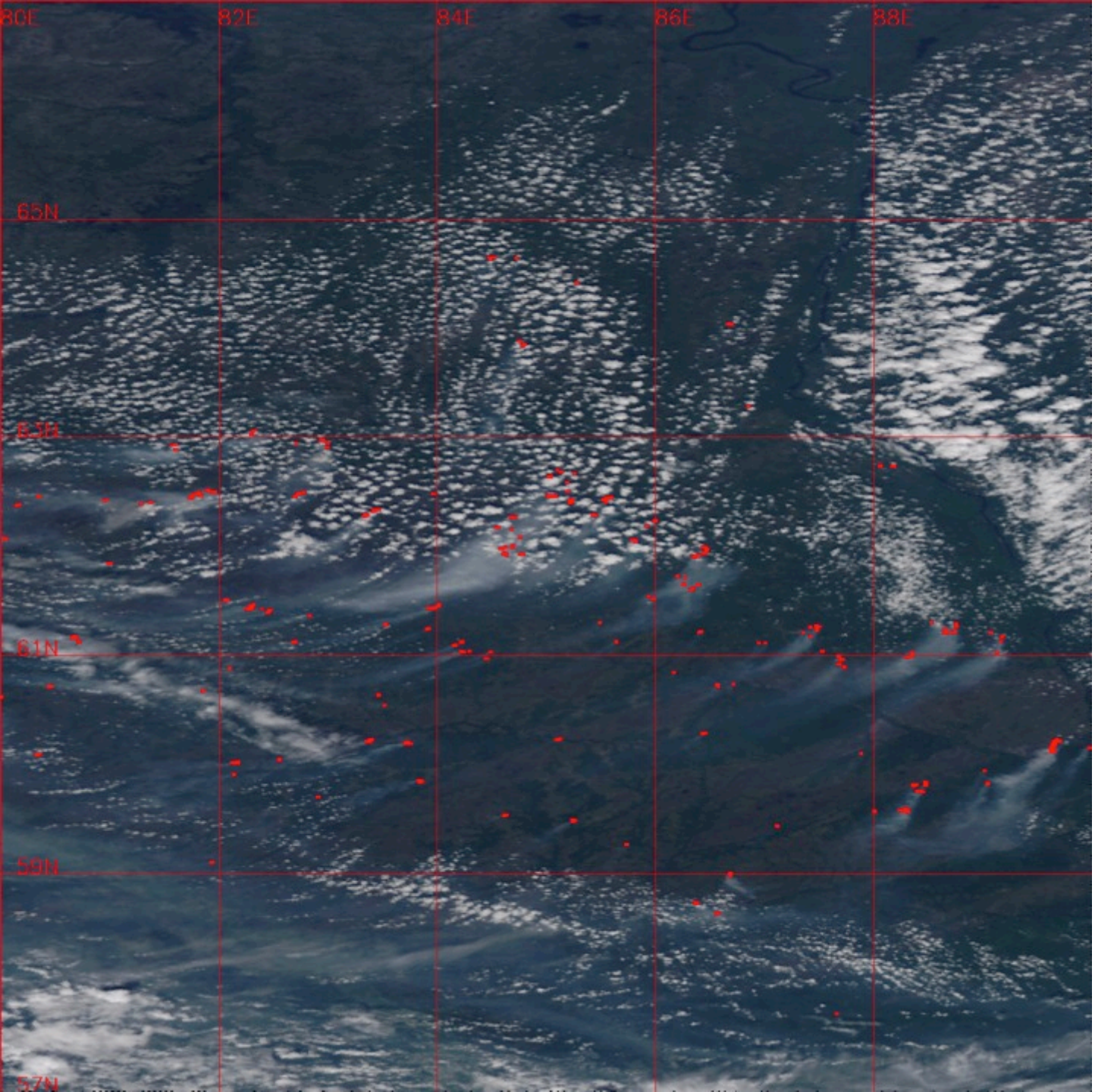
NPP VIIRS

Western Siberia

June 16 2012

6:15 UTC

M5-M4-M3 RGB
+
IDPS Active Fire ARP



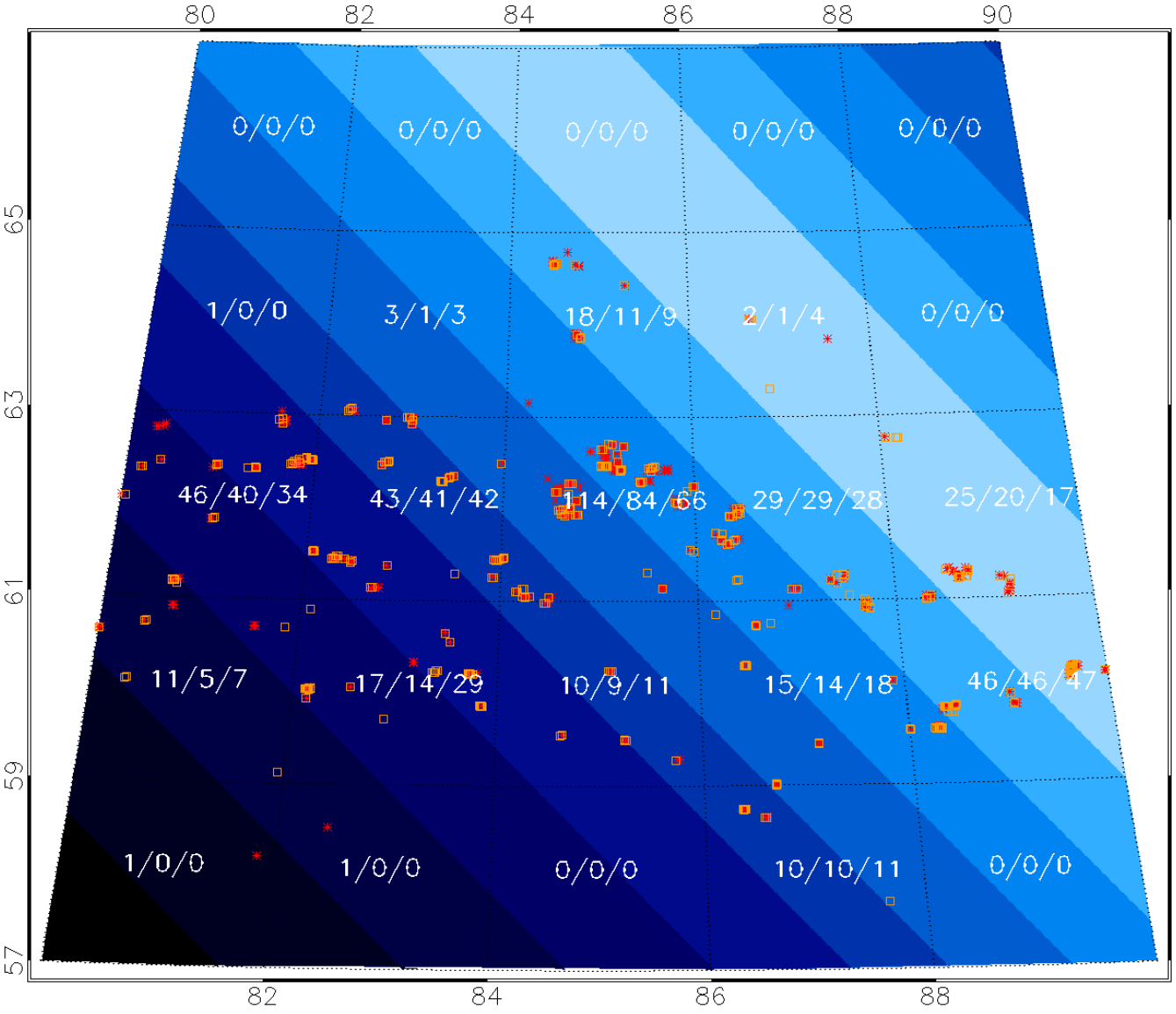
Aqua MODIS

Western Siberia

June 16 2012

6:42 UTC

Band 1-4-3 RGB
+
MYD14



VIIRS

vs.

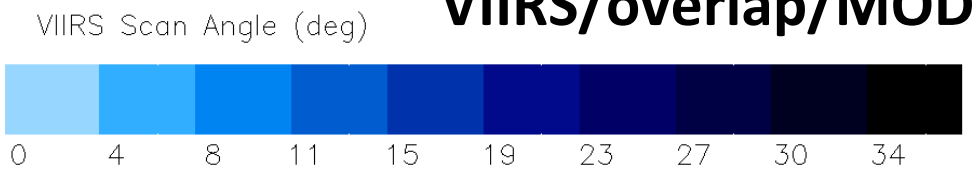
MODIS

Western Siberia

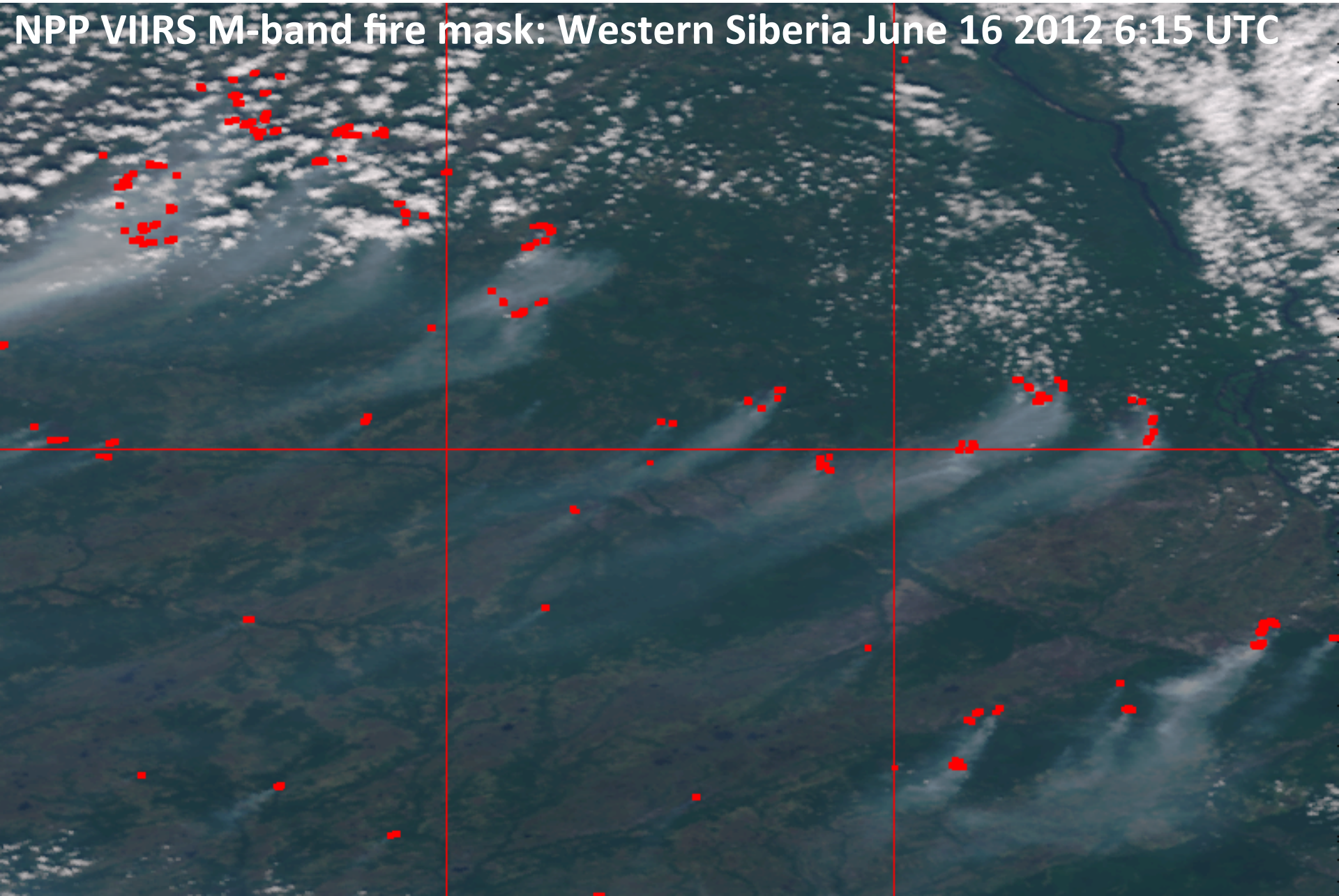
April 13 2012

Gridded statistics: AA/BB/CC
AA – number of VIIRS fire pixels (red symbols)
BB – number of VIIRS fire pixels with overlapping Aqua/MODIS fire pixels
CC – number of Aqua/MODIS fire pixels (orange symbols)

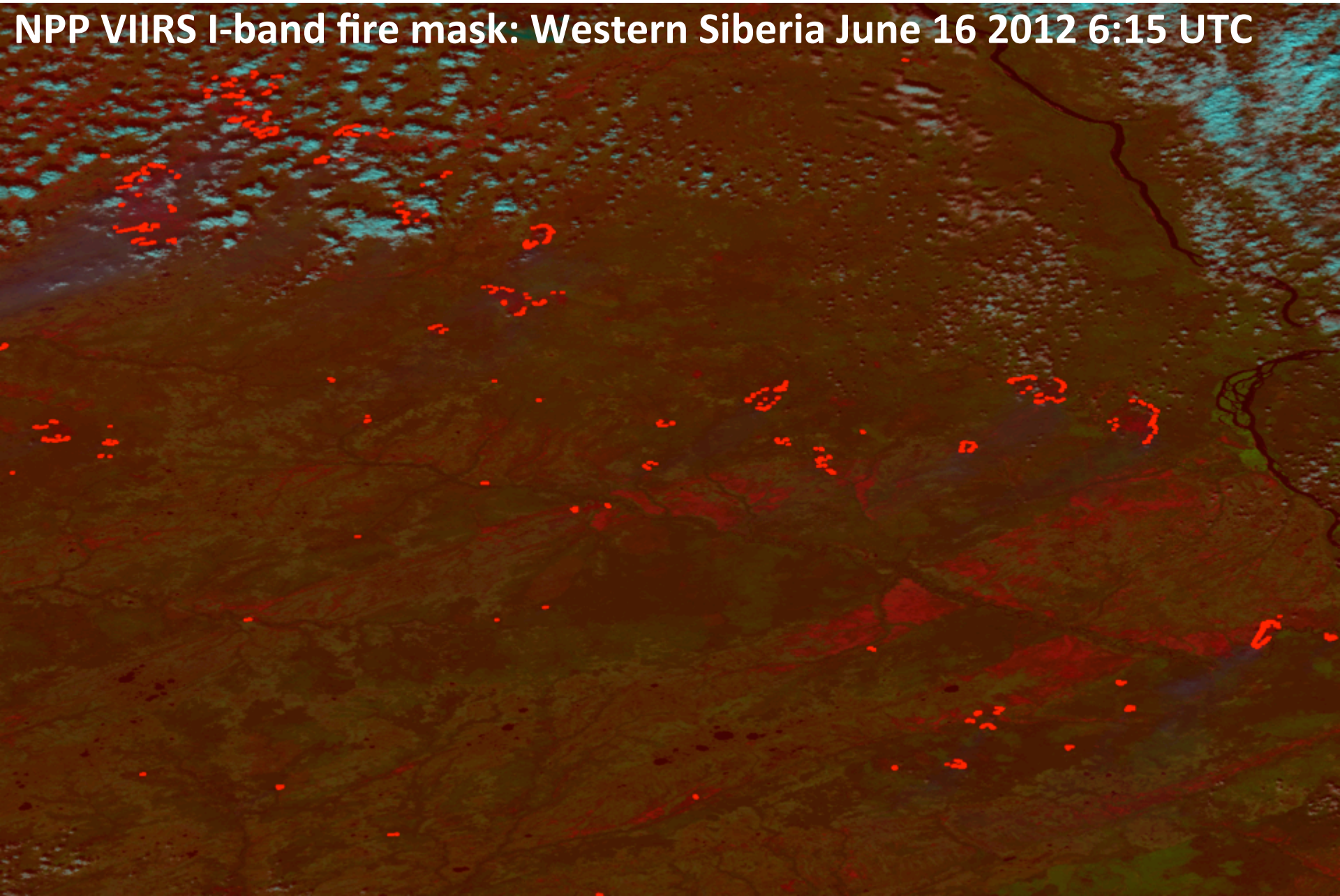
VIIRS/overlap/MODIS



One step further: use of VIIRS “I” bands

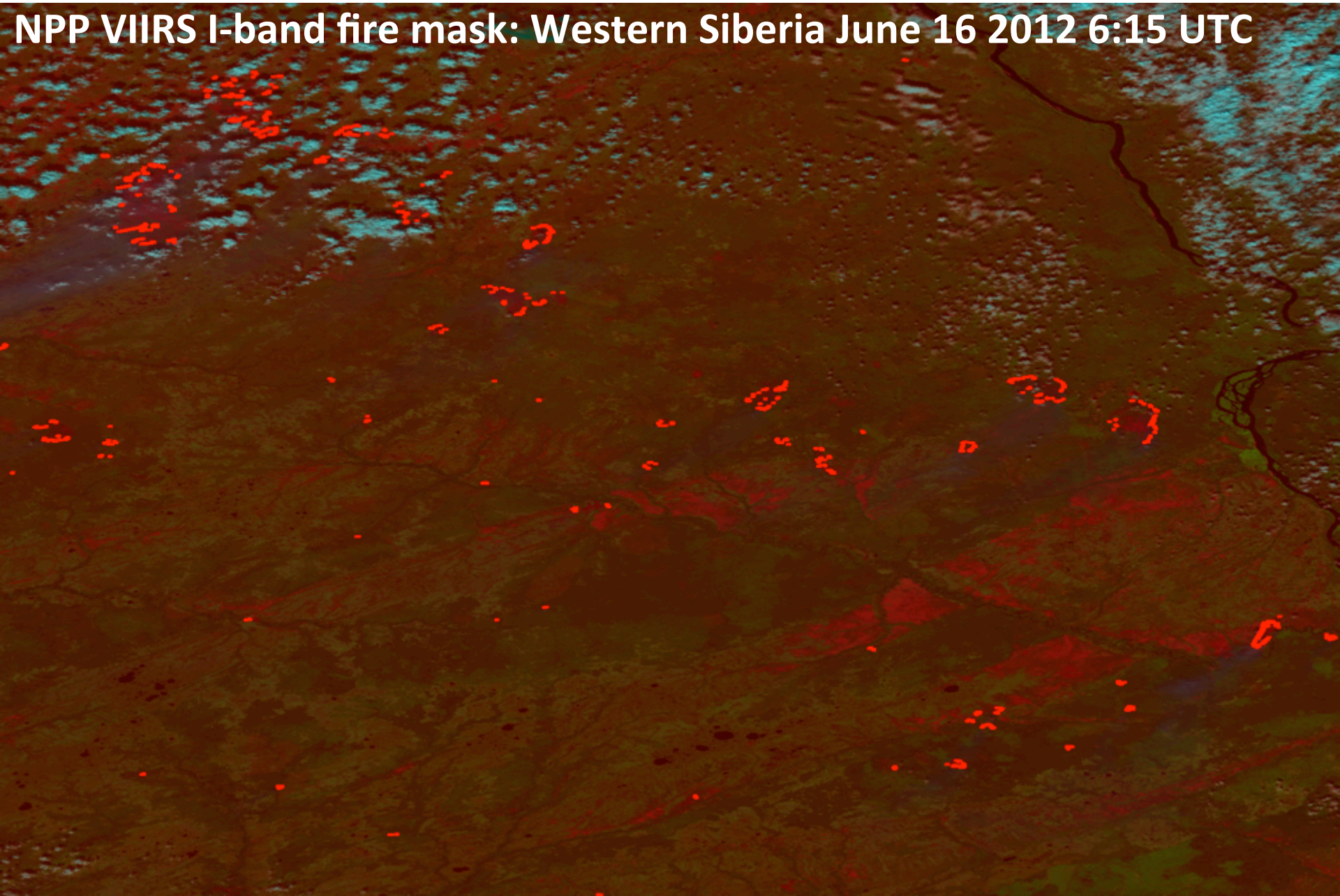


One step further: use of VIIRS “I” bands

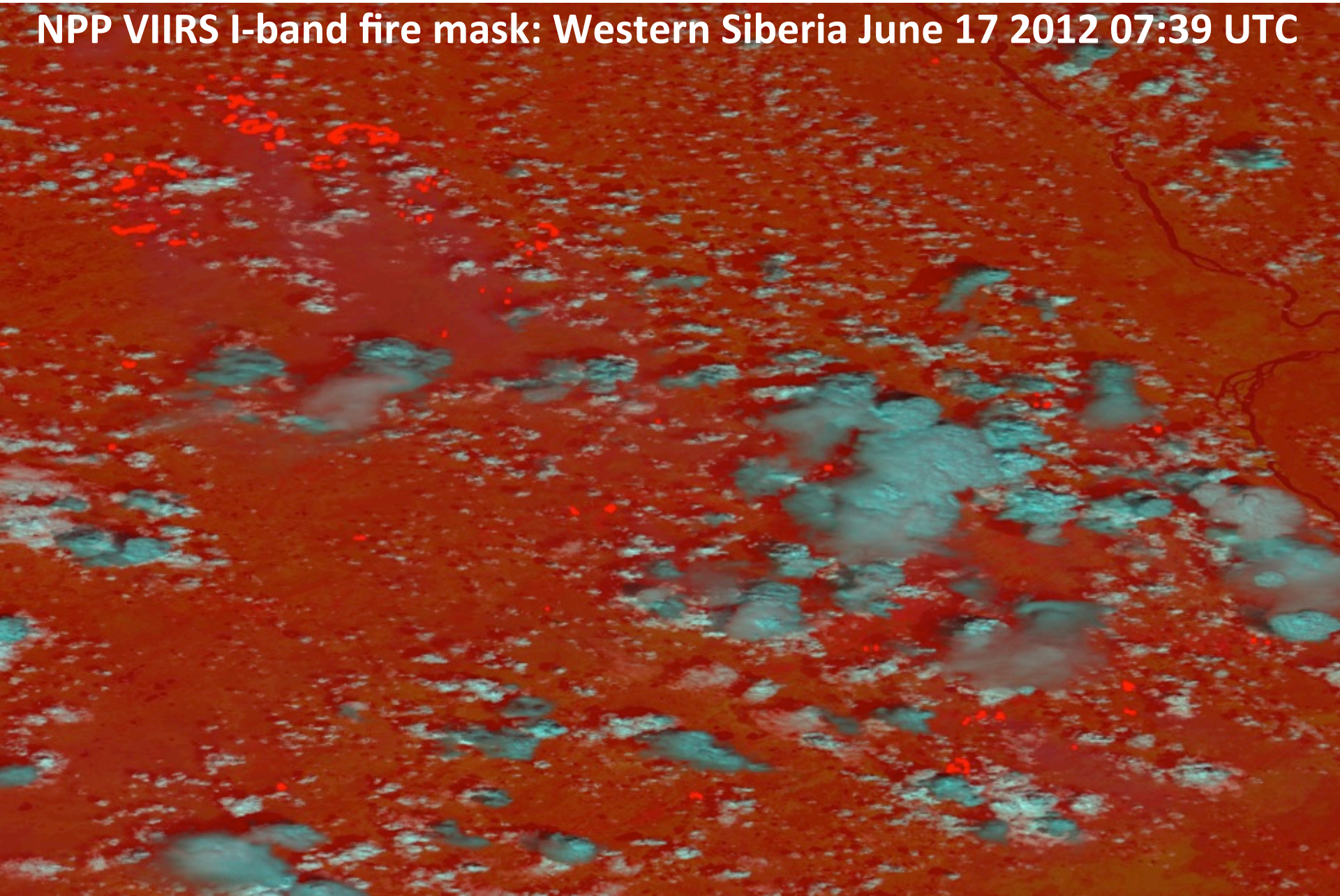


One step further: use of VIIRS “I” bands

One step further: use of VIIRS “I” bands



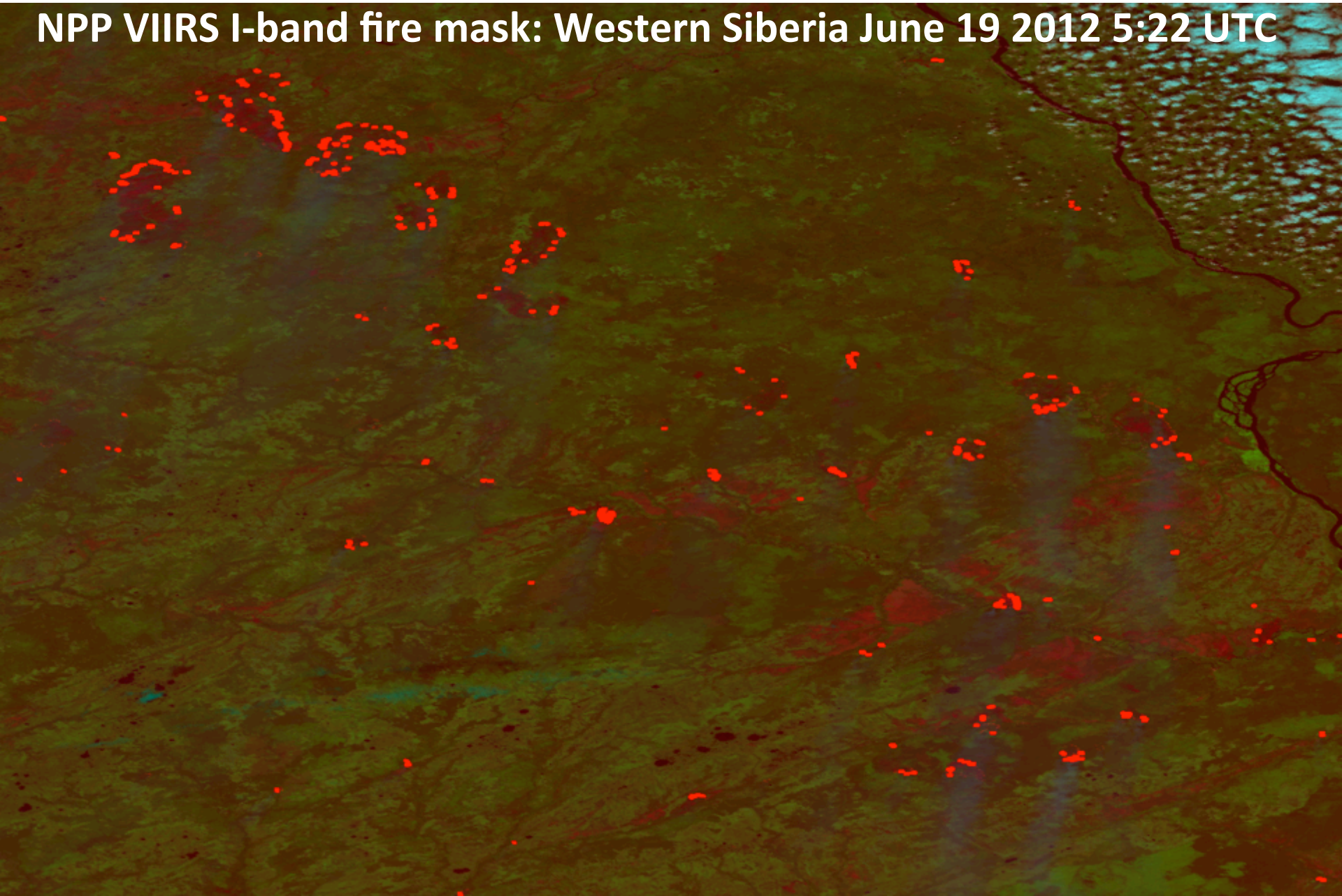
One step further: use of VIIRS “I” bands



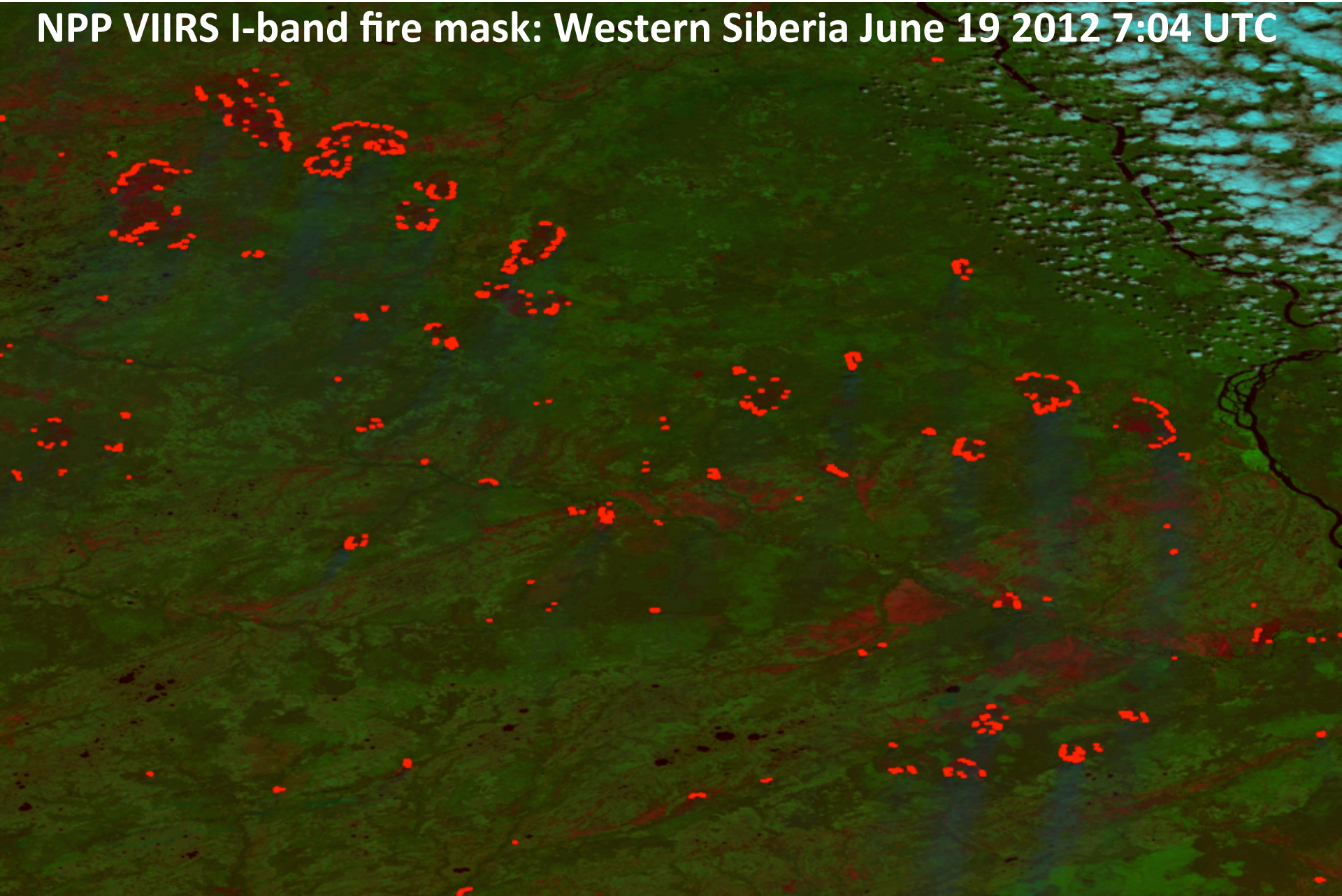
One step further: use of VIIRS “I” bands

One step further: use of VIIRS “I” bands

One step further: use of VIIRS “I” bands



One step further: use of VIIRS “I” bands



Fire characterization from S-NPP VIIRS

- **M13 saturation temperature: 634K**
  - very small percentage of fires to trigger saturation
  - Fire Radiative Power retrieval is possible
- **M15 saturation temperature: 363K**
  - small, but non-negligible percentage of fires triggers saturation of native resolution pixels
  - more complex characterization (i.e. smoldering ratio) be compromised
- **FIRE RADIATIVE POWER PRODUCT TO BE INCLUDED IN VIIRS ACTIVE FIRE PRODUCT SUITE**

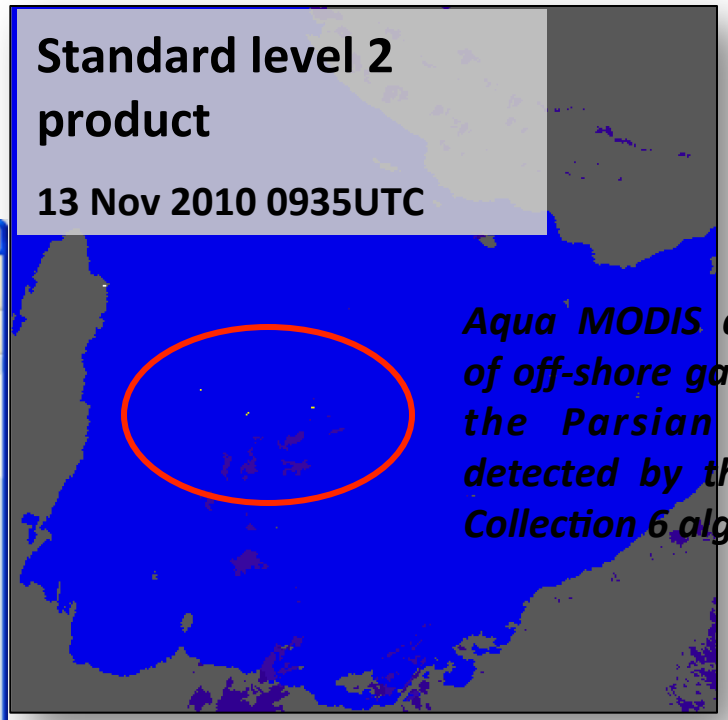
MODIS: a success story for fire detections

- MODIS is the first sensor designed to **detect and characterize hot targets** (predominantly actively burning fires) on a **global and systematic basis**

- MODIS fire data have been **extensively used** for disaster and resource management, air quality applications, ecosystem monitoring, climate studies etc.

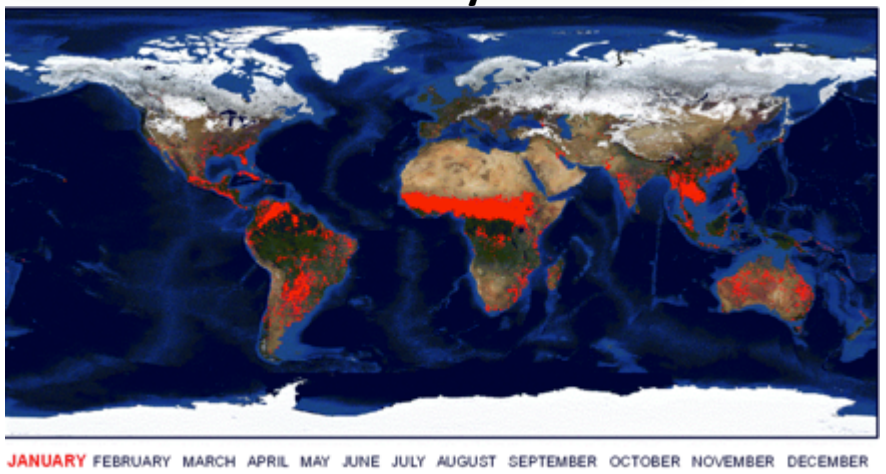
Examples of MODIS fires/thermal anomalies data

Real-time data



Aqua MODIS detections of off-shore gas flares in the Parsian Gulf as detected by the MODIS Collection 6 algorithm

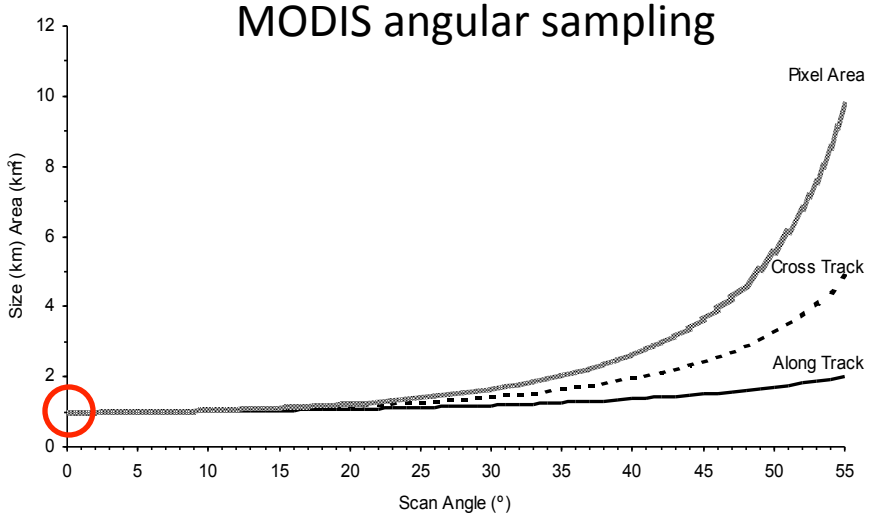
Global dynamics

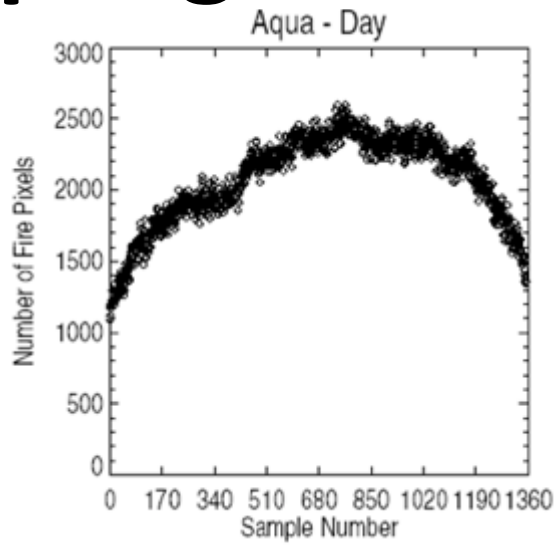


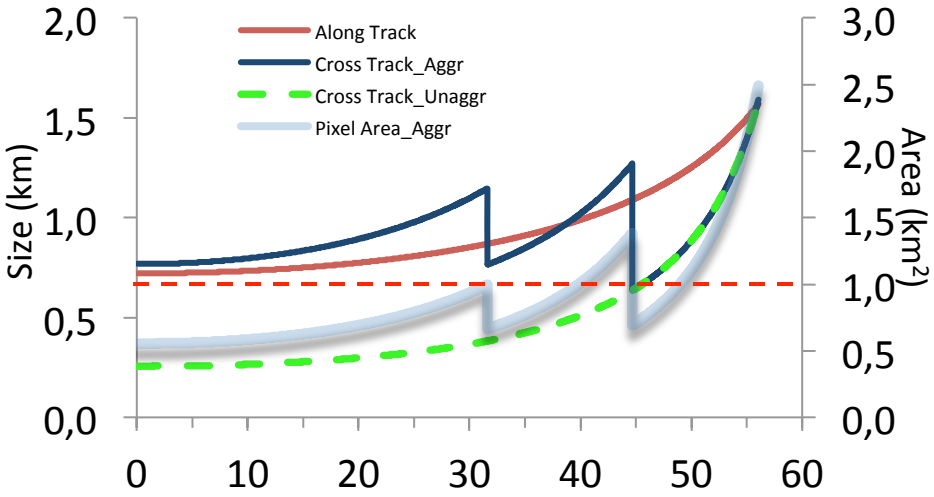
Aqua MODIS vs. Suomi NPP VIIRS

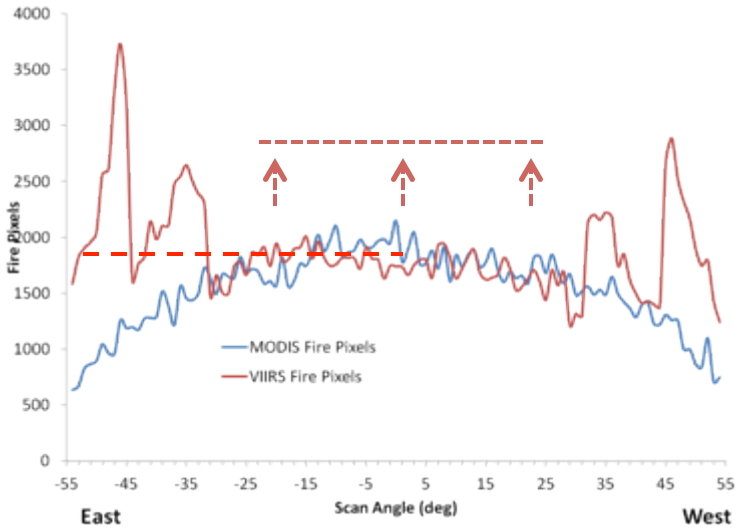
- Aqua and NPP have **similar overpass times (1:30pm)**
  - sampling of the diurnal fire cycle is similar
- Saturation levels of the primary bands allow **unsaturated radiance measurements** for most fires
  - Bands 21/22 for MODIS and M13 for VIIRS
- Some differences in **spectral placement**
- Processing **algorithms are compatible**
  - Current VIIRS algorithm is based on MODIS, albeit an earlier version
  - Differences can be resolved and the impact can be minimized
- **Primary driver** of differences is **spatial sampling**
  - Pixel size
  - Variations along scanline (aggregation schemes)
  - Variations within pixels (line-spread function, aggregation)
  - Differences in swath width (VIIRS has no gaps at low latitudes)

Angular sampling









Compatible orbital segments are determined by pixel sizes

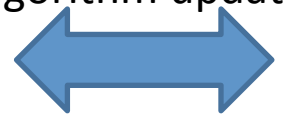
VIIRSxMYD14 Fire Detection Frequency (19 Jan <> 13 Feb)

VIIRS active fire product development

NOAA: real-time 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)

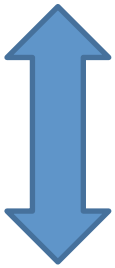
Algorithm updates



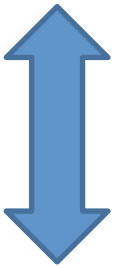
Upstream processing updates

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

- Experimental MODIS continuity product produced by LandPEATE (Product Evaluation and Test Element)
- Detections and Fire Radiative Power
- Spatially explicit fire mask
- Spatial and temporal aggregates



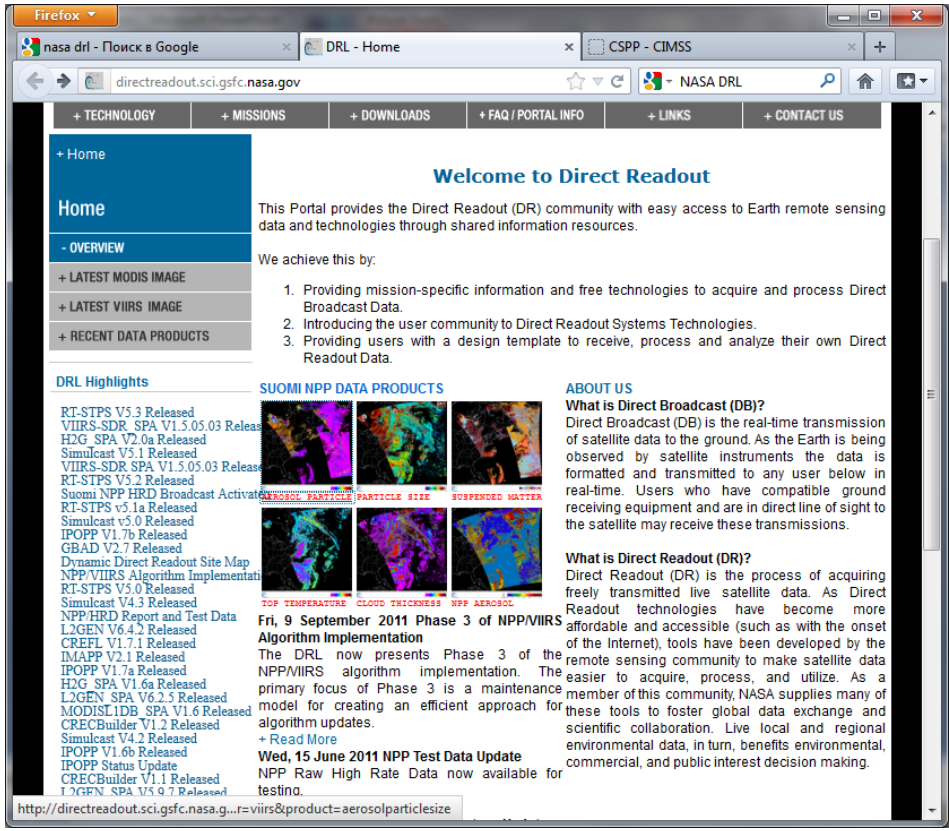
algorithm synchronization, end user feedback



DIRECT READOUT

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

Direct Readout



http://cimss.ssec.wisc.edu/cspp/

http://directreadout.sci.gsfc.nasa.gov/

BEWARE OF PROCESSING ALGORITHM – REAL-TIME VS. "SCIENCE QUALITY"

VIIRS Active Fire Product Website

viirsfire.geog.umd.edu

SUOMI NPP DATA ACCESS: CLASS

http://www.class.ncdc.noaa.gov

"NPP products will be released to the user community over a time frame of several months. As products become available please go to the Suomi NPP FAQ to determine which products can be ordered. All newly released products will be 'beta'. Please see Product Maturity Level page to determine level of quality for each product."

- ***Frequently asked questions (FAQ)***
- ***Product Maturity Levels***
- ***Tutorial on Data Access***

NPP EDR Product Maturity Levels	
1. Beta • Early release product • Minimally validated • May still contain significant errors. • Versioning not established until a baseline is determined. • Available to allow users to gain familiarity with data formats and parameters • Product is not appropriate as the basis for quantitative scientific publications studies and applications	
2. Provisional • Product quality may not be optimal • Incremental product improvements are still occurring. • Version control is in affect • 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 • May be replaced in the archive when the validated product becomes available • Ready for operational evaluation	
3. Validated • Product performance is well defined over a range of representative conditions • Ready for use by the Centrals and in scientific publications • There may be later improved versions • There are three validation stages (see next column)	**Stage 1 Validation:** Product performance has been demonstrated to comply with the specification using a small number of independent measurements obtained from selected locations, periods, and associated ground-truth/field program efforts.
	Stage 2 Validation: Product performance has been demonstrated to comply with the specification over a widely distributed set of locations and periods via several ground-truth and validation efforts.
	Stage 3 Validation: Product performance has been demonstrated to comply with the specification and the uncertainties in the product well established via independent measurements in a systematic and statistically robust way representing global conditions.

NPP EDR PRODUCT MATURITY DEFINITIONS

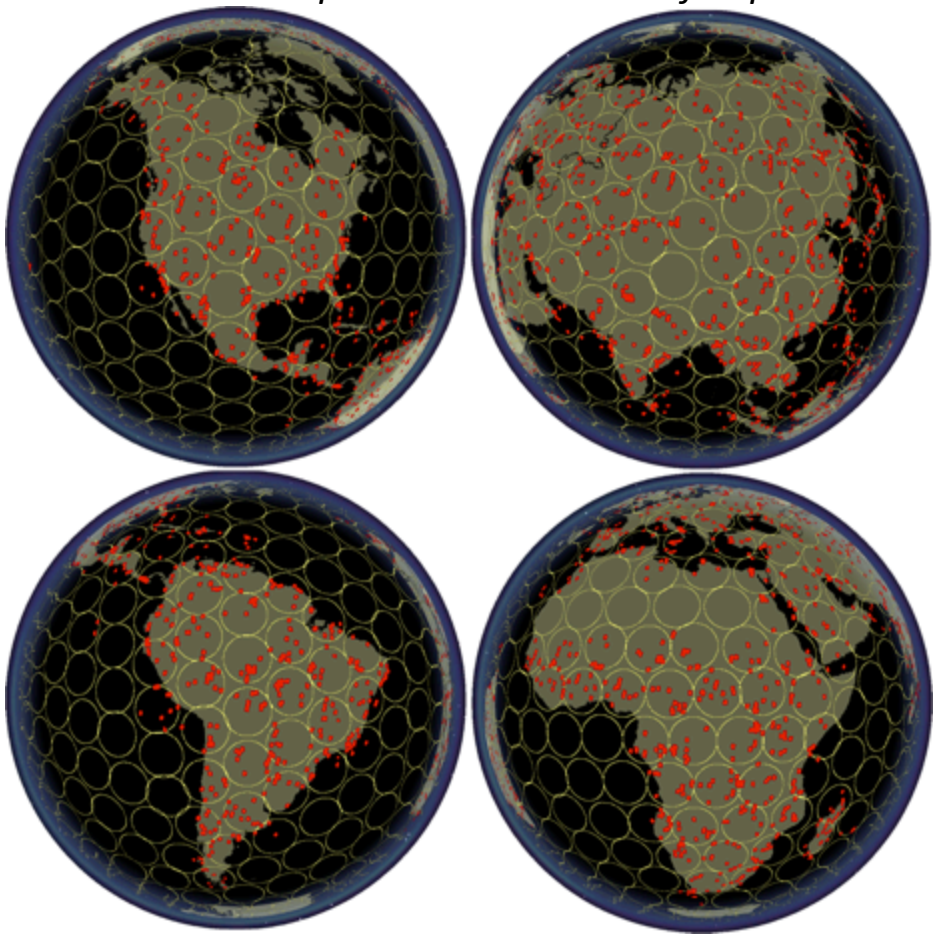
CLASS WILL START DISTRIBUTION OF PRODUCTS WHEN THEY REACH "BETA" MATURITY LEVEL

Explicit validation: MODIS heritage

Near-nadir pixels
(using ~2,500 coincident ASTER scenes)

17K MOD14 pixels sampled

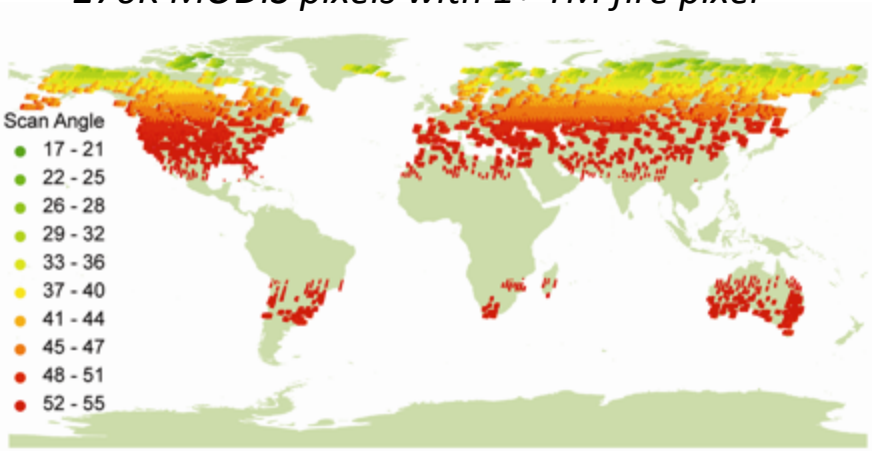
120K MODIS pixels with 1+ ASTER fire pixel

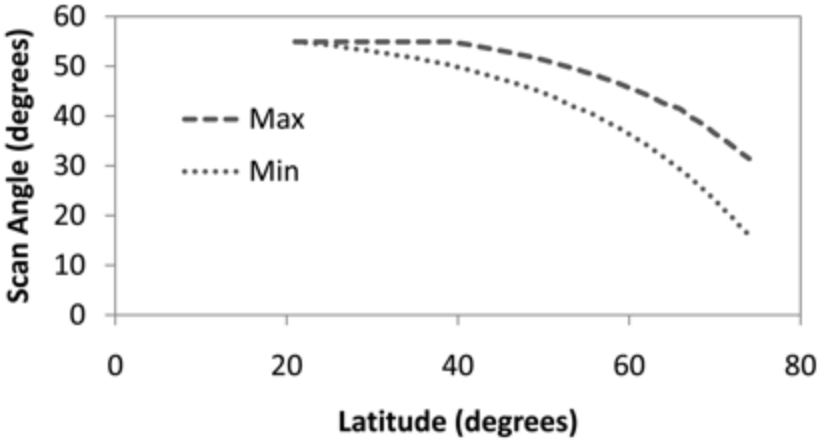


Off-nadir pixels
(using ~3,700 near-coincident TM scenes)

12K MOD14 pixels sampled

270K MODIS pixels with 1+ TM fire pixel

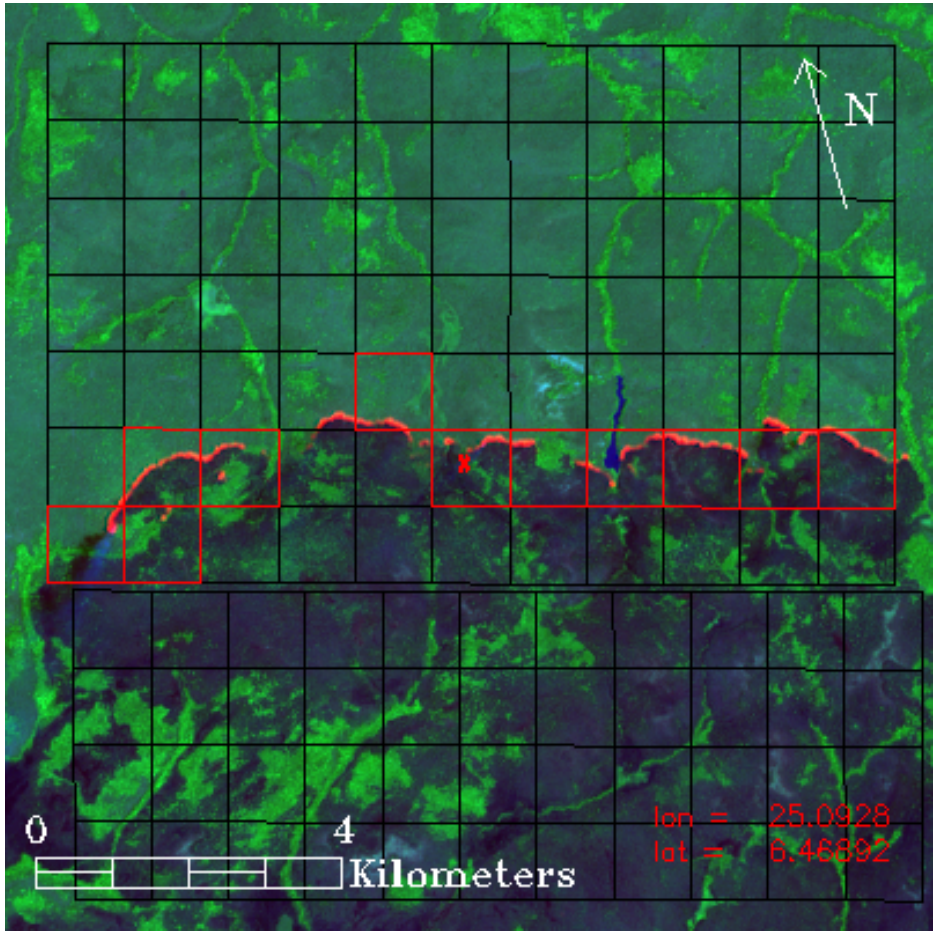




Explicit validation: MODIS heritage

Near-nadir pixels
(using ~2,500 coincident ASTER scenes)

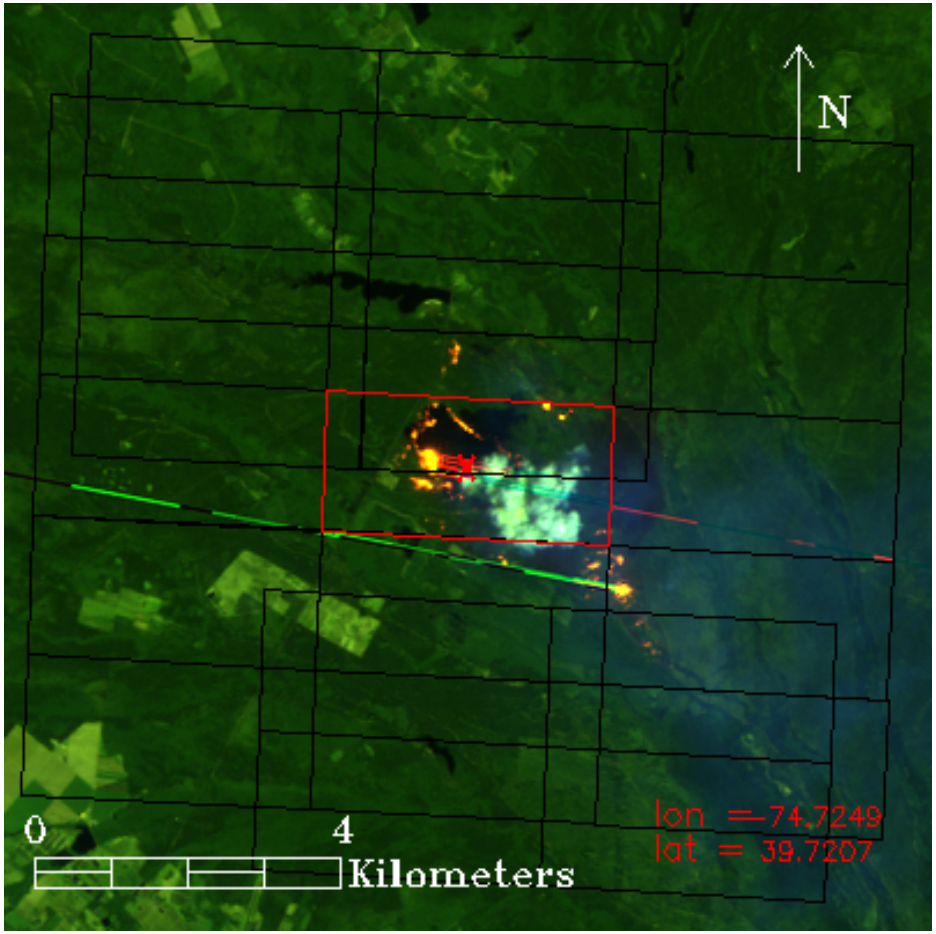
ASTER 2001-2006
SWIR detector problem > May 2007



MODIS/ASTER 19 Jan 2006 0852UTC (near nadir)

Off-nadir pixels
(using ~3,700 near-coincident TM scenes)

Landsat5 TM 2001-2010
Fire-related artifacts – saturation/bleeding

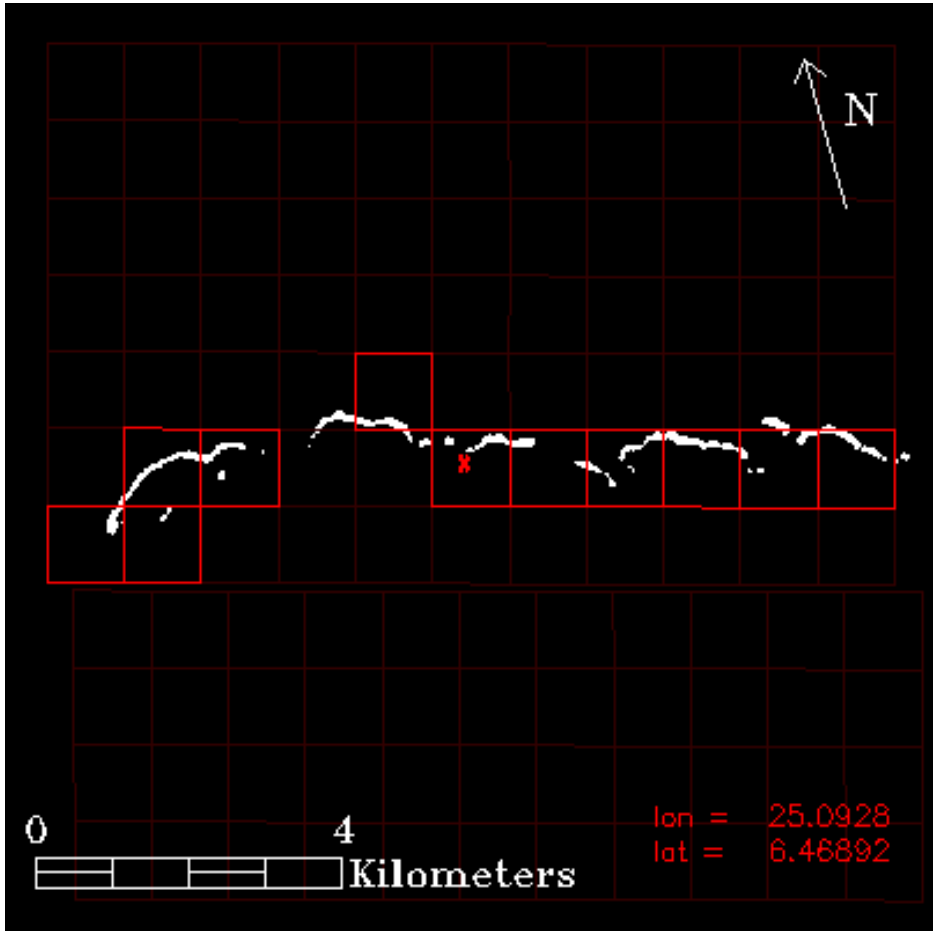


MODIS/TM 04 Aug 2007 1533UTC (52^{o} scan angle)

Explicit validation: MODIS heritage

Near-nadir pixels
(using ~2,500 coincident ASTER scenes)

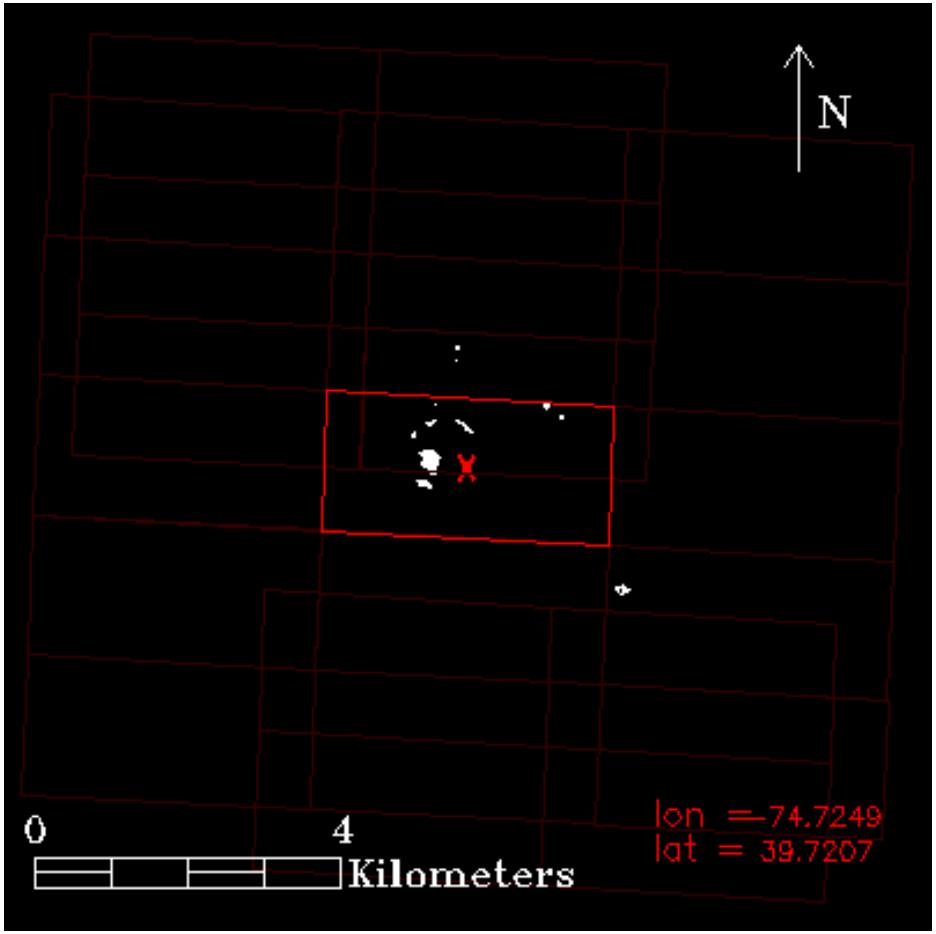
ASTER 2001-2006
SWIR detector problem > May 2007



MODIS/ASTER 19 Jan 2006 0852UTC (near nadir)

Off-nadir pixels
(using ~3,700 near-coincident TM scenes)

Landsat5 TM 2001-2010
Fire-related artifacts – saturation/bleeding



MODIS/TM 04 Aug 2007 1533UTC (52^{o} scan angle)

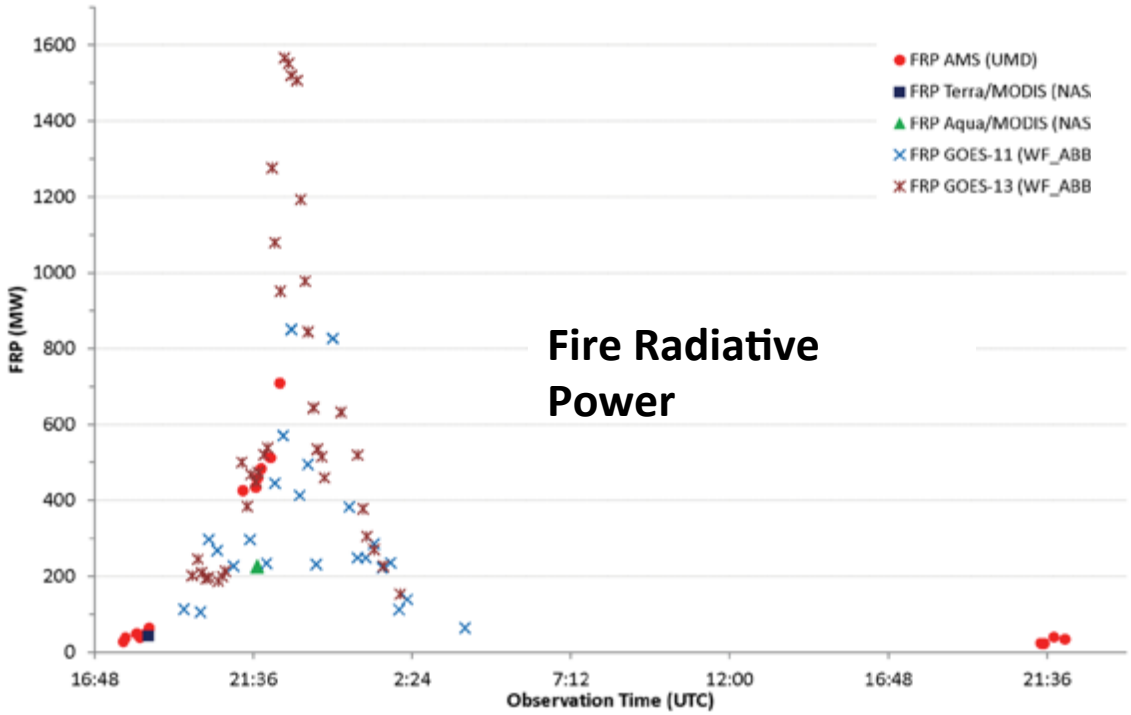
Validation Activities: airborne data

Airborne Validation – quantitative assessment

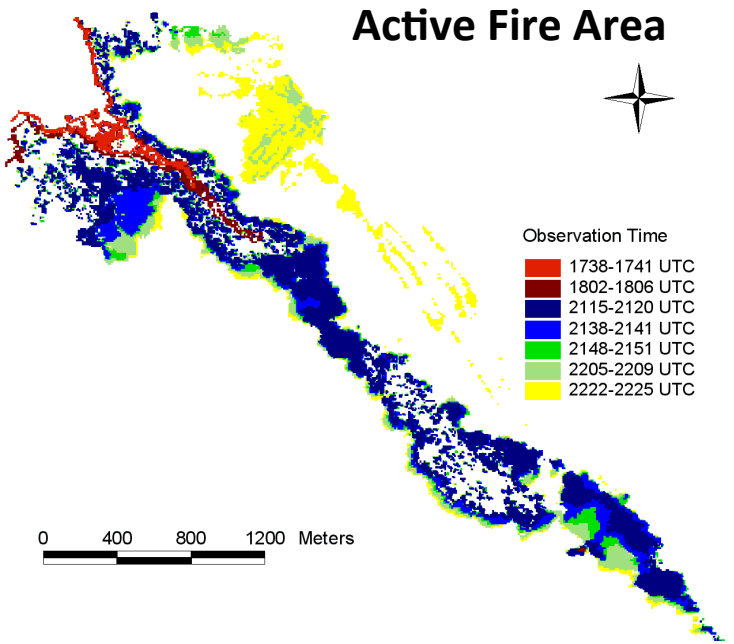
Use of fire-dedicated airborne sensors to map and characterize coincident Rx and wildland fires

Coordinated ground, airborne and spaceborne data acquisition

- USDA Forest Service
- NASA
- Universities and state agencies



Fire Radiative Power



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

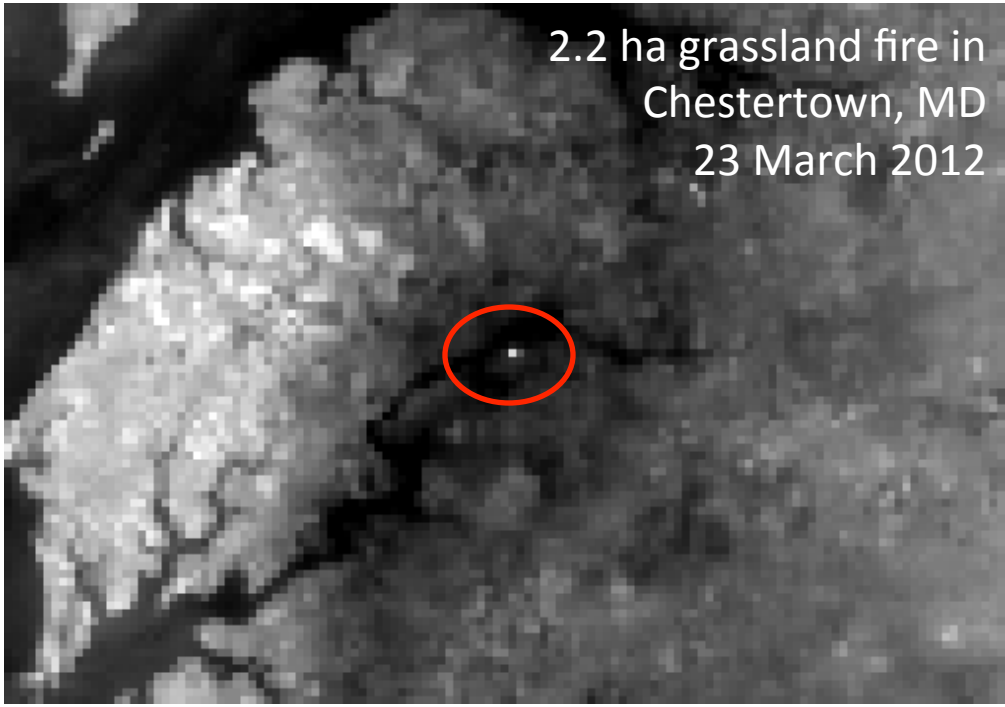
Validation Activities: in-situ data

Ground Verification – qualitative assessment

Use of coincident prescribed burns to verify active fire detection data using both I and M bands

Engaging:

- Individuals (private land owners)
- State agencies (fire/forestry departments)
- Federal agencies (USDA Forest Service)
- International community



Validation Activities: in-situ data

Ground Verification – qualitative assessment

Use of coincident prescribed burns to verify active fire detection data using both I and M bands

Fire information provided by USDA personnel

- Date and location of burn
- Area burned
- Fuel load & fuel consumption

National Forests in Alabama

2012 Rx Fire Smoke Monitoring

Notification to NOAA NESDIS Satellite Analysis Branch

The following information should be forwarded to the NOAA NESDIS team on each burn the morning of the burn:

Date of Burn: 3/27/2012

Name of Burn: Rattlesnake

Coordinates: 33°30'59" Lat -85°43'07" Lon (decimal degrees)

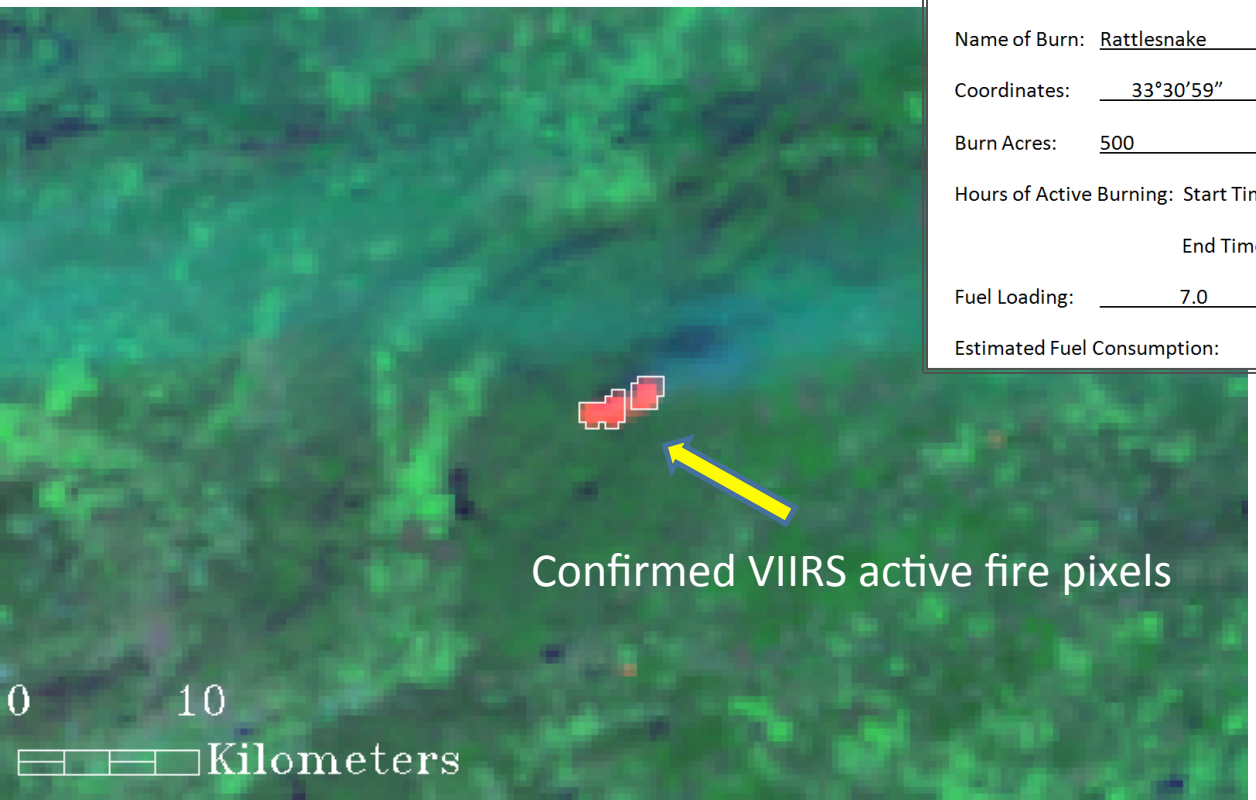
Burn Acres: 500

Hours of Active Burning: Start Time - 1000 (CST)

End Time: 1800 (CST)

Fuel Loading: 7.0 (tons per acre)

Estimated Fuel Consumption: 5.0 (tons per acre)



Summary and conclusions

- Suomi NPP fire product is currently in the **Intensive Calibration and Validation** phase
- **Early assessment** of the NPP VIIRS fire product is **encouraging**
- **Continuing fire monitoring capability** in Northern Eurasia is expected
- **Differences in sensor characteristics** between MODIS and VIIRS are reflected in fire detections
- More work is needed to implementation of **new MODIS algorithm components** (implemented in Version 6) and **sensor-specific tuning** in the VIIRS product
- Explicit **validation** remains crucial