

NASA MODIS and VIIRS Burned Area Products Update

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London*

MODIS Burned Area Products

MODIS Collections 5 and 5.1

MCD45A1	500-m Monthly
MCD45A1-based GIS Products (SCF)	Shapefiles + 500-m GeoTIFF
MCD64A1 (SCF)	500-m Monthly

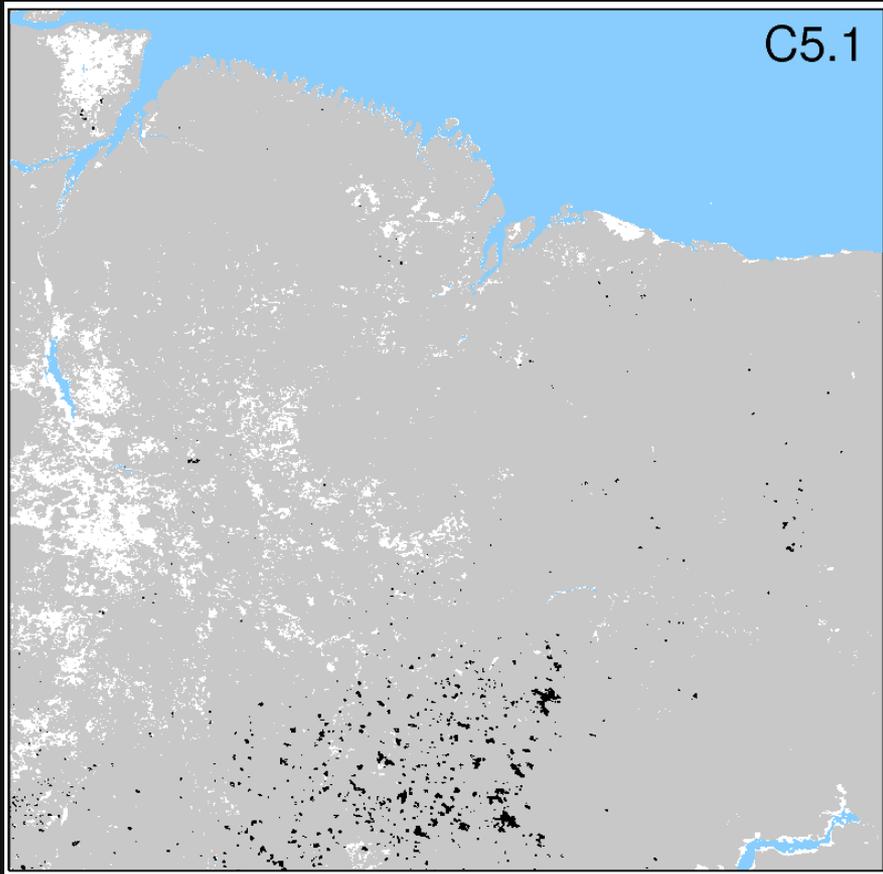
MODIS Collection 6

MCD64A1	500-m Monthly
MCD64A1-based GIS Products (SCF)	Shapefiles + 500-m GeoTIFF
MCD64CMQ (SCF)	0.25° Monthly
MCD64CDQ (SCF)	0.25° Daily

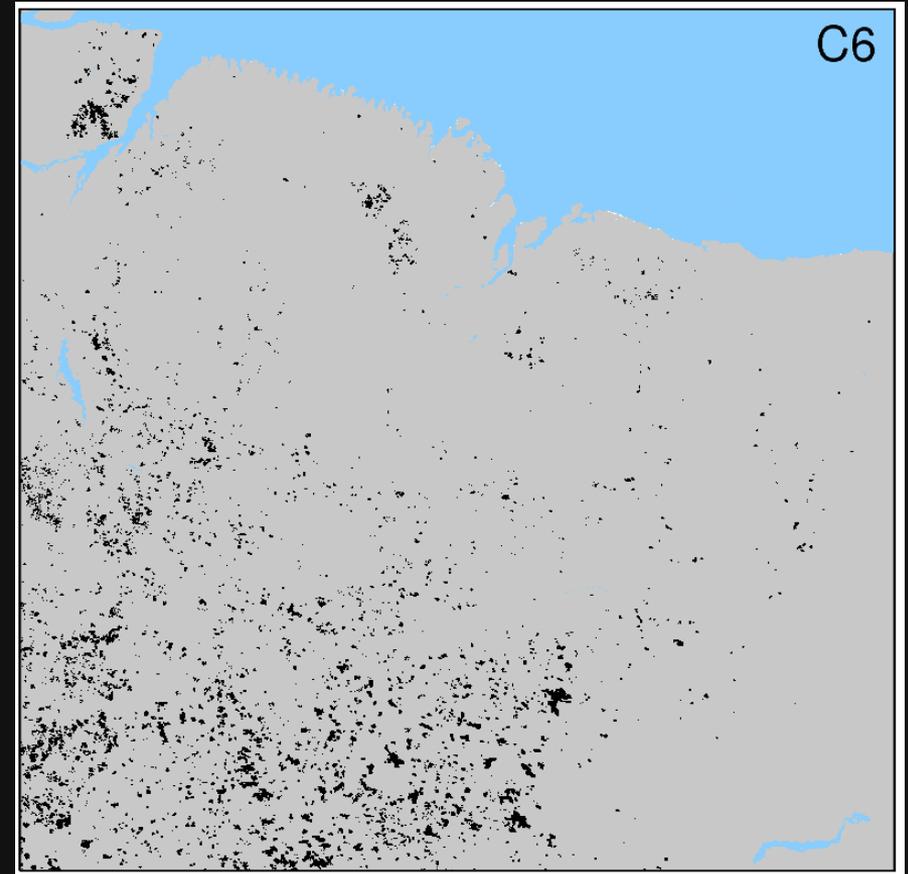
MODIS C6 BA Product Status

- C6 MCD64A1 operational production began in late 2016
- Public release February 2017
- General increase in burned area (~26%) compared to C5.1

September 2002, MODIS tile h13v09 (eastern Brazil)



0.38 Mha



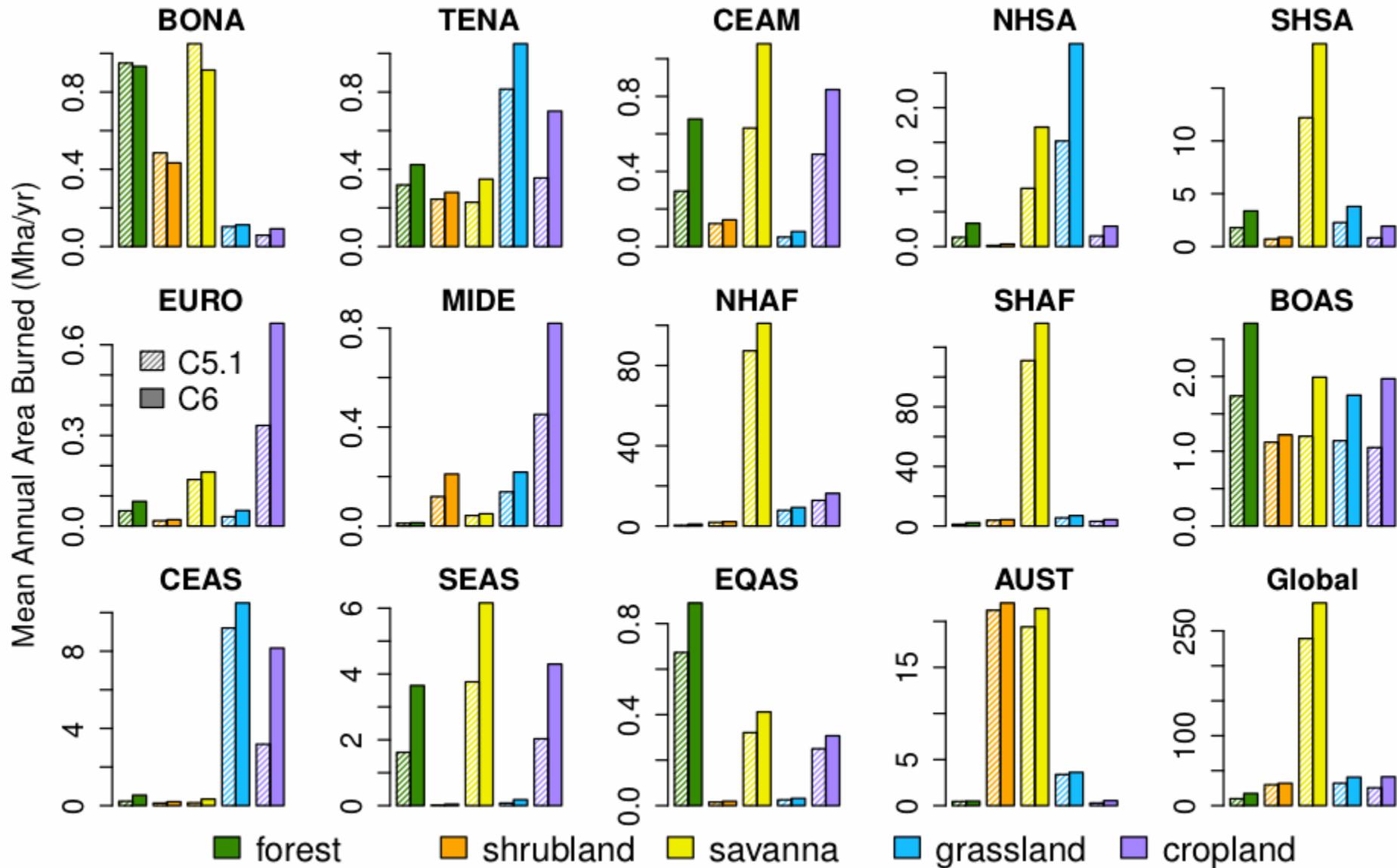
1.53 Mha

(4 × increase)

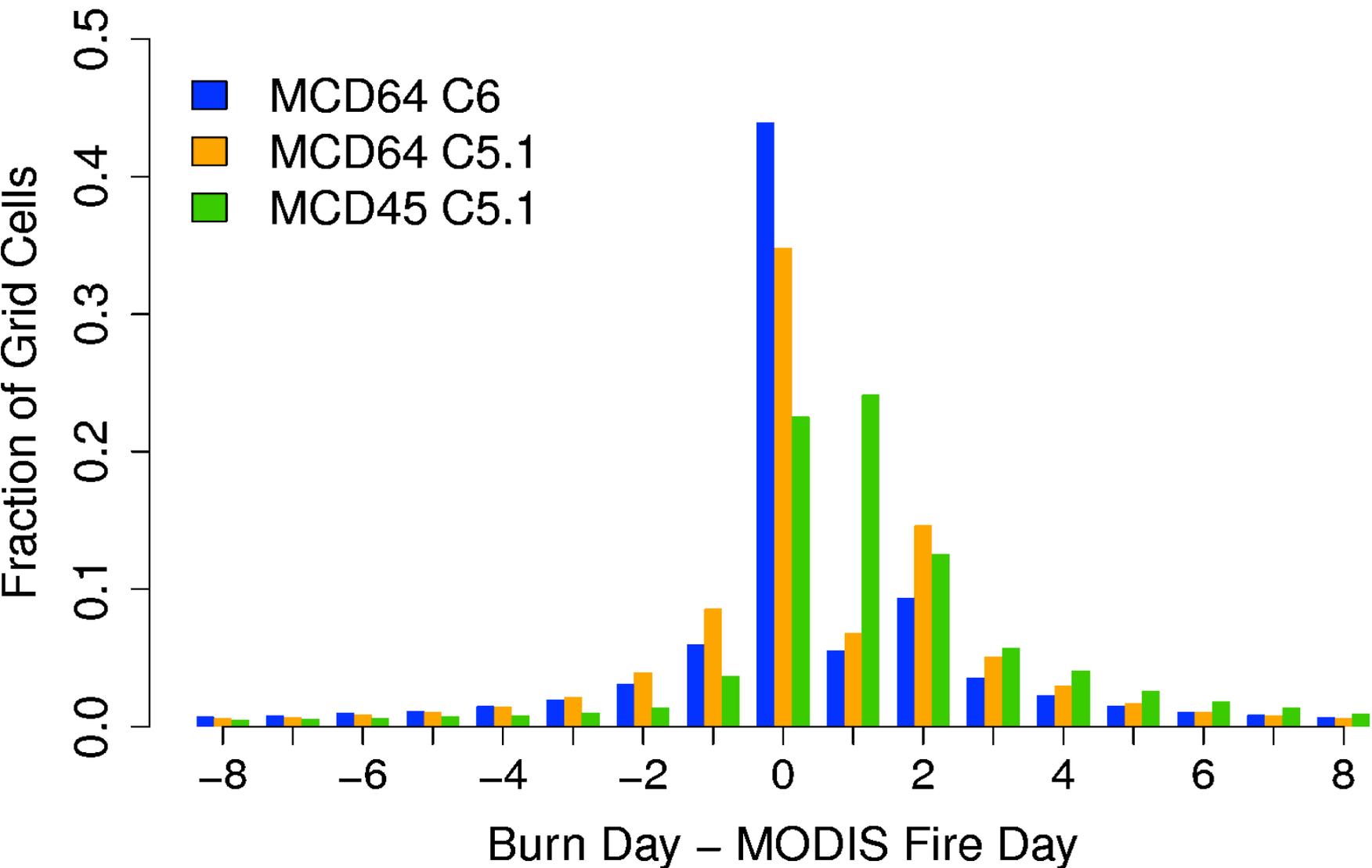
MCD64A1 2002-2016 Mean Annual Area Burned (Mha yr⁻¹)

Region	Abbrv.	C5.1	C6	Δ (%)
Global	GLOB	336.5	422.5	26
Boreal North America	BONA	2.7	2.5	-6
Temperate North America	TENA	2.0	2.8	43
Central America	CEAM	1.6	2.8	77
NH South America	NHSA	2.7	5.3	100
SH South America	SHSA	17.8	29.3	64
Europe	EURO	0.6	1.0	71
Middle East	MIDE	0.8	1.4	80
NH Africa	NHAF	110.3	129.9	18
SH Africa	SHAF	125.3	153.7	23
Boreal Asia	BOAS	6.3	9.7	55
Central Asia	CEAS	12.9	19.9	54
Southeast Asia	SEAS	7.5	14.4	91
Equatorial Asia	EQAS	1.3	1.7	30
Australia and NZ	AUST	44.8	48.1	7

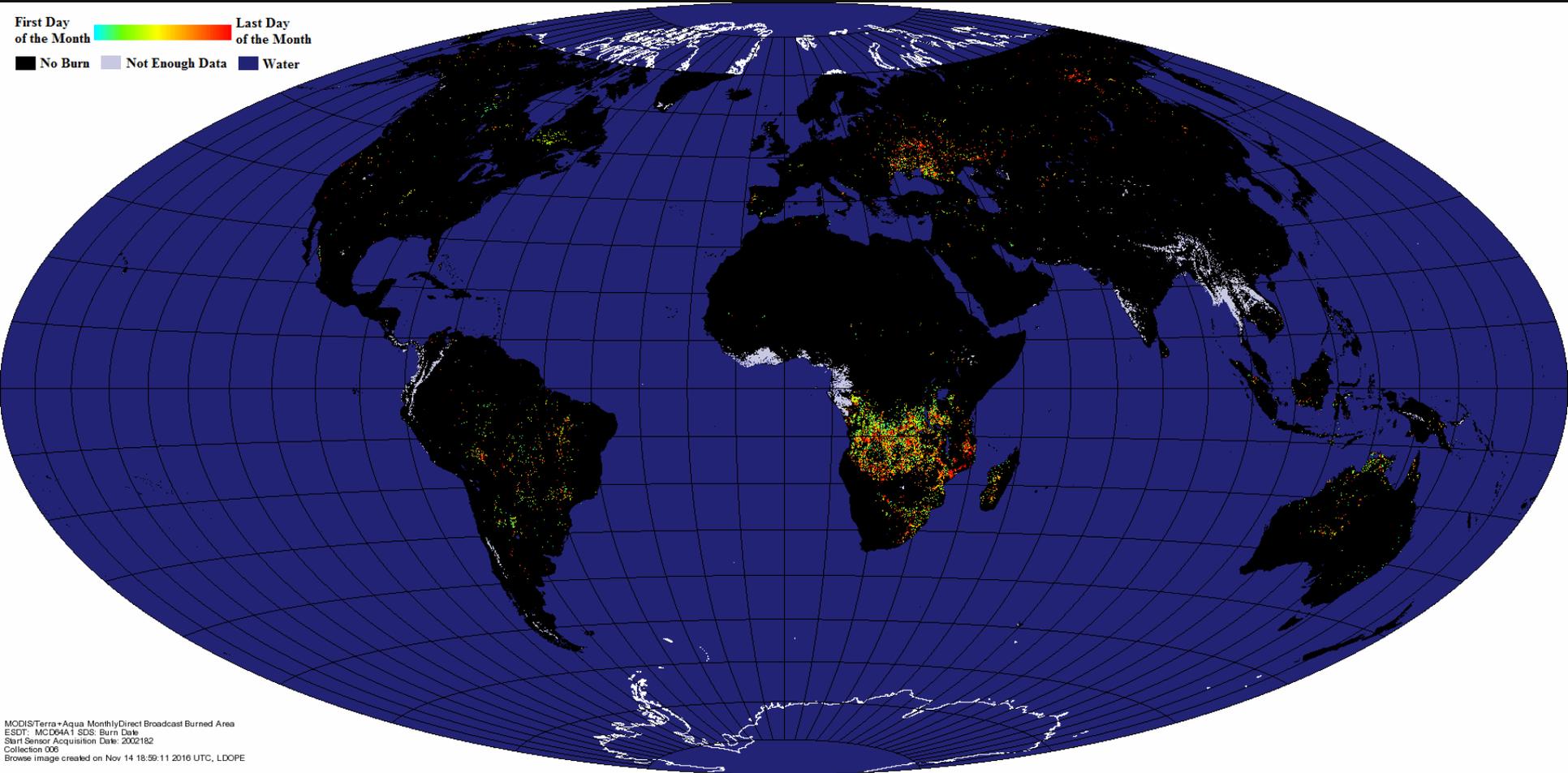
MCD64A1 2002-2016 Mean Annual Area Burned



Temporal Uncertainty (Global, 2006)

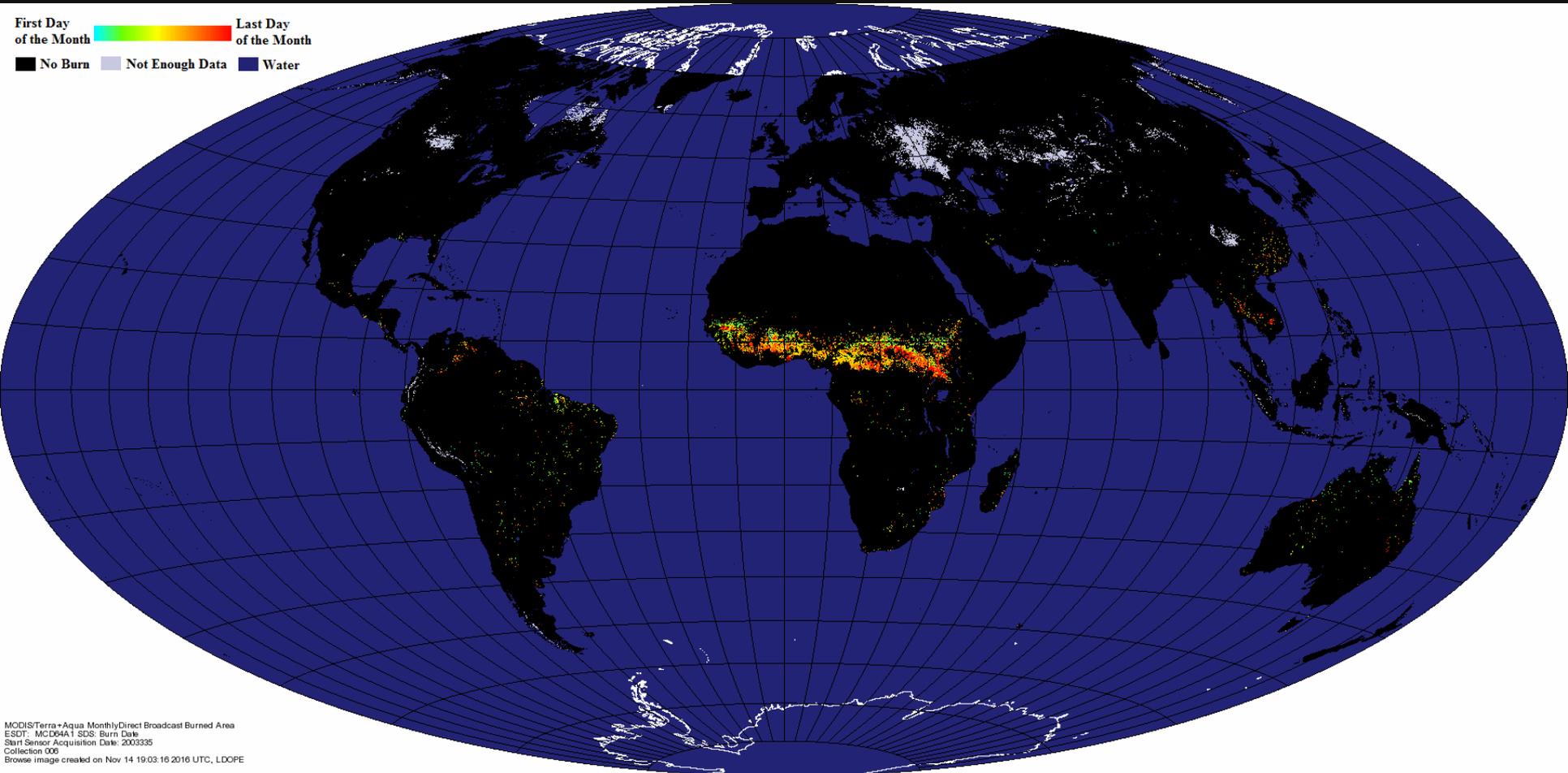


July 2002 MCD64A1 Global Browse



<http://landweb.nascom.nasa.gov/cgi-bin/browse/browseMODIS.cgi>

December 2003 MCD64A1 Global Browse



<http://landweb.nascom.nasa.gov/cgi-bin/browse/browseMODIS.cgi>

MODIS Collection 6/VIIRS Validation

- Landsat-8 imagery
- CEOS burned area validation protocol
 - Image-pair interpretation
 - Cloud free + within a set time period (~2 months)
 - Widely tested and used in peer reviewed literature
- CEOS Stage-2 (done) and Stage-3 (almost done)

CEOS Validation Hierarchy

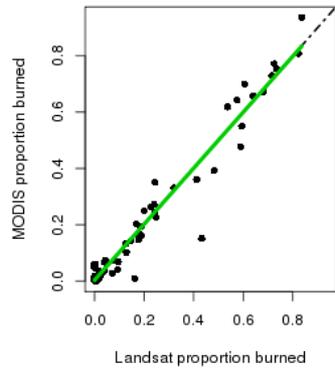
Stage 1: Product accuracy estimated using small number of measurements obtained from selected locations and time periods.

Stage 2: Product accuracy assessed over widely distributed set of locations and time periods, representative of full range of conditions present in product.

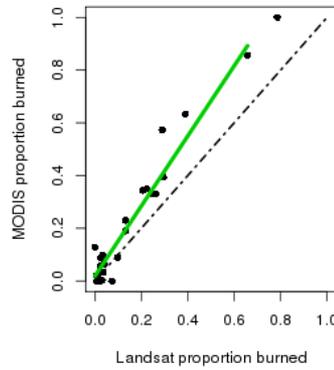
Stage 3: Product accuracy assessed, and uncertainties in product established via independent measurements made in a statistically robust way that represents global conditions, and is characterized by selection of reference data via a probability sampling, i.e., design-based validation.

Stage 4: Results for Stage 3 systematically updated when new product versions are released, or when time coverage of existing products expands.

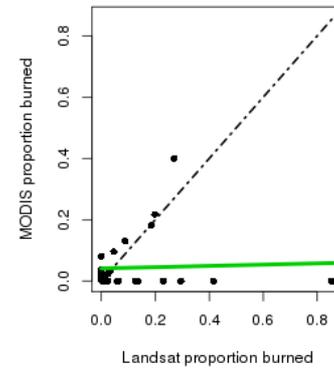
L5_002_069_20070917-20071003 (1736 km²)
R2 = 0.954 n = 70 y = 0.003 + 0.995 x¹



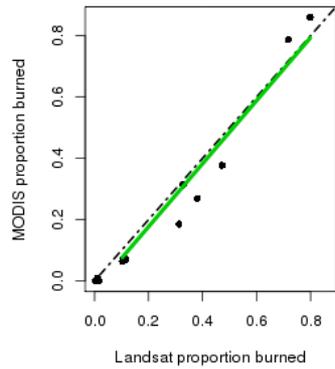
L5_027_039_20110826-20110911 (620 km²)
R2 = 0.951 n = 25 y = 0.018 + 1.329 x¹



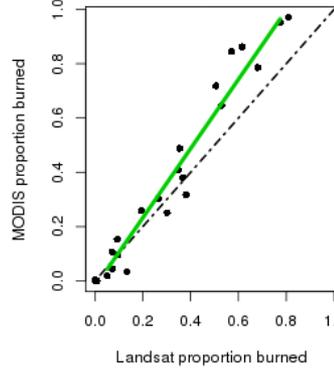
L5_040_028_20110821-20110906 (744 km²)
R2 = 0.003 n = 30 y = 0.041 + 0.021 x¹



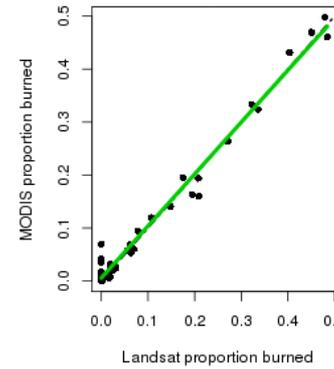
L5_041_021_20090518-20090923 (422 km²)
R2 = 0.965 n = 17 y = -0.029 + 1.028 x¹



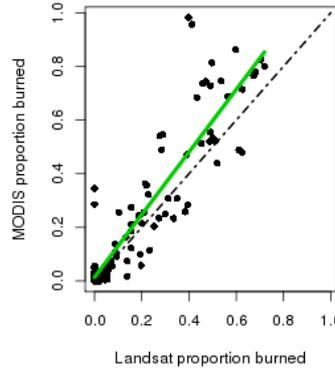
L5_043_020_20100417-20100722 (645 km²)
R2 = 0.963 n = 26 y = -0.022 + 1.275 x¹



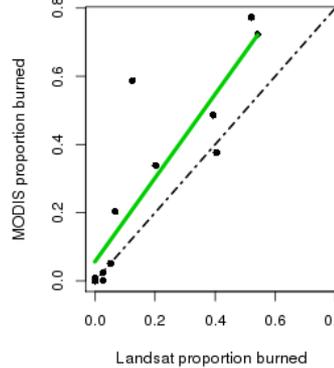
L5_043_034_20030601-20030905 (967 km²)
R2 = 0.982 n = 39 y = 0.006 + 0.981 x¹



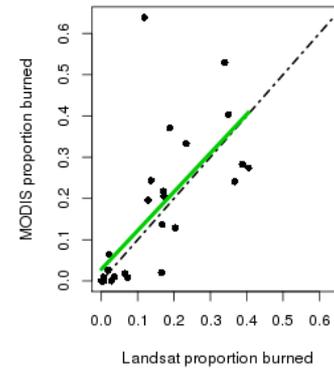
L5_045_029_20110808-20110909 (2827 km²)
R2 = 0.822 n = 114 y = 0.014 + 1.166 x¹

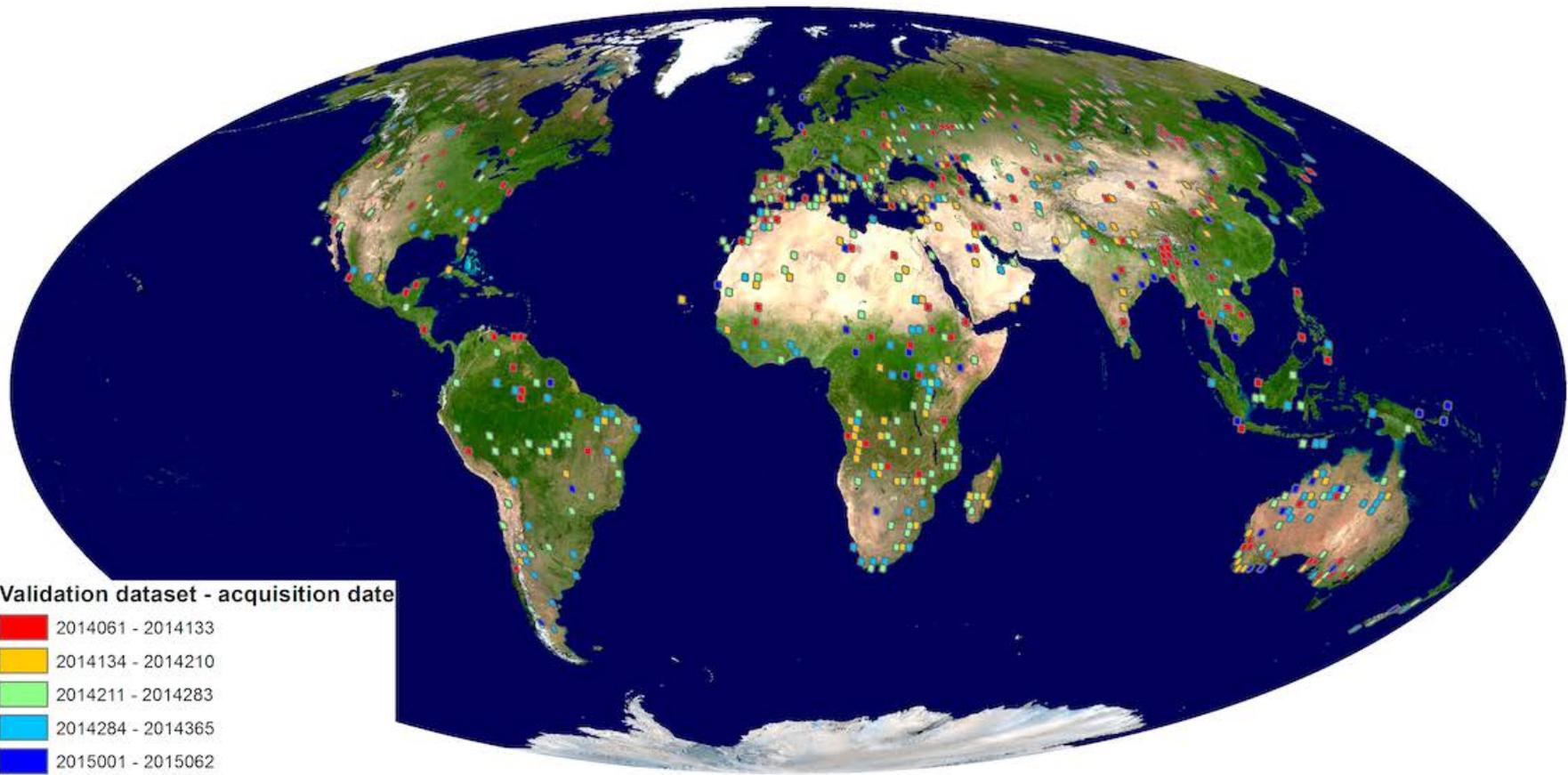


L5_045_032_20040804-20040820 (298 km²)
R2 = 0.776 n = 12 y = 0.056 + 1.227 x¹



L5_047_017_20110518-20110806 (694 km²)
R2 = 0.489 n = 28 y = 0.028 + 0.939 x¹





700 Landsat-8 image pairs to validate one year of MCD64A1

VIIRS Burned Area Product Status

- Adapt MCD64 production code to use VIIRS data
 - 750-m versus 375-m bands
- Retain 500-m grid for MODIS compatibility

VIIRS Burned Area Products

VIIRS “Collection 1”

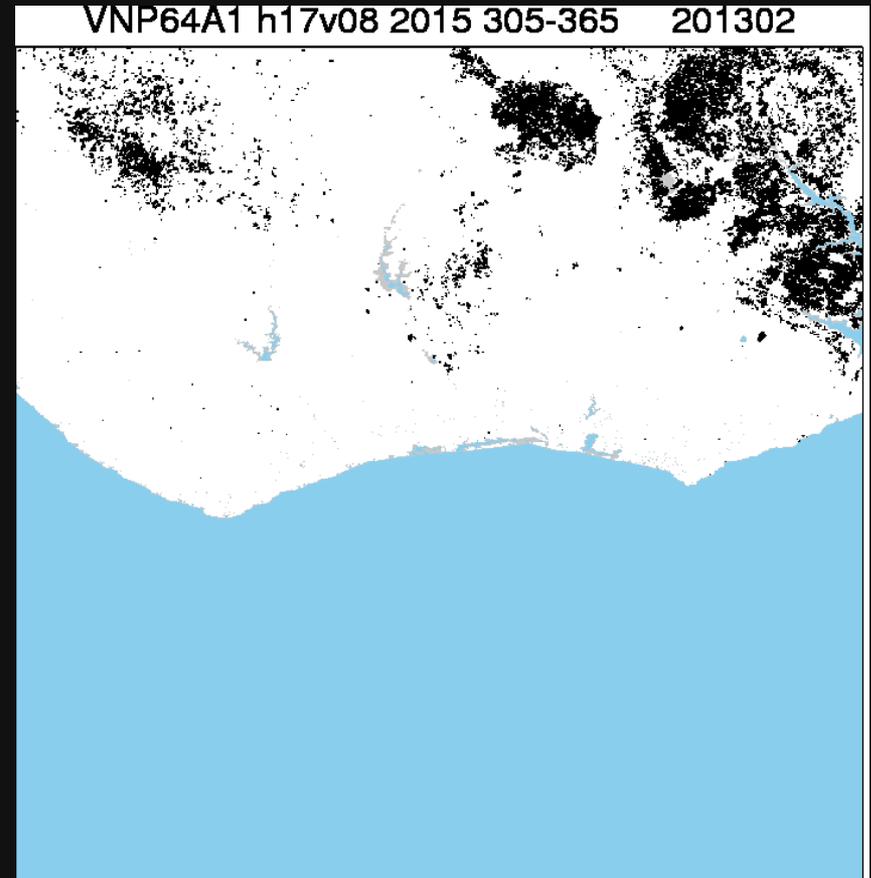
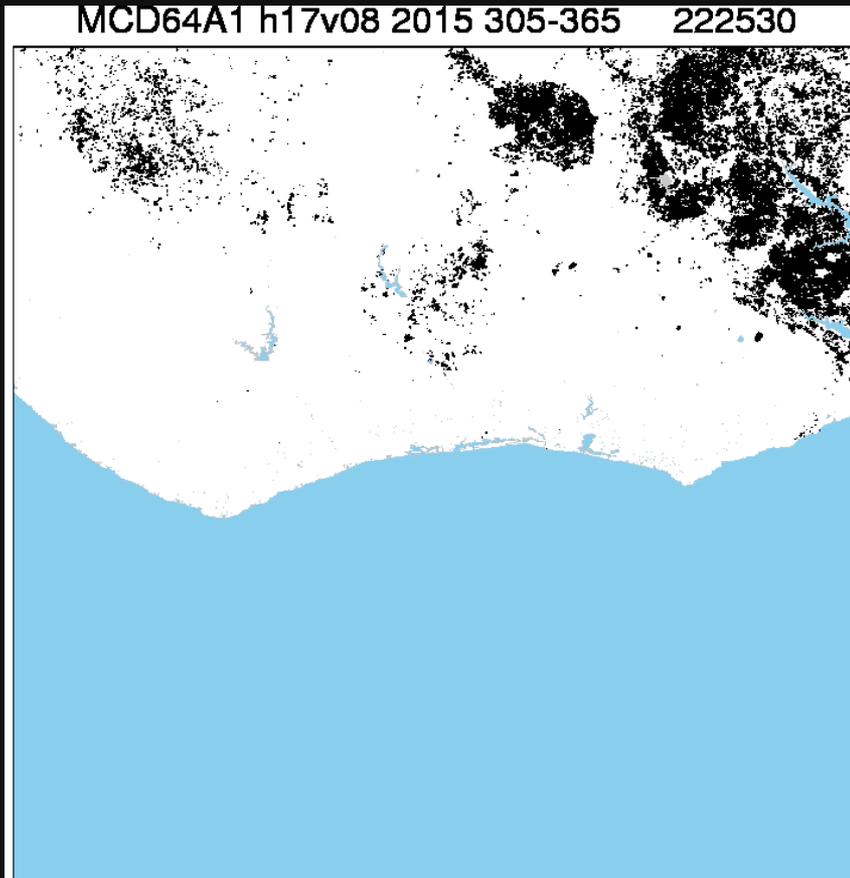
VNP64A1	500-m Monthly
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March 2017 release significantly behind schedule due to delays in availability of upstream VIIRS input products, now exacerbated by gap in continuation funding.

VIIRS VNP64A1 Prototype

MODIS

VIIRS*



*1-km NPP_DSRFIP_L3 daily surface reflectance product used as stand-in for 500-m VIIRS daily surface reflectance.

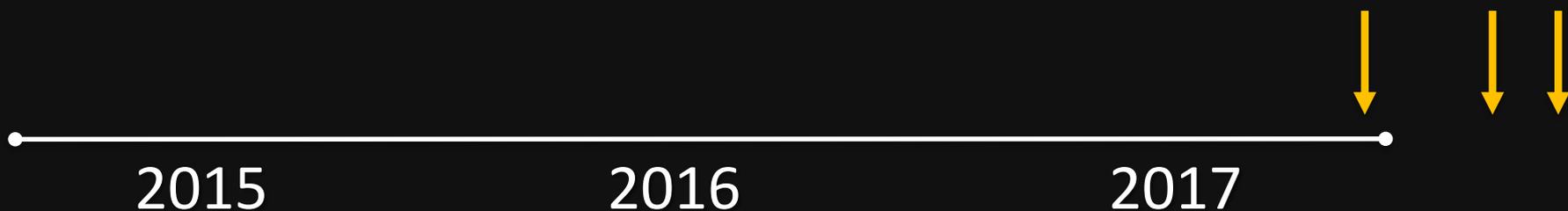
VIIRS burned area input expected timeline:

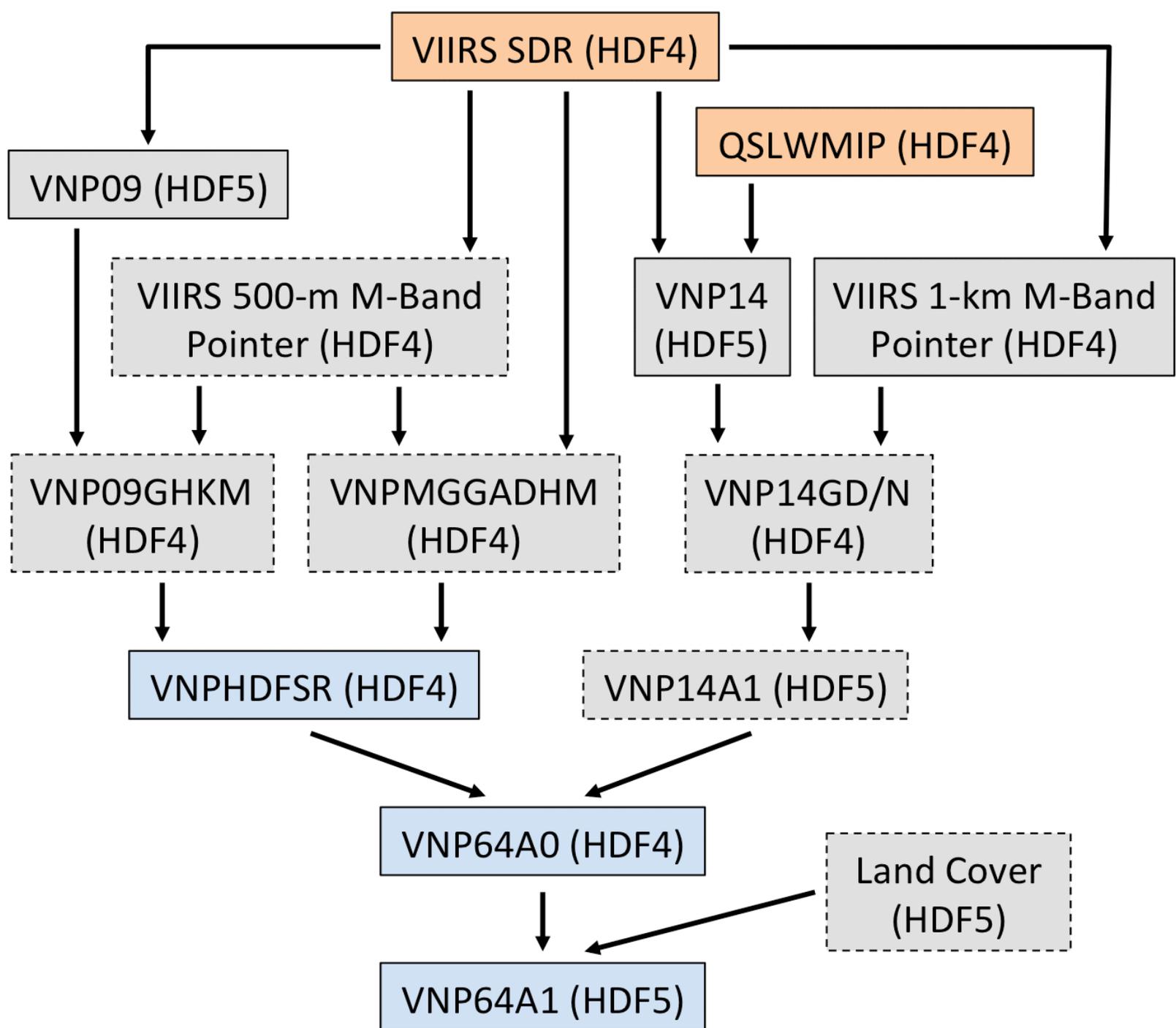


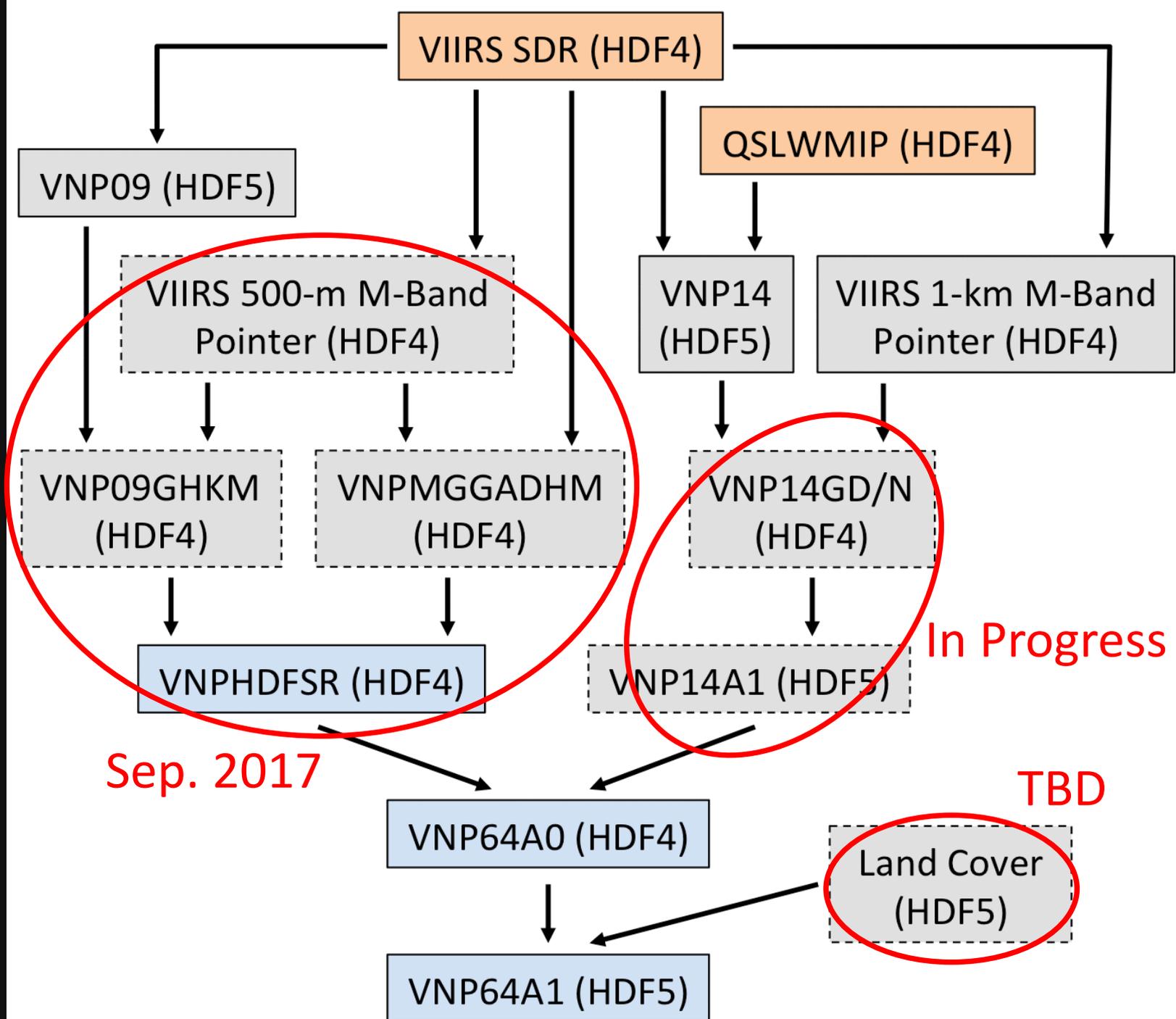
VIIRS burned area input expected timeline:

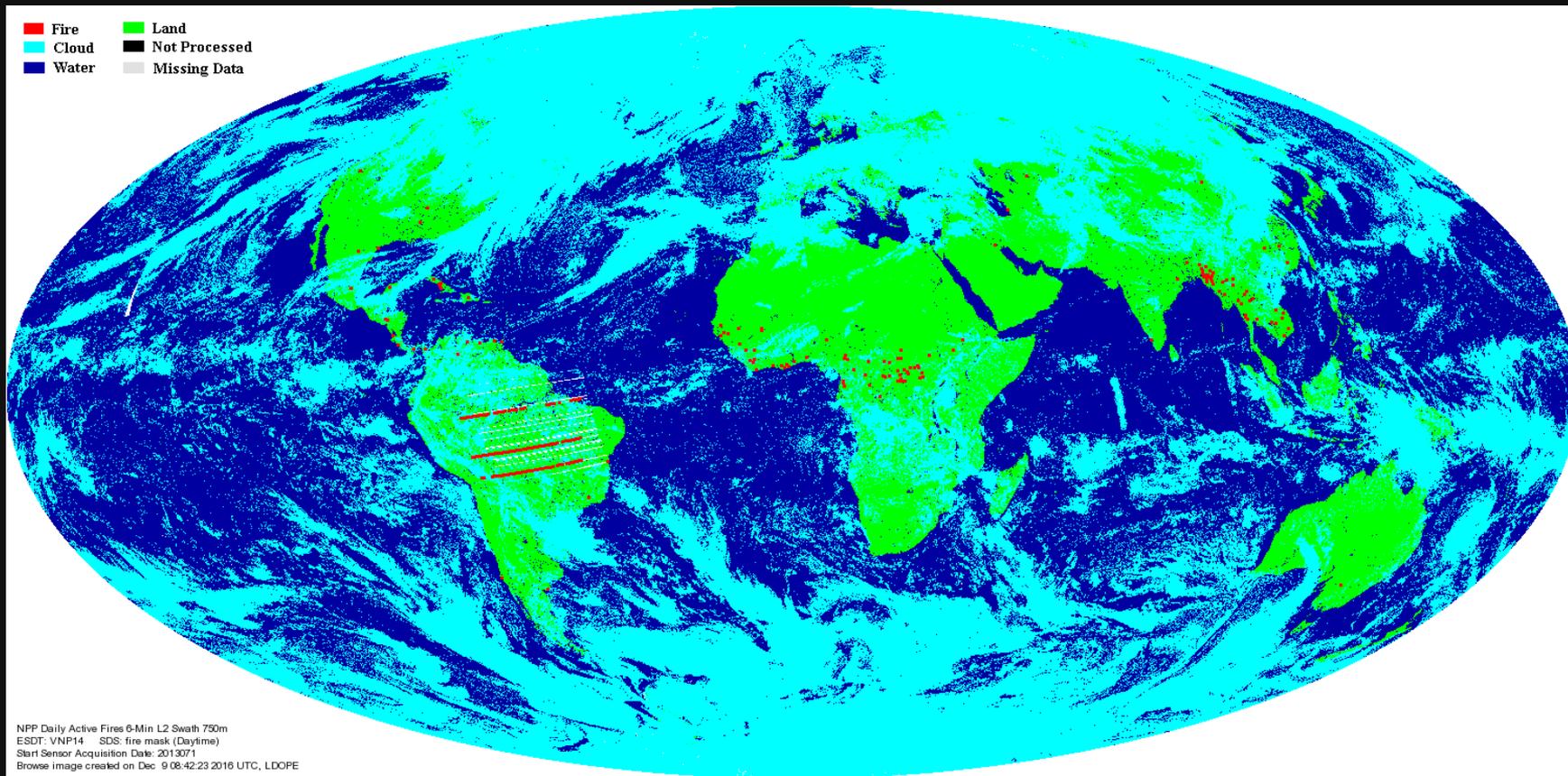


VIIRS burned area input actual timeline:









750-m VIIRS VNP14 active fire product 12 March 2013

Arcs of false fire pixels caused by spurious M13 scans.

VIIRS Burned Area Issues

- VIIRS to MODIS transition
 - Aqua: ≥ 2021
 - Terra: 2022 (2025 w/ relaxed equatorial crossing time)
- Lack of morning VIIRS overpass
 - Use SLSTR active fire observations

