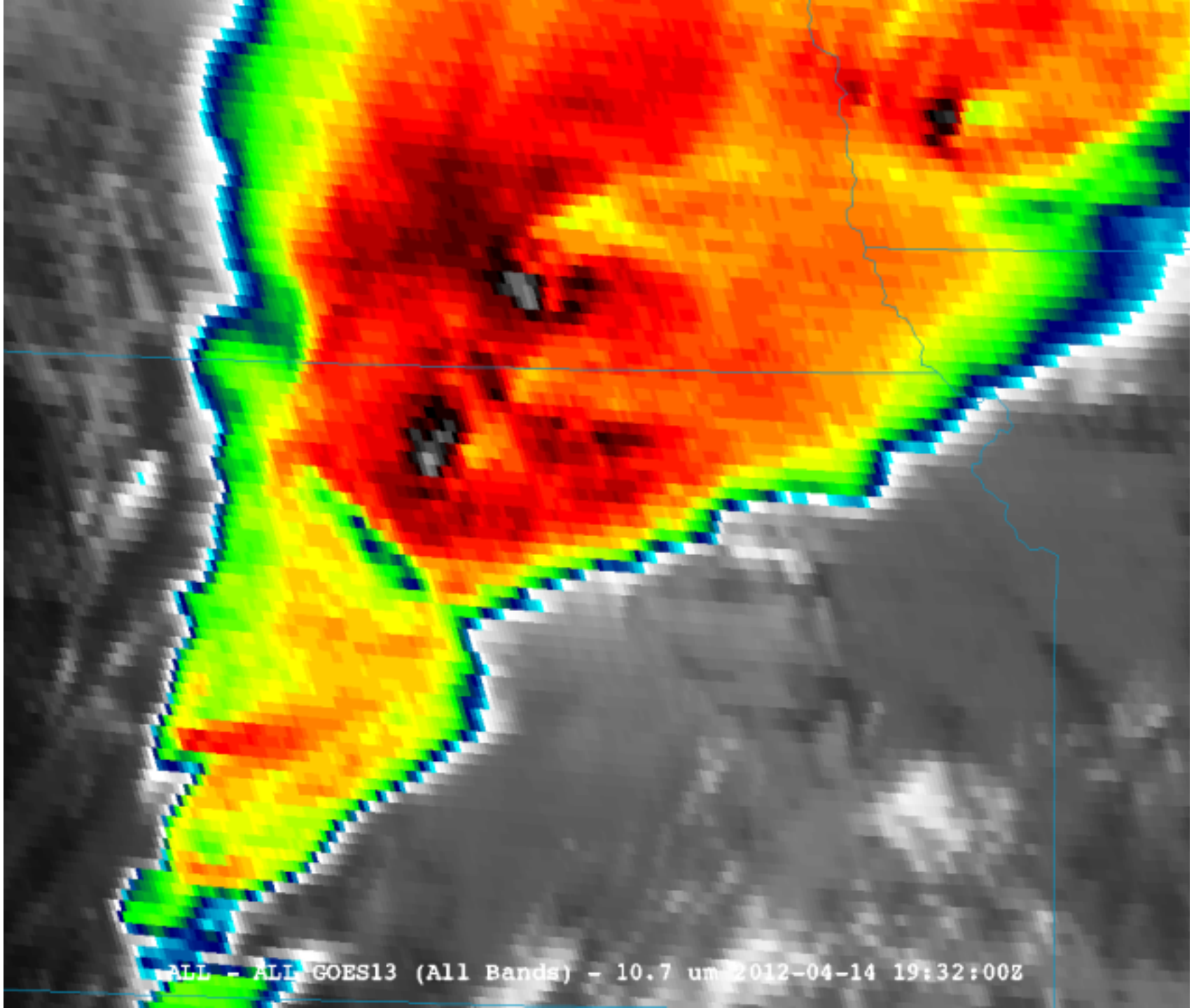
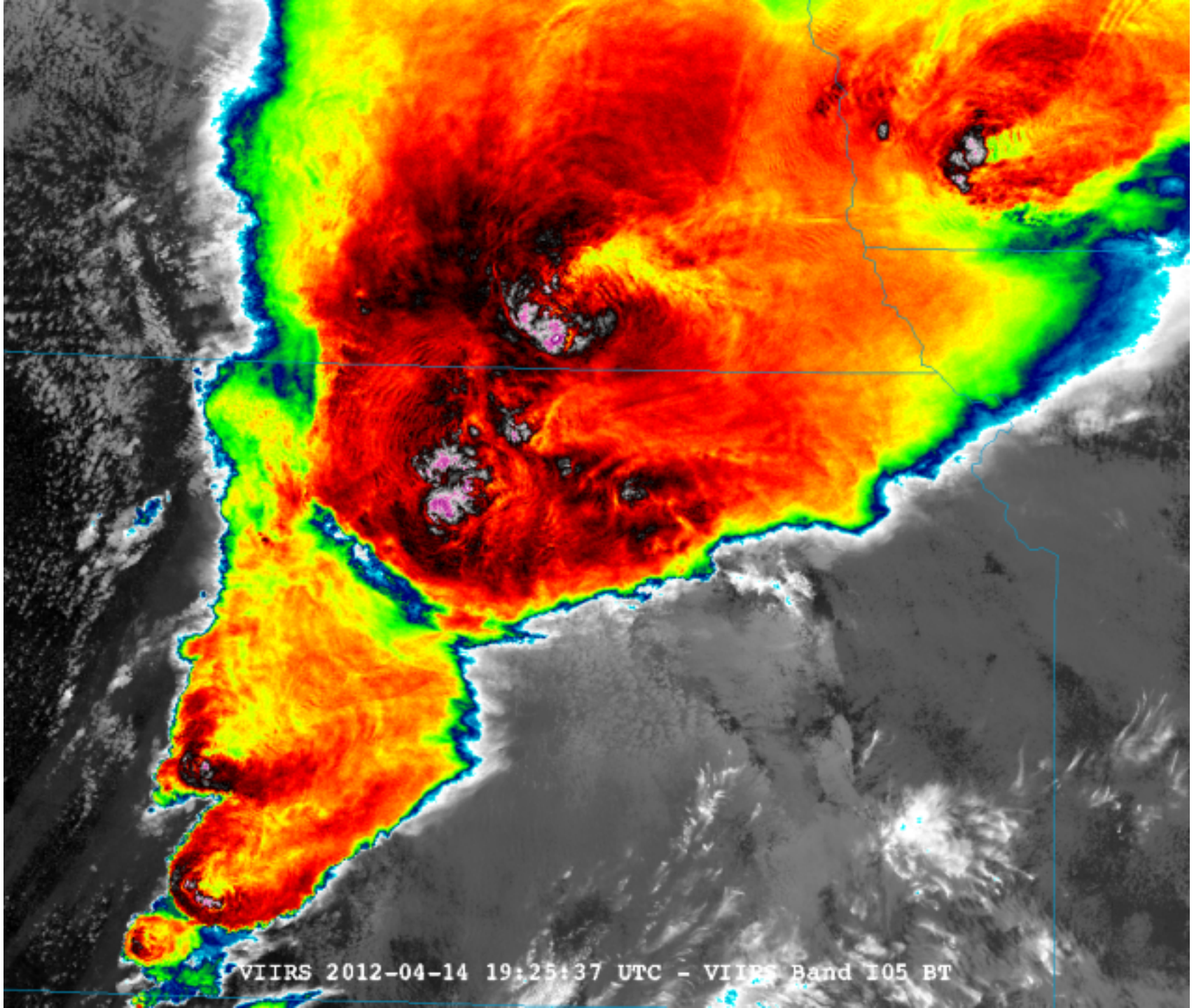
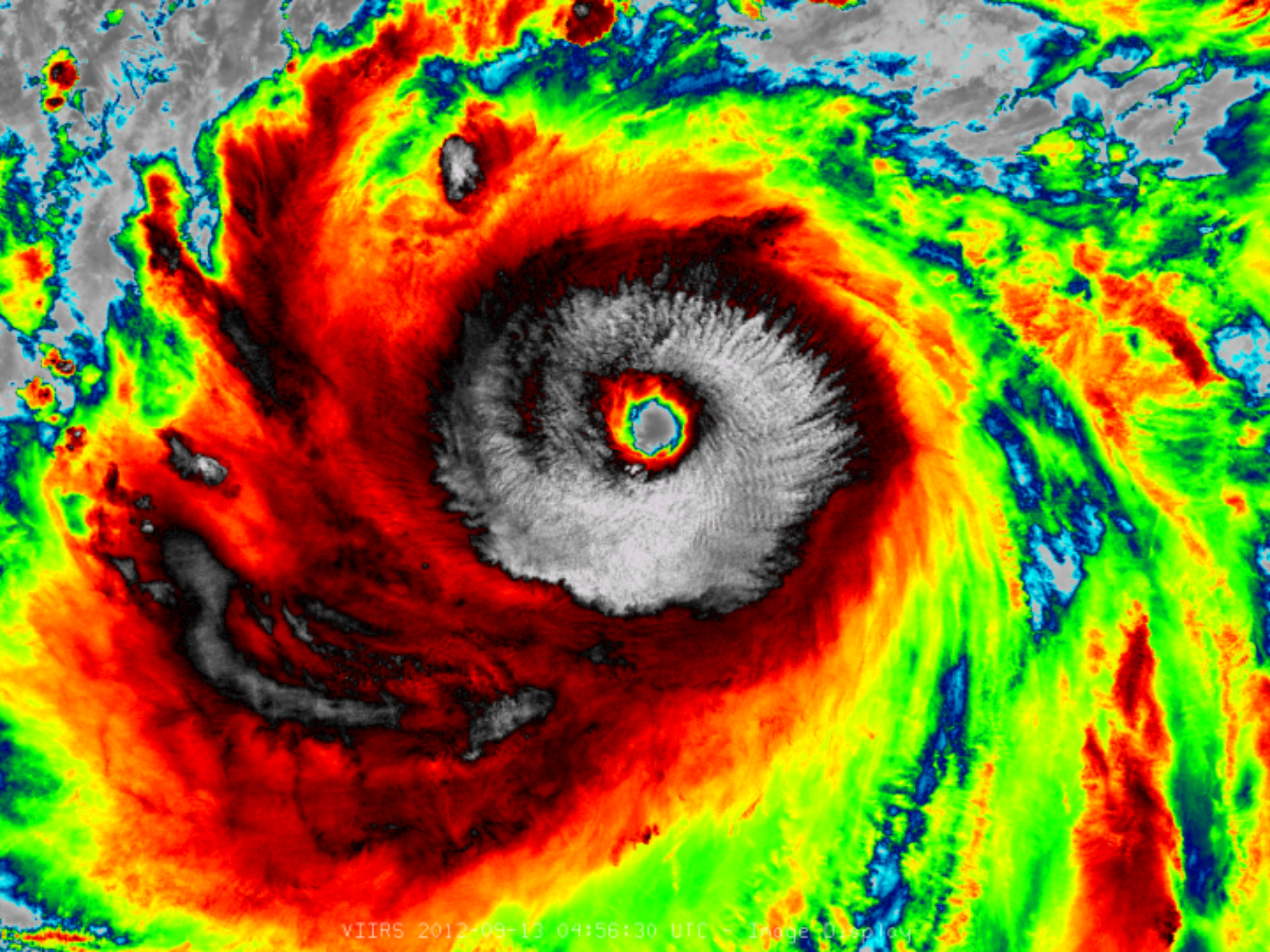
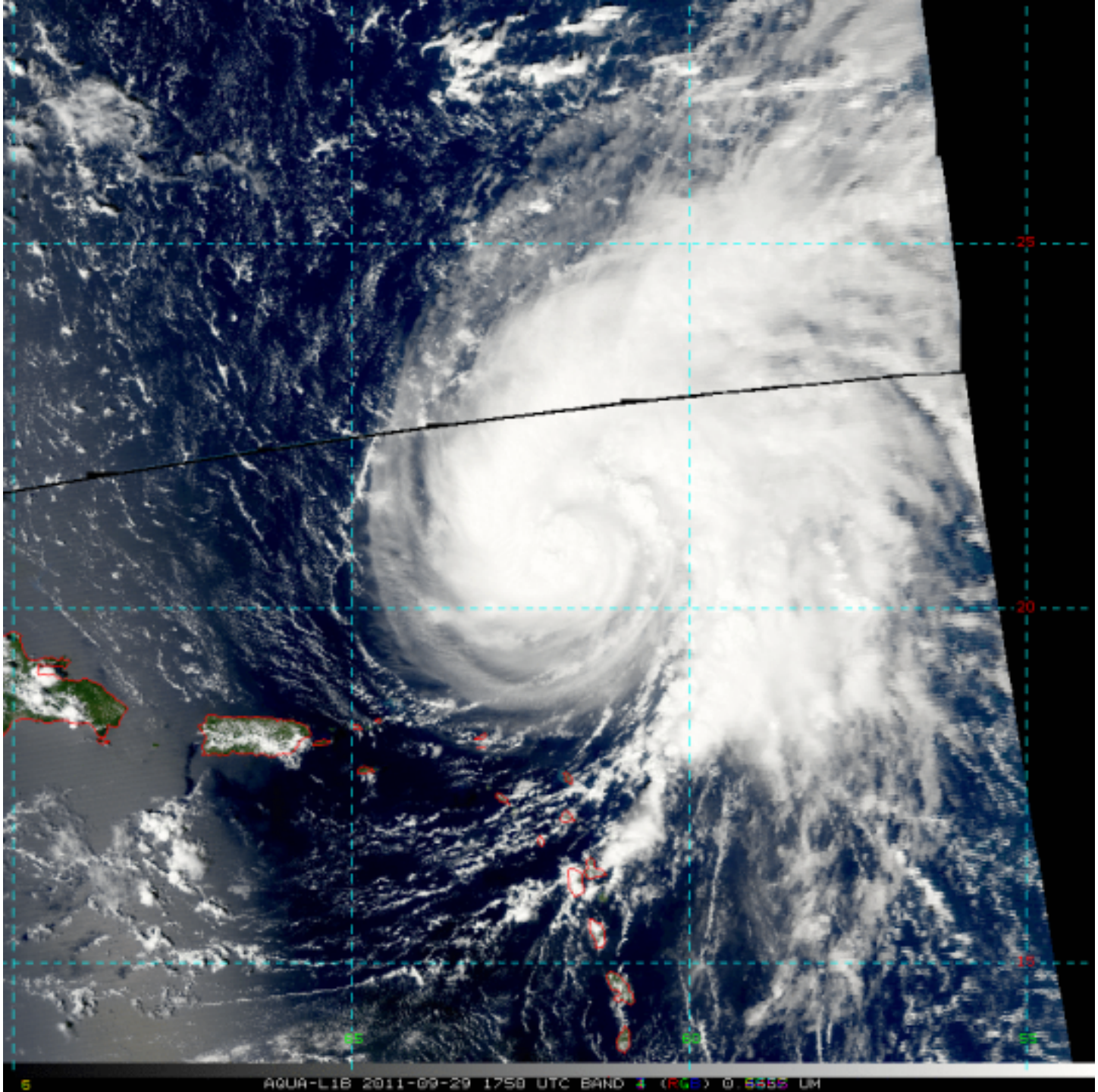
Satellites See the World

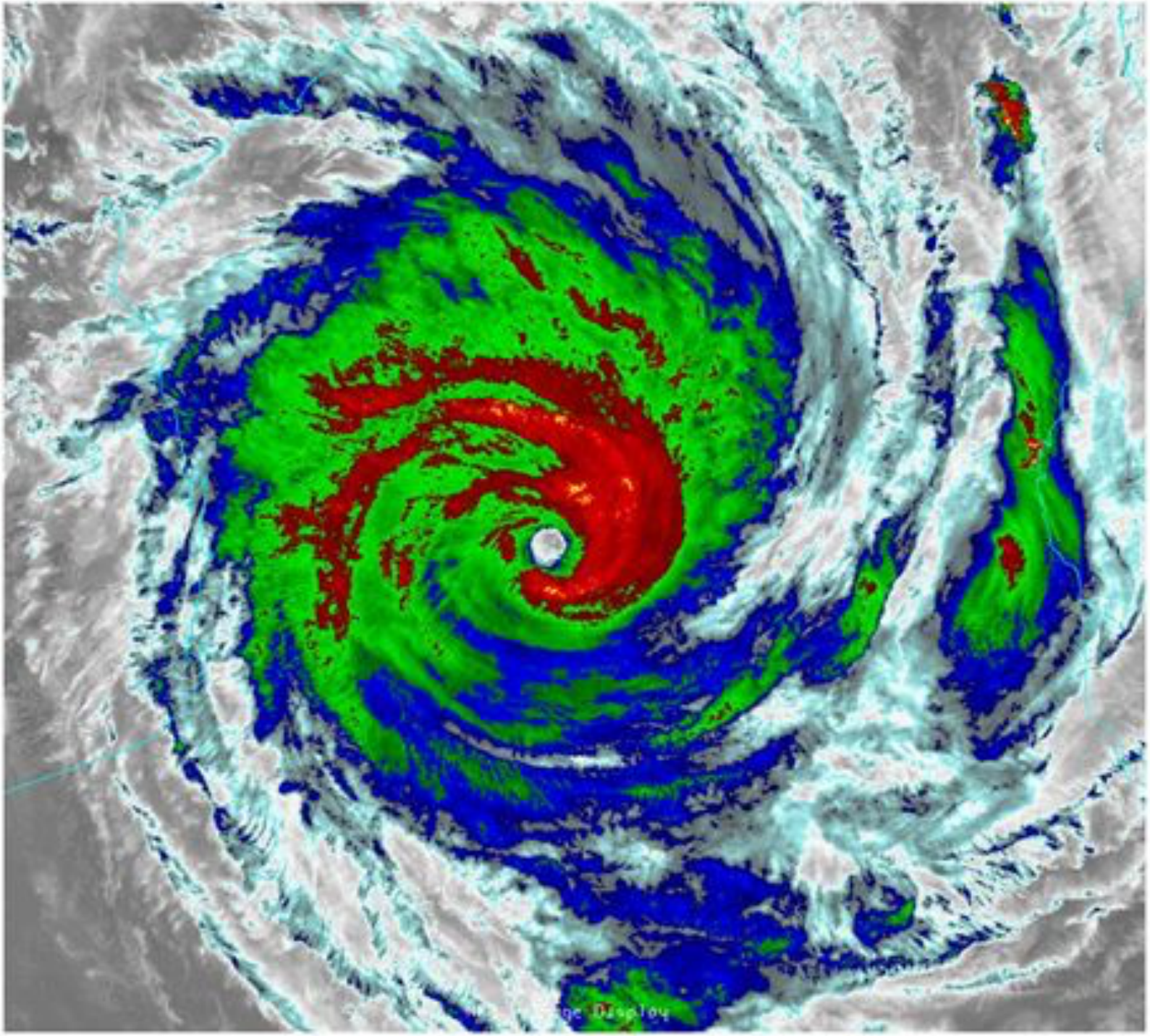
NOAA Satellite Conference

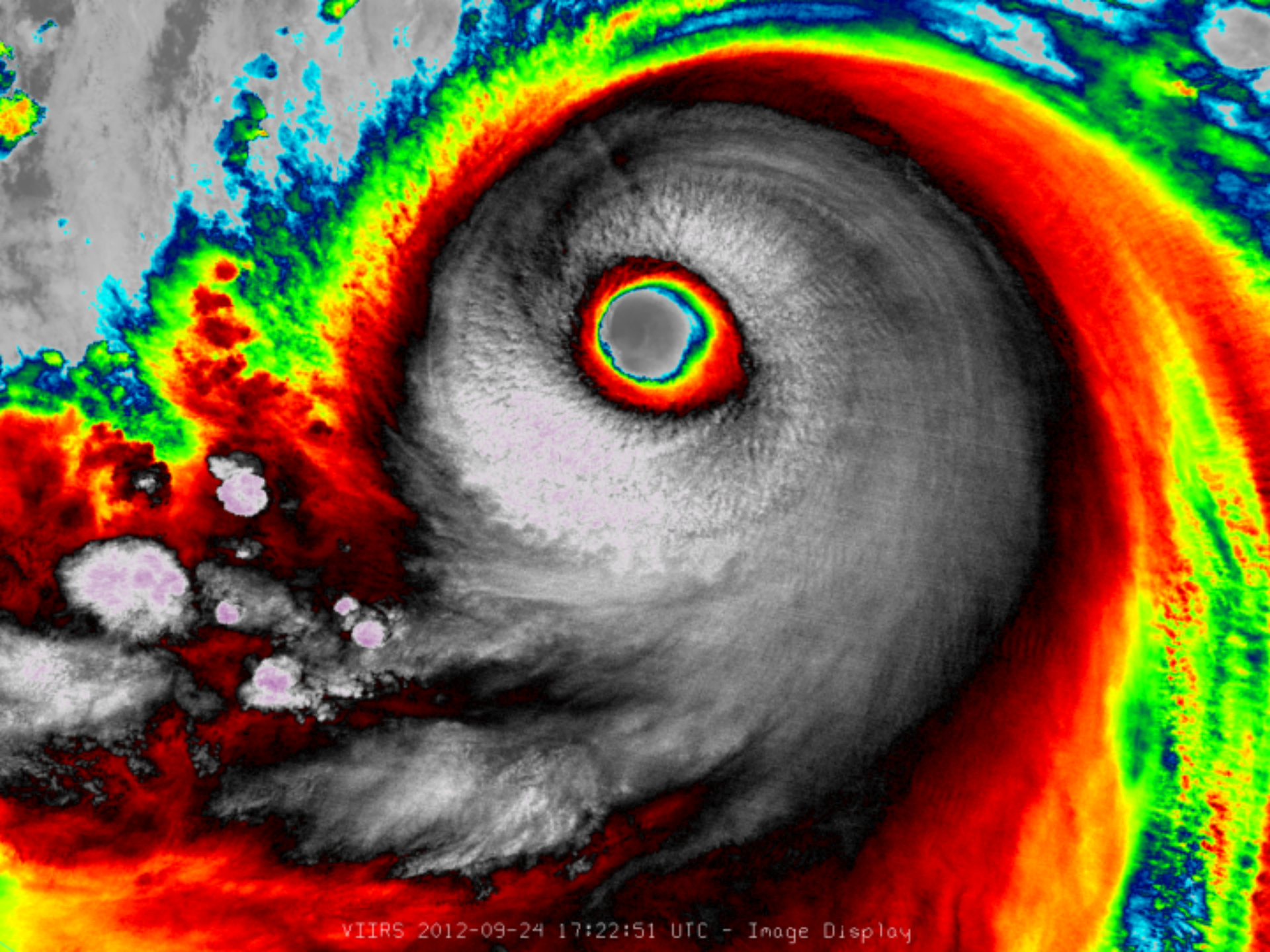

ALL - ALL GOES13 (All Bands) - 10.7 um 2012-04-14 19:32:00Z

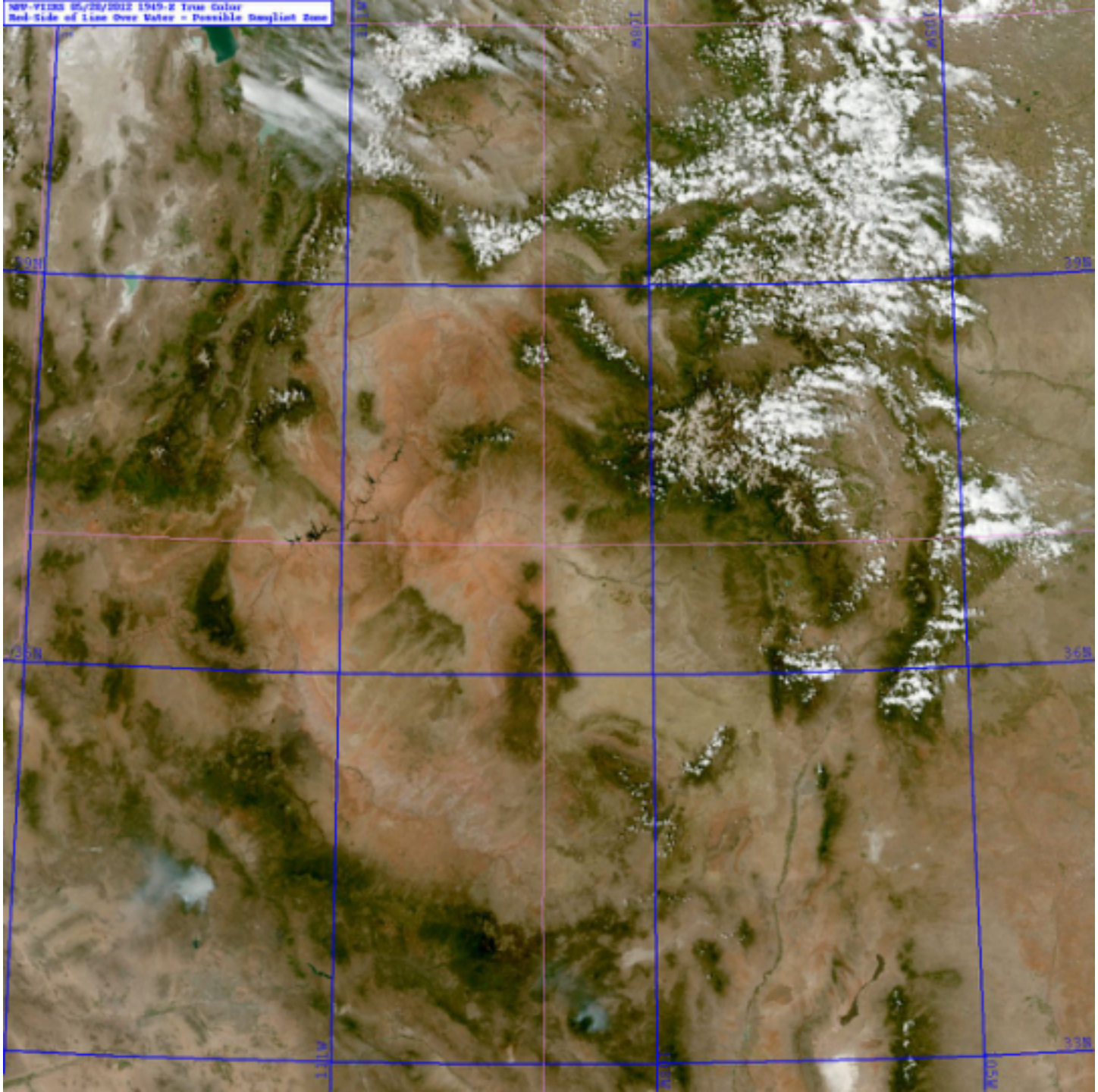

VIIRS 2012-04-14 19:25:37 UTC - VIIRS Band I05 BT

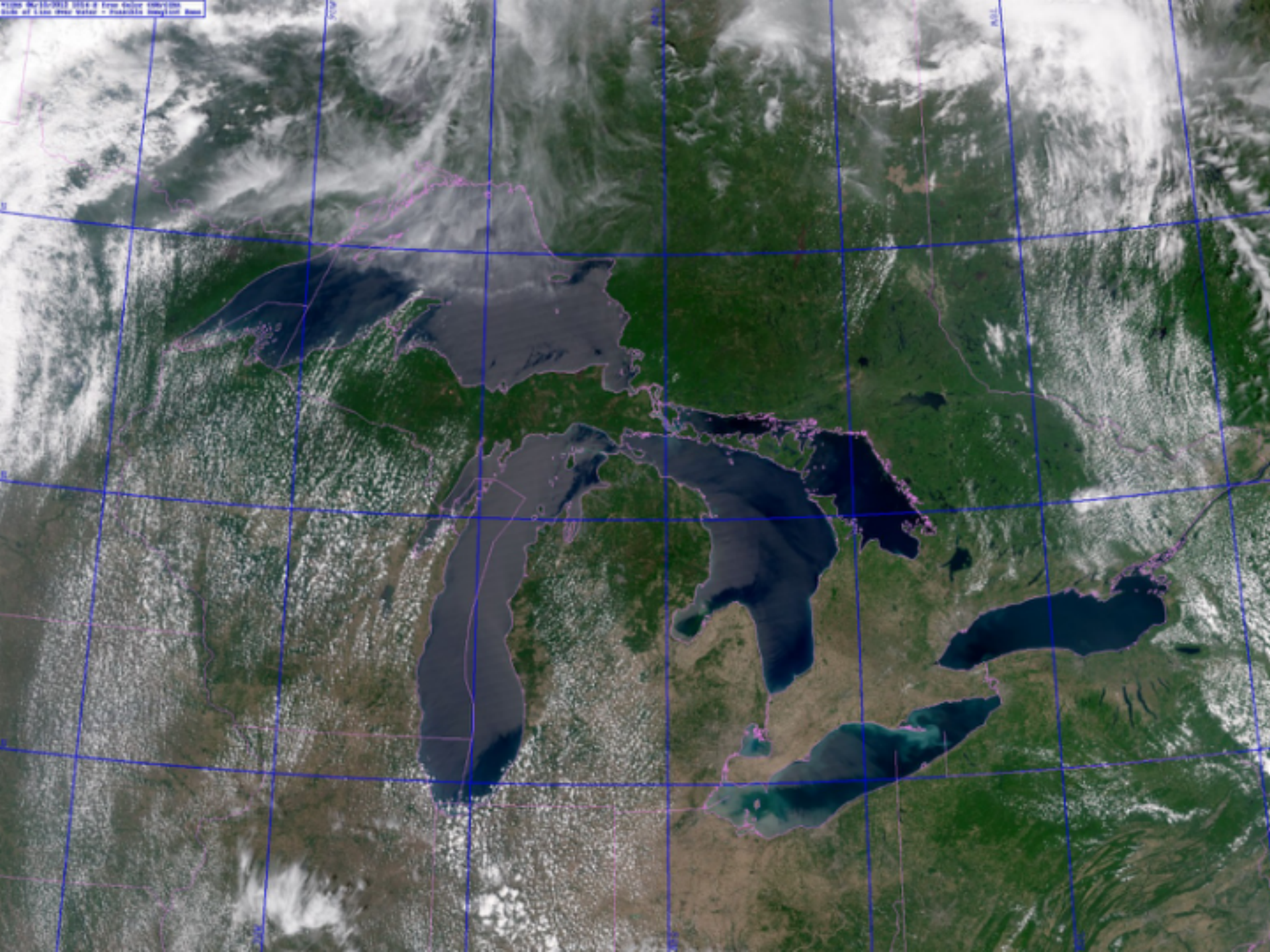

VIIRS 2012-09-13 04:56:30 UTC - Image Display

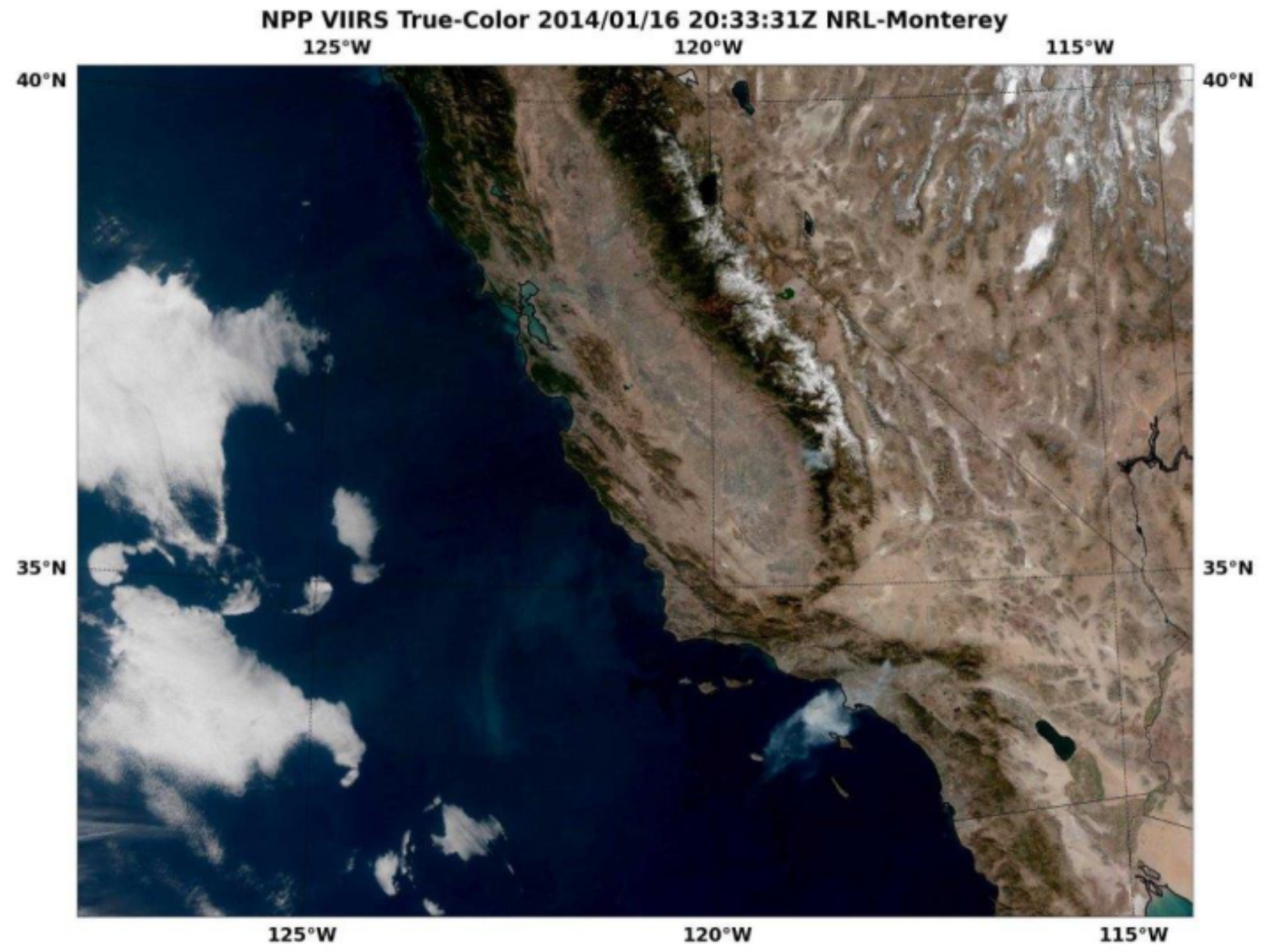

25
20
15
65
60
55
AQUA-L1B 2011-09-29 1750 UTC BAND 4 (RGB) 0.5555 UM

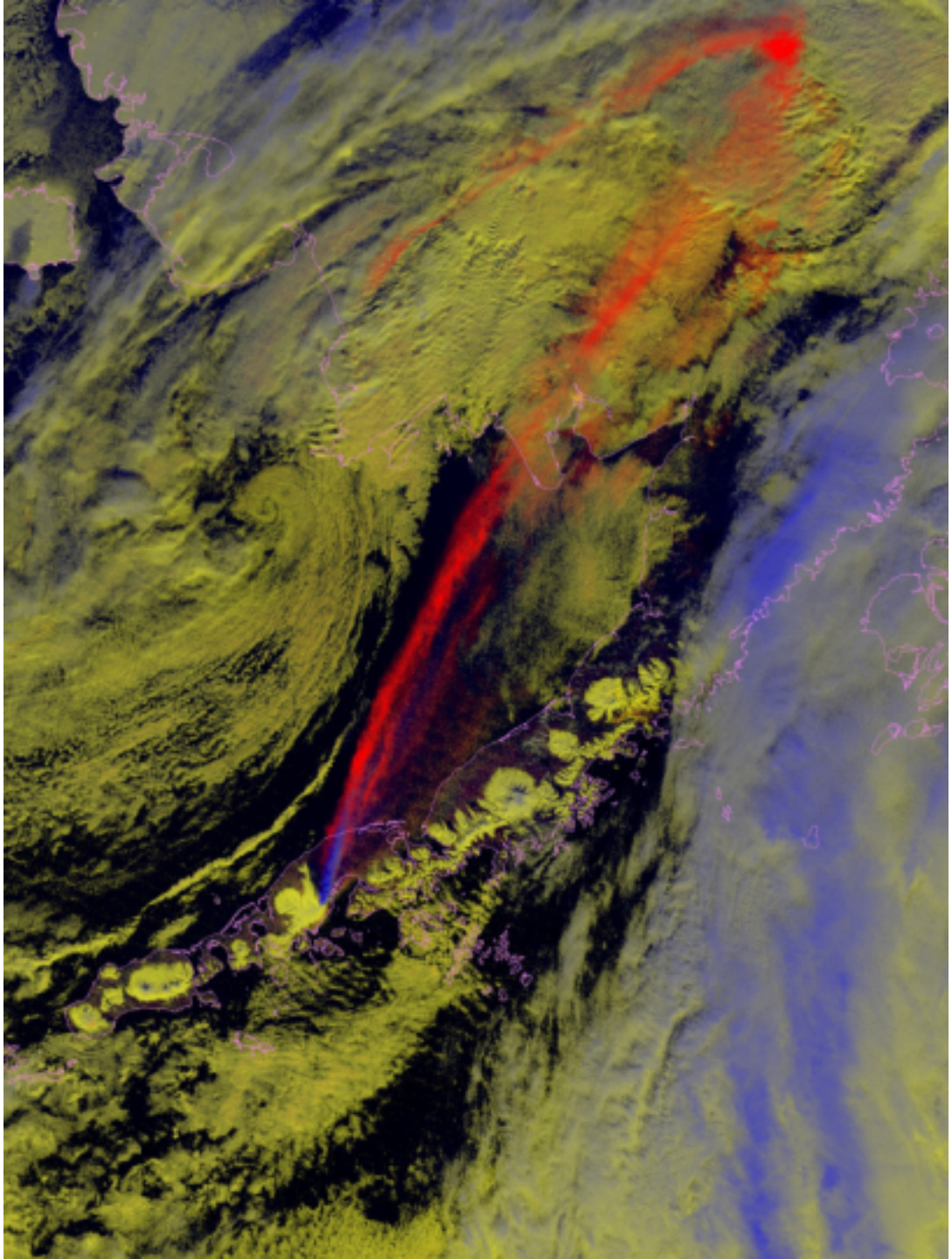


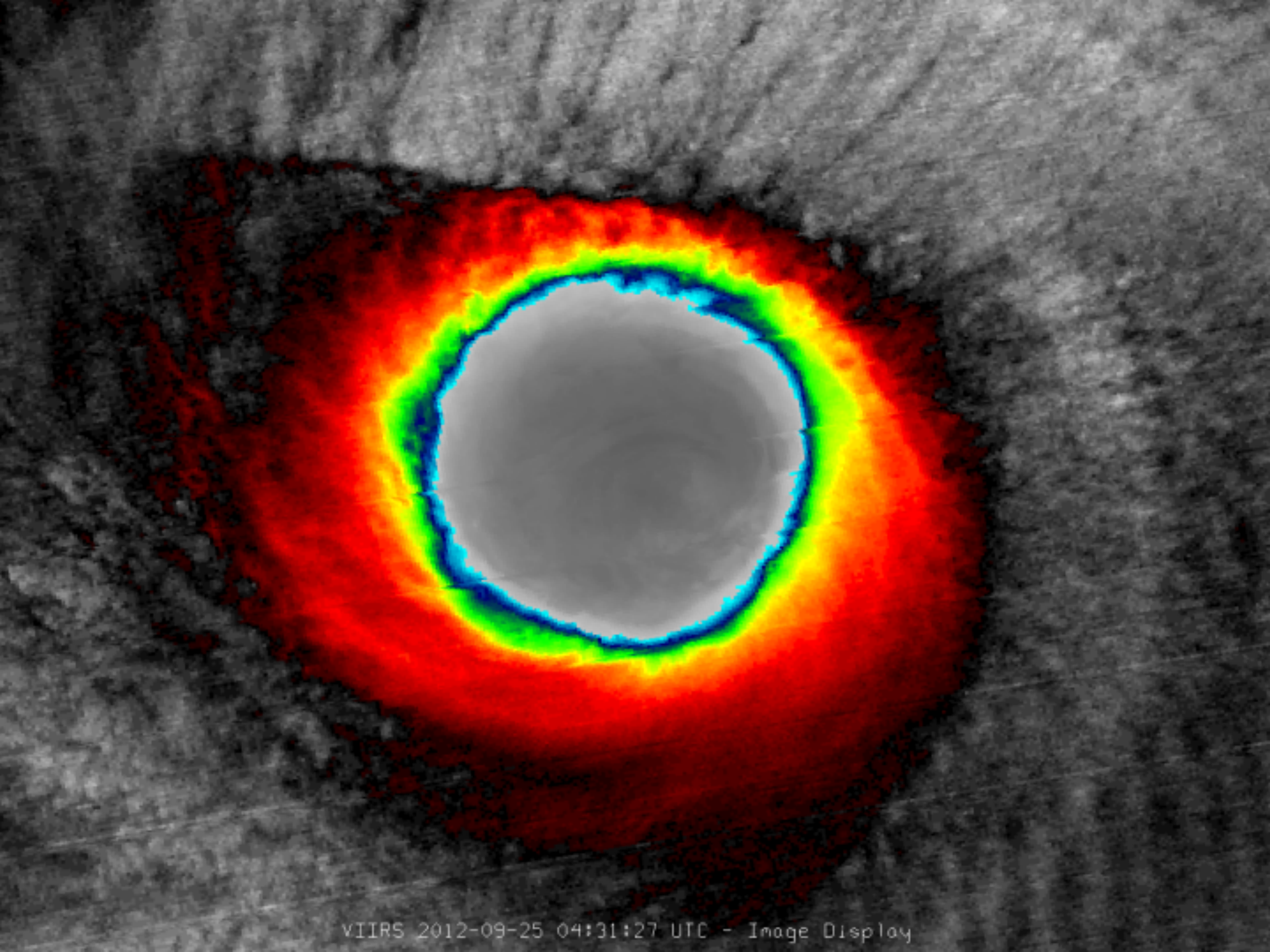

VIIRS 2012-09-24 17:22:51 UTC - Image Display

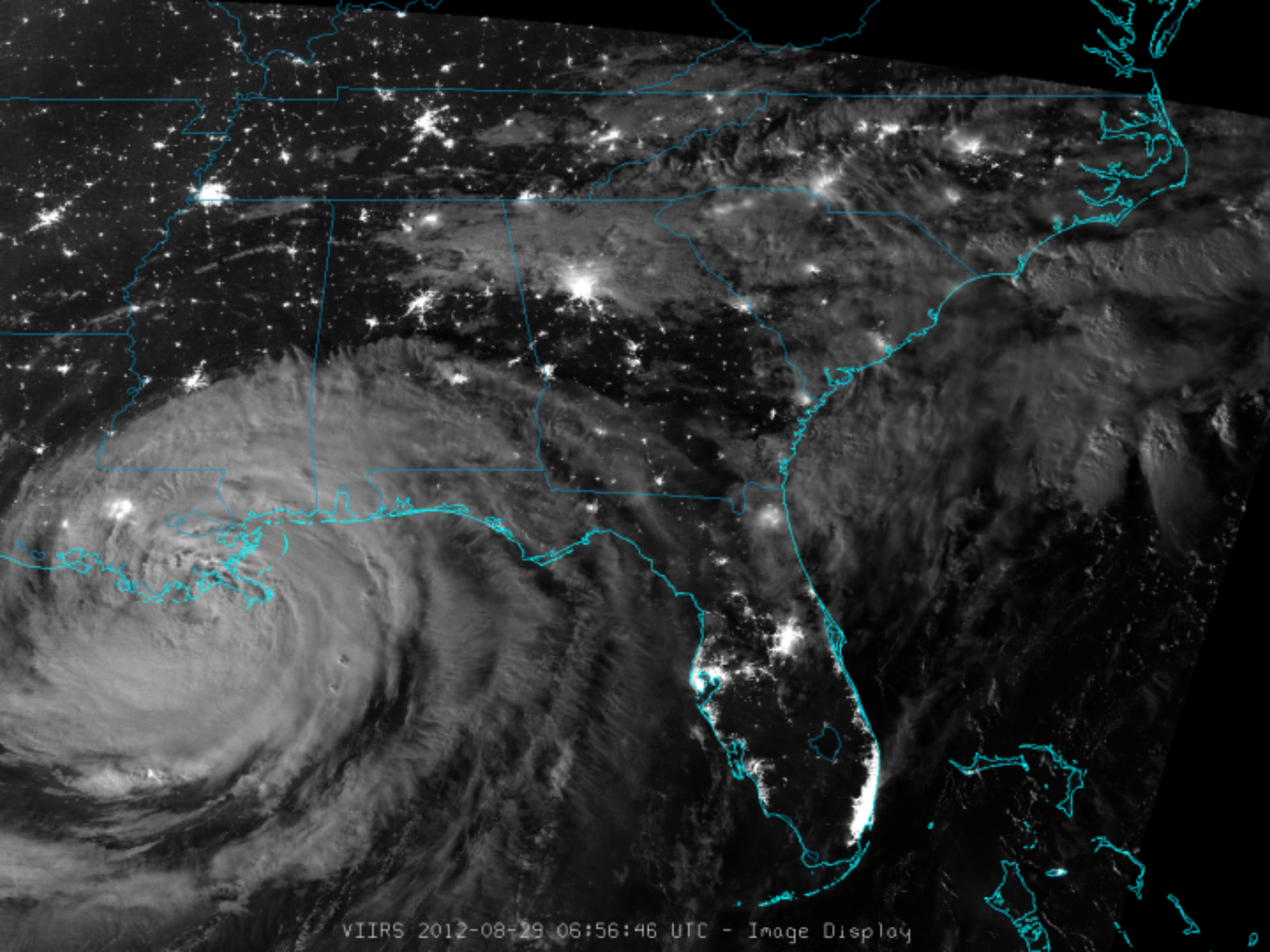

NPP-VIIRS 05/28/2012 1949-Z True Color
Red-Side of Line Over Water - Possible Sunglint Zone
39N
36N
33N

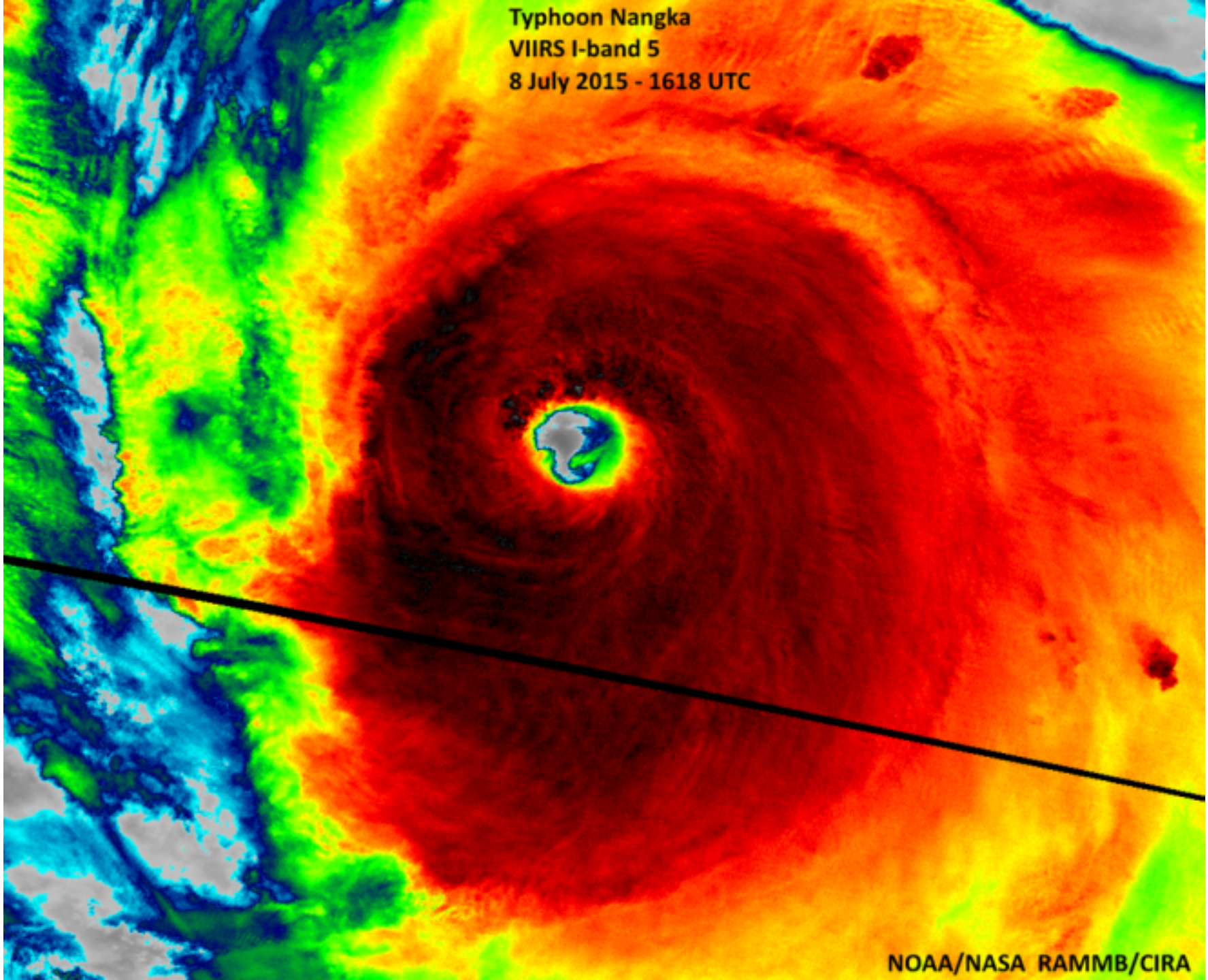


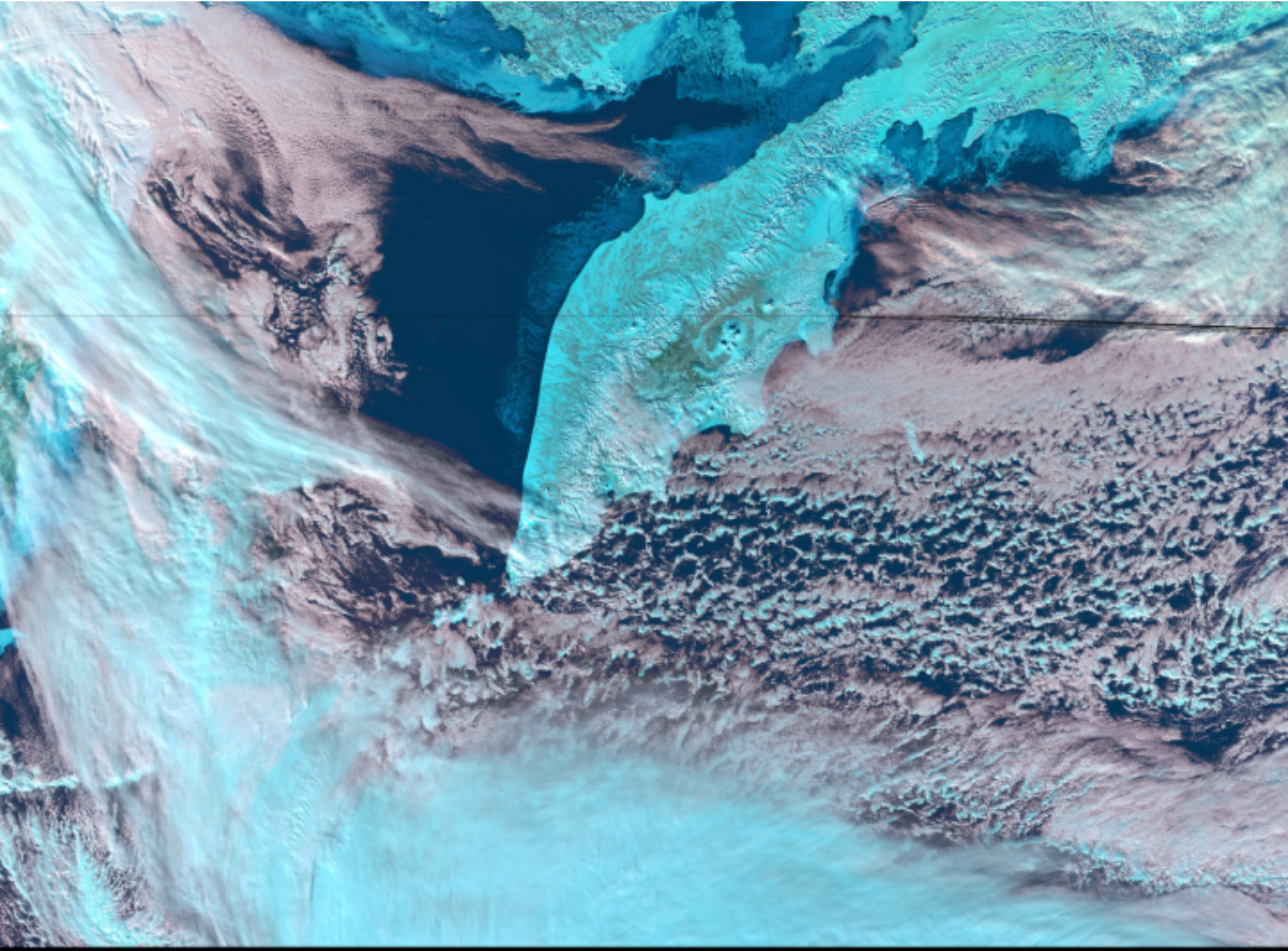

NPP VIIRS True-Color 2014/01/16 20:33:31Z NRL-Monterey
125°W
120°W
115°W
40°N
35°N

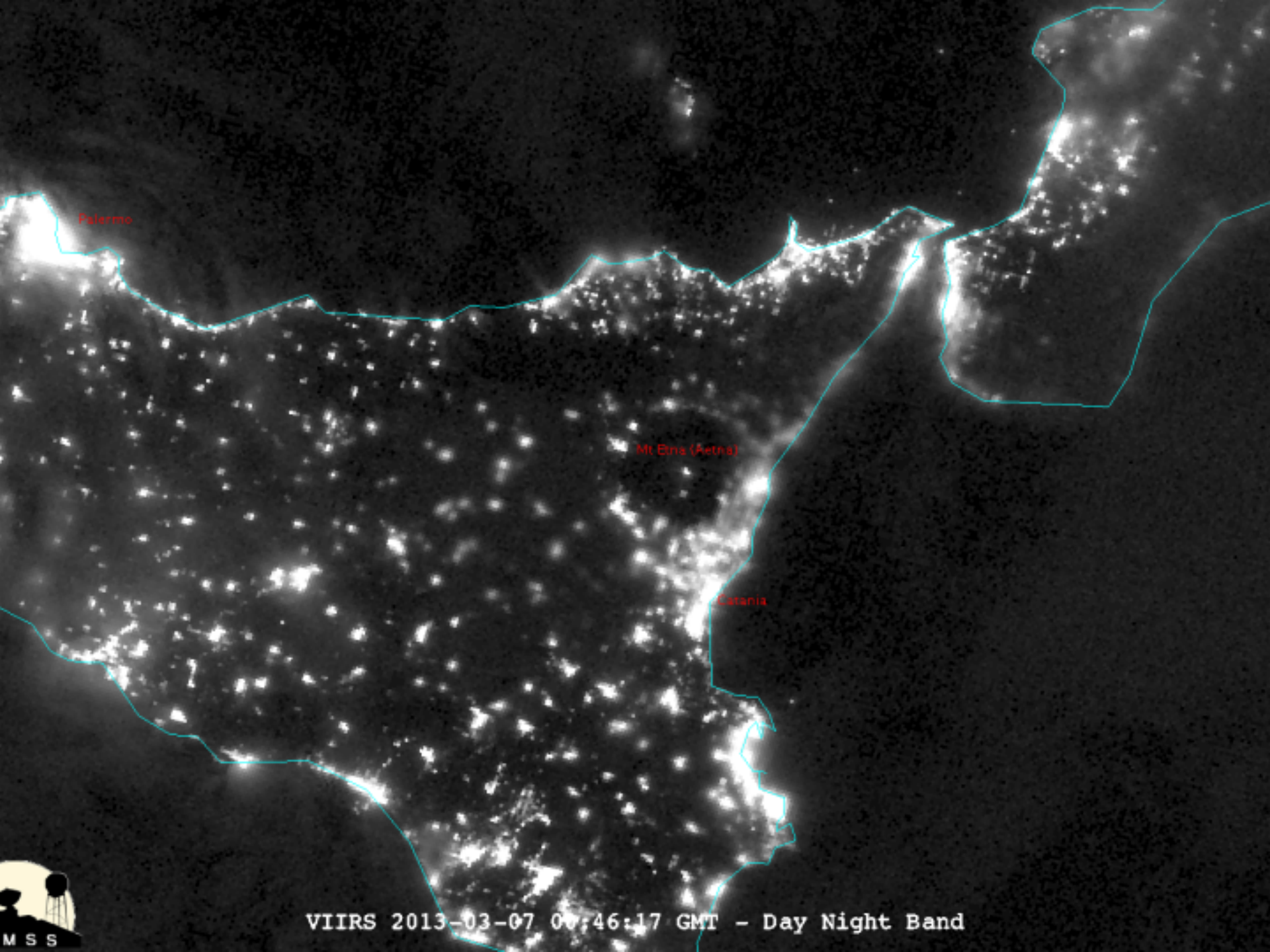


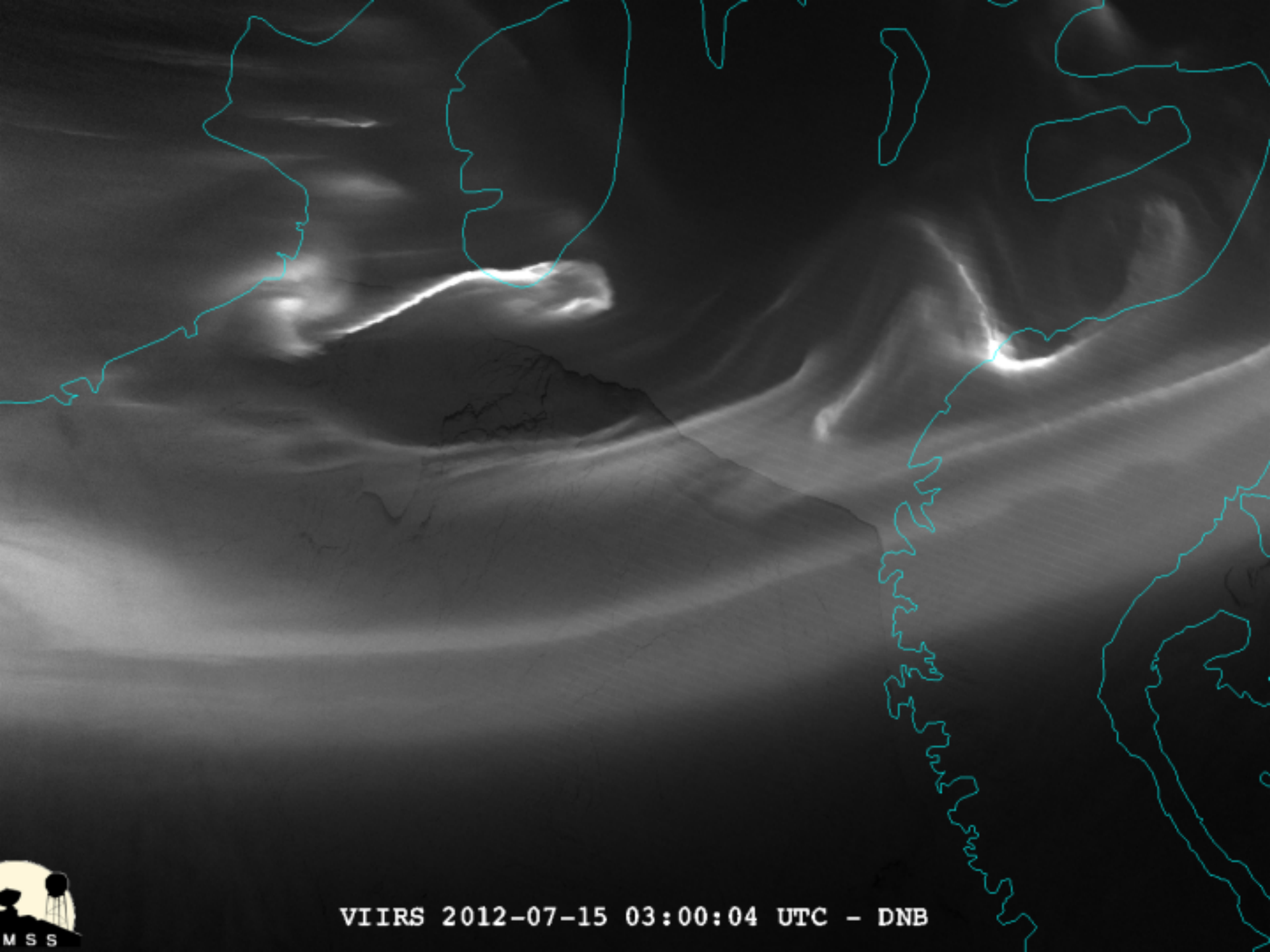

VIIRS 2012-09-25 04:31:27 UTC - Image Display

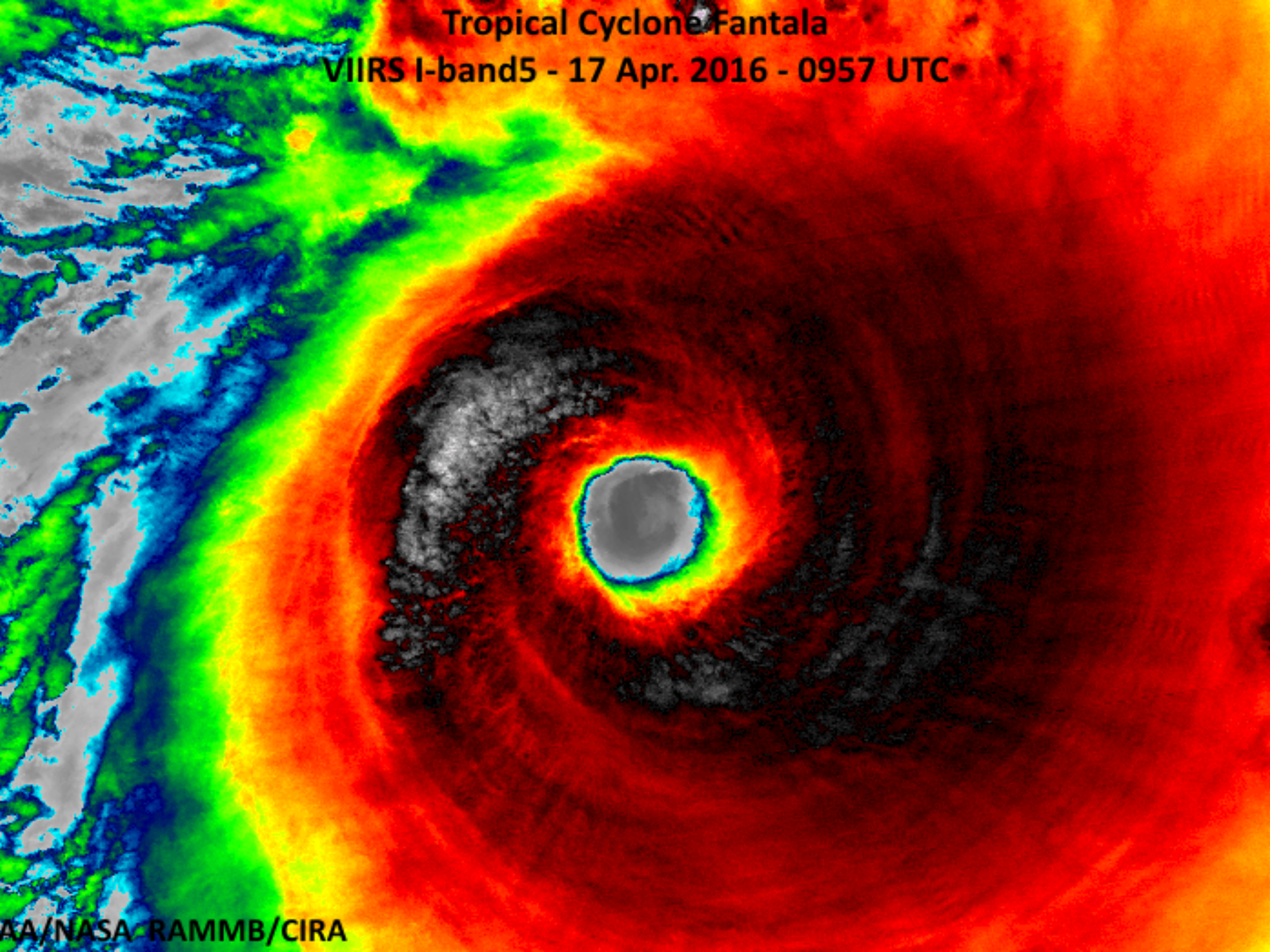

VIIRS 2012-08-29 06:56:46 UTC - Image Display

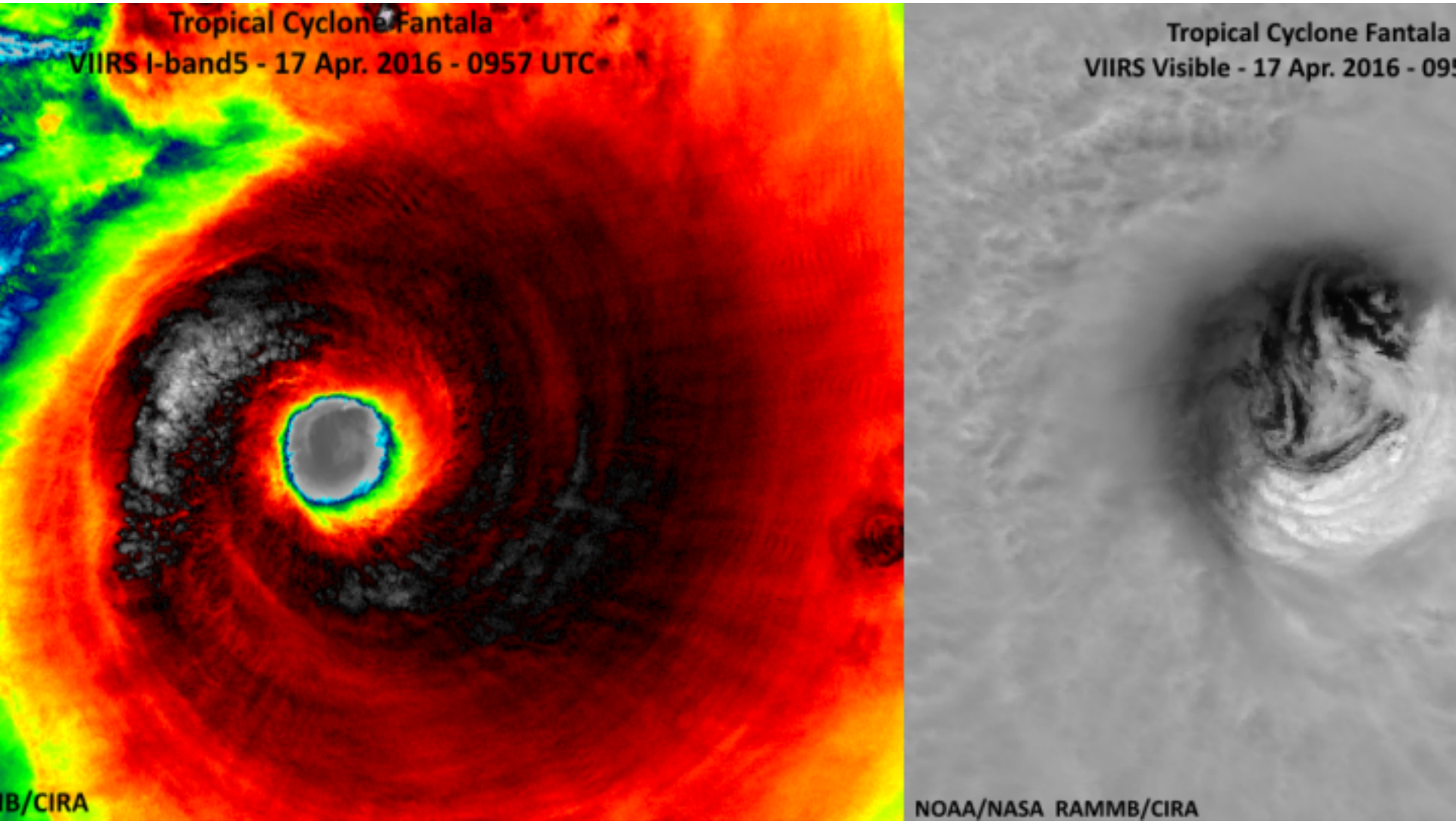

Typhoon Nangka
VIIRS I-band 5
8 July 2015 - 1618 UTC
NOAA/NASA RAMMB/CIRA

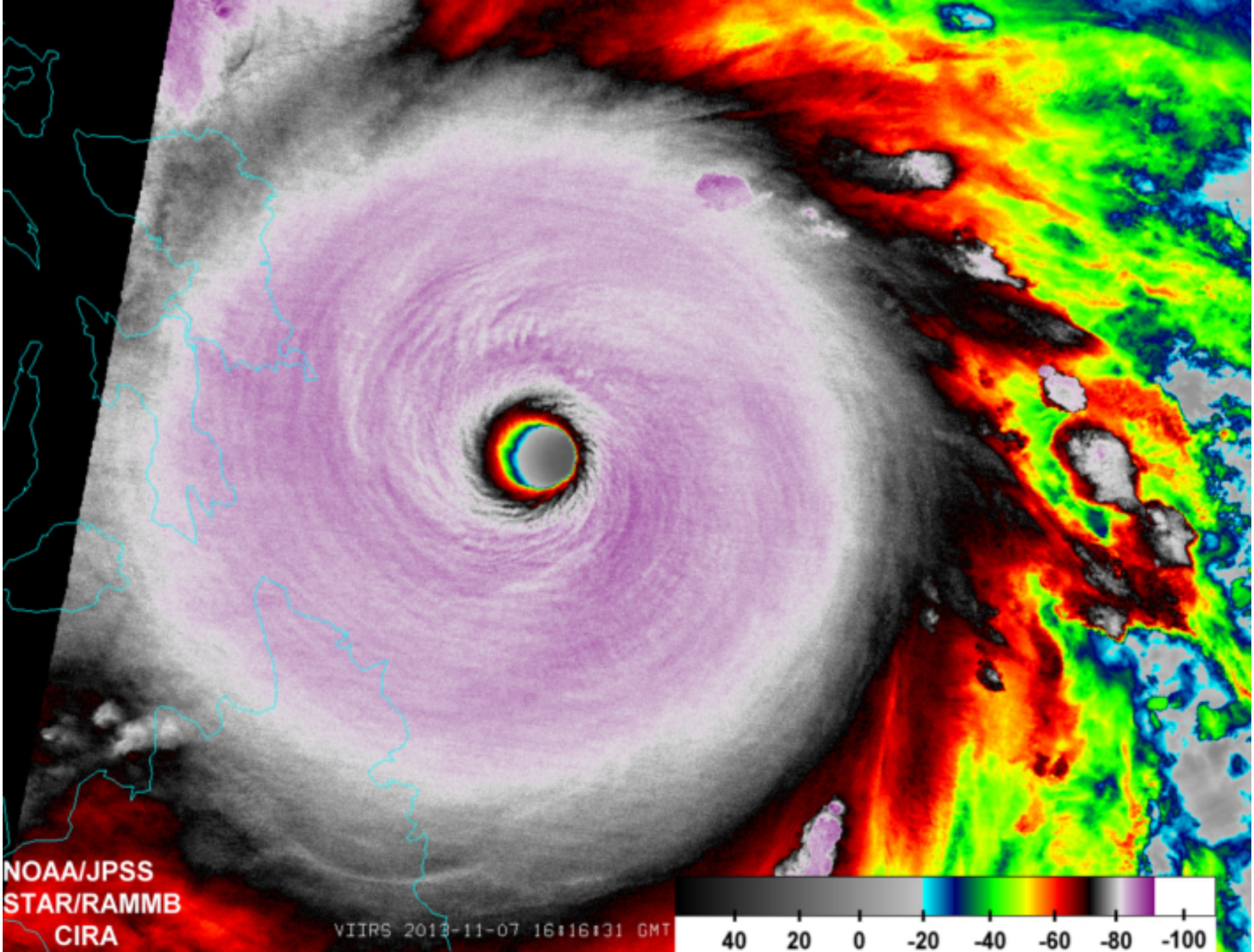


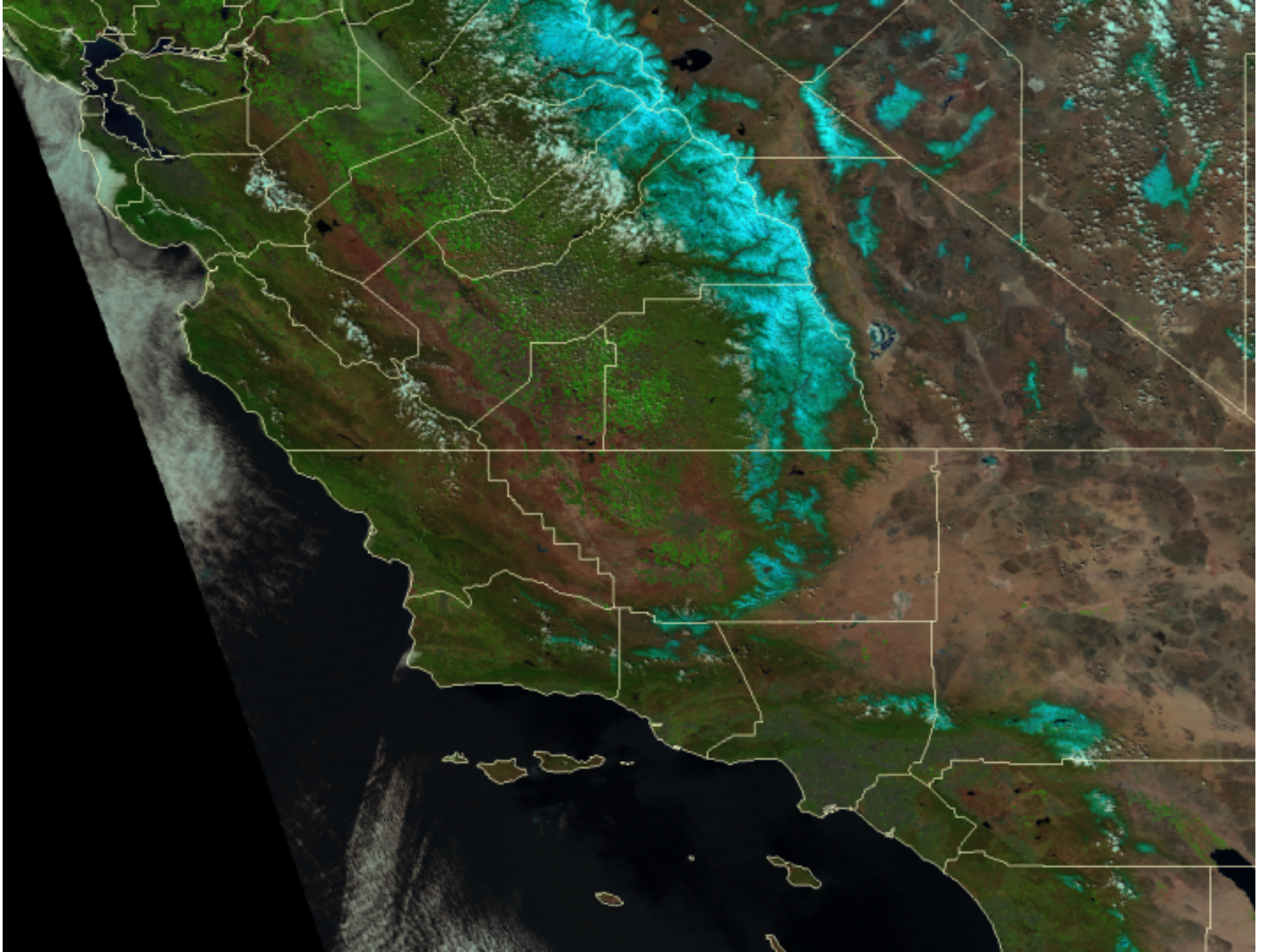

Palermo
Mt Etna (Aetna)
Catania
VIIRS 2013-03-07 00:46:17 GMT - Day Night Band

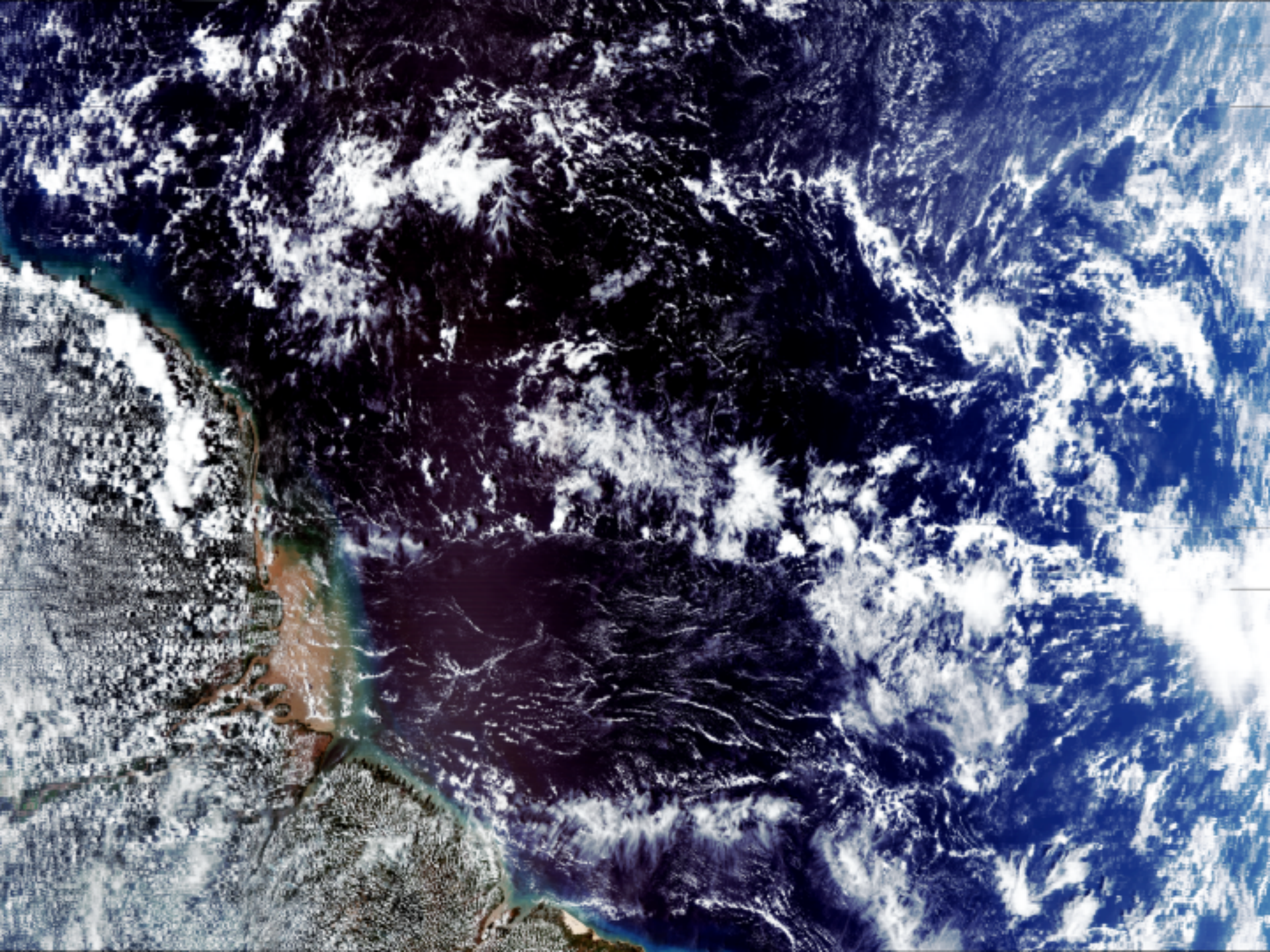

VIIRS 2012-07-15 03:00:04 UTC - DNB

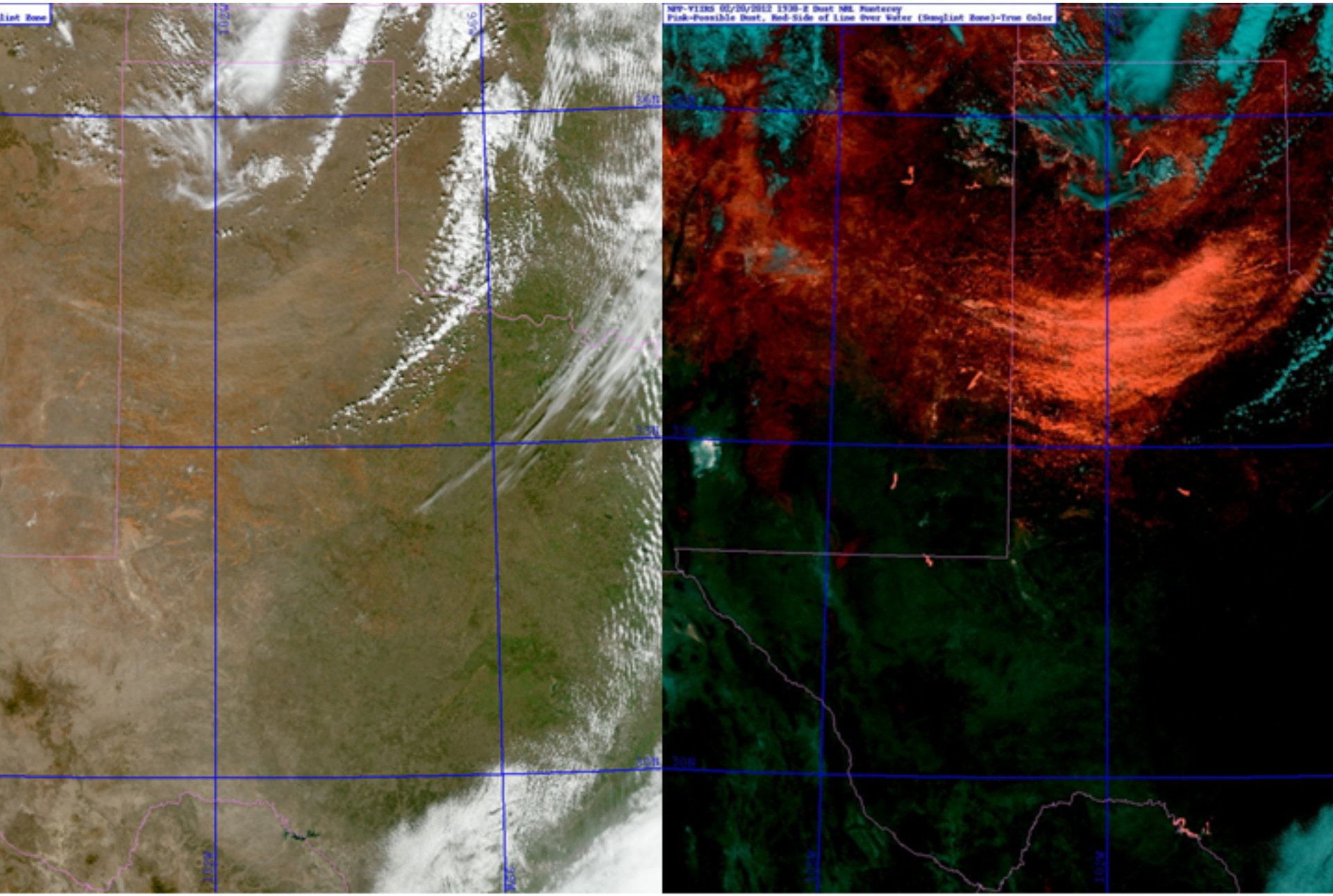

Tropical Cyclone Fantala
VIIRS I-band5 - 17 Apr. 2016 - 0957 UTC
AA/NASA RAMMB/CIRA

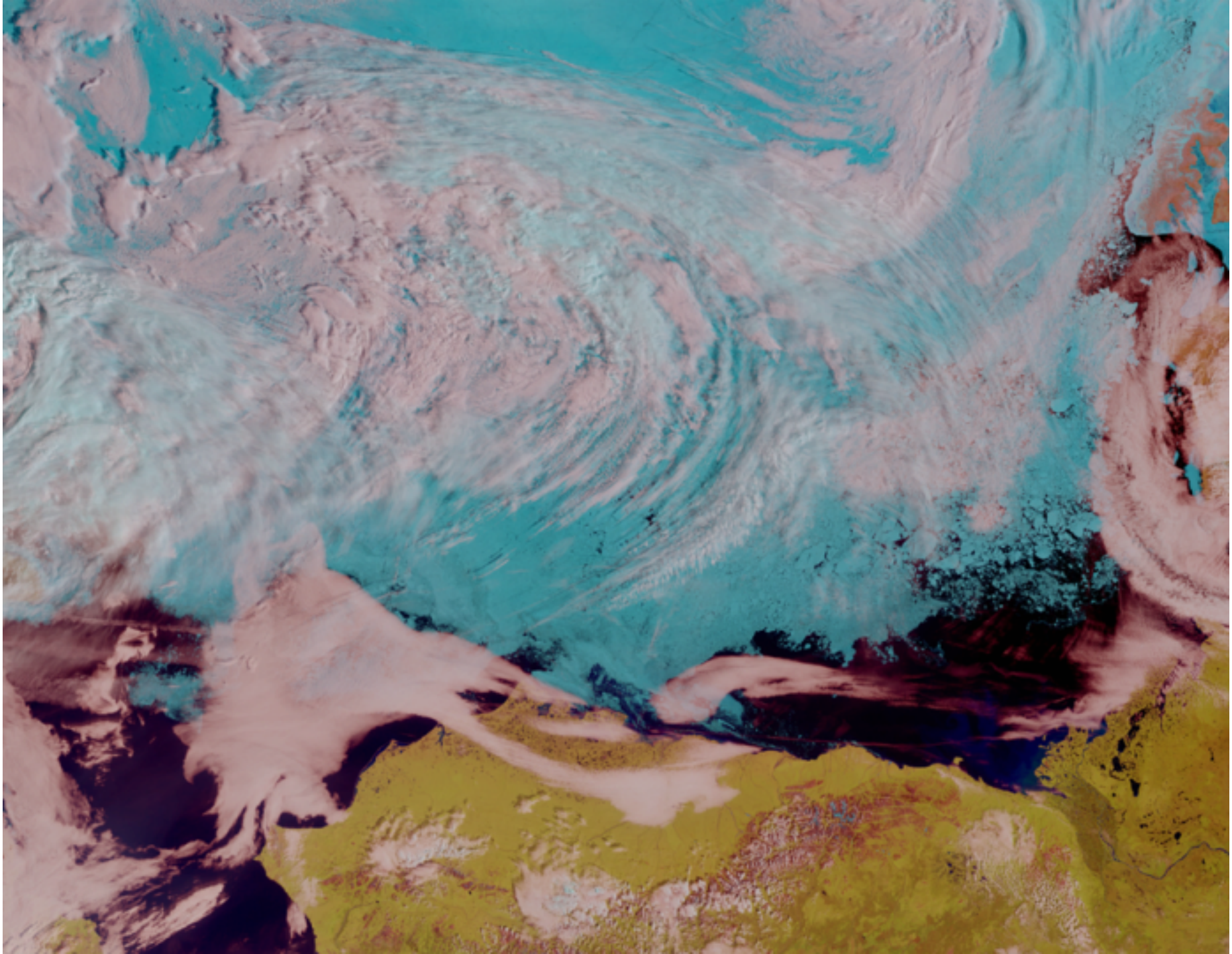

Tropical Cyclone Fantala
VIIRS I-band5 - 17 Apr. 2016 - 0957 UTC
IB/CIRA
Tropical Cyclone Fantala
VIIRS Visible - 17 Apr. 2016 - 09
NOAA/NASA RAMMB/CIRA

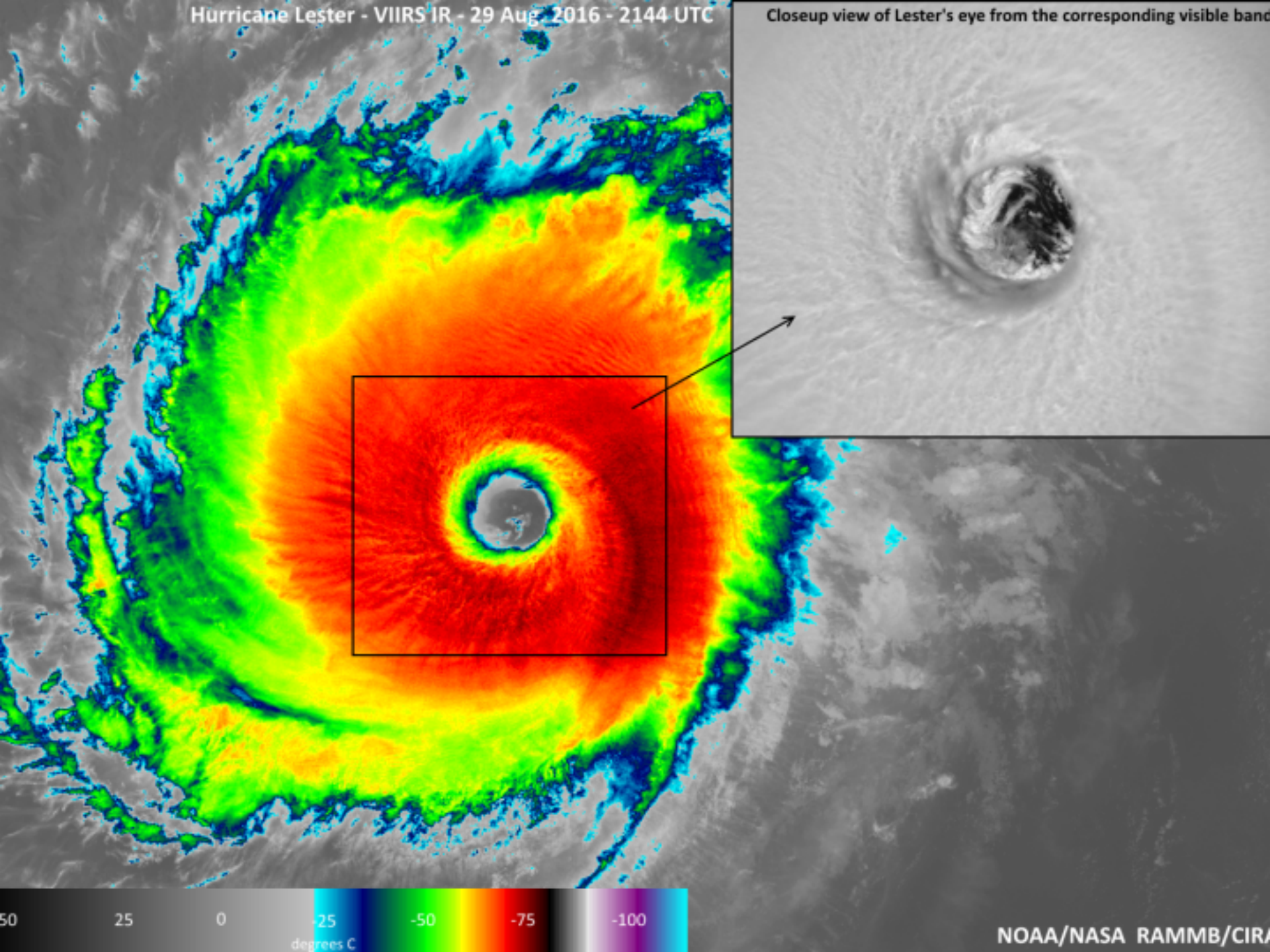

NOAA/JPSS
STAR/RAMMB
CIRA
VIIRS 2013-11-07 16:16:31 GMT
40
20
0
-20
-40
-60
-80
-100

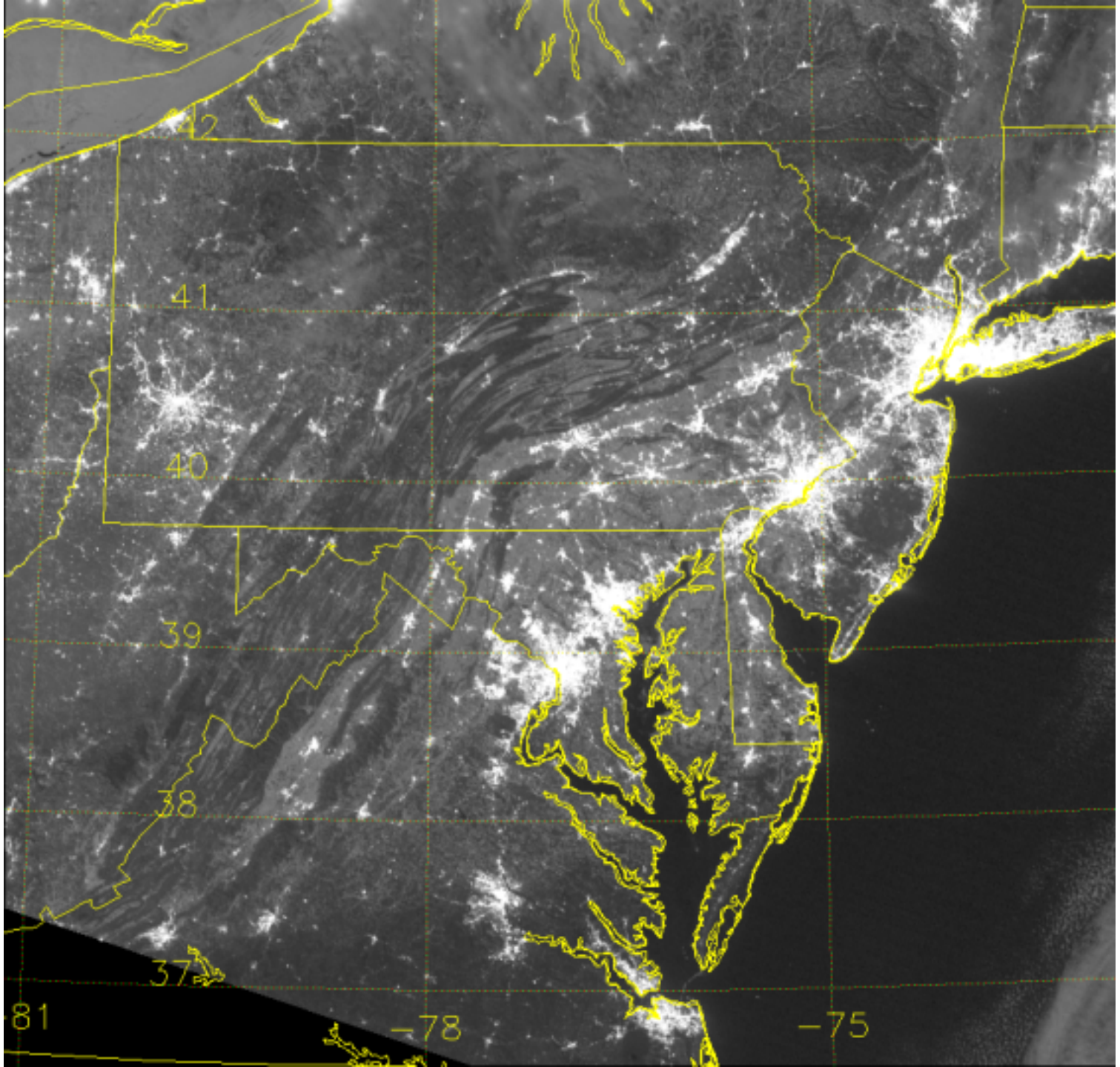


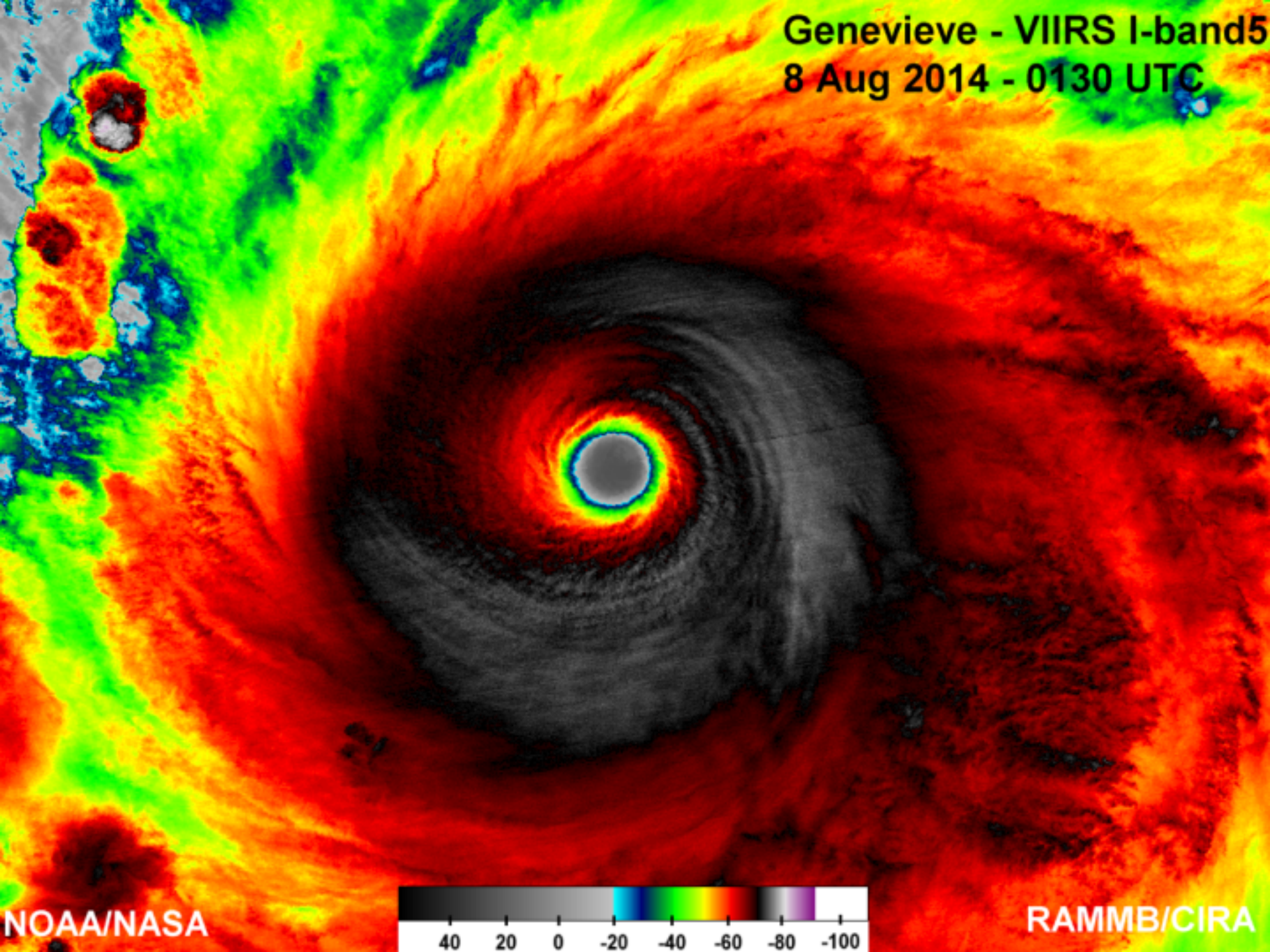


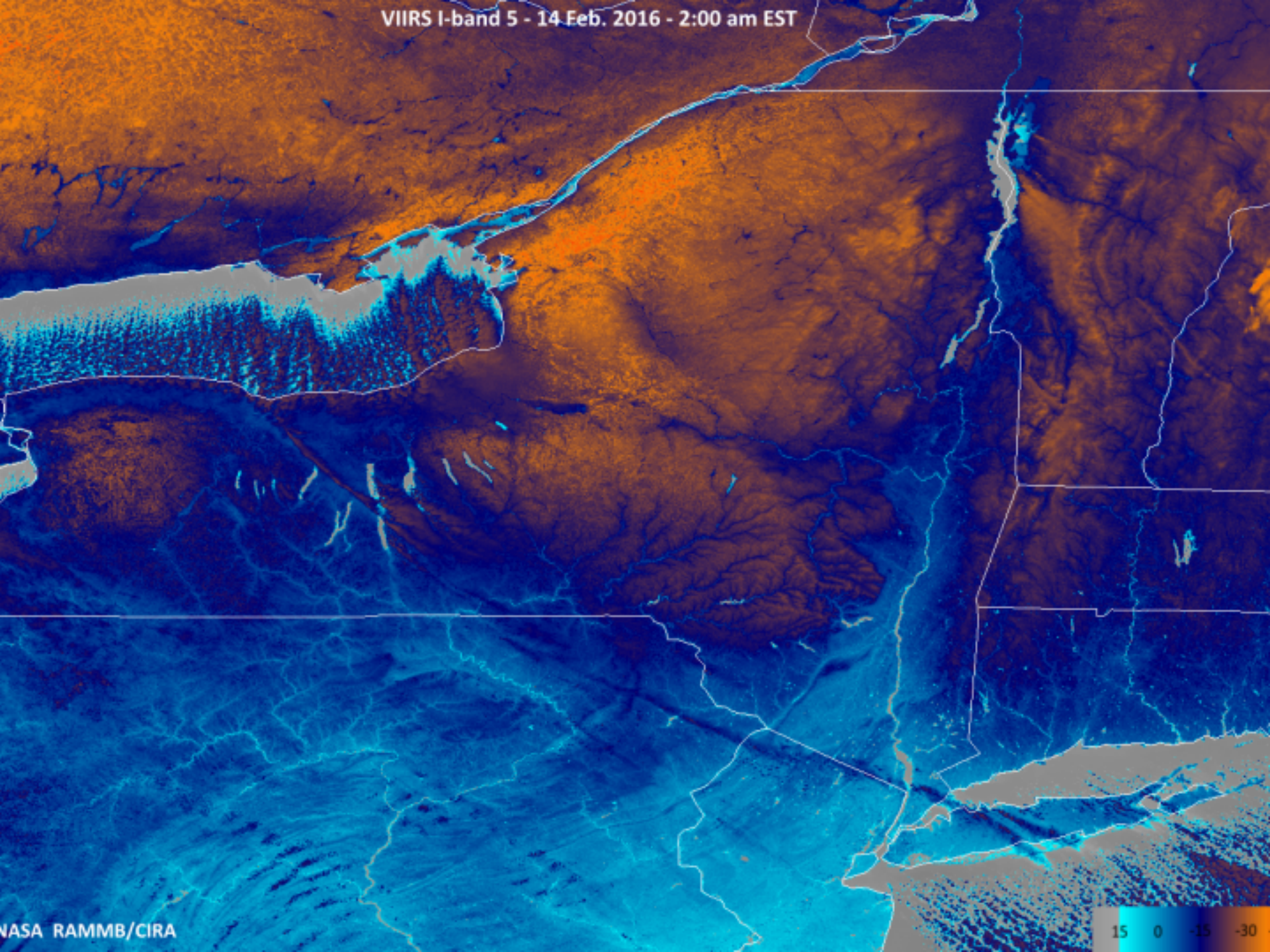

NPP-VIIRS 02/20/2012 1930-Z Dust NRL Monterey
Pink-Possible Dust, Red-Side of Line Over Water (Sunglint Zone)-True Color

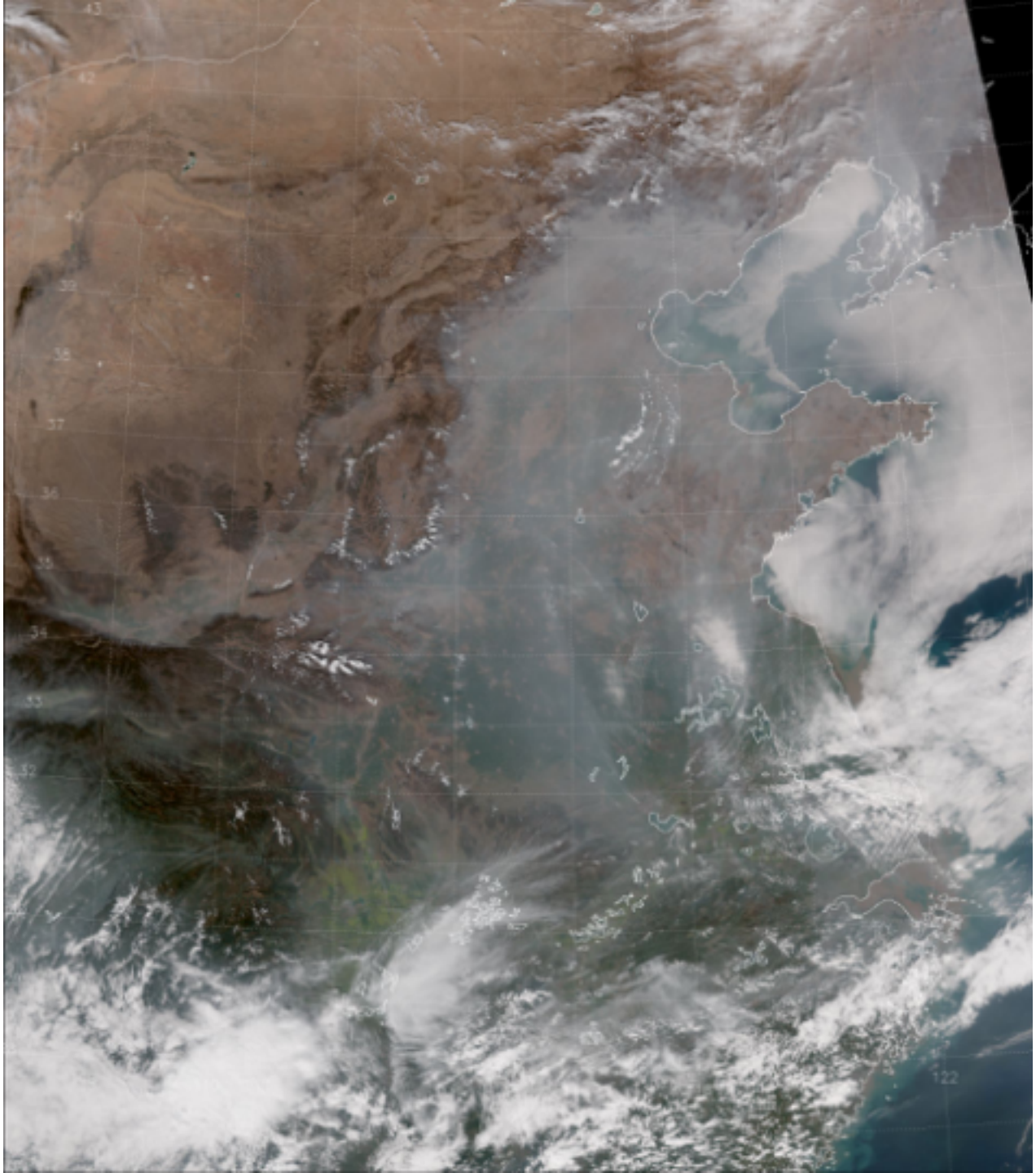


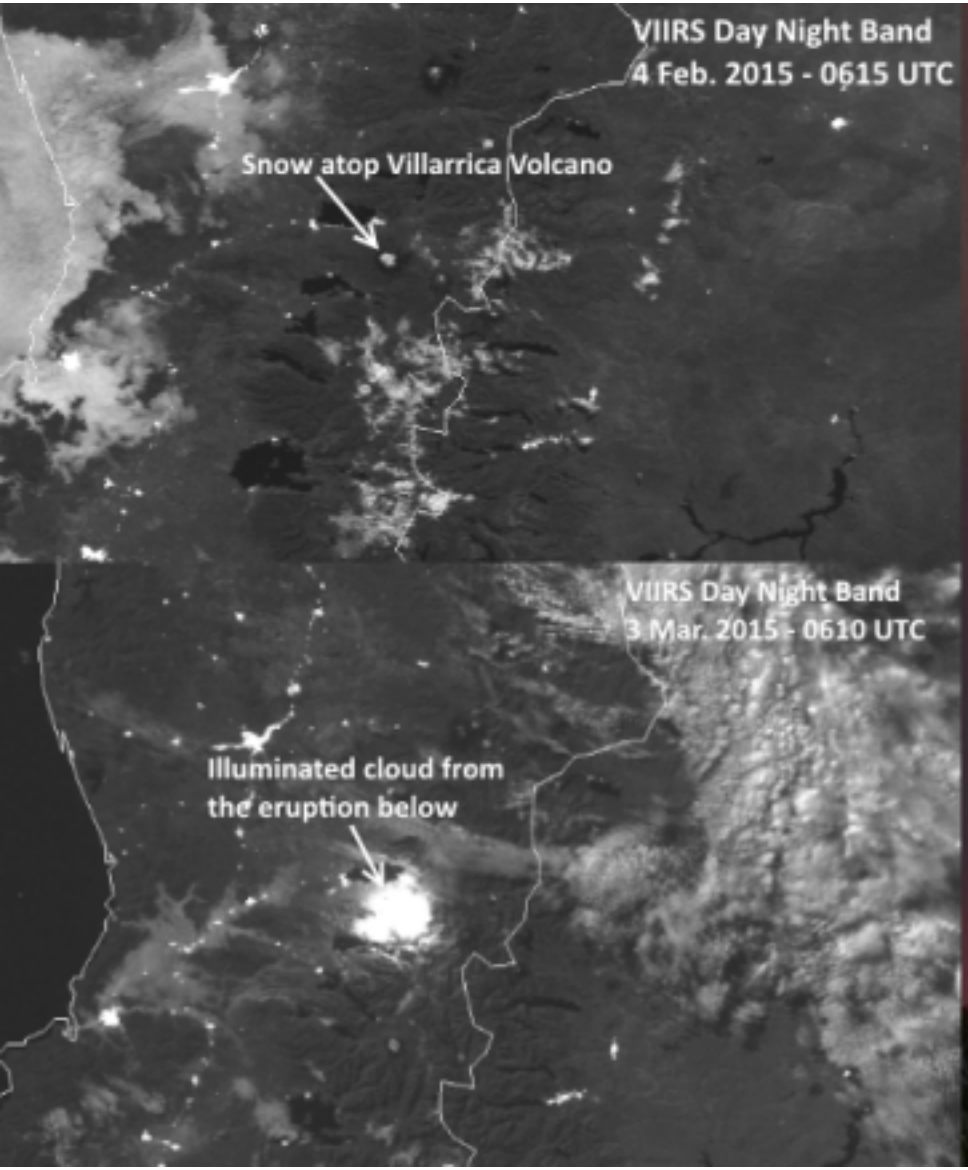

Hurricane Lester - VIIRS IR - 29 Aug 2016 - 2144 UTC
Closeup view of Lester's eye from the corresponding visible band
50
25
0
-25
-50
-75
-100
degrees C
NOAA/NASA RAMMB/CIRA


42
41
40
39
38
37
81
-78
-75

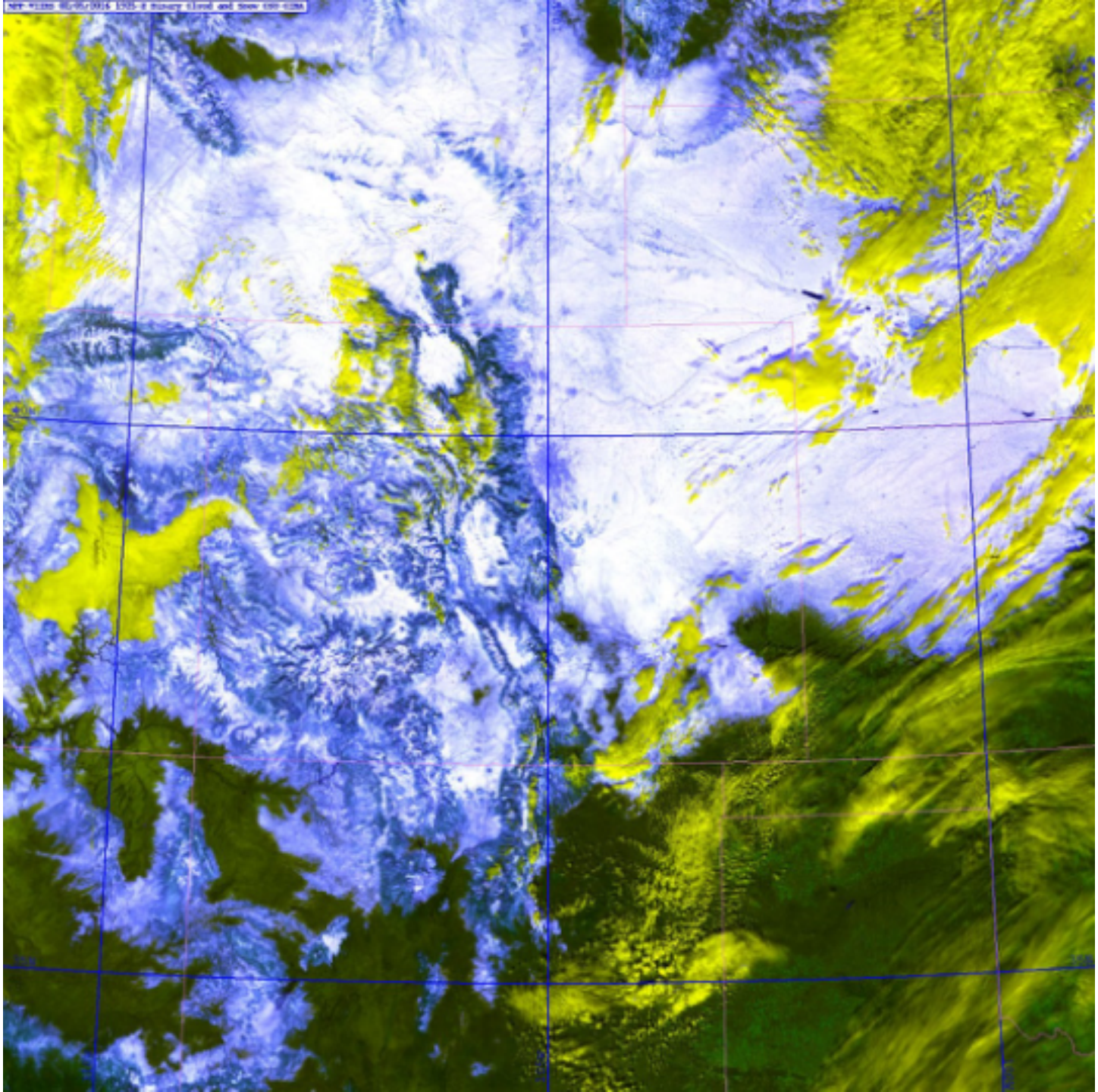

Genevieve - VIIRS I-band5
8 Aug 2014 - 0130 UTC
NOAA/NASA
40 20 0 -20 -40 -60 -80 -100
RAMMB/CIRA

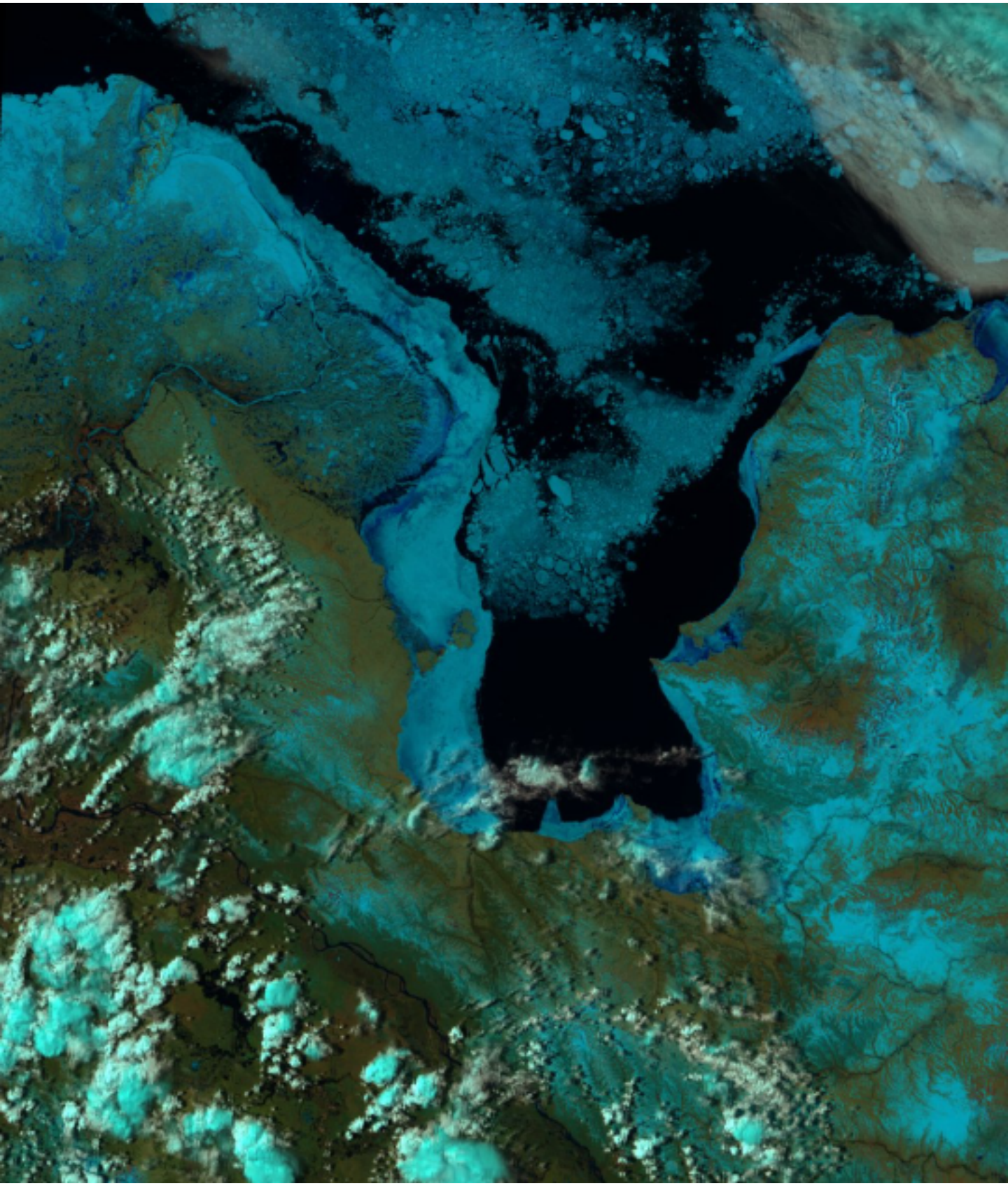

VIIRS I-band 5 - 14 Feb. 2016 - 2:00 am EST
NASA RAMMB/CIRA
15
0
-15
-30



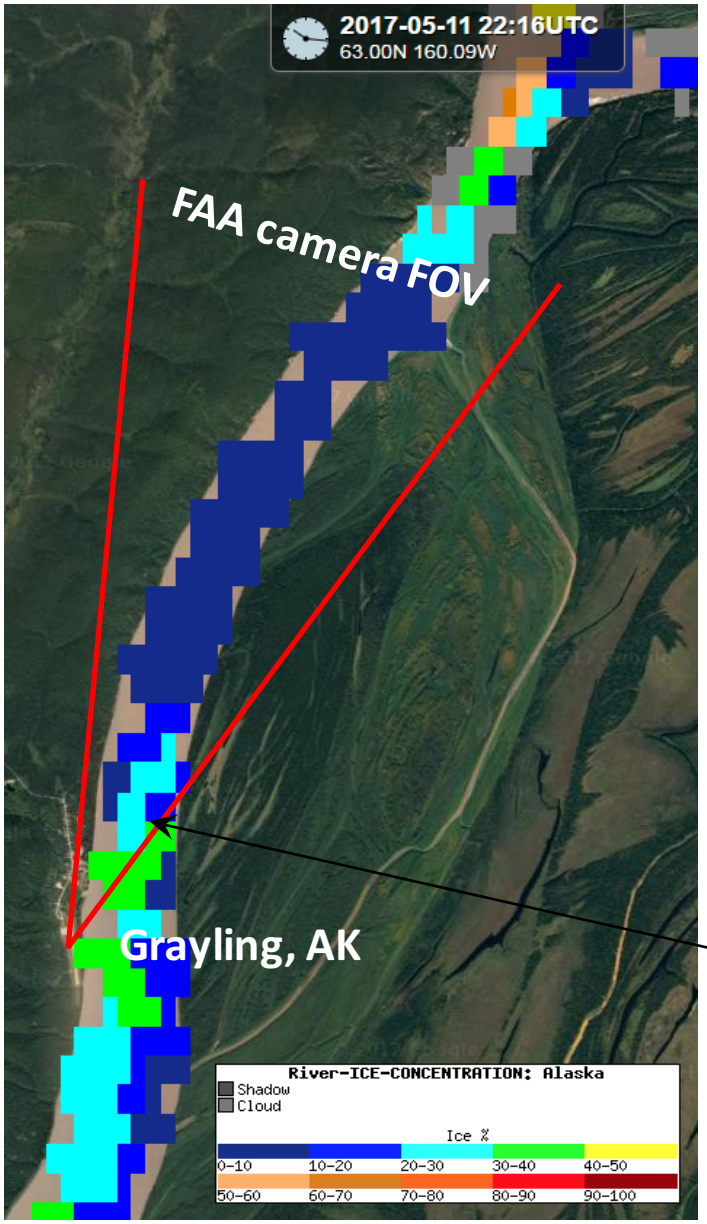

VIIRS Day Night Band
4 Feb. 2015 - 0615 UTC
Snow atop Villarrica Volcano
VIIRS Day Night Band
3 Mar. 2015 - 0610 UTC
Illuminated cloud from
the eruption below

AP Photo/Aton Chile

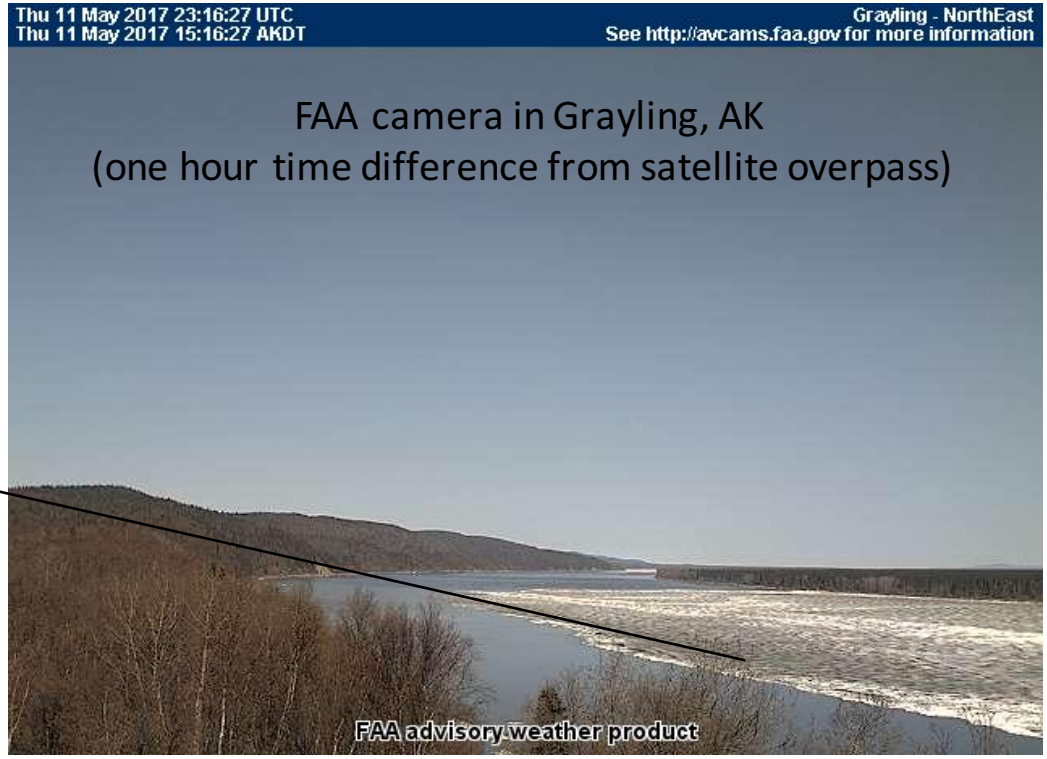




Satellite vs FAA camera

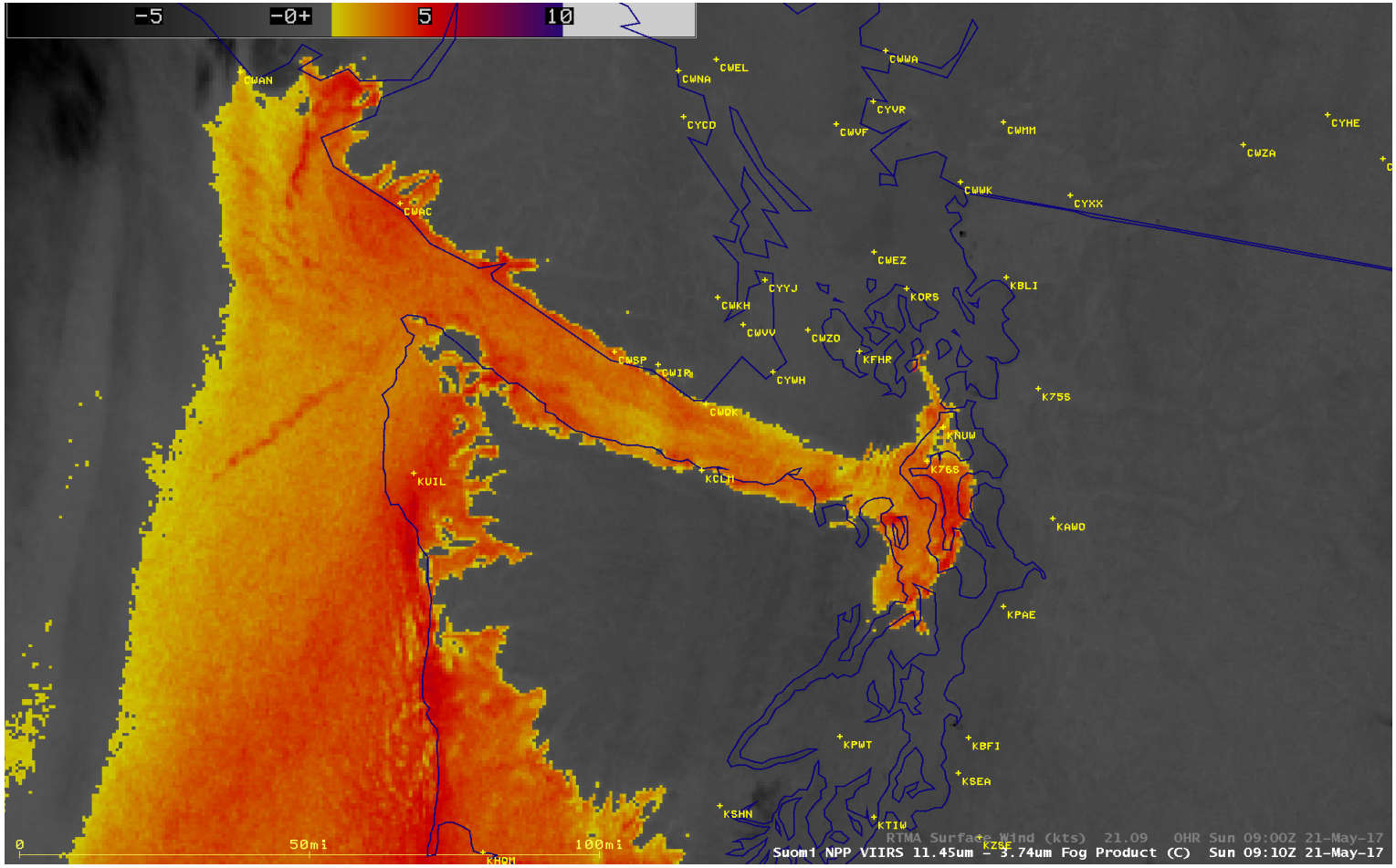


Melting ice may be quite dark causing underestimate of the ice concentration



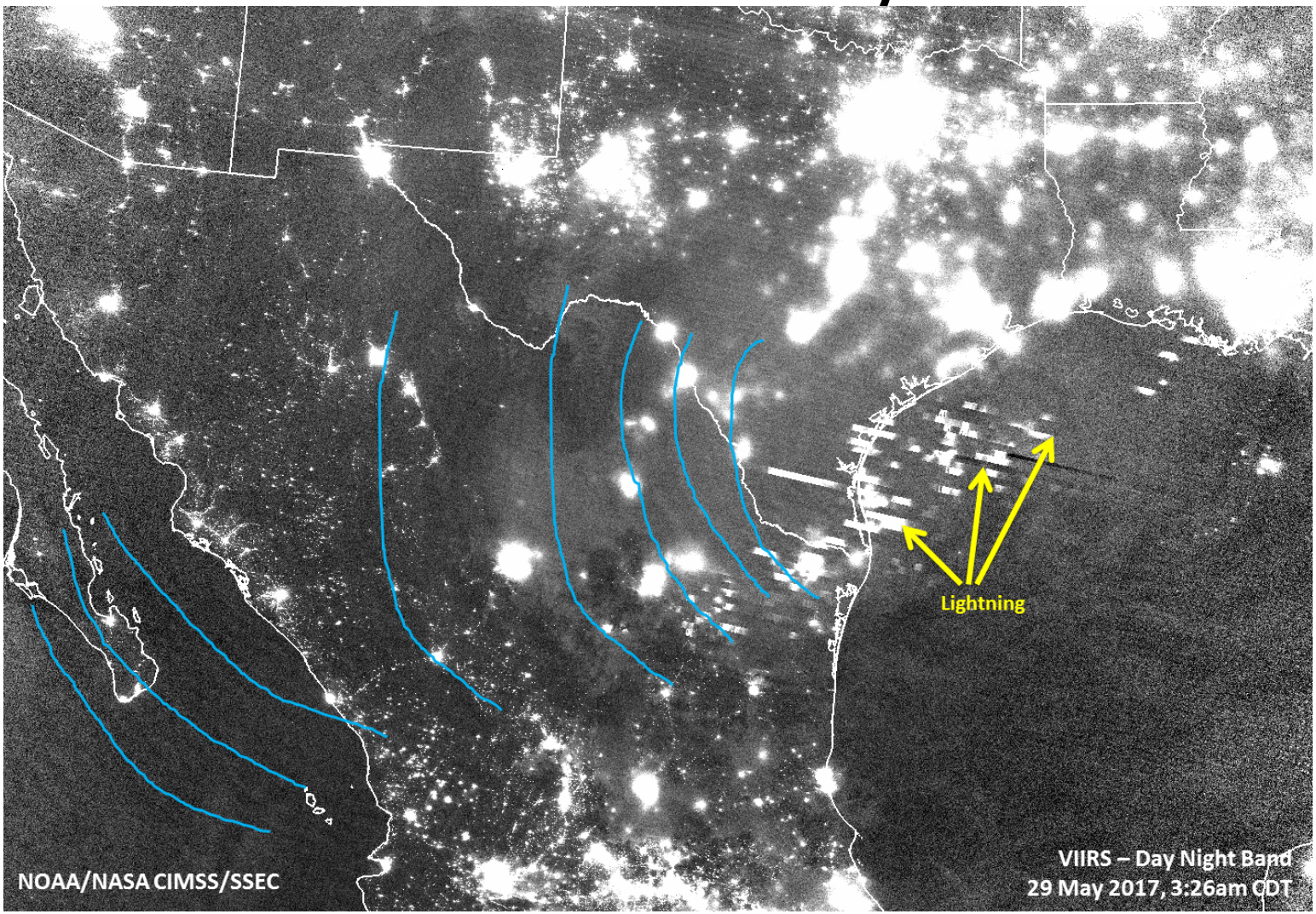
Fog/Stratus in the Straight of Juan de Fuca

During the 21 May nighttime hours, a Suomi NPP VIIRS infrared Brightness Temperature Difference (11.45 – 3.74 μm) "Fog/Stratus Product" image at 0910 UTC ***(below)*** revealed that the fog/stratus plume covered much of the Strait (especially along the Washington coast), and that the leading edge had begun to spread both northward and southward from Whidbey Island. In addition, note the presence of a linear ship track *(darker red enhancement)* extending southwestward from Cape Flattery.



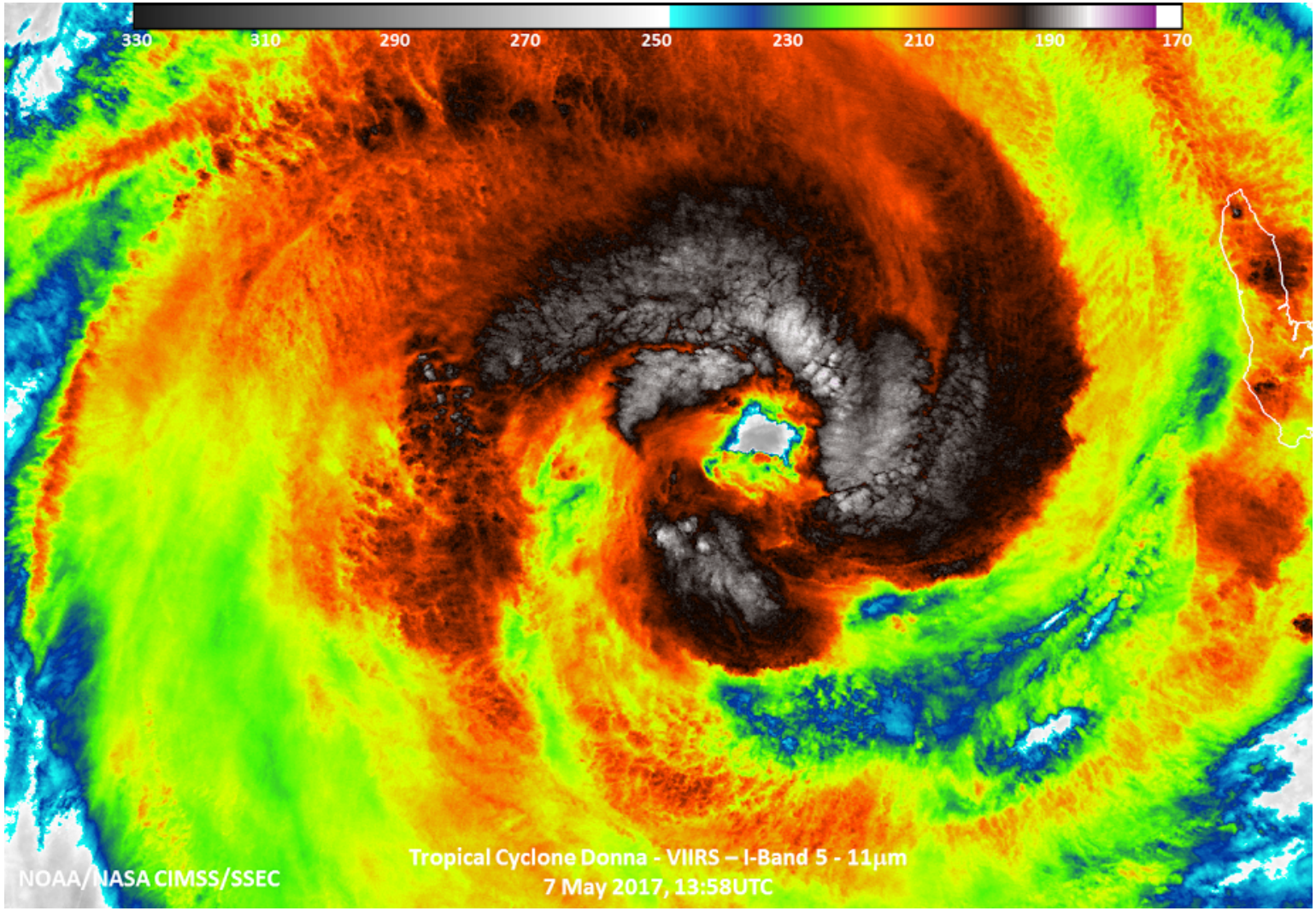
Credit: Scott Bachmeier, CIMSS

Gravity Waves and Lightning on DNB – 29 May 2017



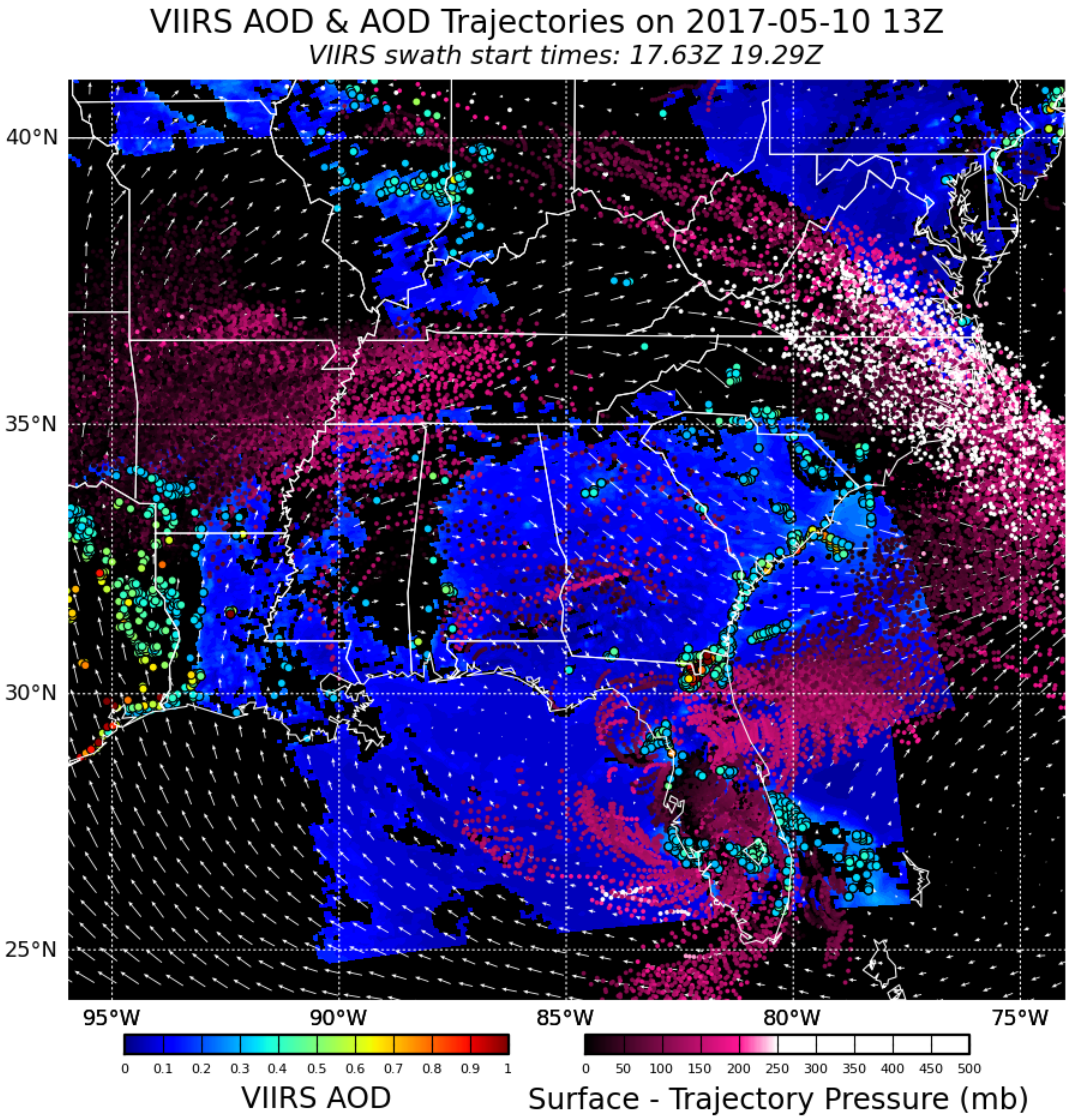
Credit: William Straka

Tropical Cyclone Donna – 8 May 2017

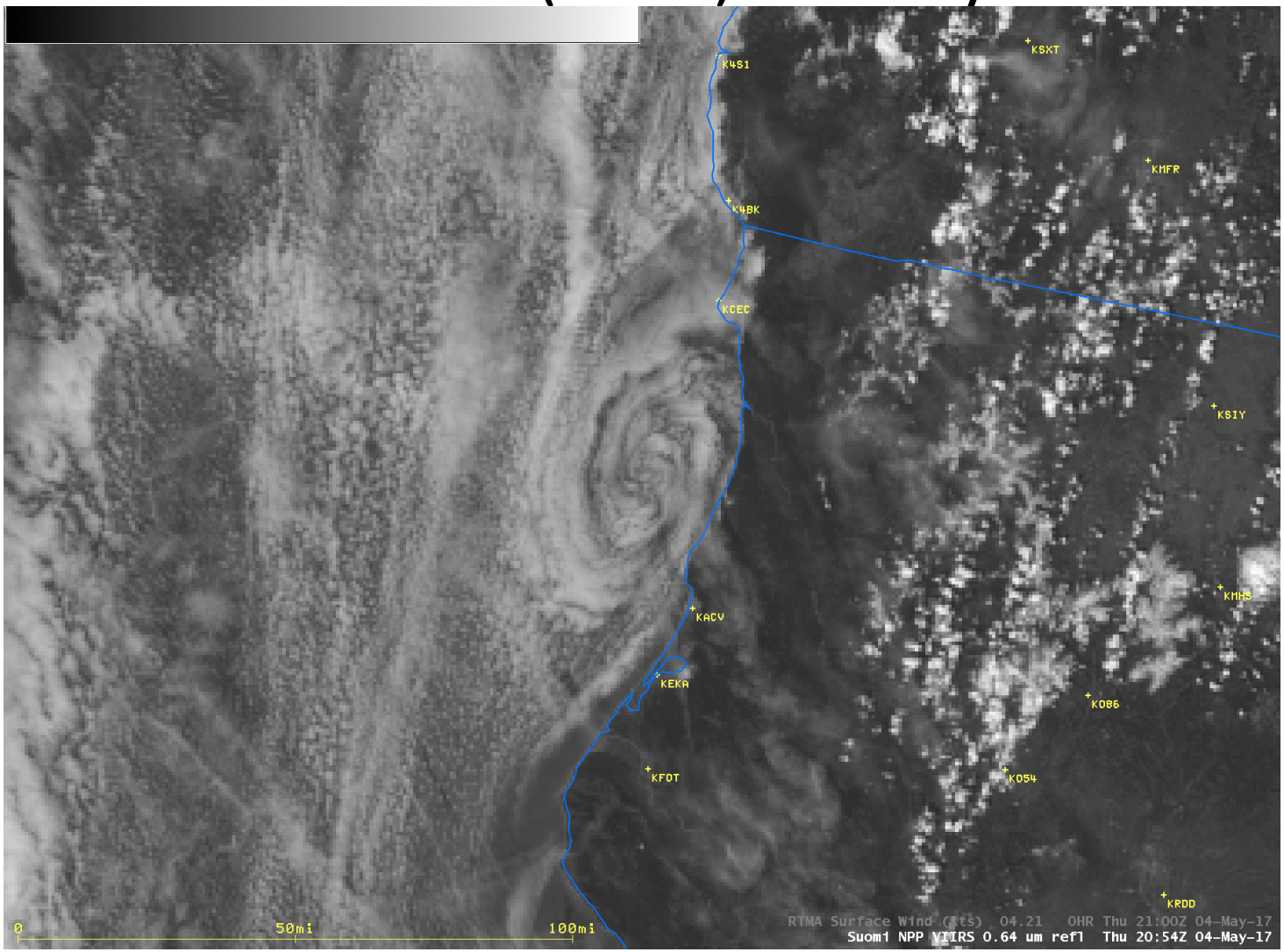


Credit: William Straka

Near Vanuatu islands NE of Australia – became the strongest May Southern Hemisphere TC on record


VIIRS AOD & AOD Trajectories on 2017-05-10 13Z
VIIRS swath start times: 17.63Z 19.29Z
40°N
35°N
30°N
25°N
95°W
90°W
85°W
80°W
75°W
0 0.1 0.2 0.3 0.4 0.5 0.6 0.7 0.8 0.9 1
VIIRS AOD
0 50 100 150 200 250 300 350 400 450 500
Surface - Trajectory Pressure (mb)

Small Eddy and Coastal Jet off the Coast of Northern CA (VIIRS) – 4 May 2017

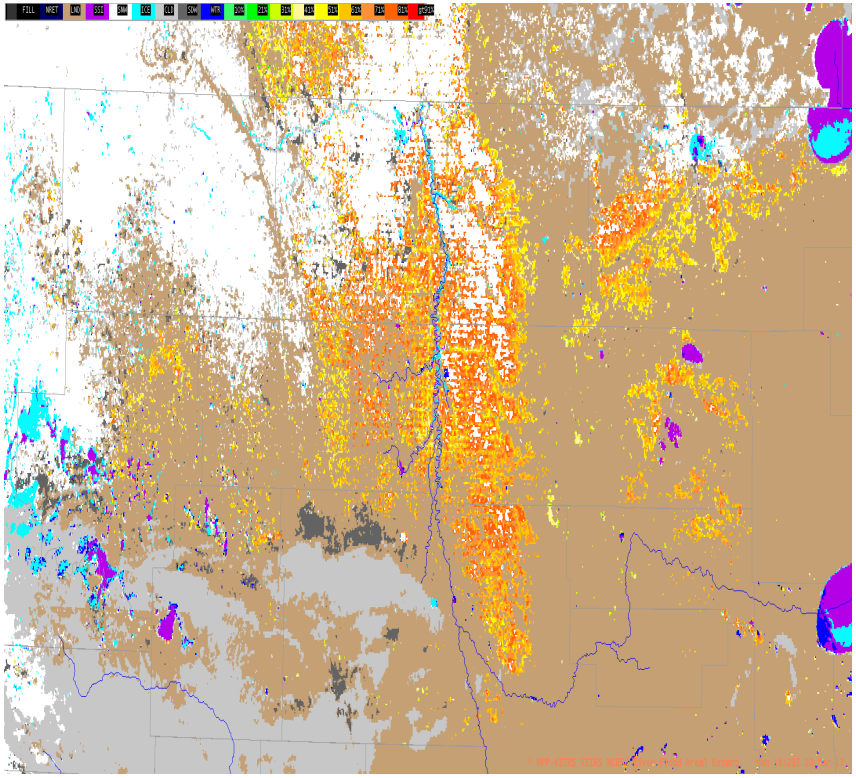


Credit: CIMSS Blog

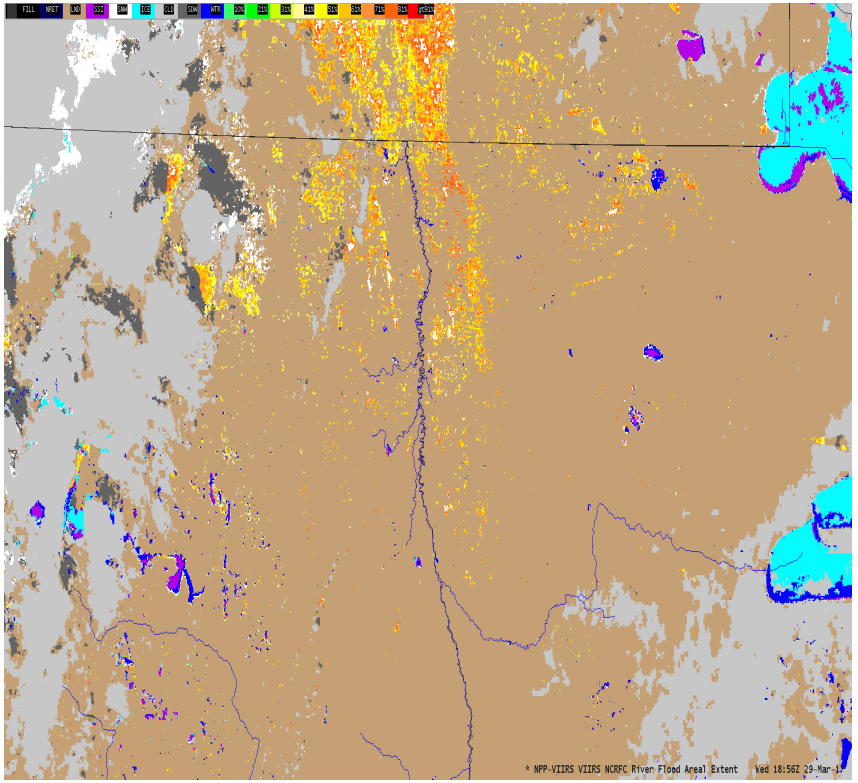
RTMA Surface Winds

Red River of the North Spring Snowmelt

March 20, 2017

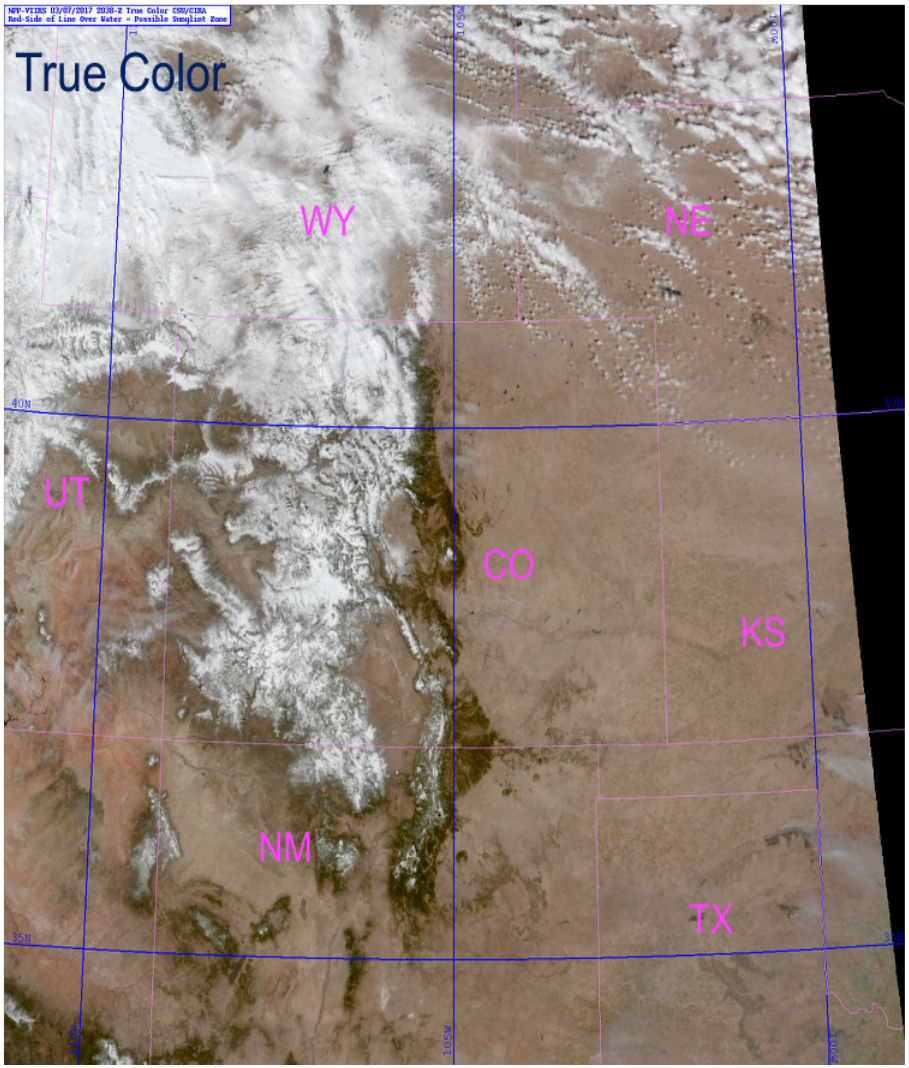


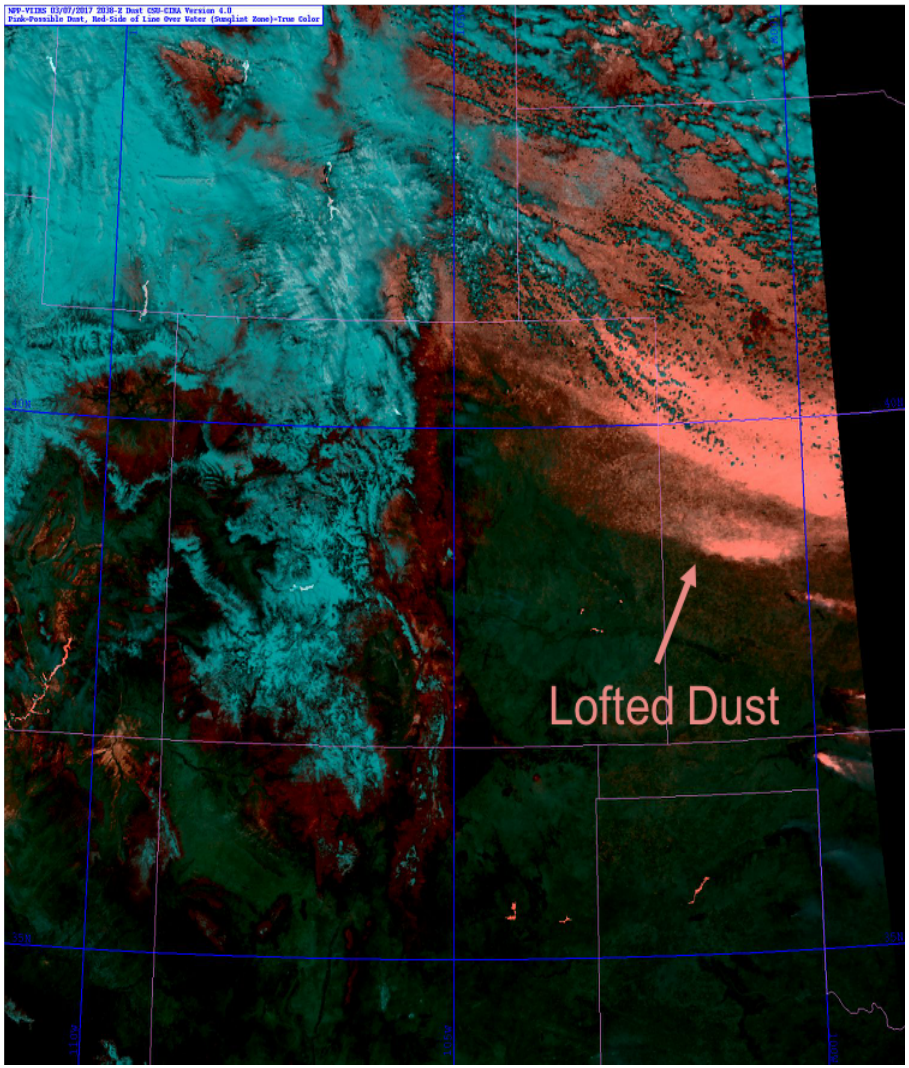
March 29, 2017



- Lack of inundation indicated ground was thawing and allowing water to infiltrate soil
- Flood Area product was also used to validate AMSR2 NASA project results

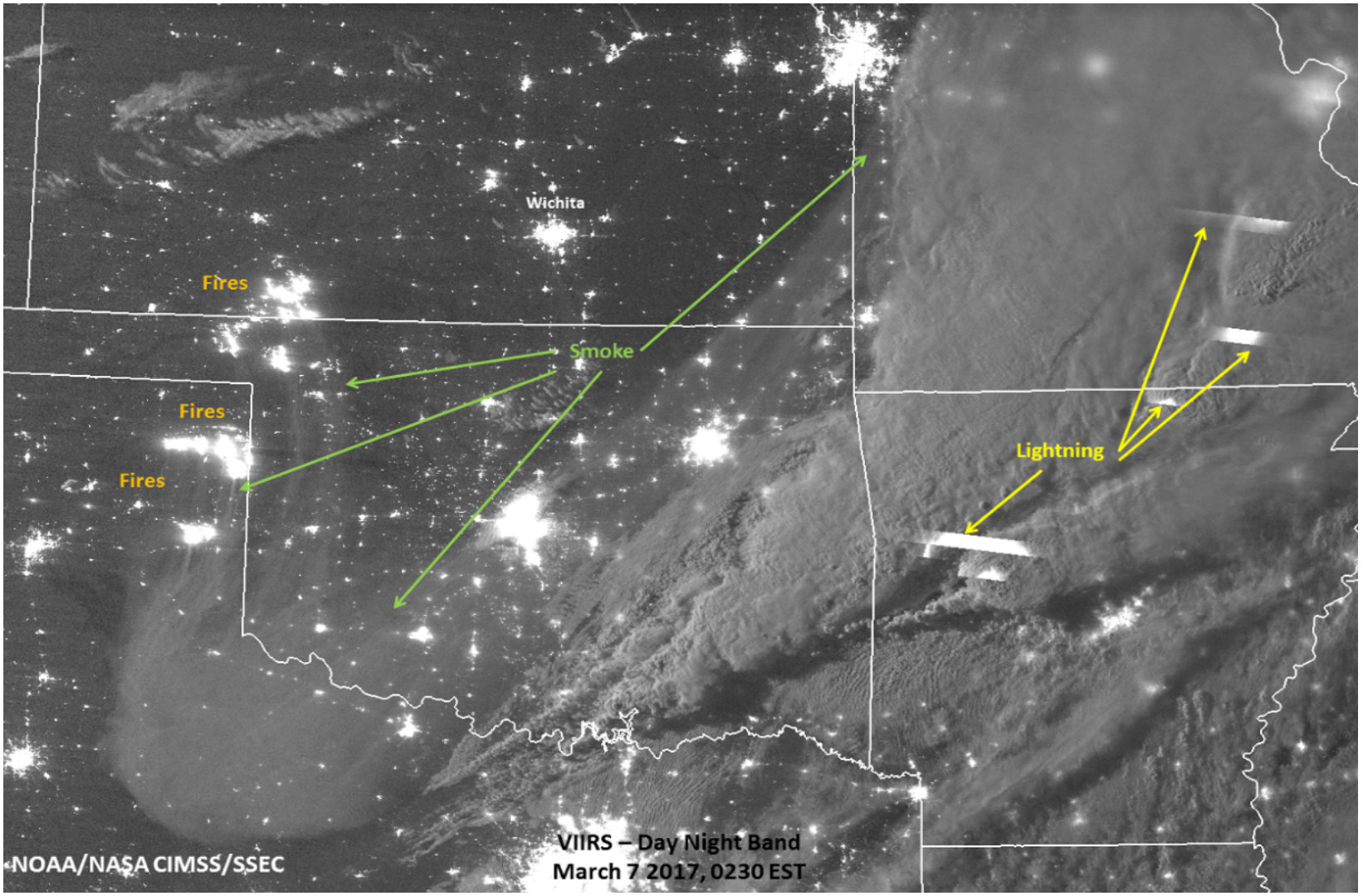
Suomi NPP VIIRS, 7 March 2017, 2038 UTC: Colorado Dust Storm





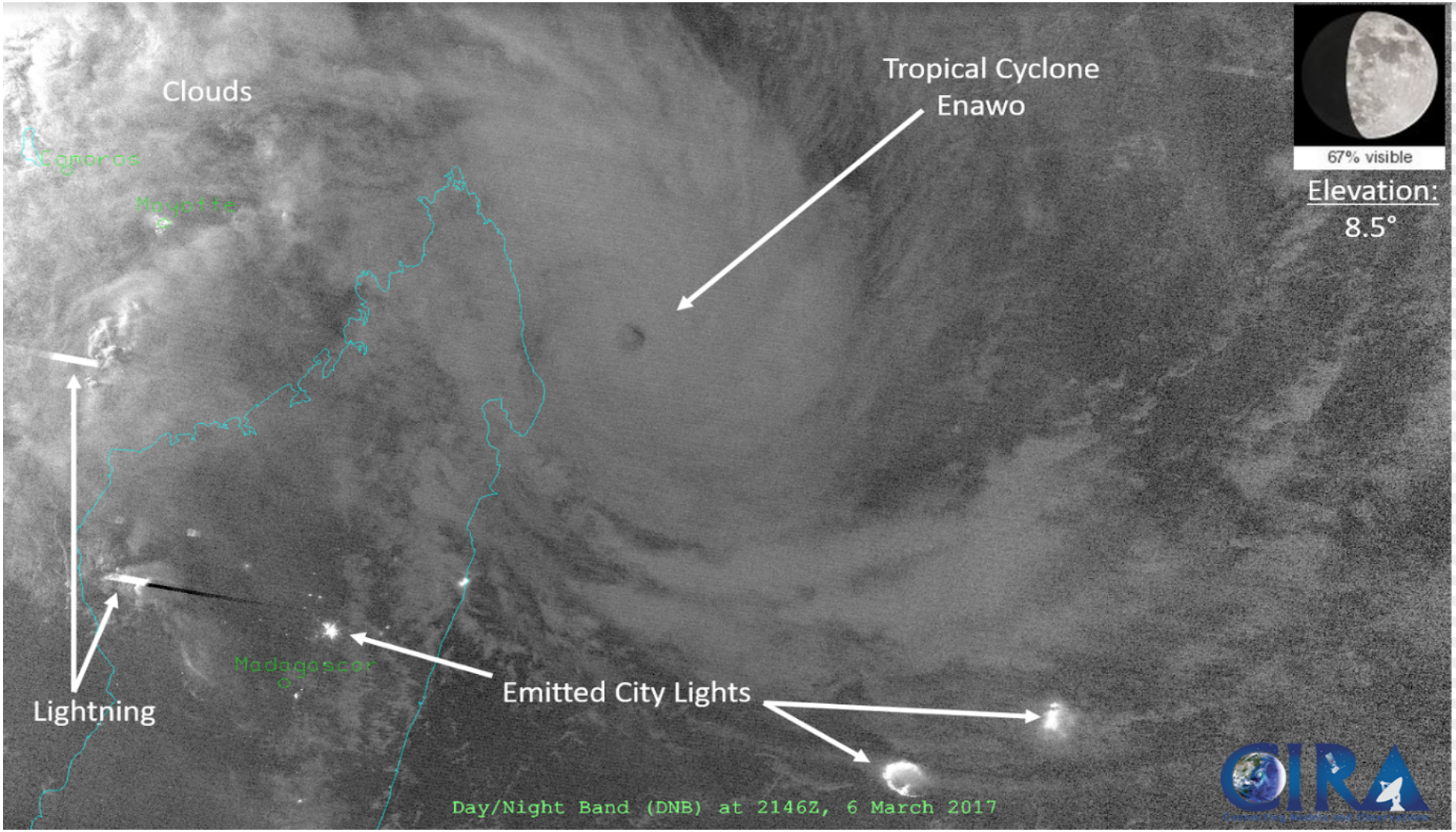
Credit: Jorel Torres

OK Fires – 7 Mar 2017



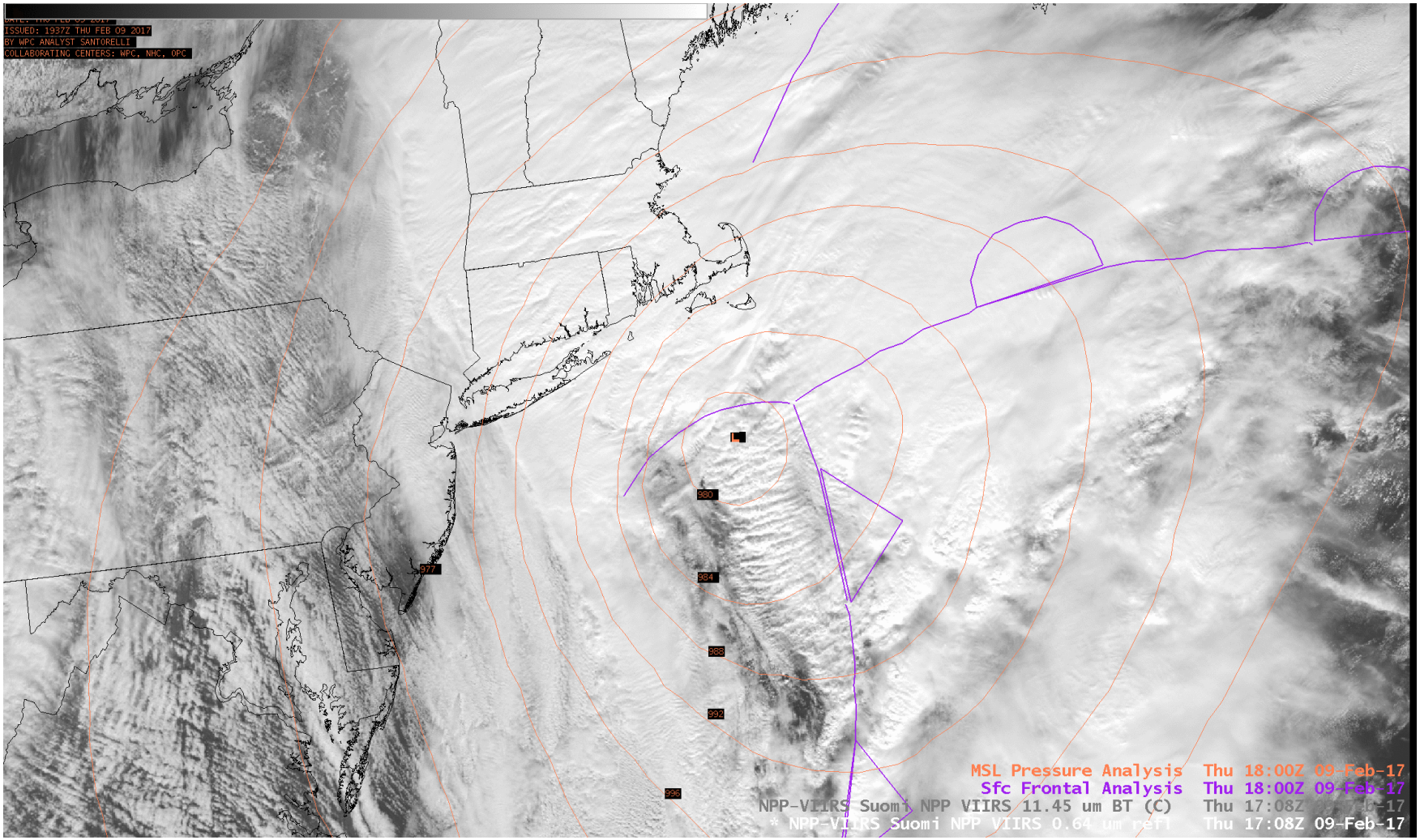
Credit: William Straka

Tropical Cyclone Enawo in DNB
6 March 2017



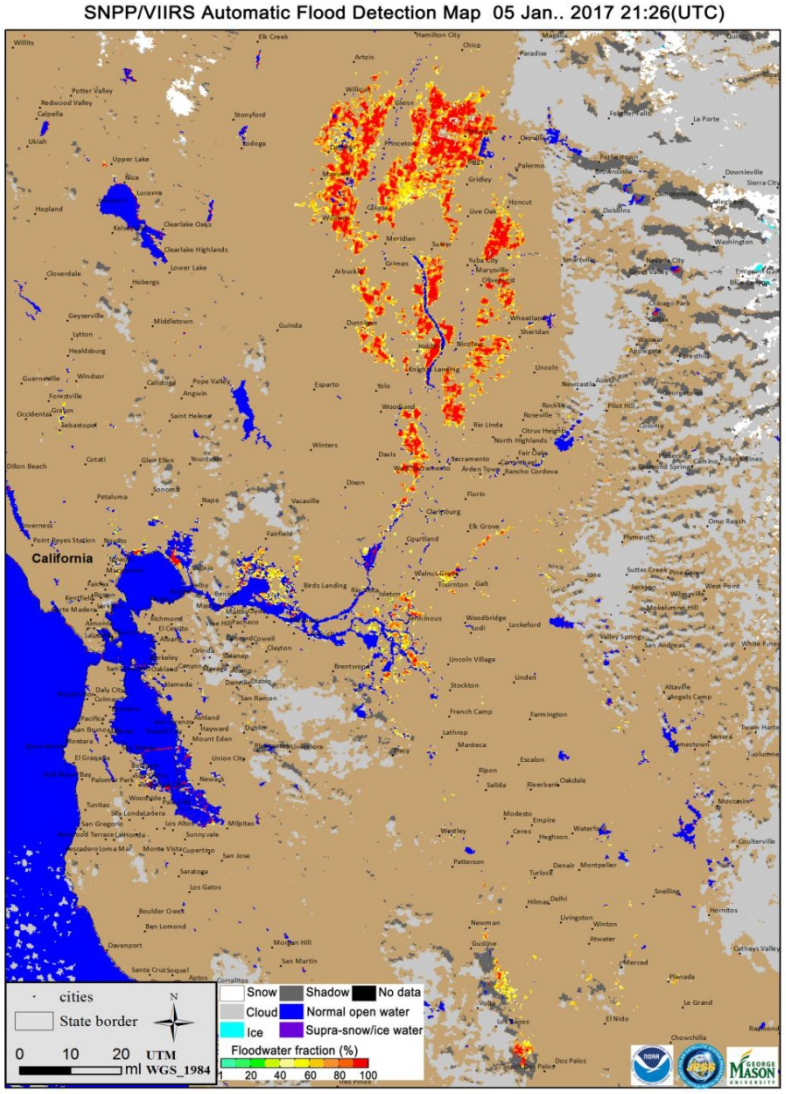
Credit: CIRA Blog

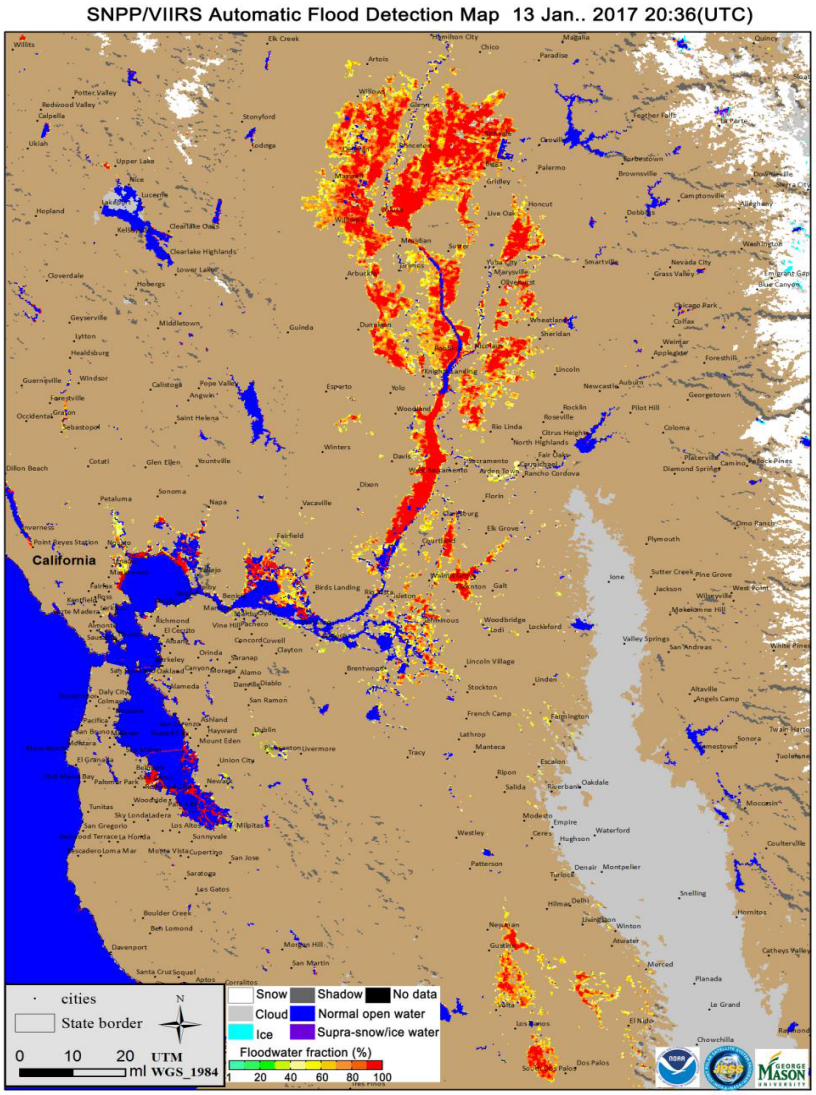
Northeast US Winter Storm
9 Feb 2017



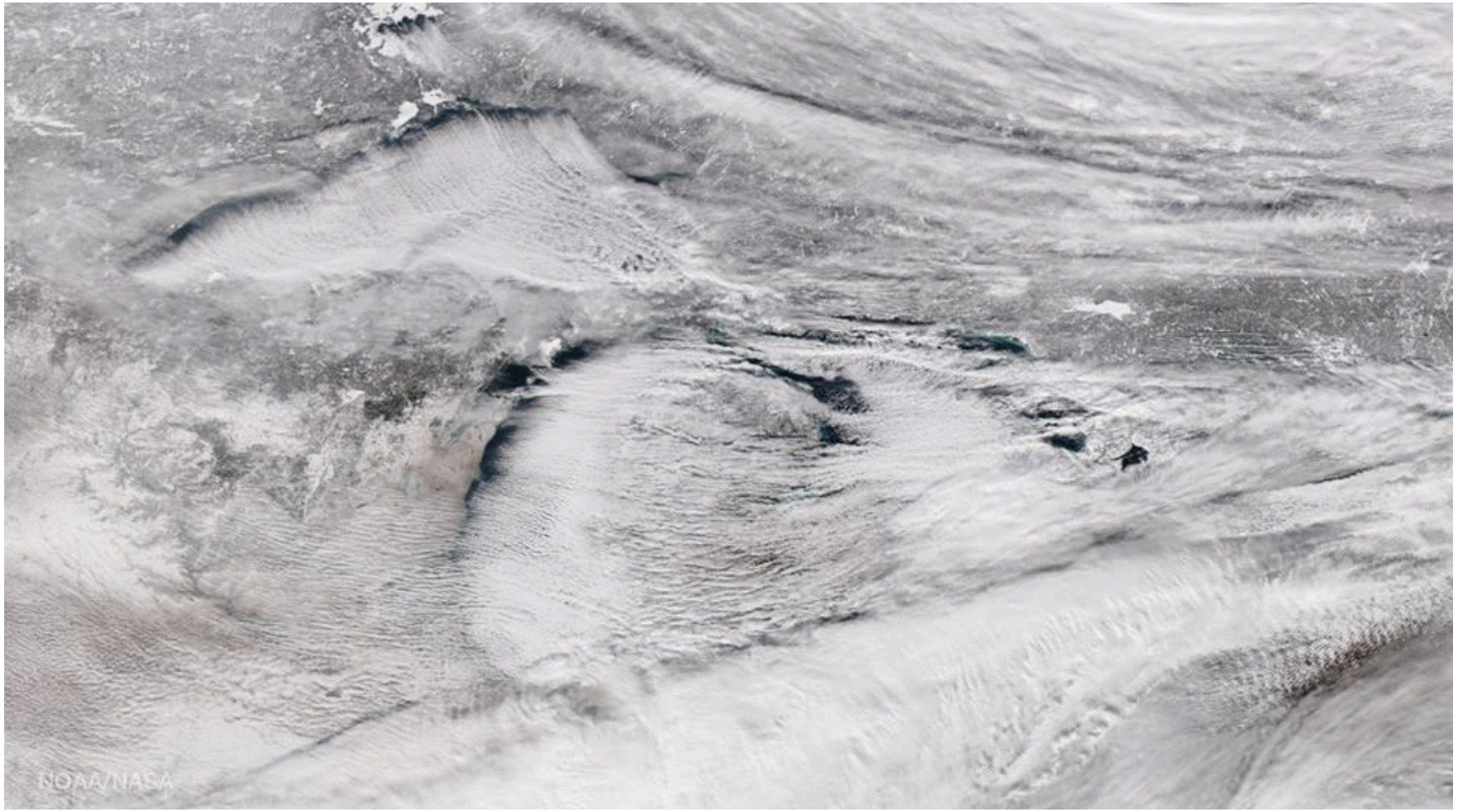
Suomi NPP VIIRS Visible (0.64 µm) and Infrared Window (11.45 µm) image

CA Flooding in Jan 2017





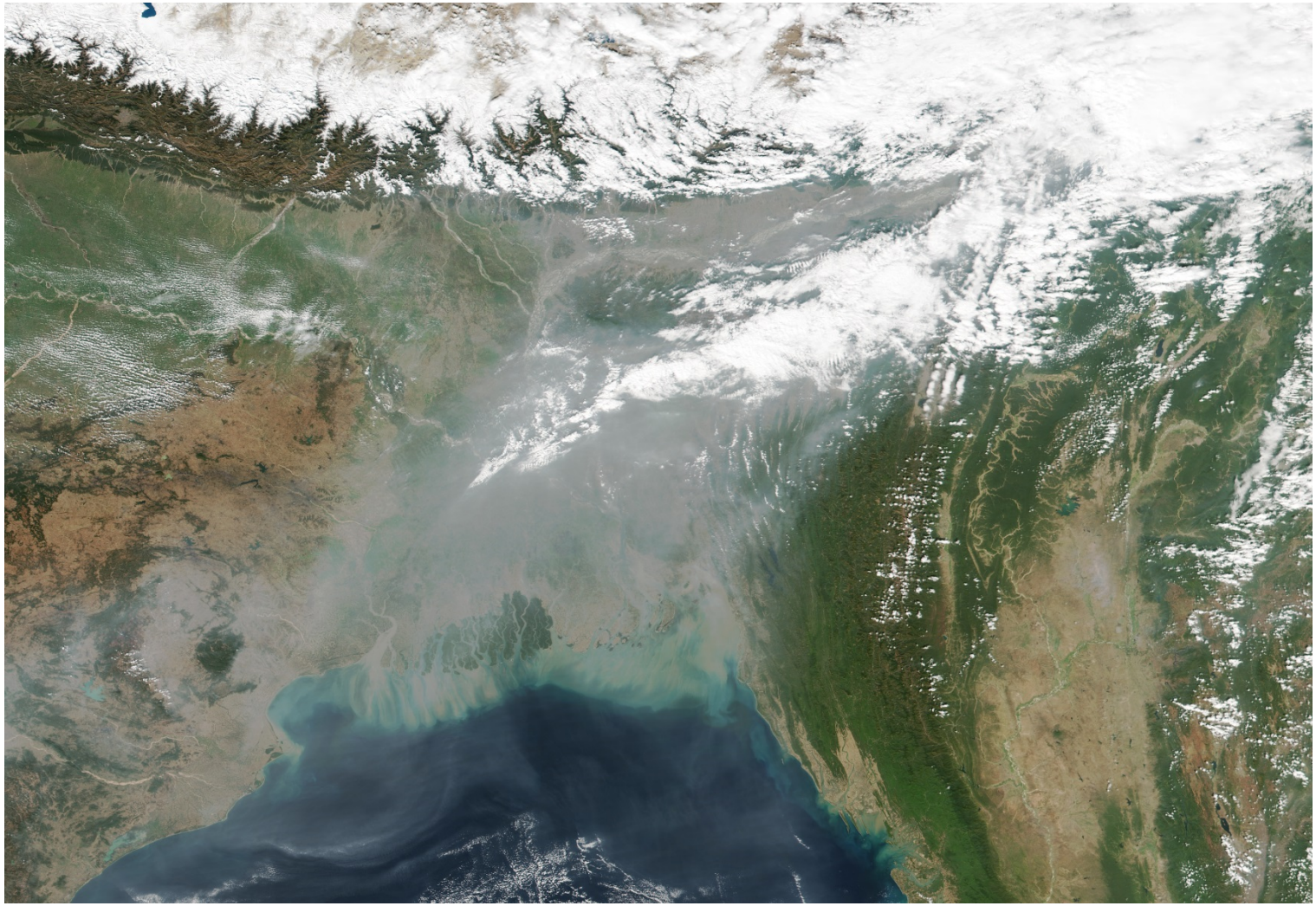
Lake Effect Snow from VIIRS
5 Jan 2017



Credit: NOAA's Environmental Visualization Laboratory

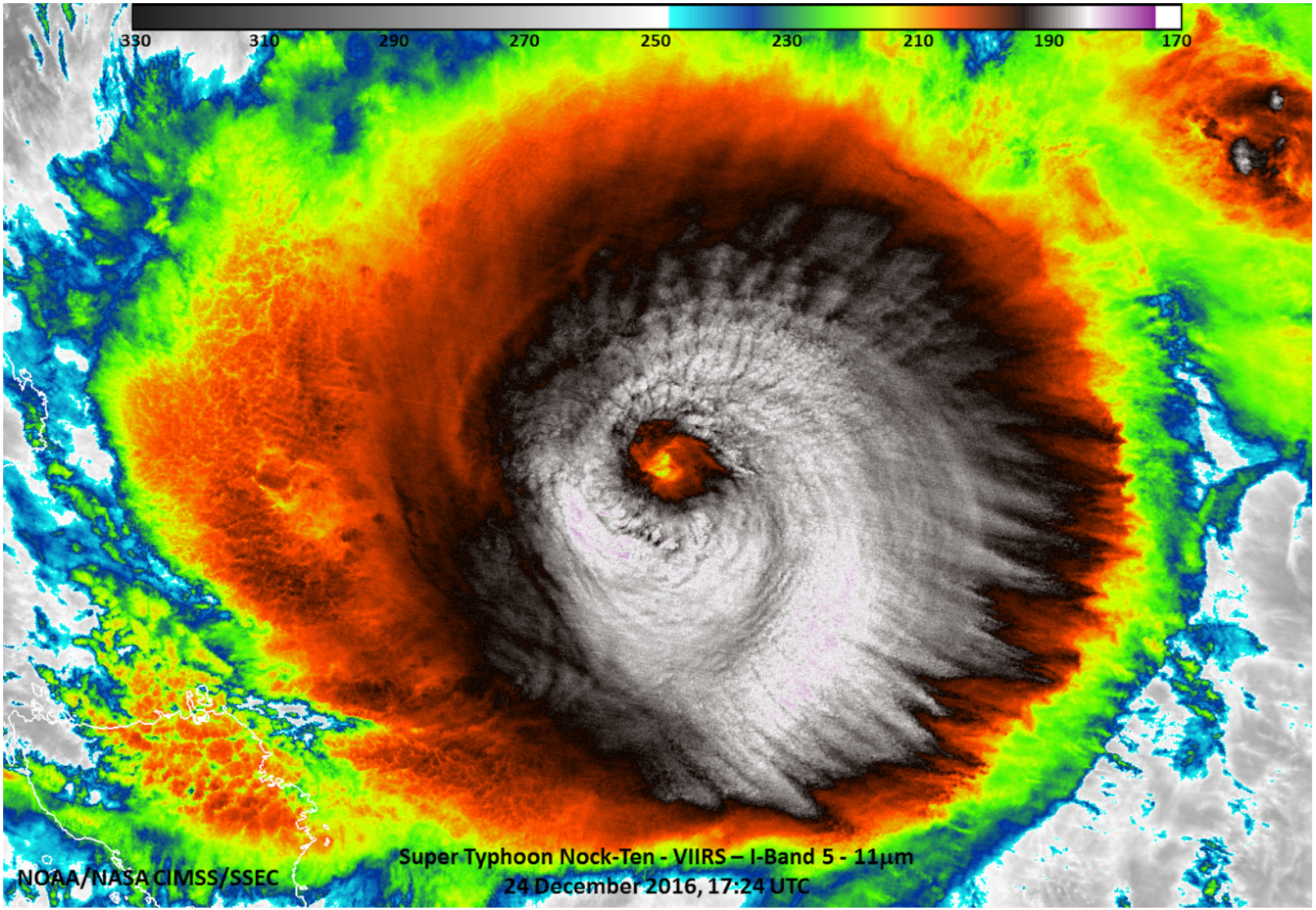
Haze over Bangladesh – 28 Jan 2017

VIIRS Natural Color Image



Credit: LANCE/EOSDIS Rapid Response

Super Typhoon Nock-Ten
24 Dec 2016



Credit: William Straka

An Oasis in the Sahara – 2 Dec 2016

VIIRS true-color image of the Inner Niger Delta, a large area of lakes in the semi-arid transition zone known as the Sahel between the Sahara and the Sudanian Savanna

Credit: Environmental Visualization Lab

Hurricane Otto – 24 Nov 2016

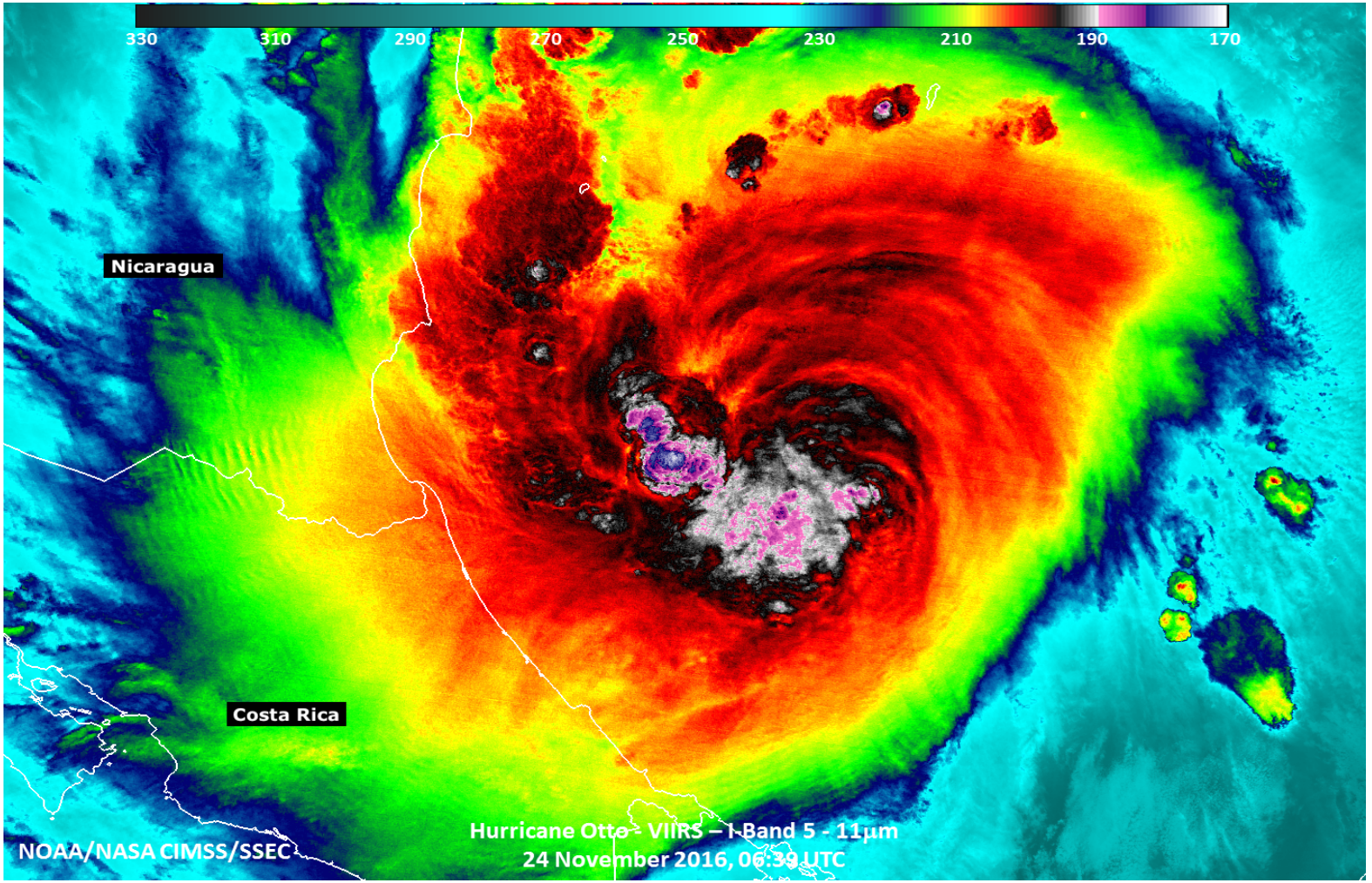
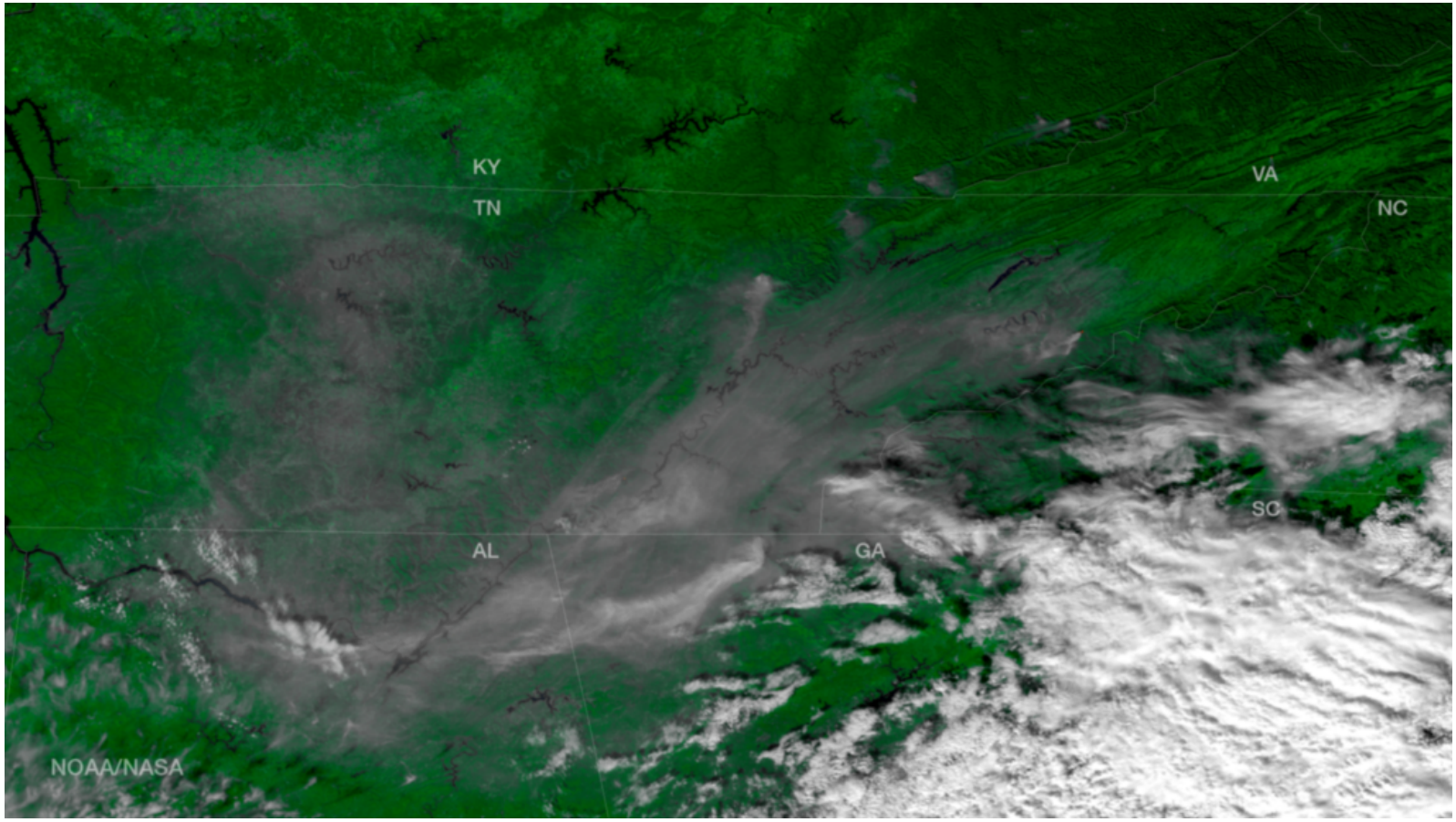


Image shows the presence of cloud-top gravity waves propagating westward along the Nicaragua/Costa Rica border; these waves were likely a response to deep convective bursts offshore near the center of Otto

Credit: William Straka and CIMSS Blog

Fires in the Southeastern United States
14 Nov 2016



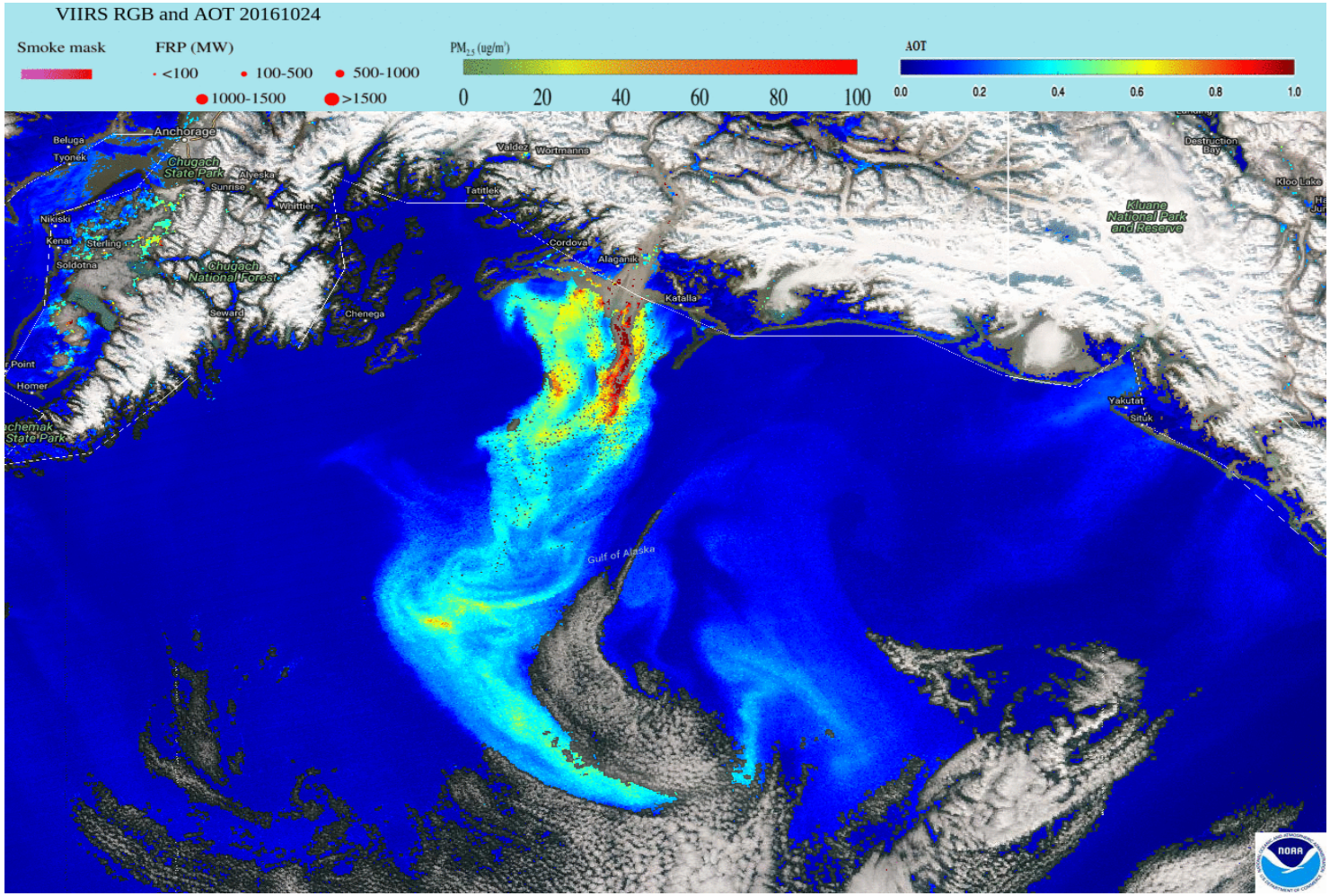
According to the National Interagency Fire Center, more than 30 fires burning in the southeastern United States blackened greater than 80,000 acres in North Carolina, Georgia, Tennessee and Kentucky

Credit: Environmental Visualization Lab

2016 Lake Erie Algal Bloom "Mild" Compared to Those of Recent Years

VIIRS true-color image showing the extent of the algal blooms in Lake Erie on October 11, 2015 (left), and, by way of comparison, October 10, 2016 (right)

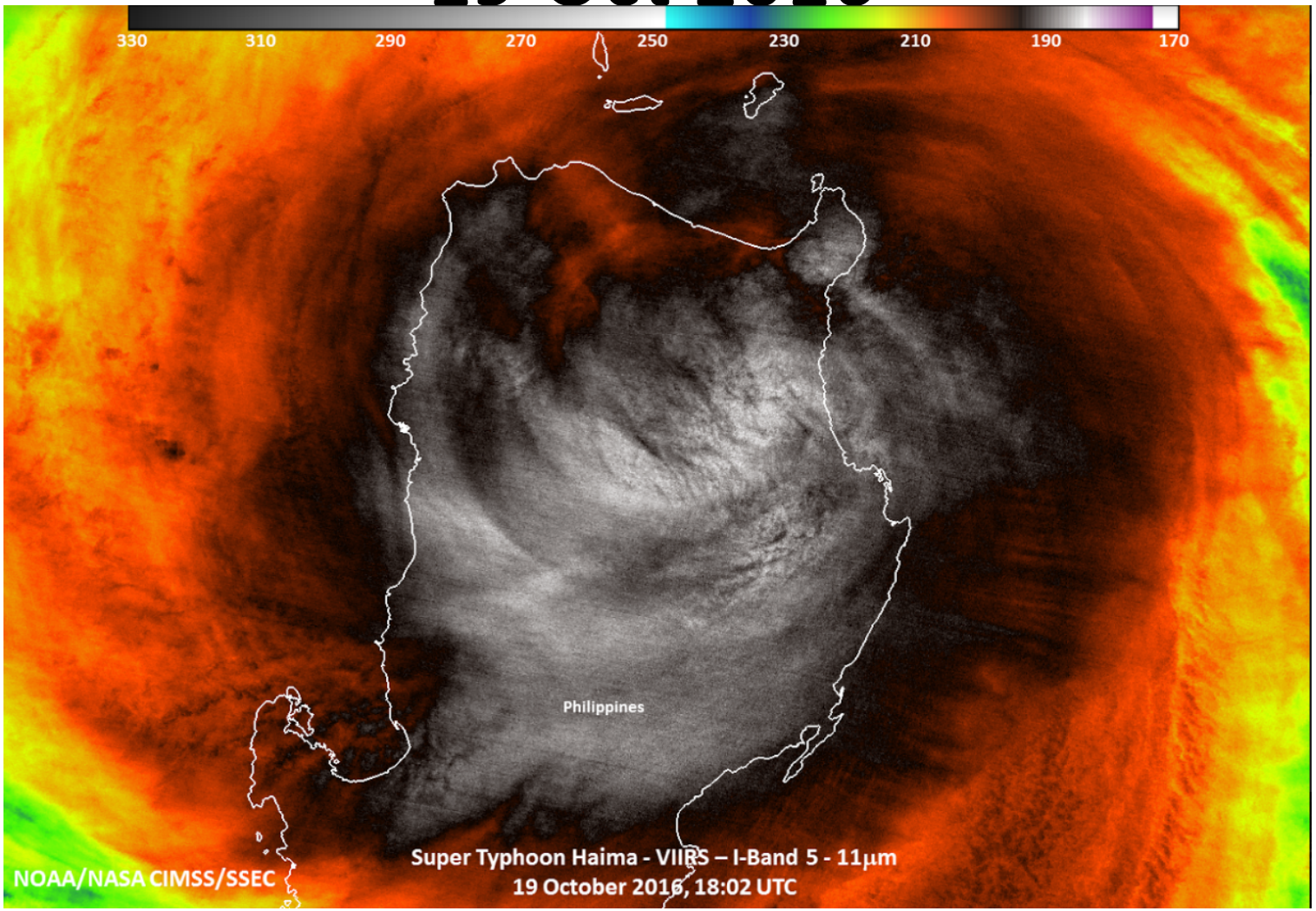
Credit: Environmental Visualization Lab



Above is VIIRS imager showing the hazy signature of large amounts of airborne glacial silt and sand from the **Copper River** Valley being transported southward over the adjacent offshore waters of the Gulf of Alaska. The fine glacial silt and sand particles were being lofted by strong katabatic gap winds being channeled southward down the Copper River Valley — these winds were the result of a strong pressure gradient between arctic high pressure that was moving from the Interior of Alaska to the Yukon Territory of Canada (**surface analyses**) and a large occluded low centered off the coast of British Columbia and the US Pacific Northwest

Credit: CIMSS Blog 25 Oct

Super Typhoon Haima
19 Oct 2016



Credit: William Straka

Strong Storm Hits the Northwest
15-16 Oct 2016

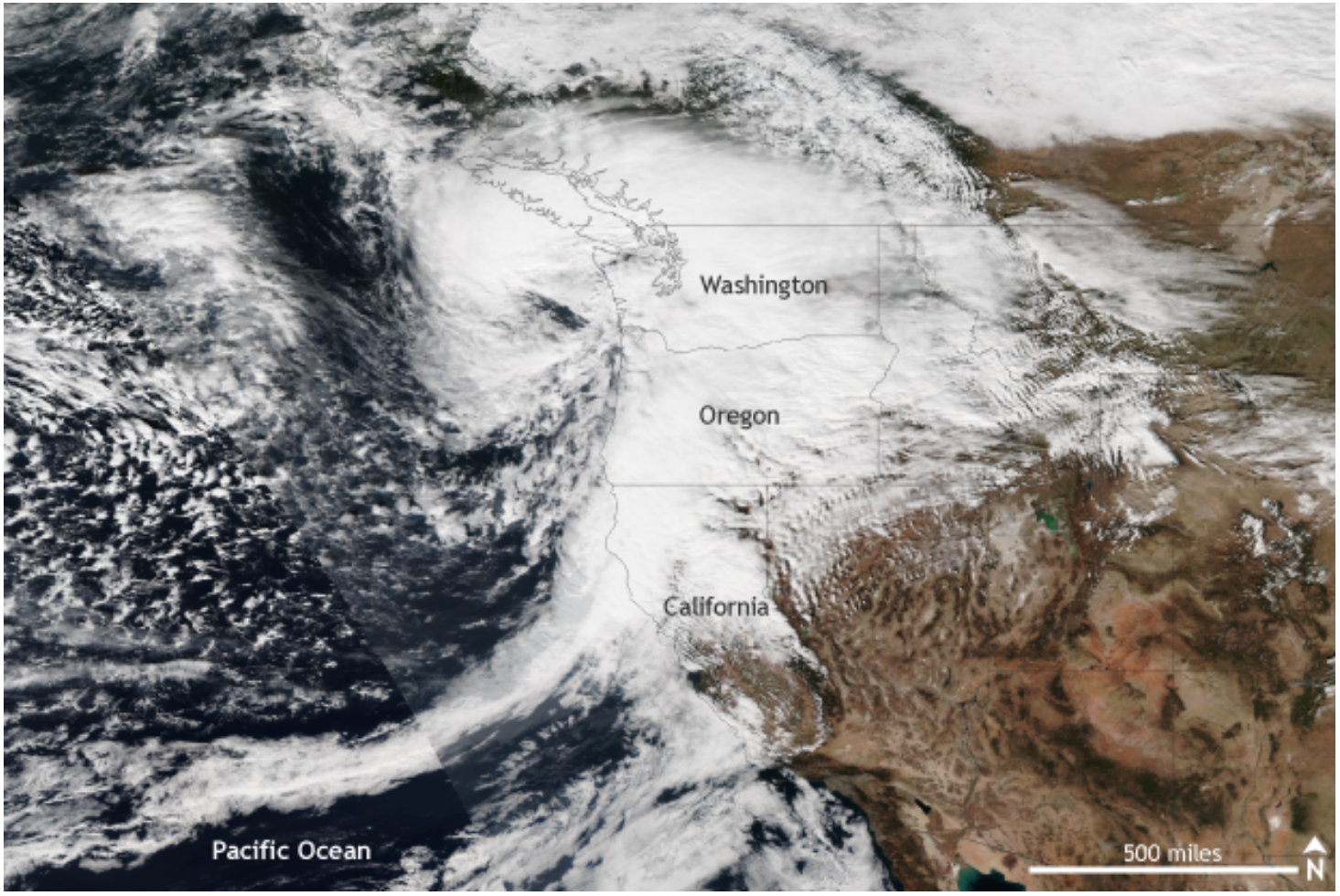
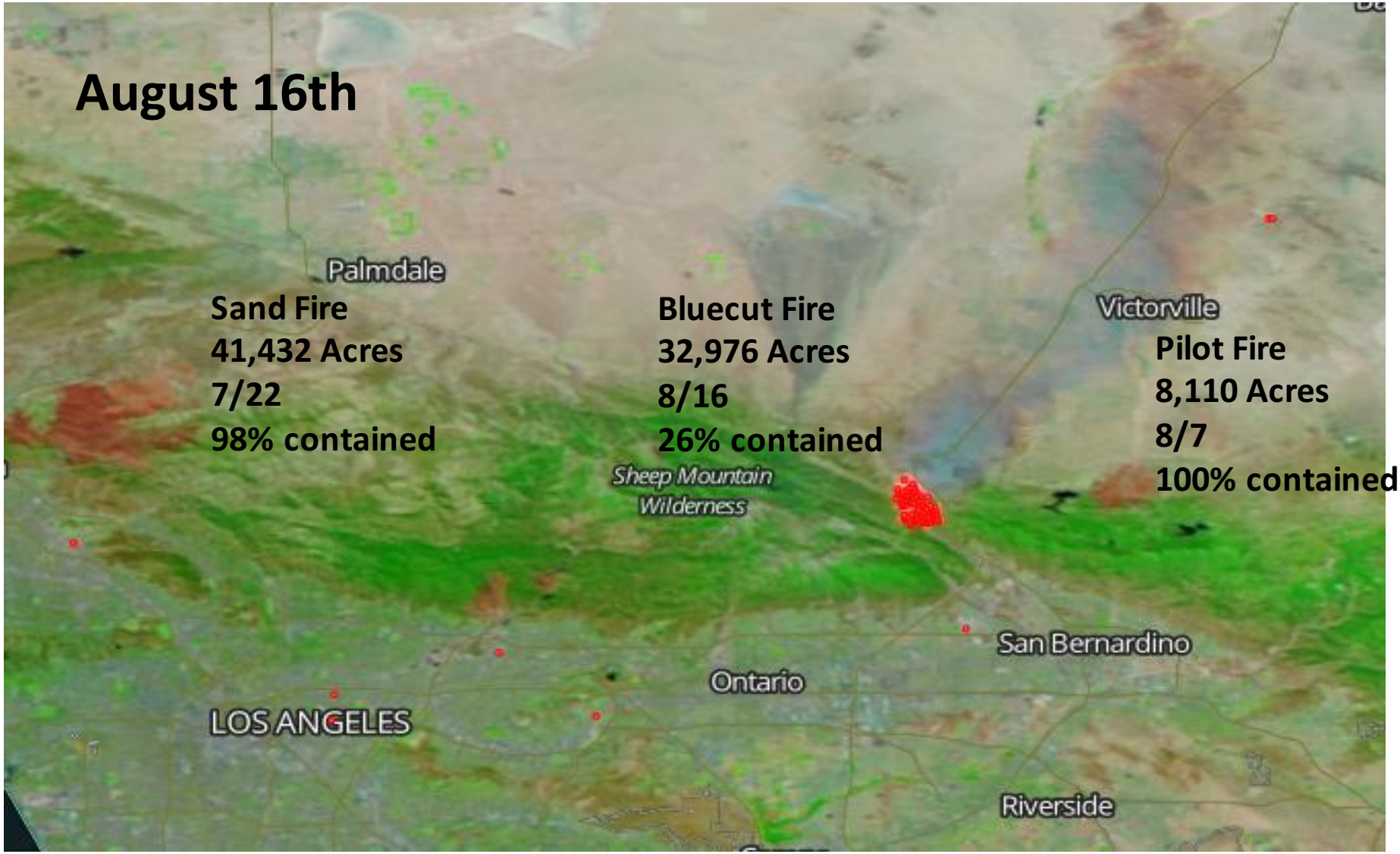


Image from the Suomi-NPP Satellite provided by the [NOAA Environmental Visualization Laboratory]

Sand and Pilot Fires Burn Scars
Bluecut Fire - Active

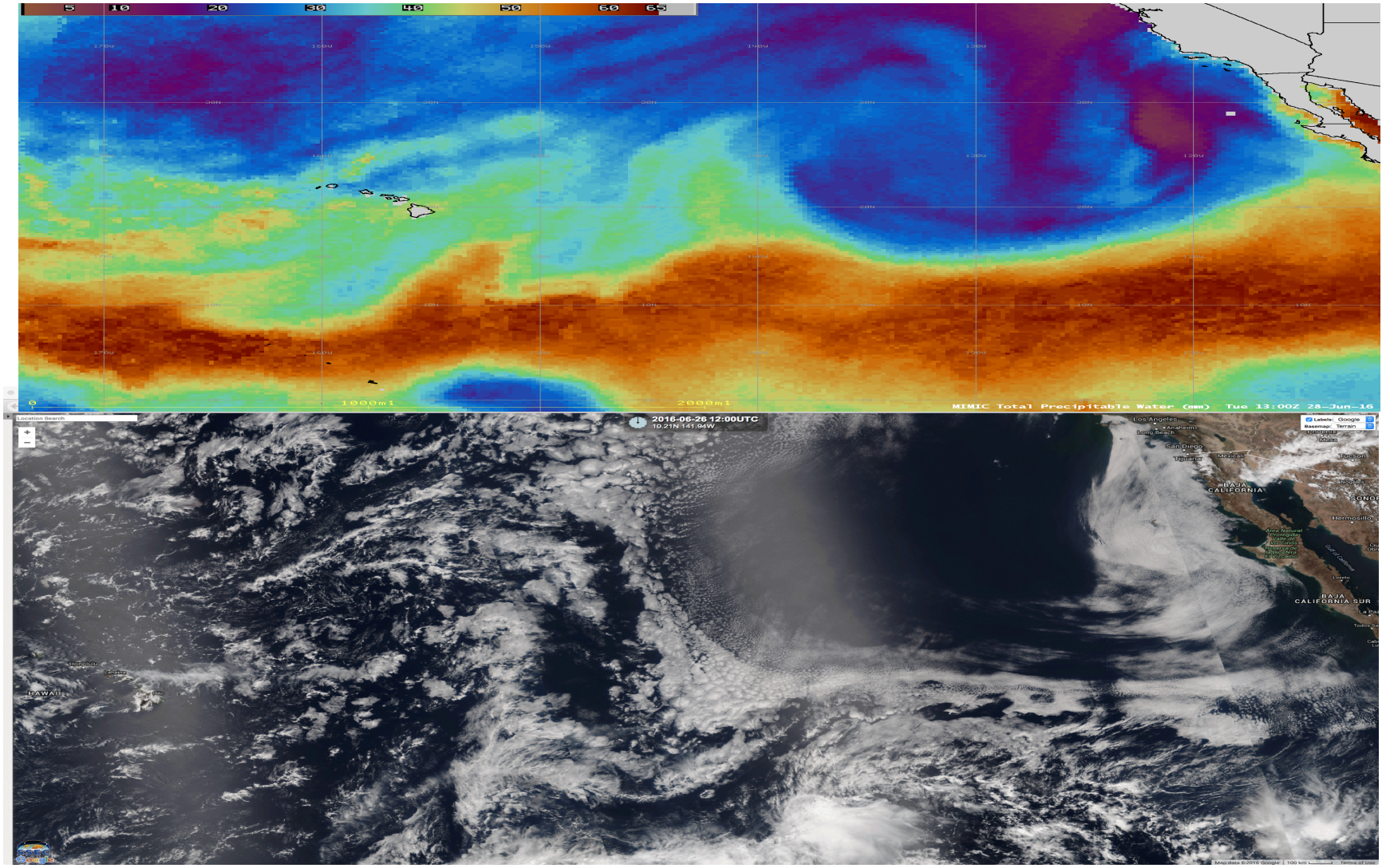


Northwest Passage Ice – 8 Aug 2016

Credit: Mitch Goldberg

Suomi SNPP True Color – 13 May 2016
Image from NESDIS Facebook

Dry Trade Wind Surge Approaching Hawaii Late Jun 2016 (Scott Bachmeier Post)



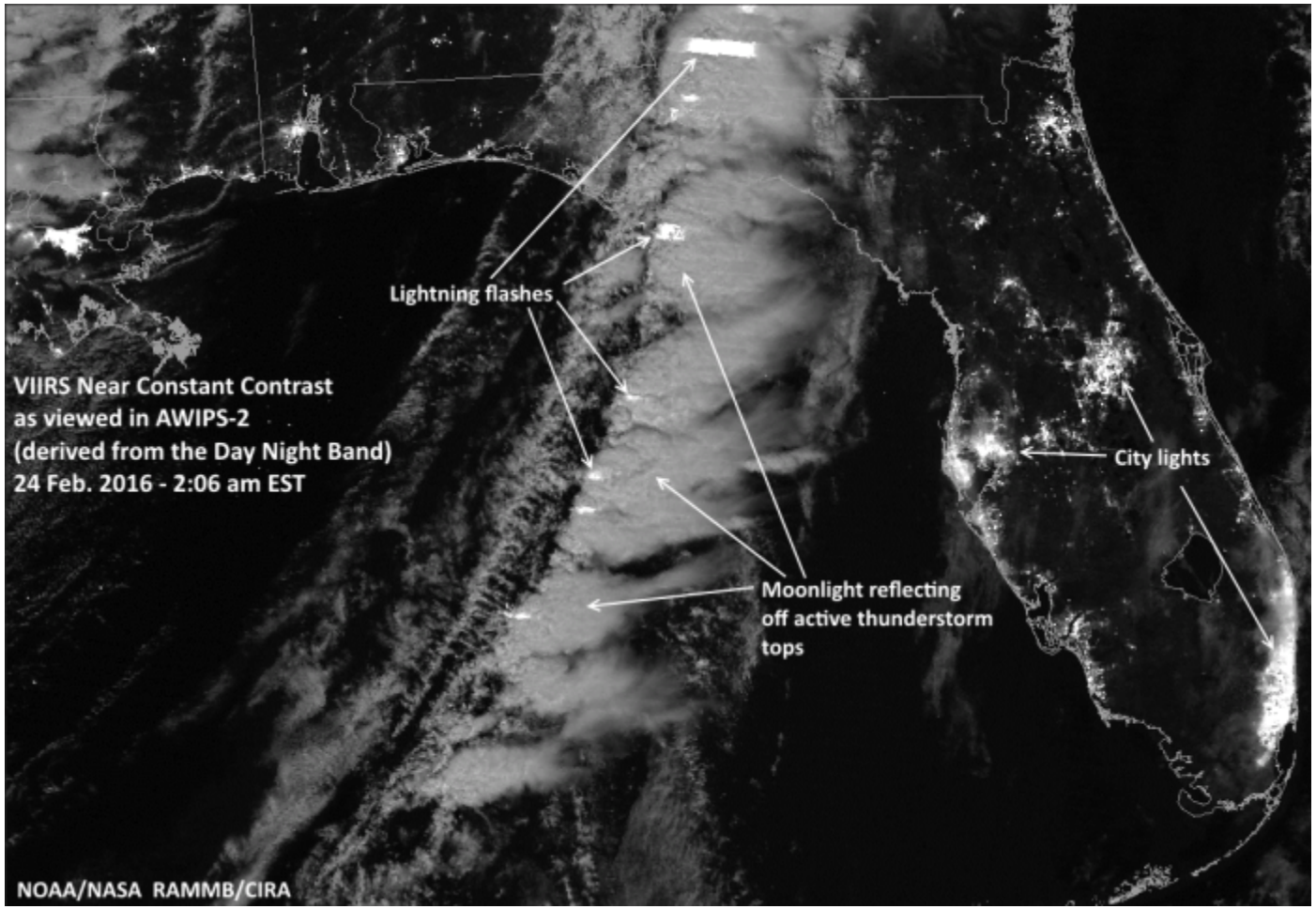
The progression of the leading edge of the dry trade wind surge could also be followed on daily composites of Suomi NPP VIIRS true-color Red/Green/Blue (RGB) images

VIIRS Image (5 Apr 2016) NE Snowstorm

Credit: NOAA Environmental Vis Lab

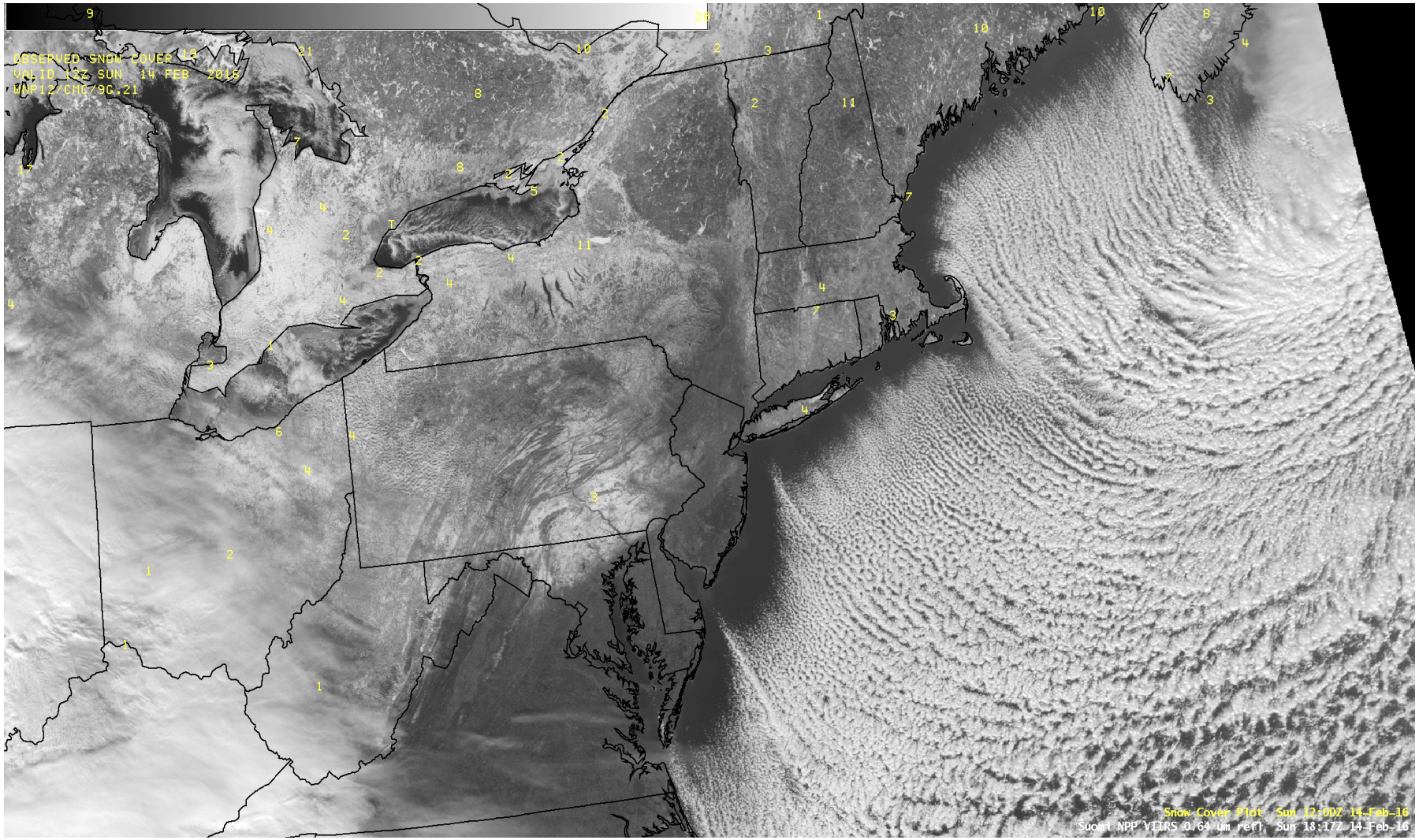
Thunderstorms in FL – 24 Feb 2016

NCC in AWIPS II



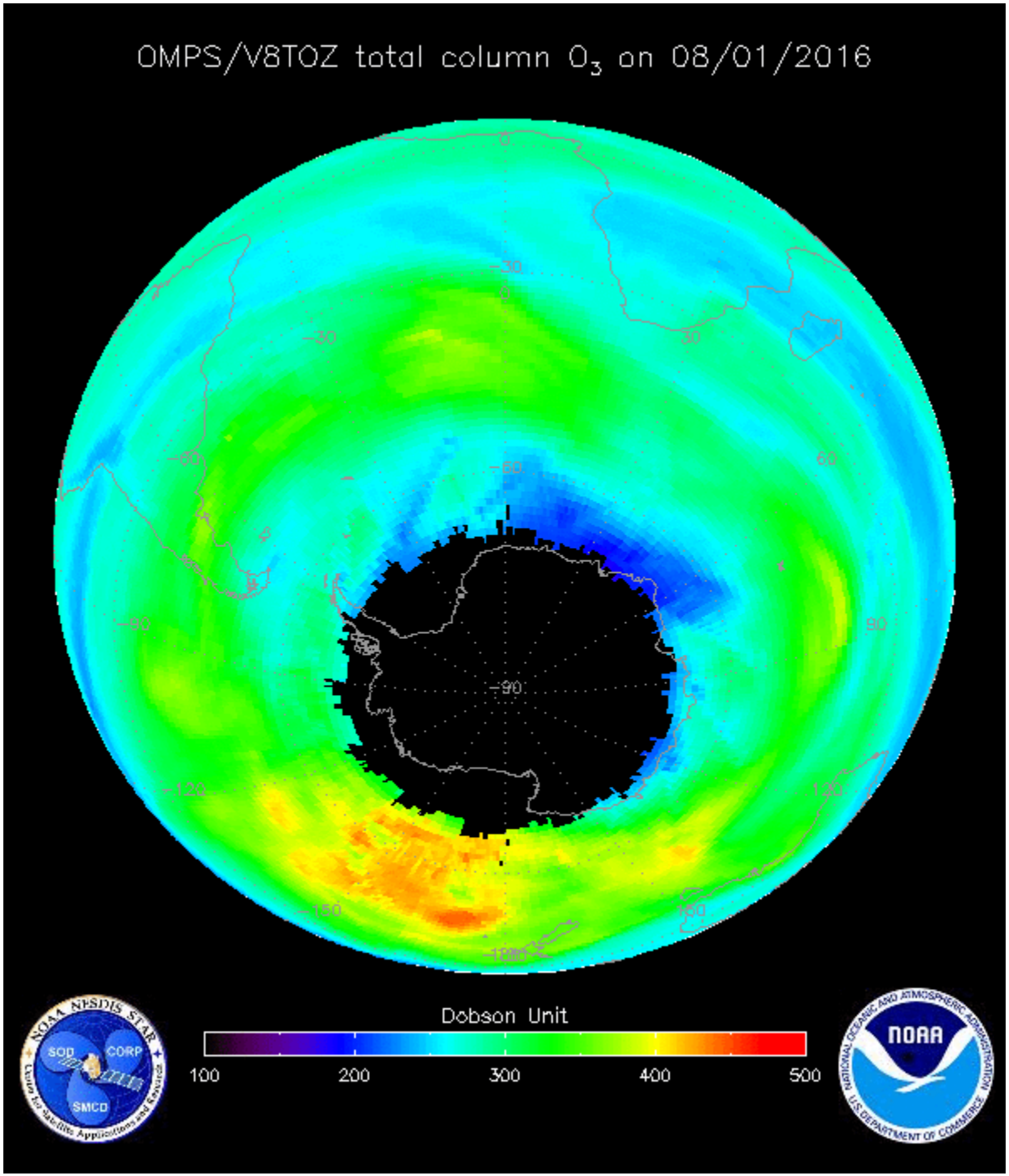
Credit: Dan Lindey and Jorel Torres

Cold-Air Advection – NE Coast
15 Feb 2016



Visible vs snow/ice/ice_cloud RGB

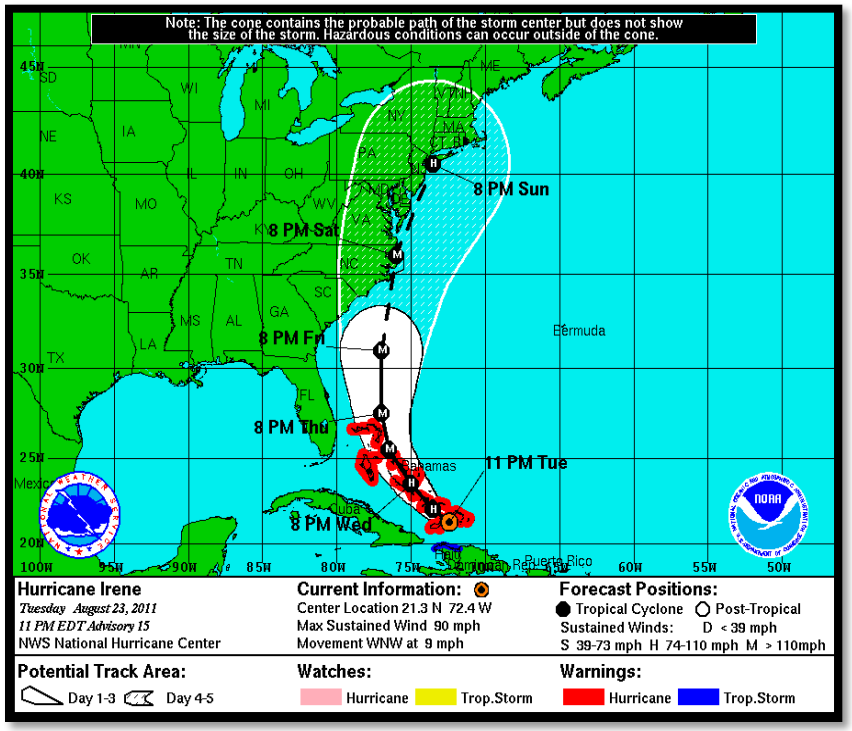
Credit: Scott Bachmeir


OMPS/V8TOZ total column O_3 on 08/01/2016
Dobson Unit
100
200
300
400
500
NOAA NESDIS STAR
SOD
CORP
SMCD
NOAA

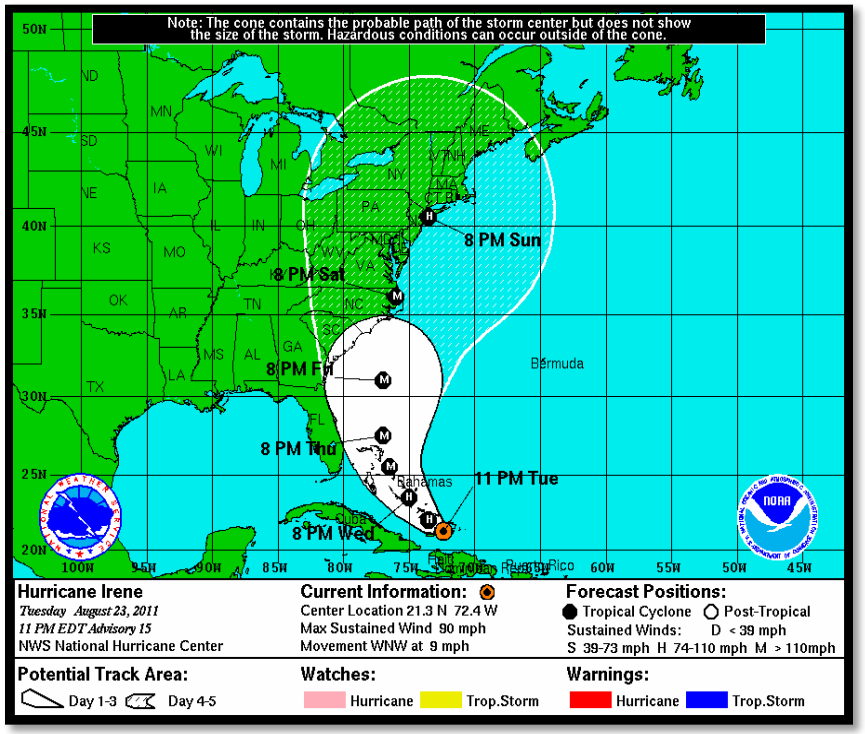
Weather Forecasting

Advanced Forecast Enterprise

▶ Observations + Models + Supercomputers + Expert Forecasters

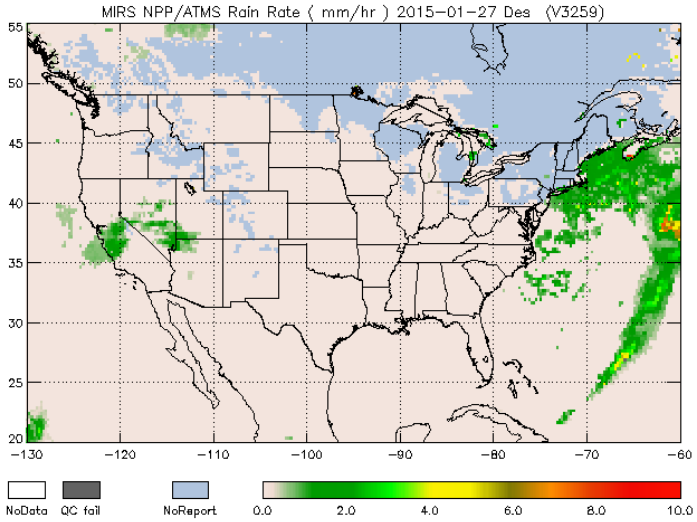


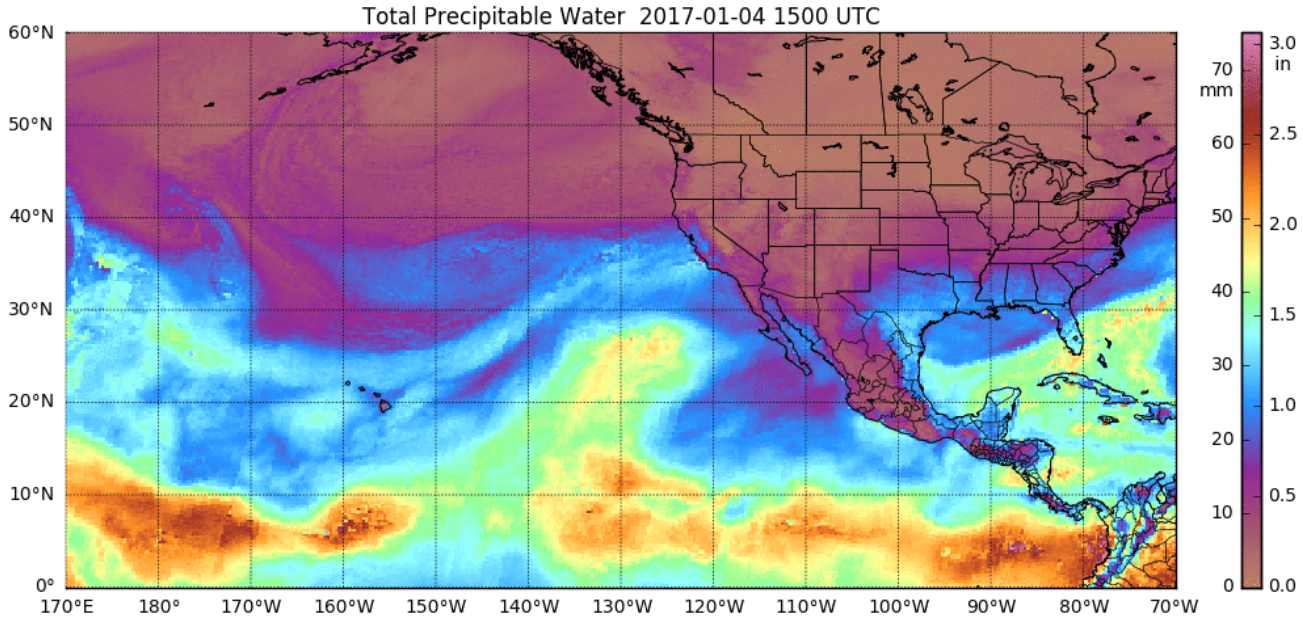
2011 Irene Forecast



"2001" Irene Forecast

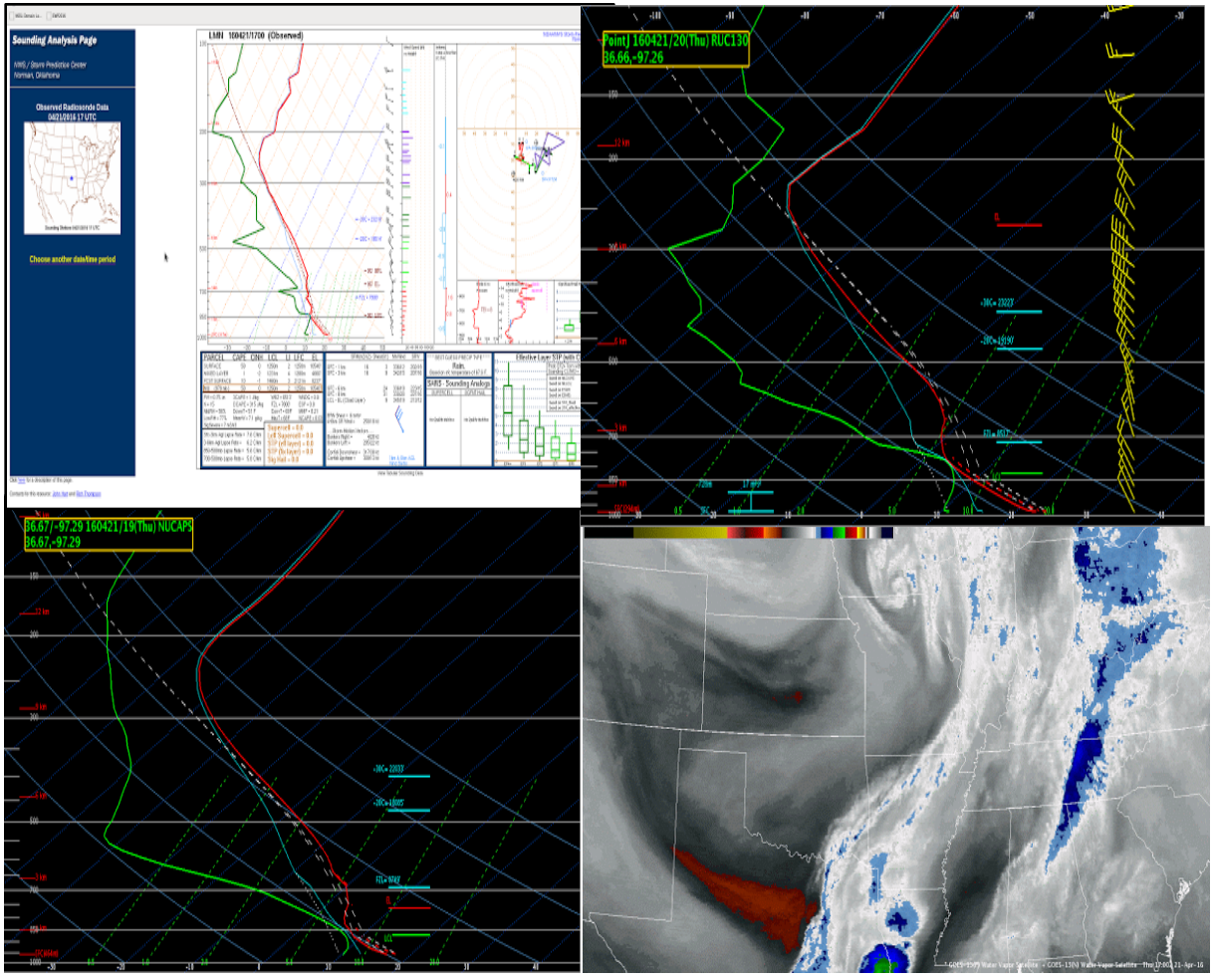
ATMS Monitors Rain and Atmospheric Rivers





CrIS/ATMS provides vertical temperature and moisture information to supplement radiosonde reports

- **NUCAPS vs. Observed (RAOB) and Forecast (RAP Model) Soundings**
- http://goesrhwt.blogspot.com/2016/04/on-large-scale-thursday-afternoon.html

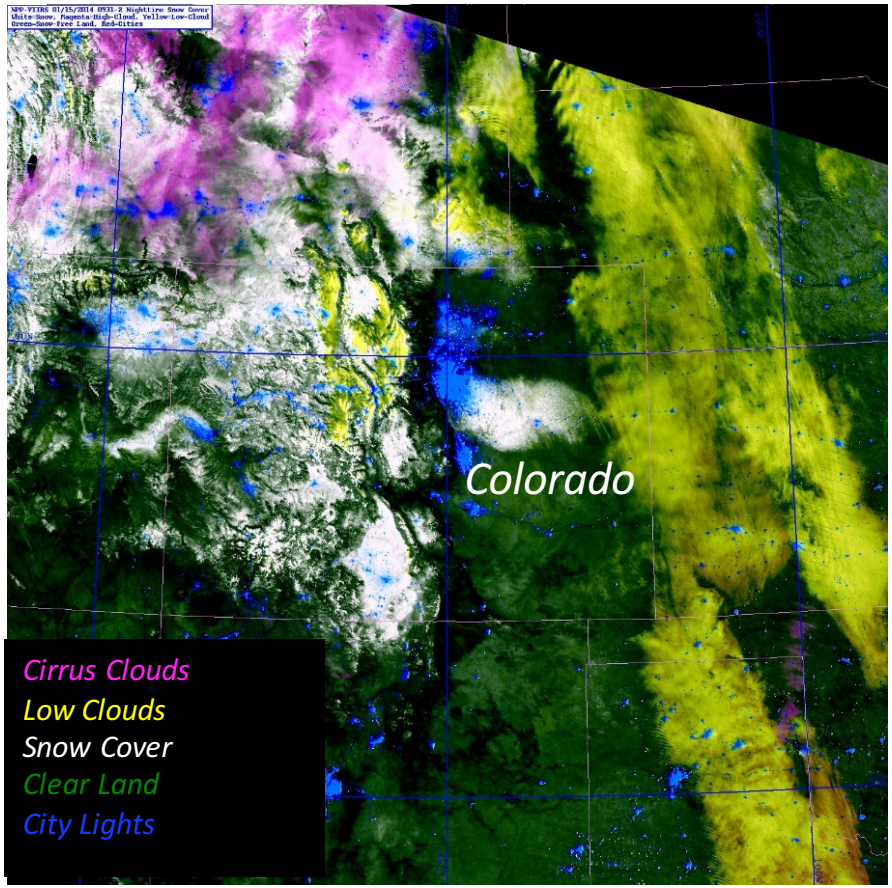


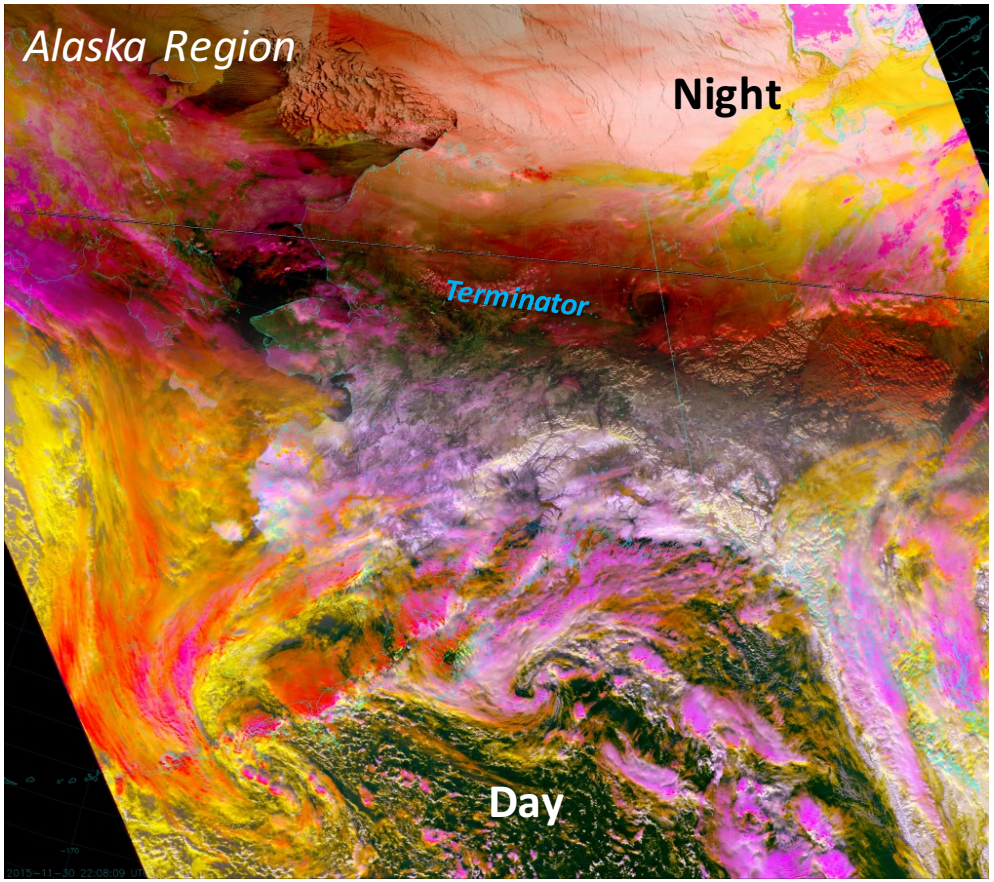
- **Top Left**: ARM SGP RAOB at 17Z
- **Bottom Left** : NUCAPS closest accepted at 19Z
- **Top Right**: RAP model at 20z
- **Bottom Right**: GOES 13 & 15 water vapor plan view from 17z to 20z.

- GOES water vapor imagery showed an influx of dry air sinking south across the Central Plains through the early afternoon hours.

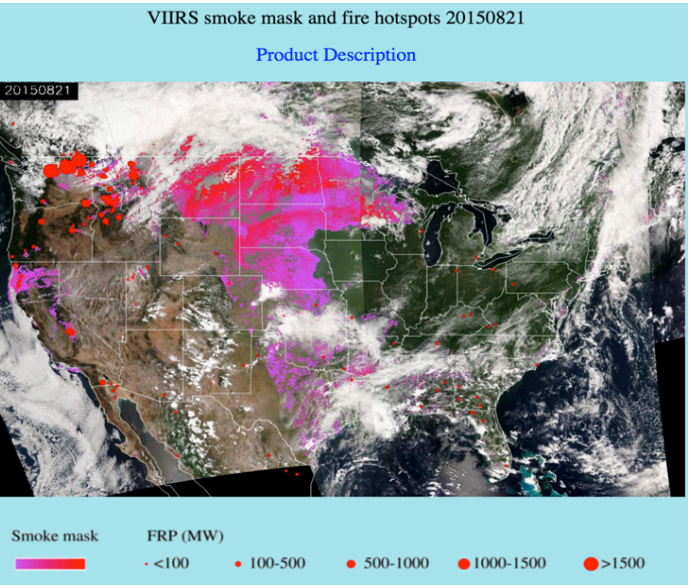
- This explained the drier feature captured by NUCAPS at 19Z and also confirmed by the RAP model at 20Z.

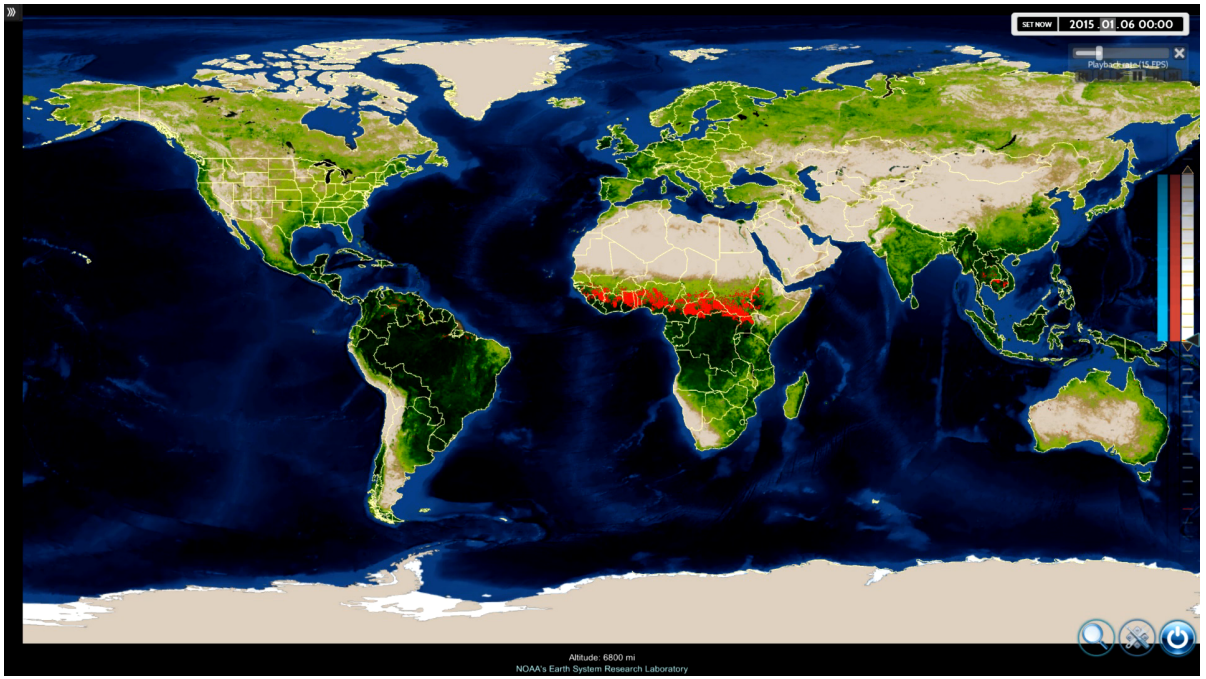
VIIRS Sees Snow at Night





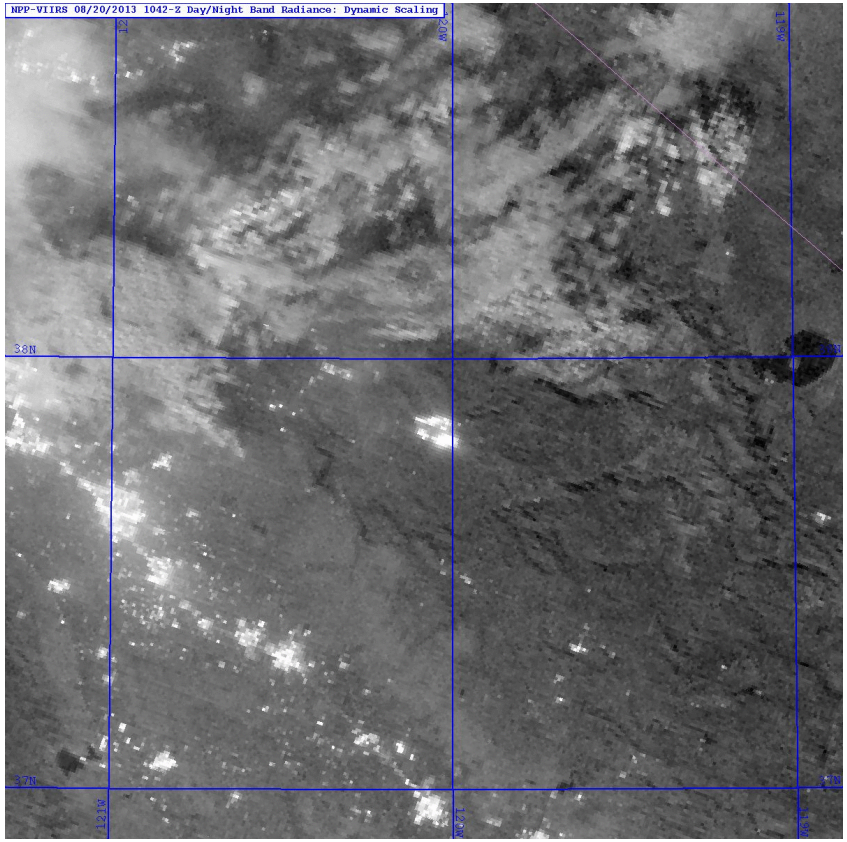
Dangerous Phenomena: Fires





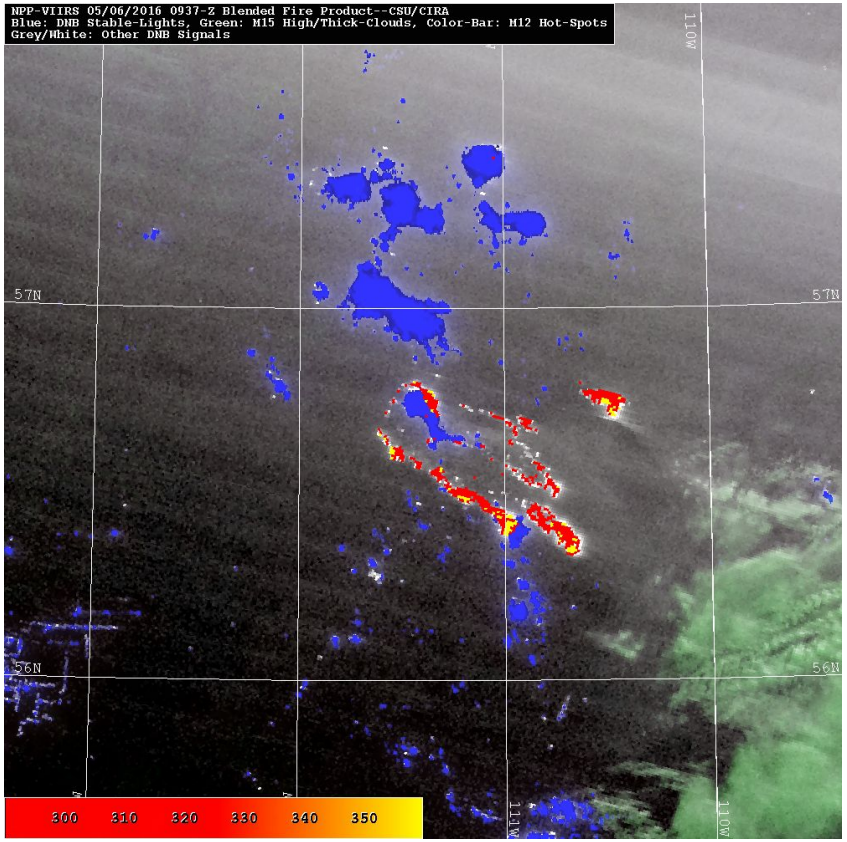
New Capabilities

Rim Fire: ~Aug 2013



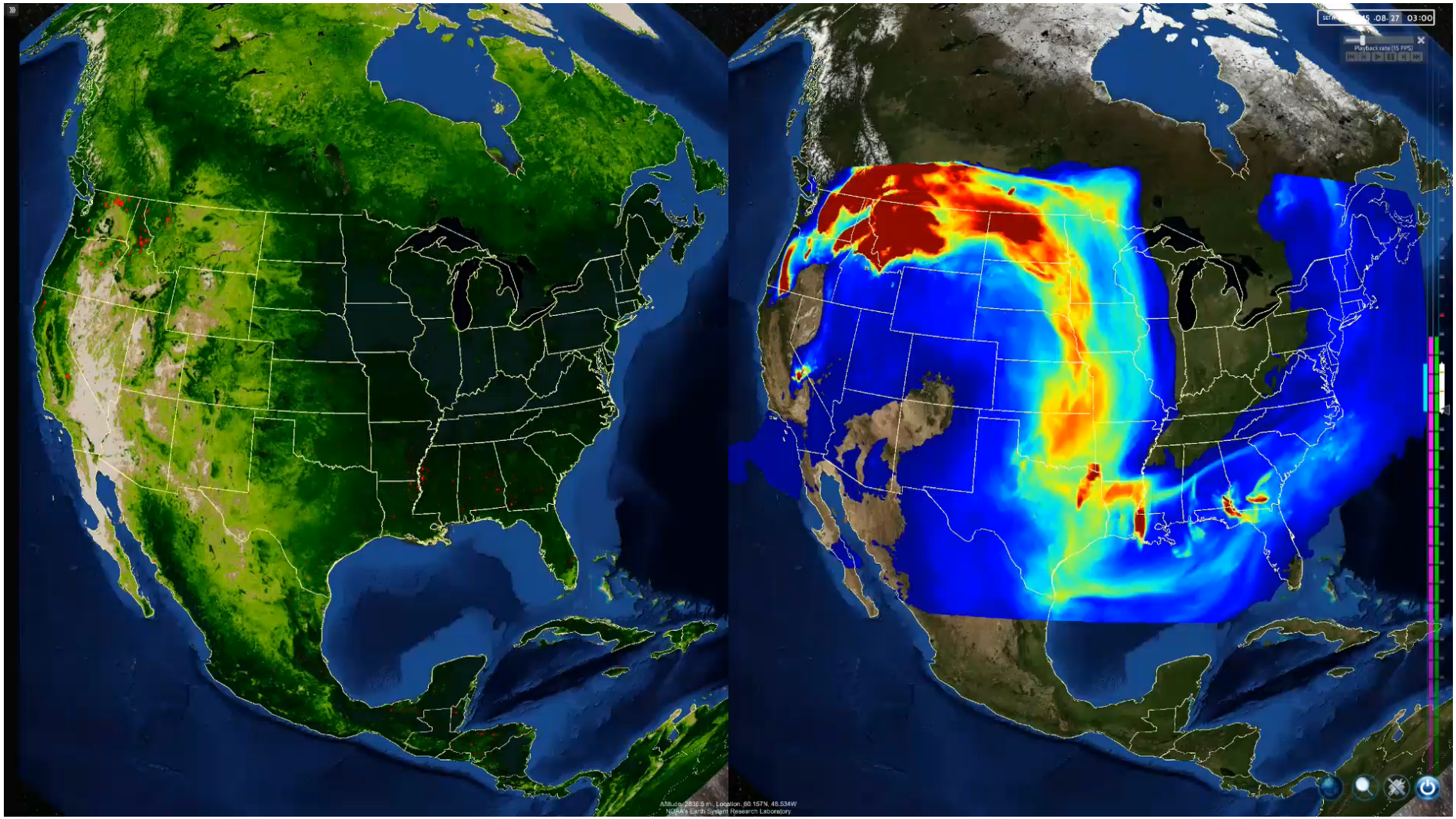
Help firefighters monitor the status of nocturnal fire lines.

Ft. McMurray Fire: 4-6 May 2016



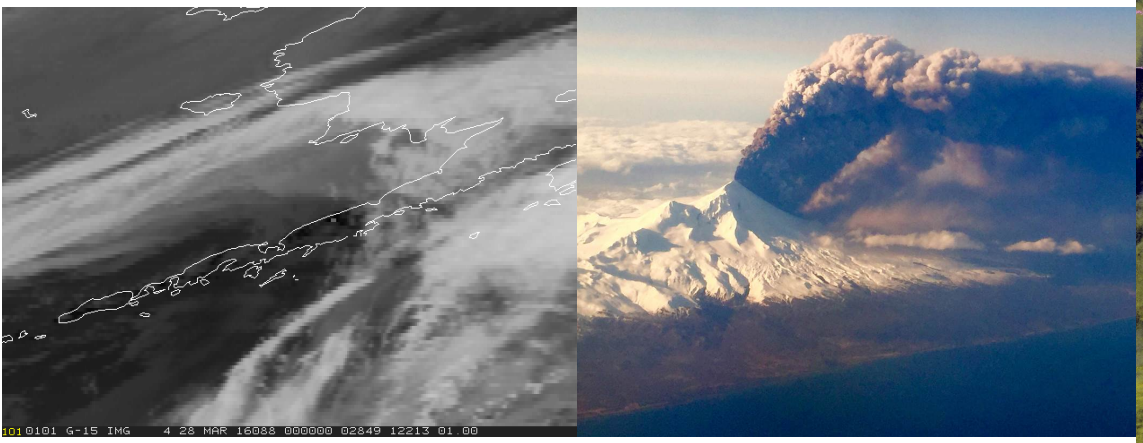
Detection of lights from small/nascent fires (e.g., lightning triggered) initially undetected by thermal infrared bands.

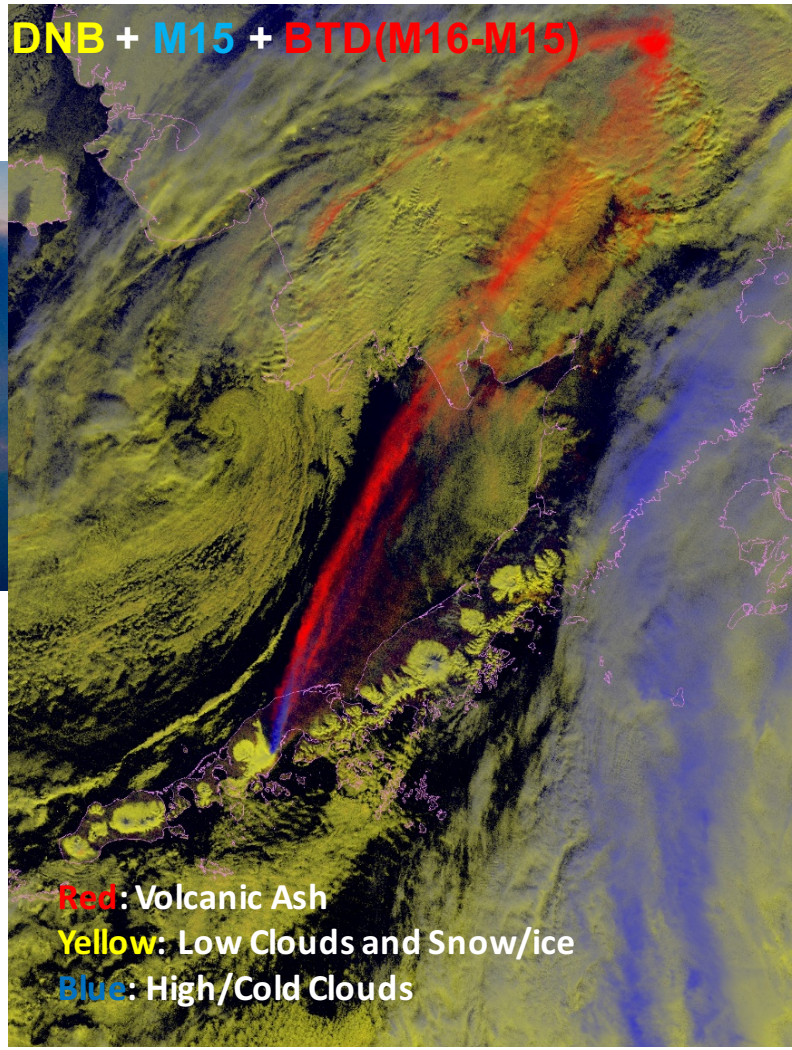
Dangerous Phenomena: Smoke



DNB Erupts on the Scene

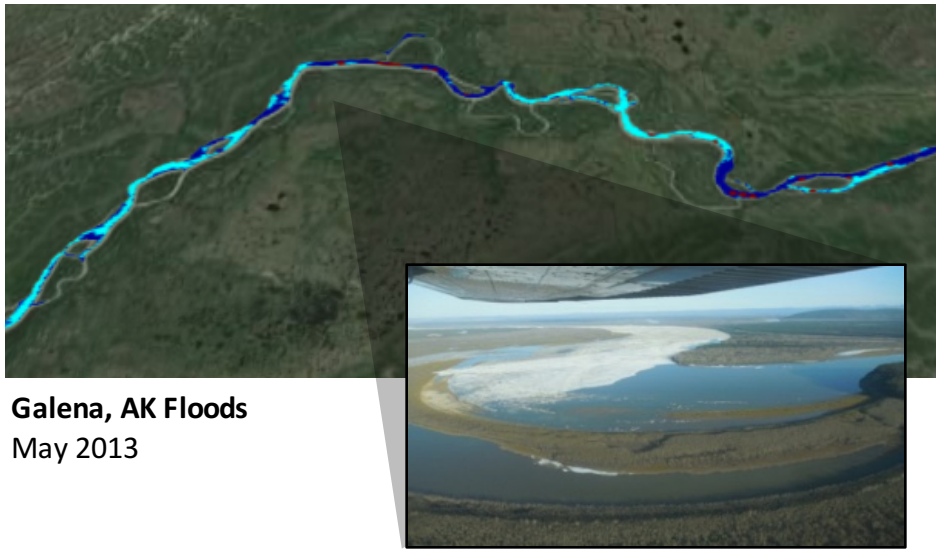
Eruption of Pavlof Volcano, Aleutian Chain:
27 March 2016



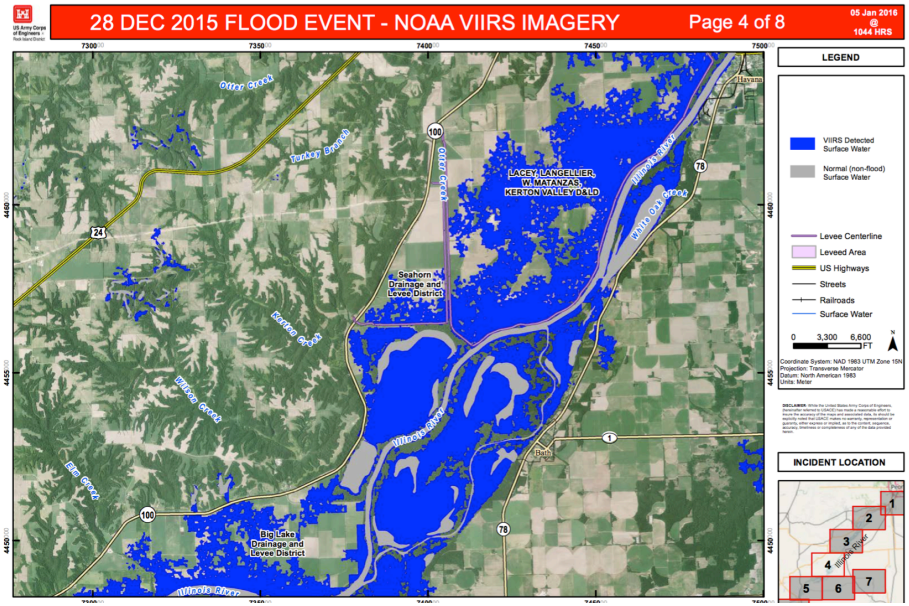


- Combining the DNB with other VIIRS bands allows us to create novel nighttime imagery.
- Offers the same sharp contrast of low-level and surface features as we are used to seeing in daytime imagery.

Dangerous Phenomena: Floods



Galena, AK Floods
May 2013



- VIIRS can identify river ice jams which can lead to large flood events
- Flooding from ice jams can occur in a very short time
- Flooding can occur from snow melt and heavy rains

Marine Conditions

The New York Times
Sunday, April 7, 2013

Environment

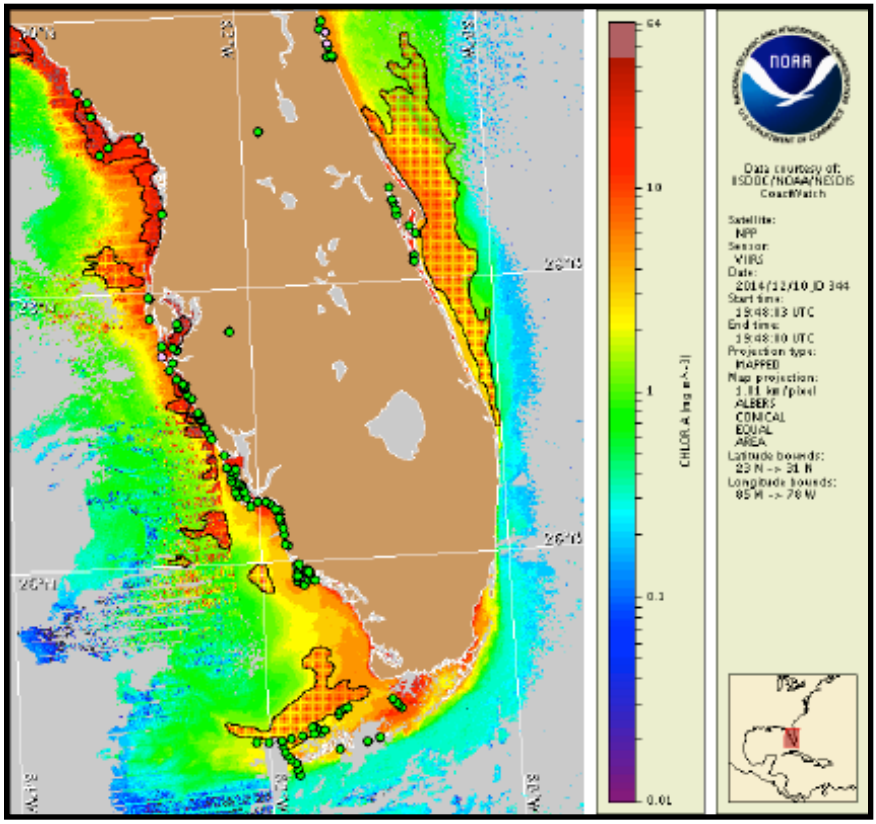
WORLD | U.S. | N.Y. / REGION | BUSINESS | TECHNOLOGY | SCIENCE | HEALTH | SPORTS | OPINION

ENVIRONMENT SPACE & COSMOS

Florida Algae Bloom Leads to Record Manatee Deaths

A manatee off Peanut Island, Fla.

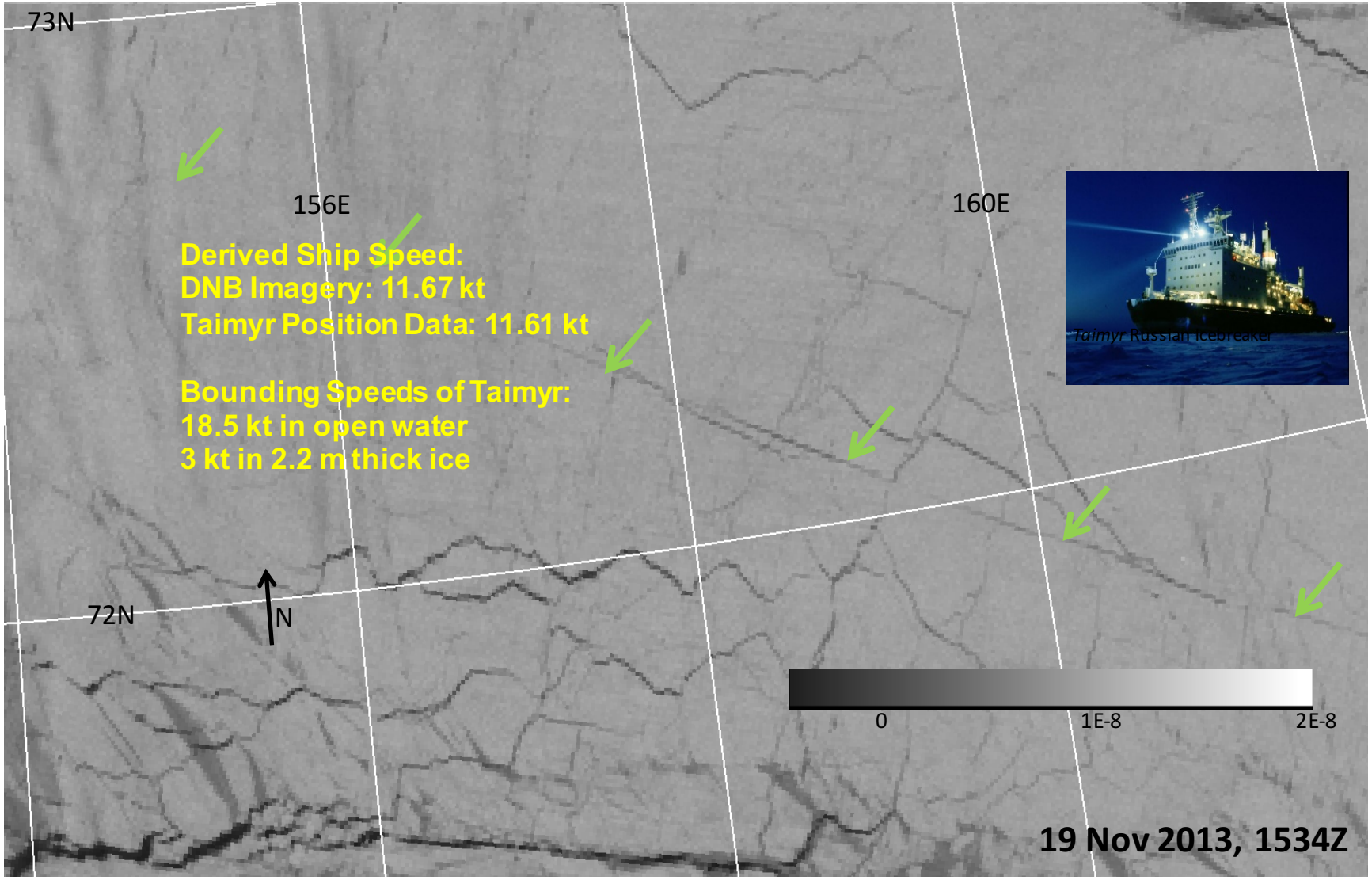
Julio Cortez/Associated Pre



NOAA Harmful Algal Bloom Operational Forecast System (HAB-OFS)

Bulletins

Movement of Individual Ships



Coral Bleaching

NOAA Coral Reef Watch Maximum Satellite Coral Bleaching Alert Area YTD
18 June 2016

theguardian
website of the year

home › environment › wildlife | energy | pollution | climate change

Thursday 26 May 2016
14.11 BST

Coral

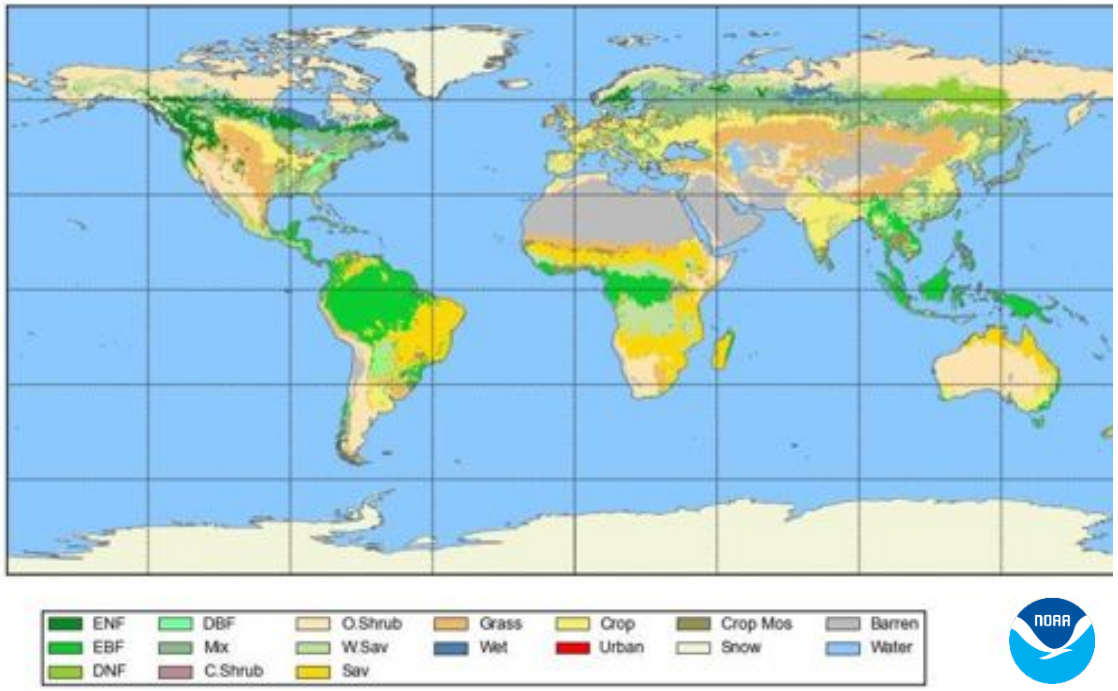
Thailand closes dive sites over coral bleaching crisis

In a rare move to shun tourism profits for environmental protection, 10 popular dive sites have been shut down in a bid to slow a coral bleaching crisis

Land Conditions

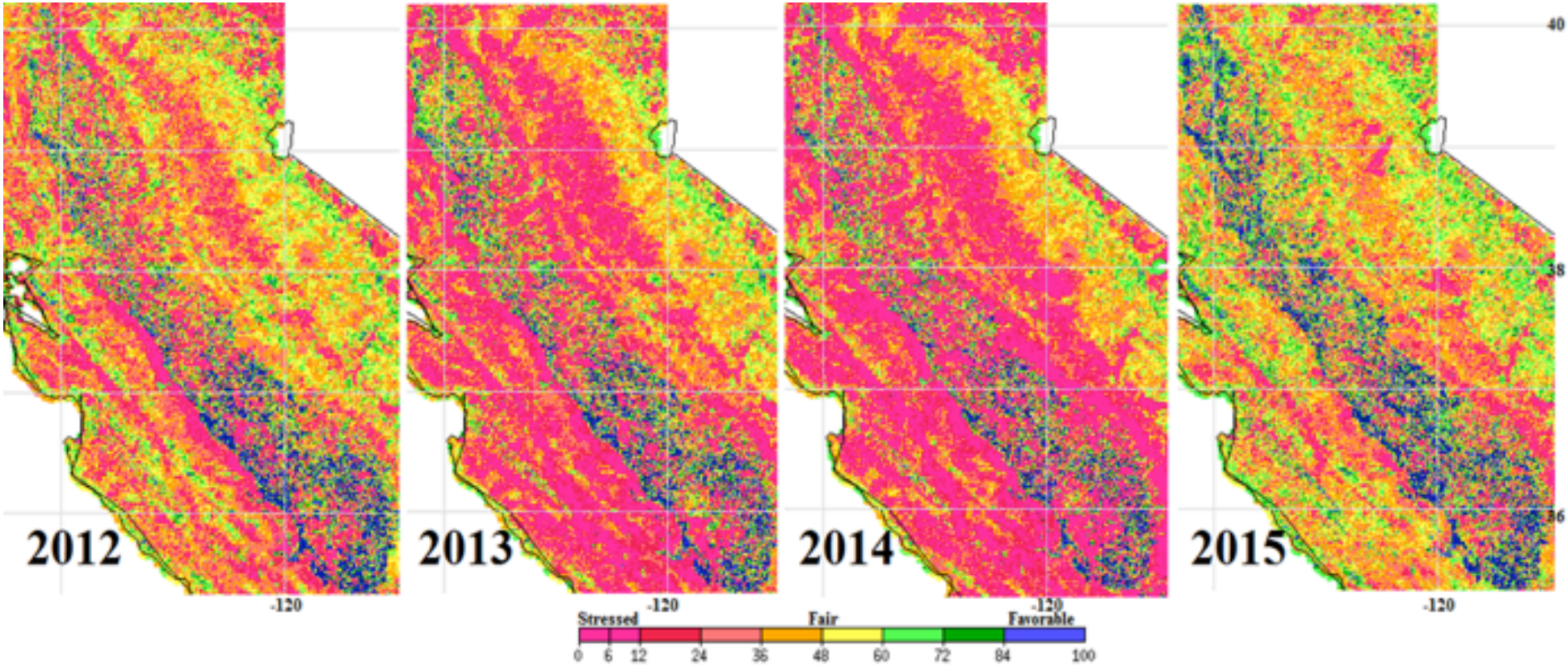
Suomi NPP VIIRS Global Surface Type Composite (ST-EDR)

2 Nov 2016



Weekly GVF 7/26/15

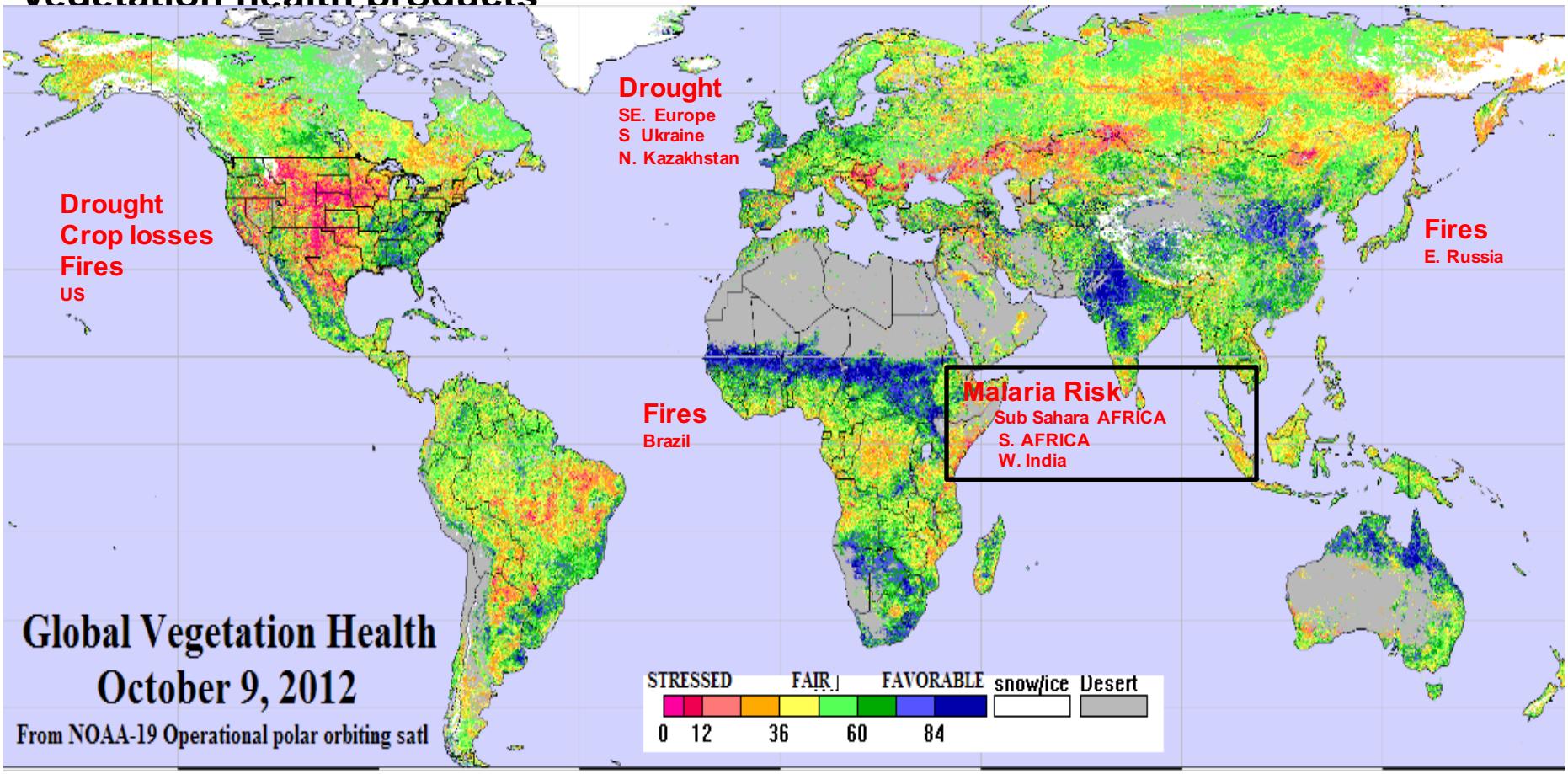
California Drought



S-NPP/VIIRS-500m Vegetation health, June 12, USA, California, Central Valley

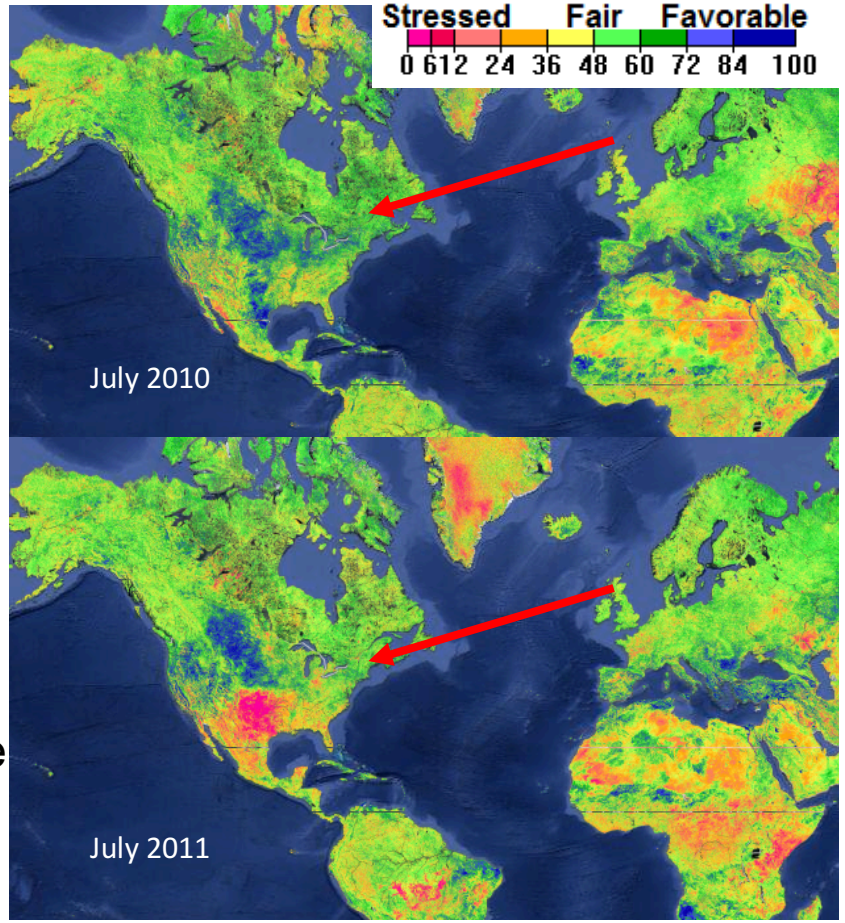
Vegetation and Agriculture Data Products

Vegetation health products



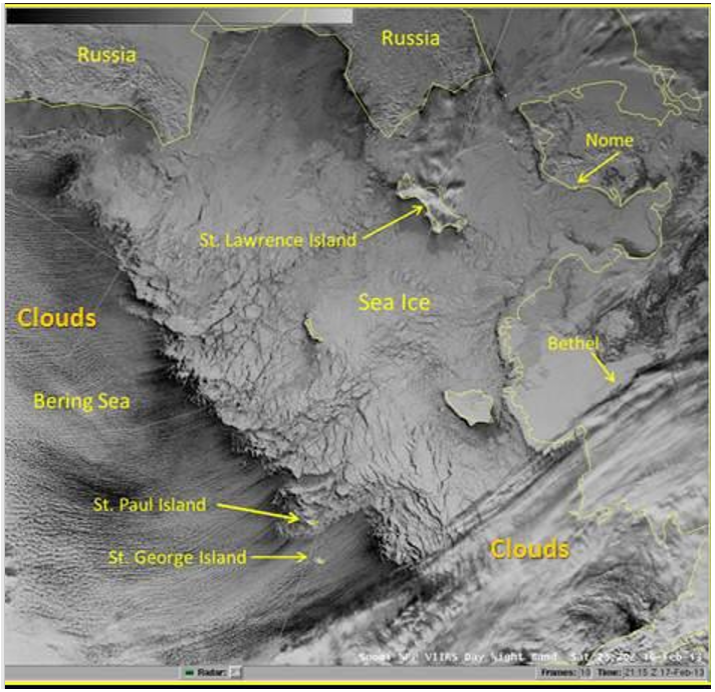
Vegetation and Agriculture Data Products

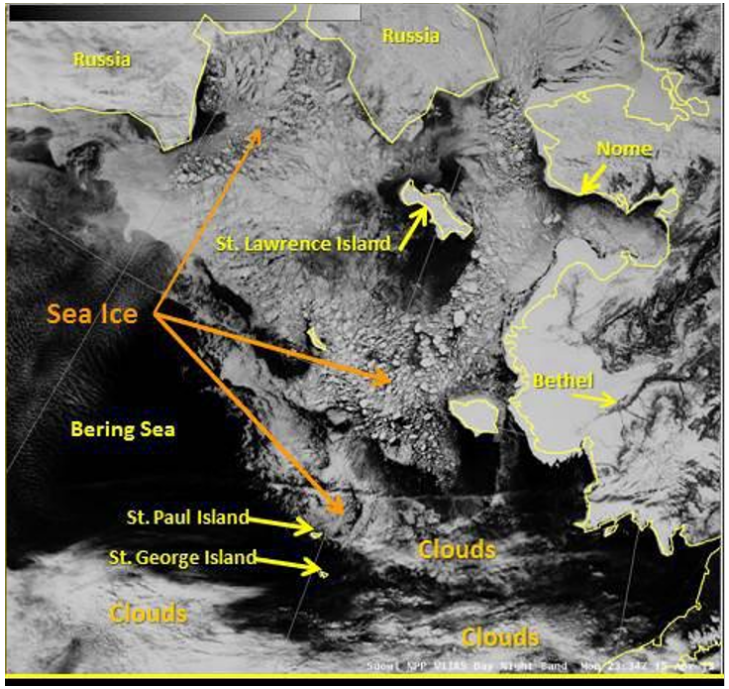
- Vegetation health products
- Soil moisture, land surface temperature
- Land type
  - arid vs. semi arid
- Snow cover and snow water equivalent
  - water resources
- Precipitation
  - especially important for areas without radar
- Global assessments and historical perspective



Transportation and Commerce

Feb. 16, 2013





April 15, 2013

- Aviation route planning
- Commercial shipping and navigation
- Recreational boating
- Railways
- Ground transportation
- Power utilities

Power Utilities

9/22/2016 0615 UTC

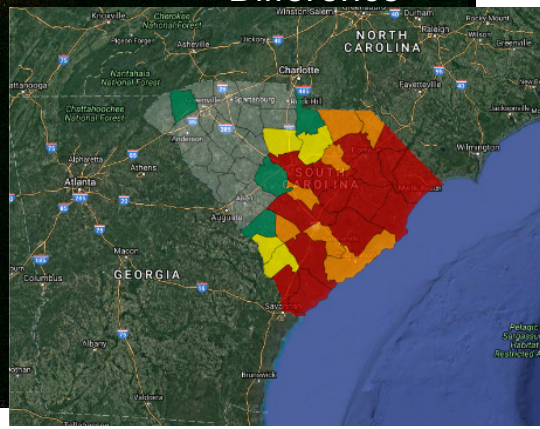
COLOR KEY

Gold = no changes to lights

Red = possible power outages

Green = 'new lights' (e.g., moonlight, diffusion of lights by clouds, or search and rescue / disaster relief)

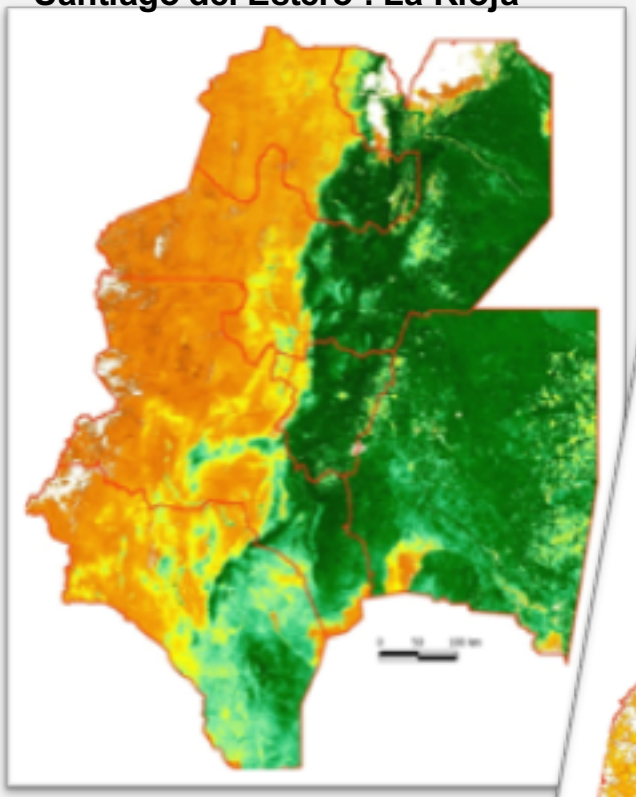
Difference



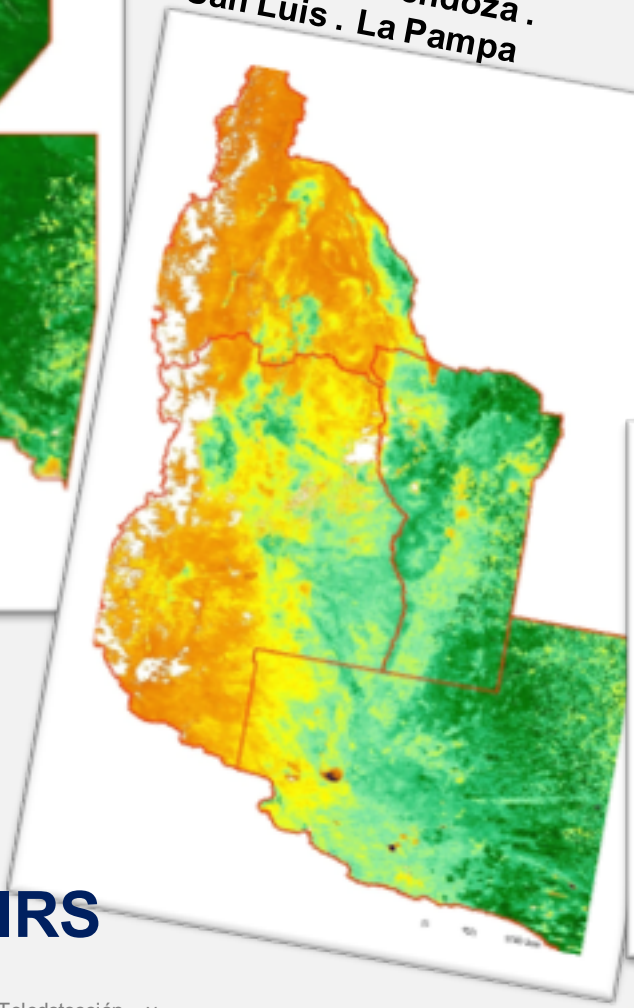
Servicio Meteorológico Nacional

Department of Remote Sensing and Environmental Applications

Jujuy . Salta . Catamarca . Tucumán .
Santiago del Estero . La Rioja



San Juan . Mendoza .
San Luis . La Pampa



Corrientes. Misiones

NDVI

Chaco.
Formosa

NDVI

- sin datos
- agua
- -0.1
- -0.05
- 0
- 0.04
- 0.14
- 0.24
- 0.34
- 0.44
- 0.54
- 0.64
- 0.74
- 1

MONTHLY MAXIMUM Images

SUOMI NPP - VIIRS

Servicio Meteorológico Nacional

Teledetección y Aplicaciones Ambientales

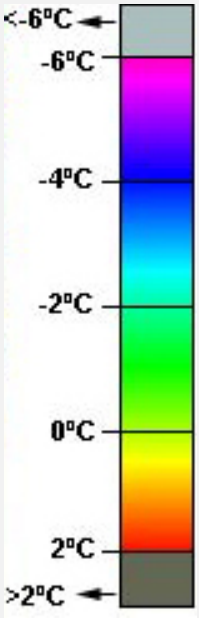
2017 | Año de las Energías Renovables

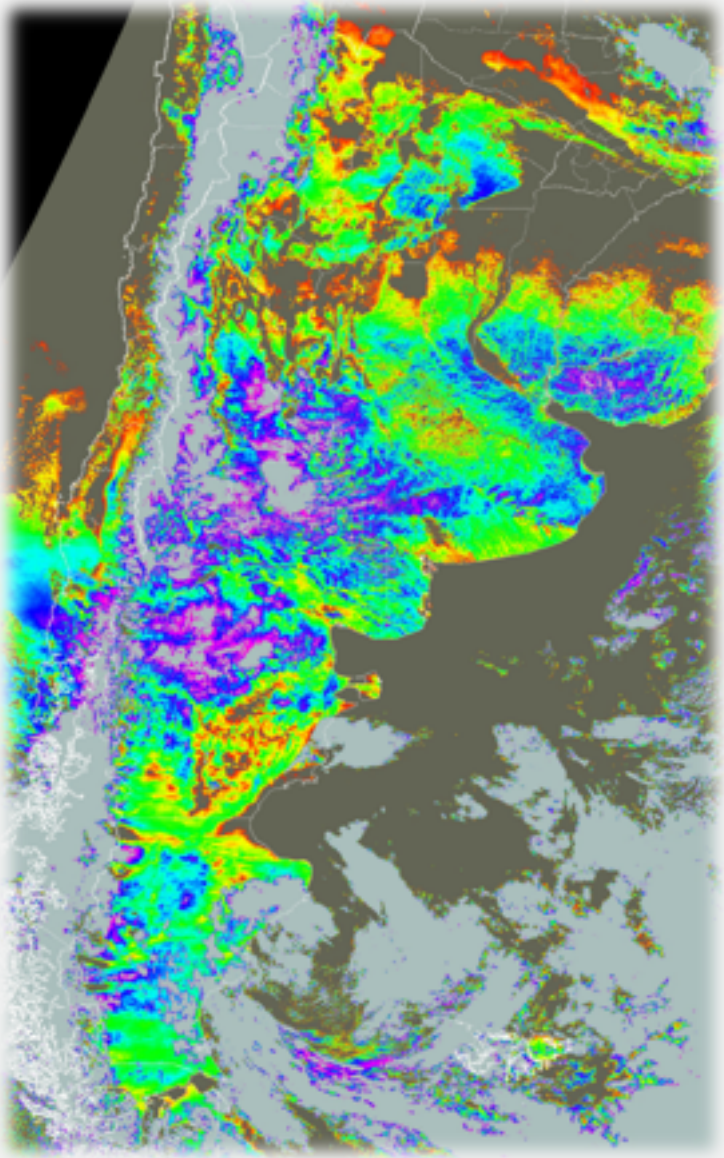
Ministerio de Defensa
Presidencia de la Nación

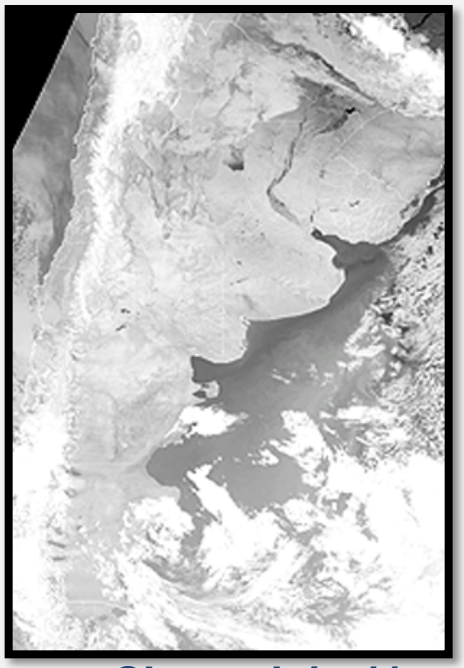
Land Surface Temperature

(Ground frost)

NOAA-18
12-JUNE-15 . 08:28 UTC



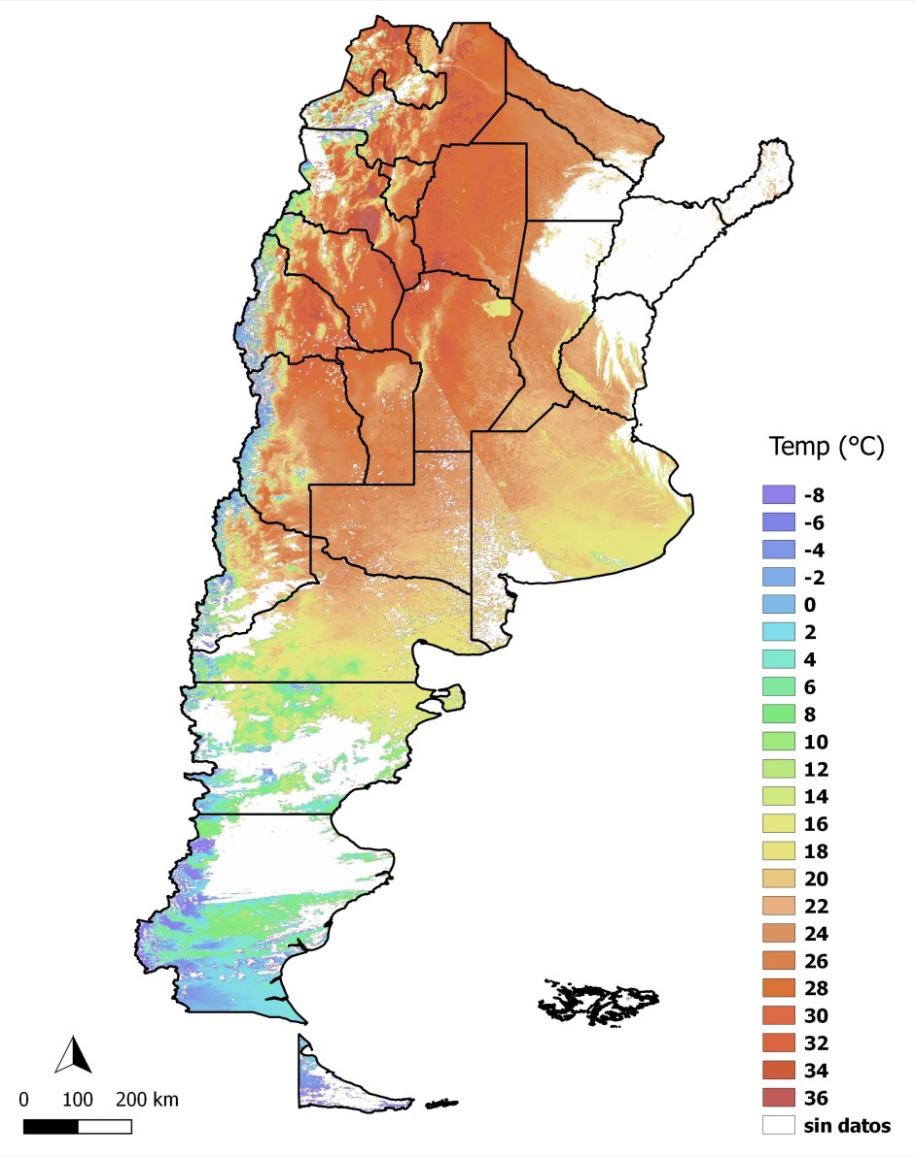




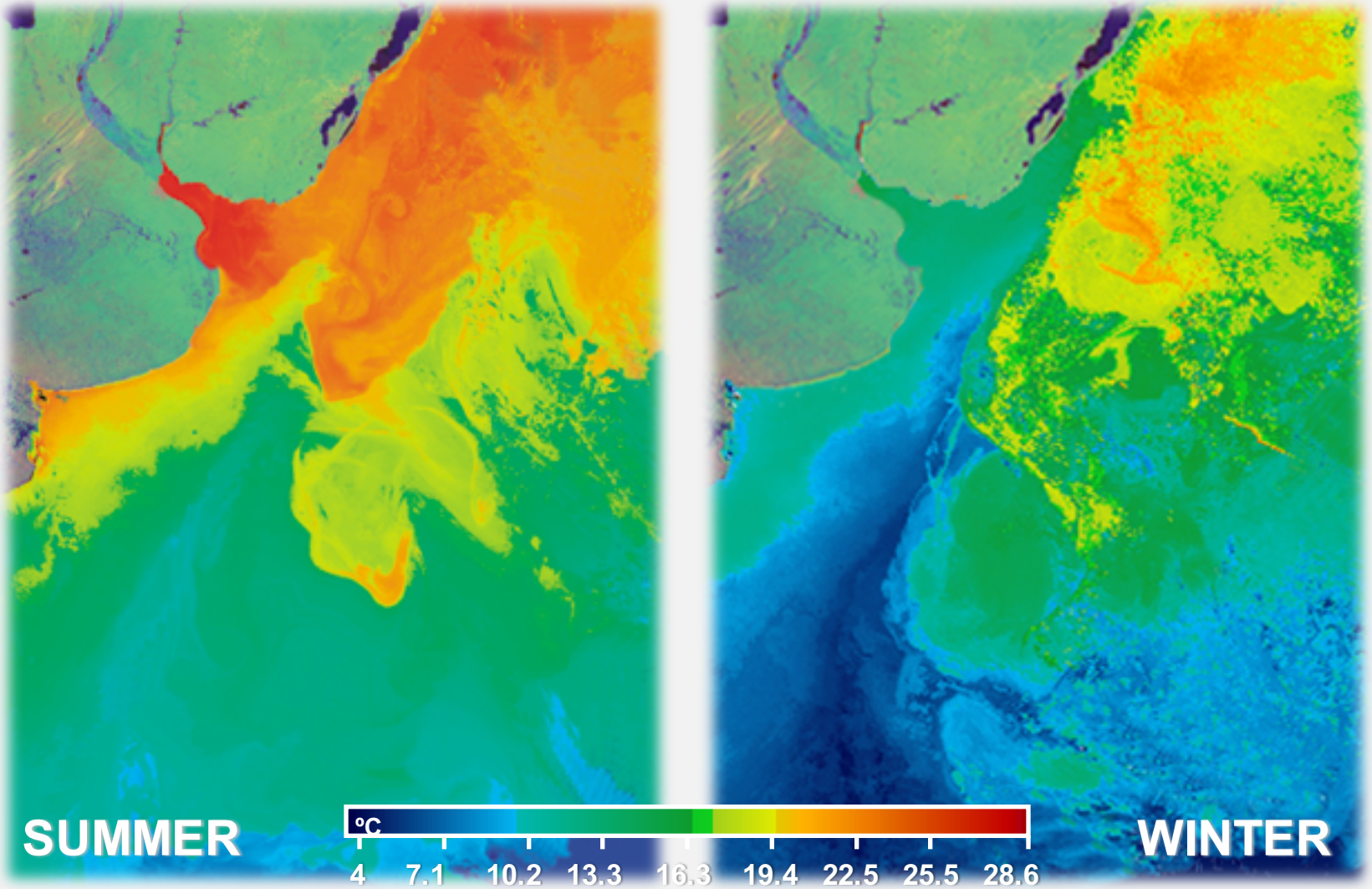
Channel 4 . 11 µm

Land Surface Temperature "LST"

SUOMI NPP-VIIRS
18-AUG-15
750m

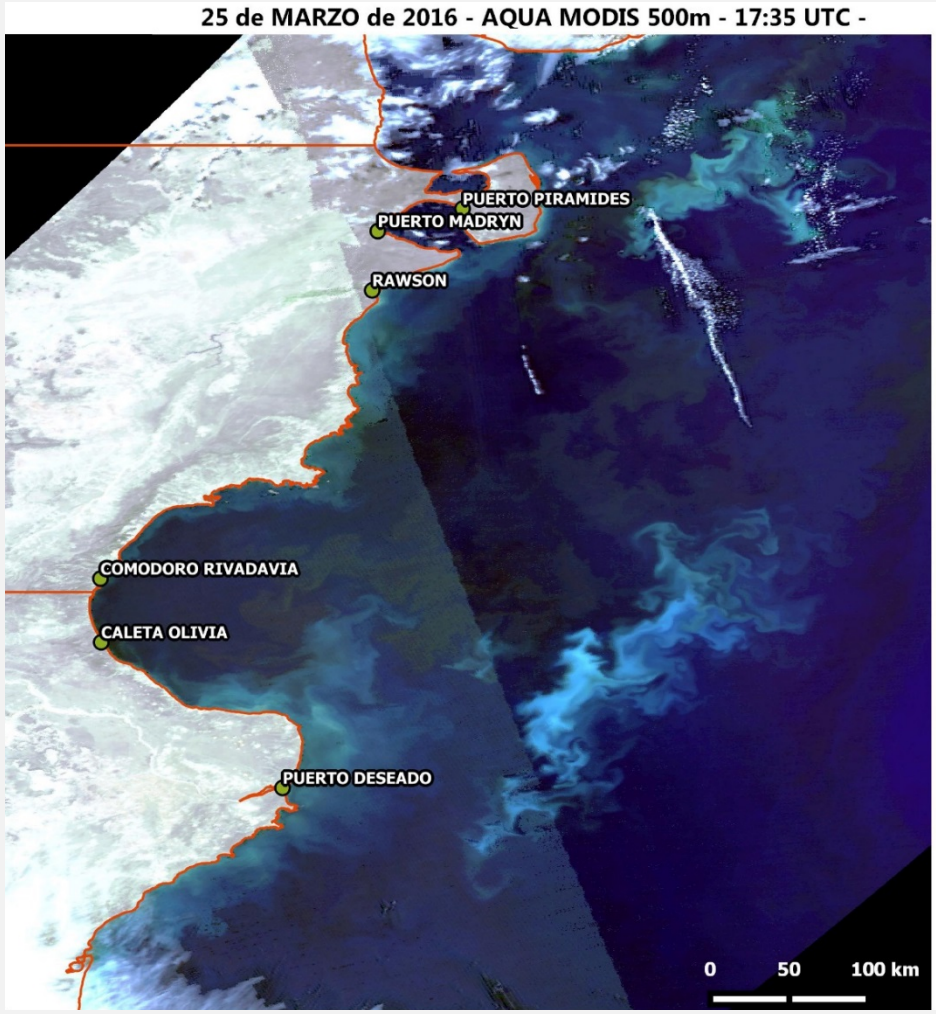


Sea Surface Temperature

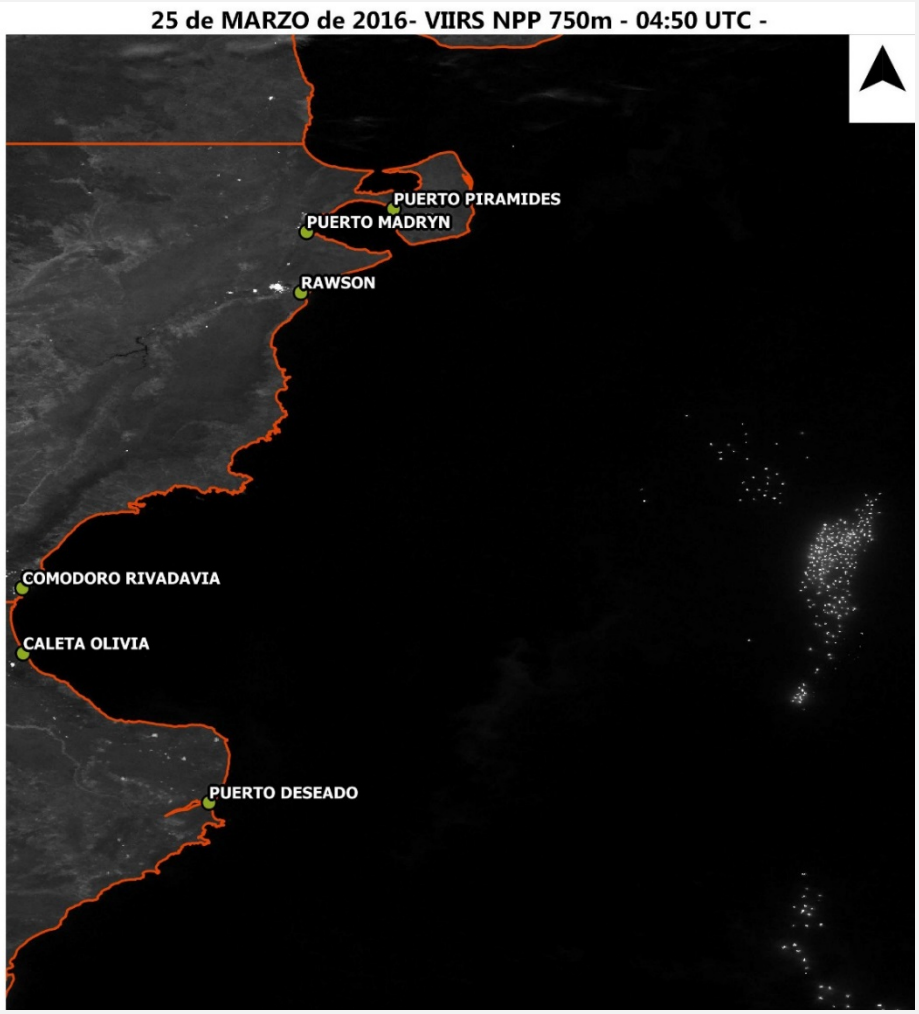


ARGENTINA SEA - DBN

PHYTOPLANKTON



Real color (RGB143). It is possible to observe the presence of phytoplankton in the Argentine Sea.



DNB (at night). Observed lights of possible fishing vessels coinciding with the highest concentration of phytoplankton.

Servicio Meteorológico Nacional

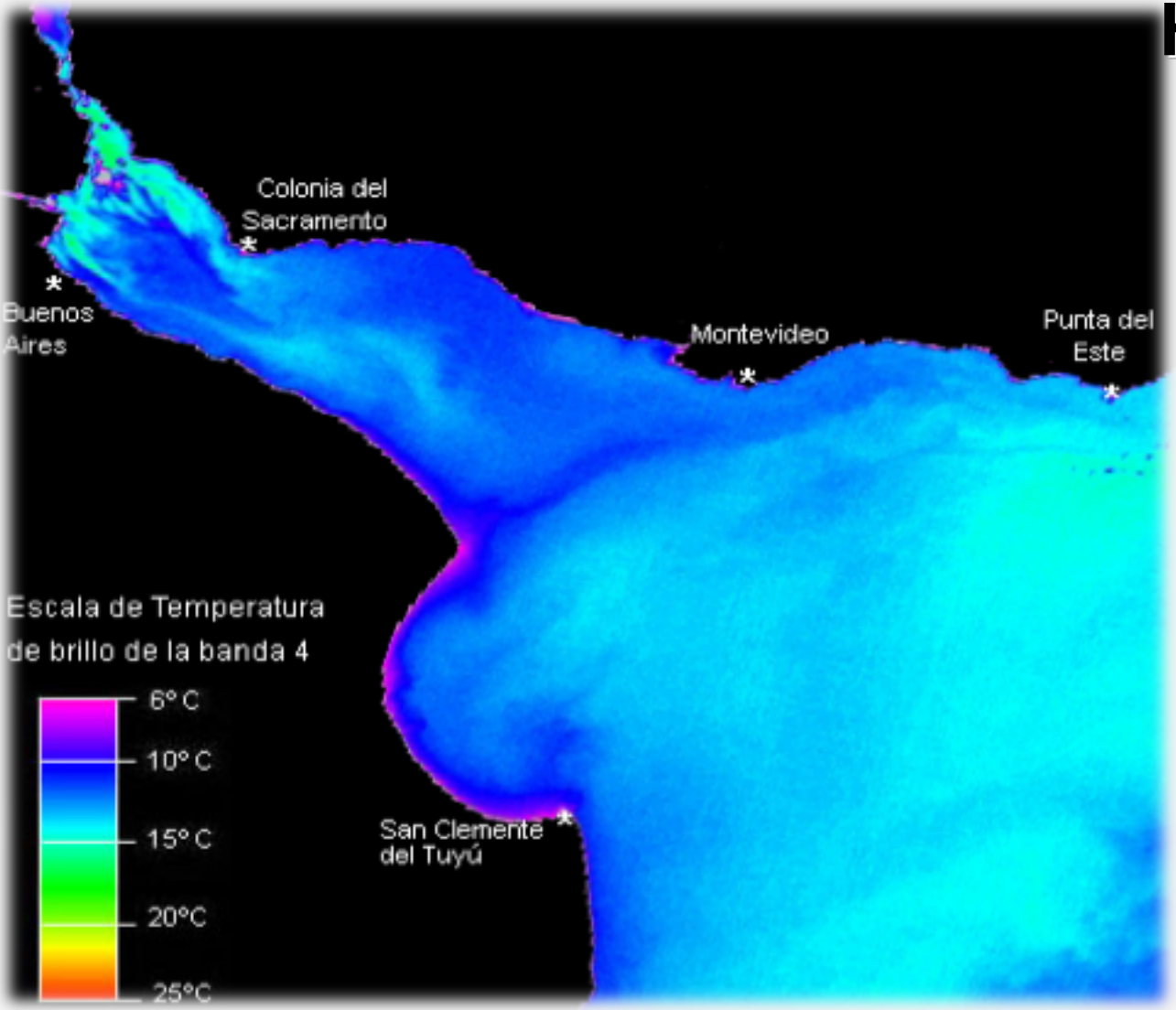
Teledetección y Aplicaciones Ambientales

2017 | Año de las Energías Renovables

Ministerio de Defensa
Presidencia de la Nación

HYDROLOGY

Surface Temperature of Río de la Plata



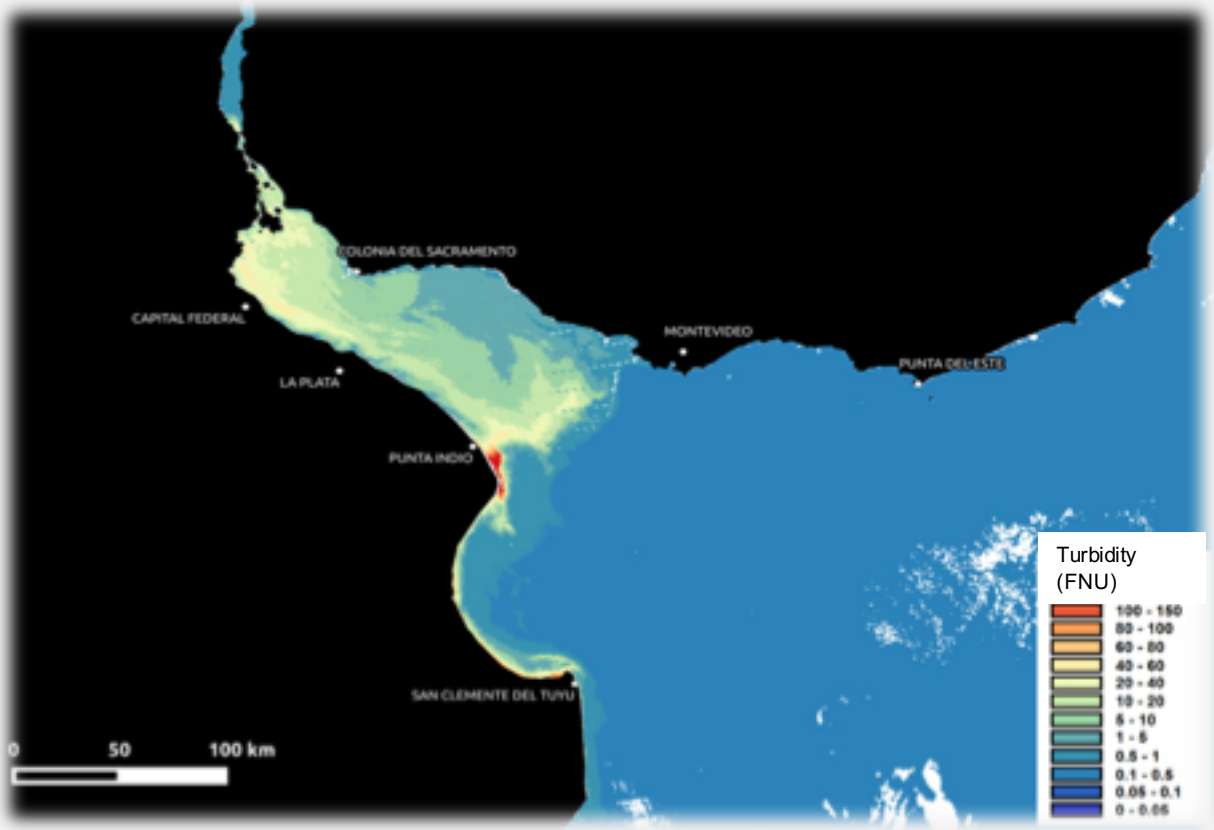
08-JUNE-2012

05:50 UTC

NOAA-18

HYDROLOGY

Turbidity of Río de la Plata



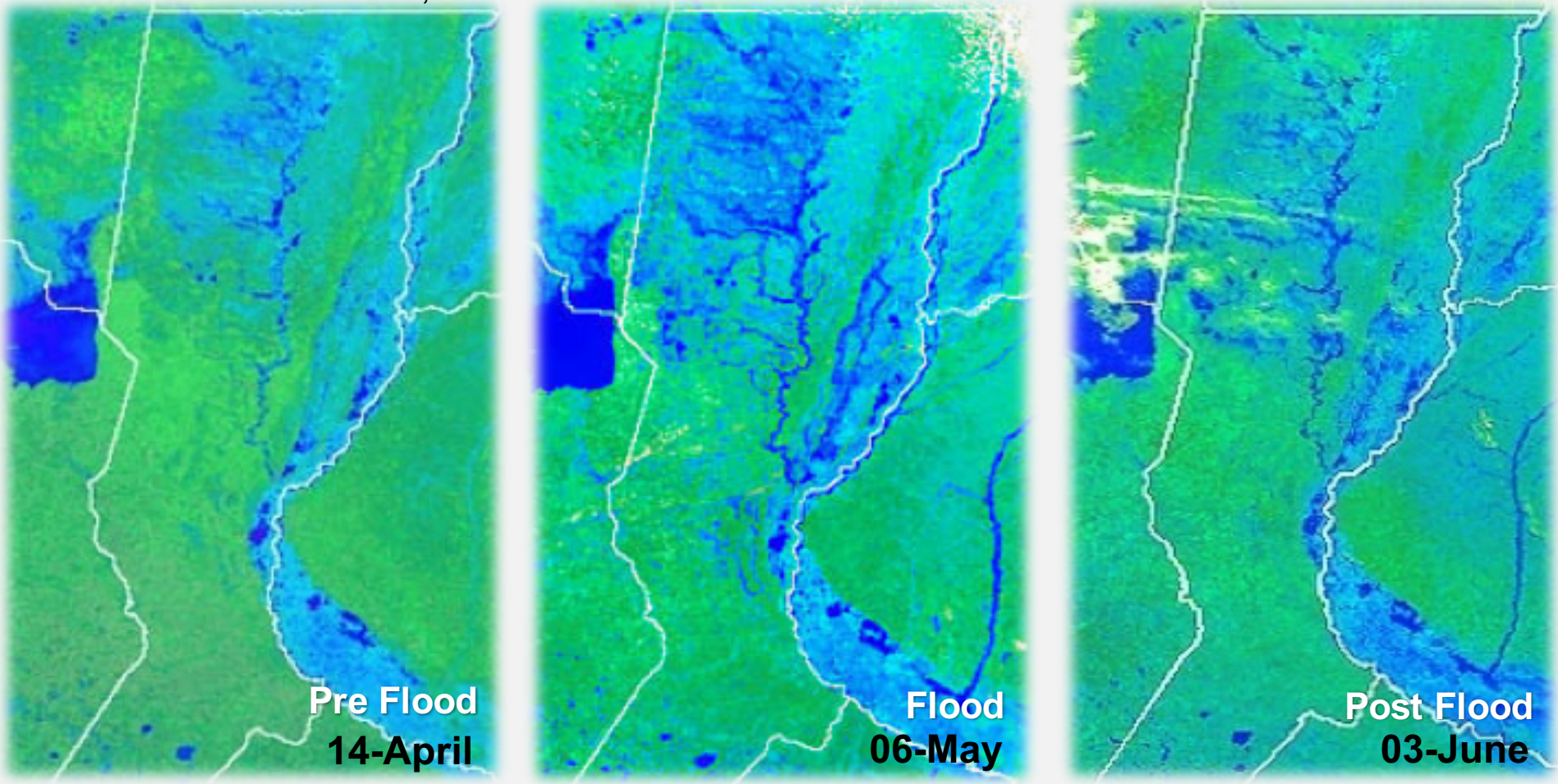
01-APRIL-2015
17:35 UTC
AQUA/MODIS

Turbidity map of Río de la Plata in nephelometric units (FNU). More reddish colors indicate greater water turbidity. The processing algorithm uses bands 1 (645nm) and 2 (859nm), corrected by atmosphere using bands 5 (1240nm) and 7 (2130nm). Algorithm developed by Dogliotti et al., 2015. Data source: OceanColor NASA - AQUA-MODIS.

HYDROLOGY

Year **2003** - **NOAA-17**

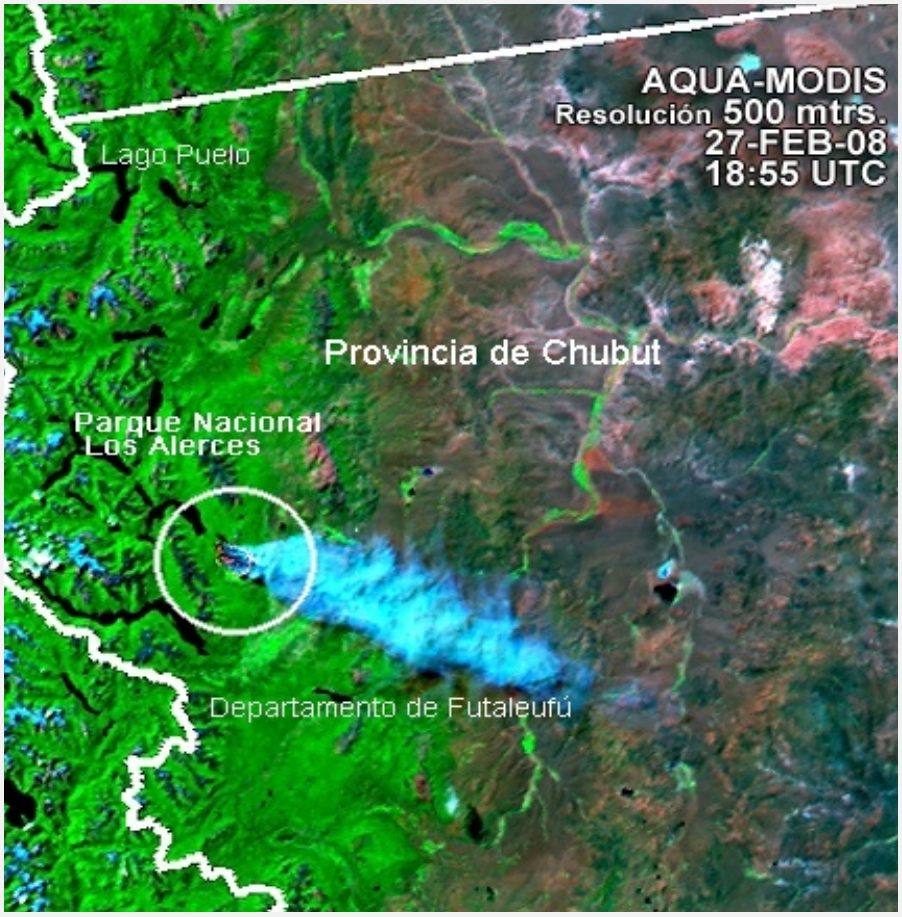
Flood - Río Salado Norte, Pcia. Santa Fe

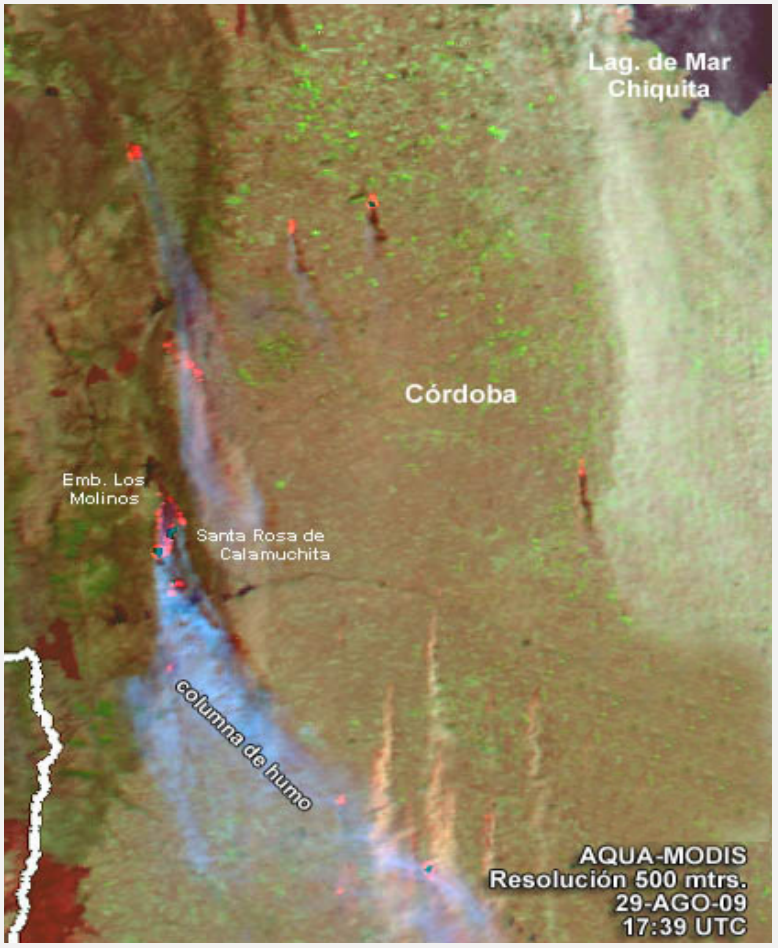


The rivers, lagoons and flooded areas are seen in bright blue. The less intense blue tones correspond to different levels of soil moisture.

FIRE

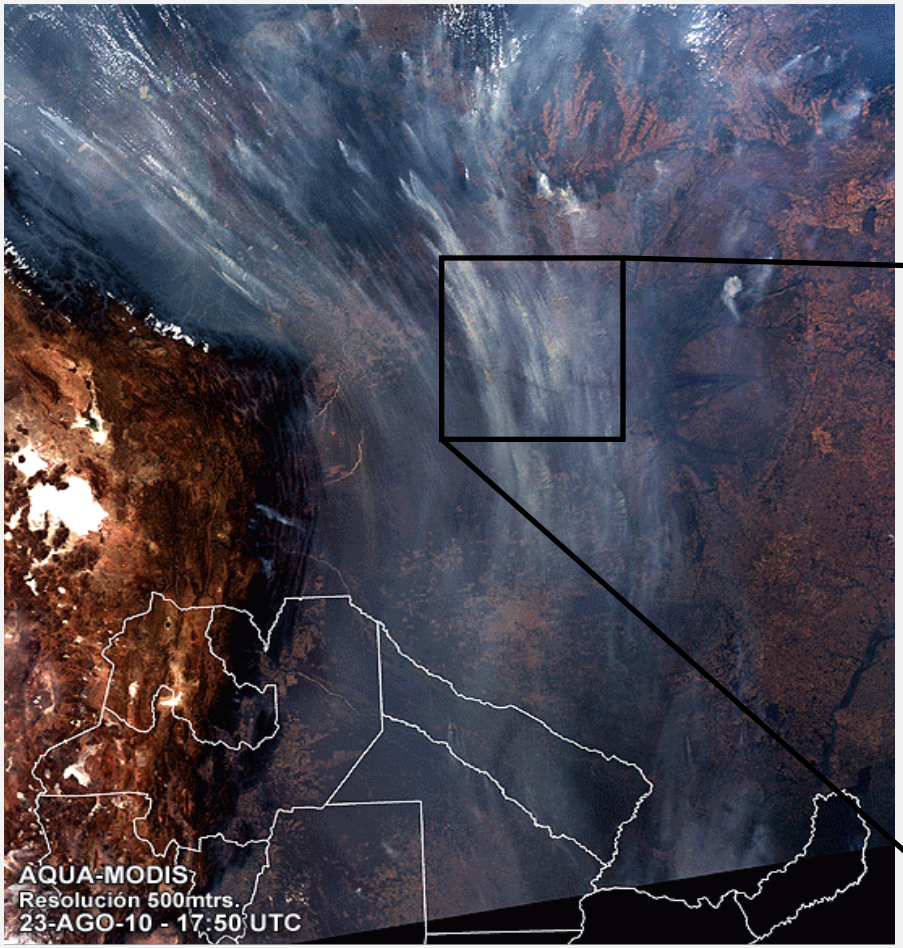
The area affected by
the fires, is observed in red tones
and in cyan the evolution of the column of smoke





FIRE

In the darkest image the smoke is observed, generated by the fires in Brazil and Bolivia, which covers as far north as Argentina.

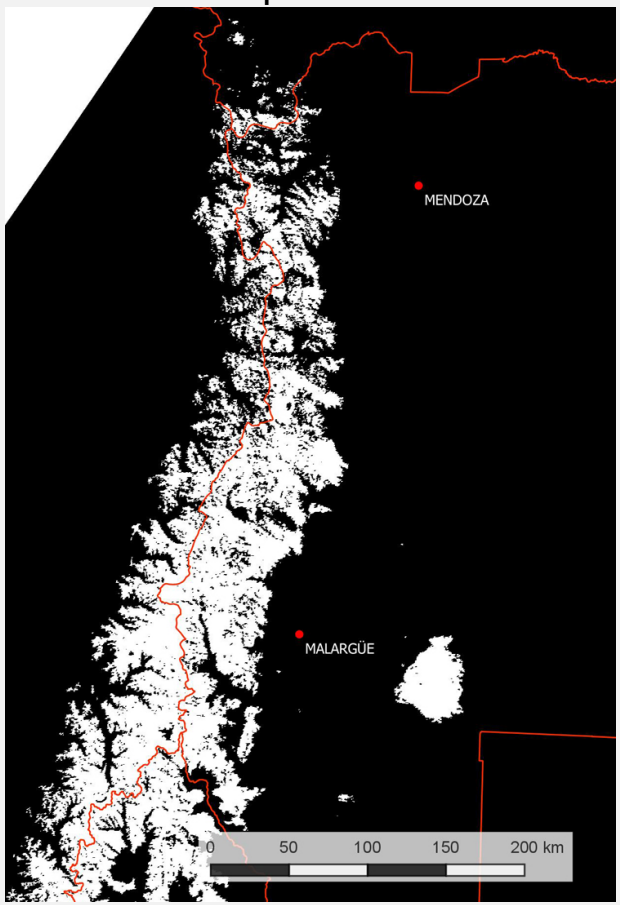


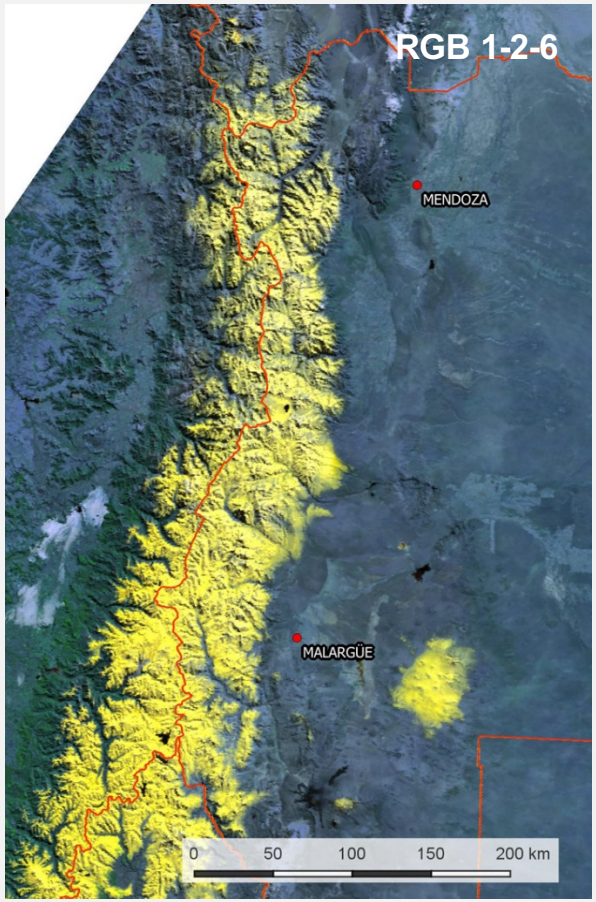
In the other color composition are observed the active fires and the areas burned in red-edge and part of the smoke in cyan.

Snow map built from a classification tree with data from multiple bands.

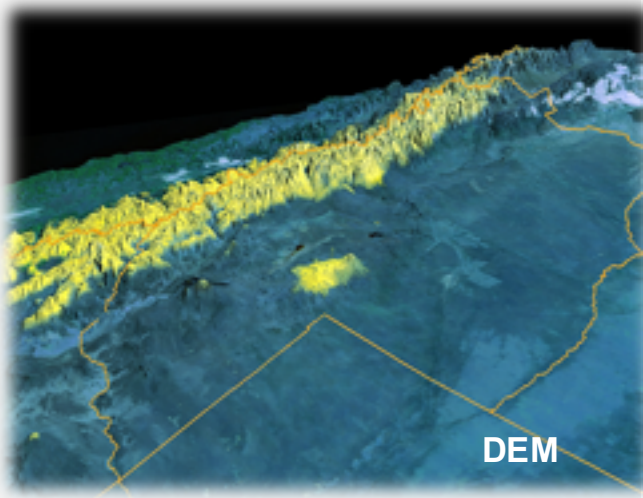
SNOW

Mendoza



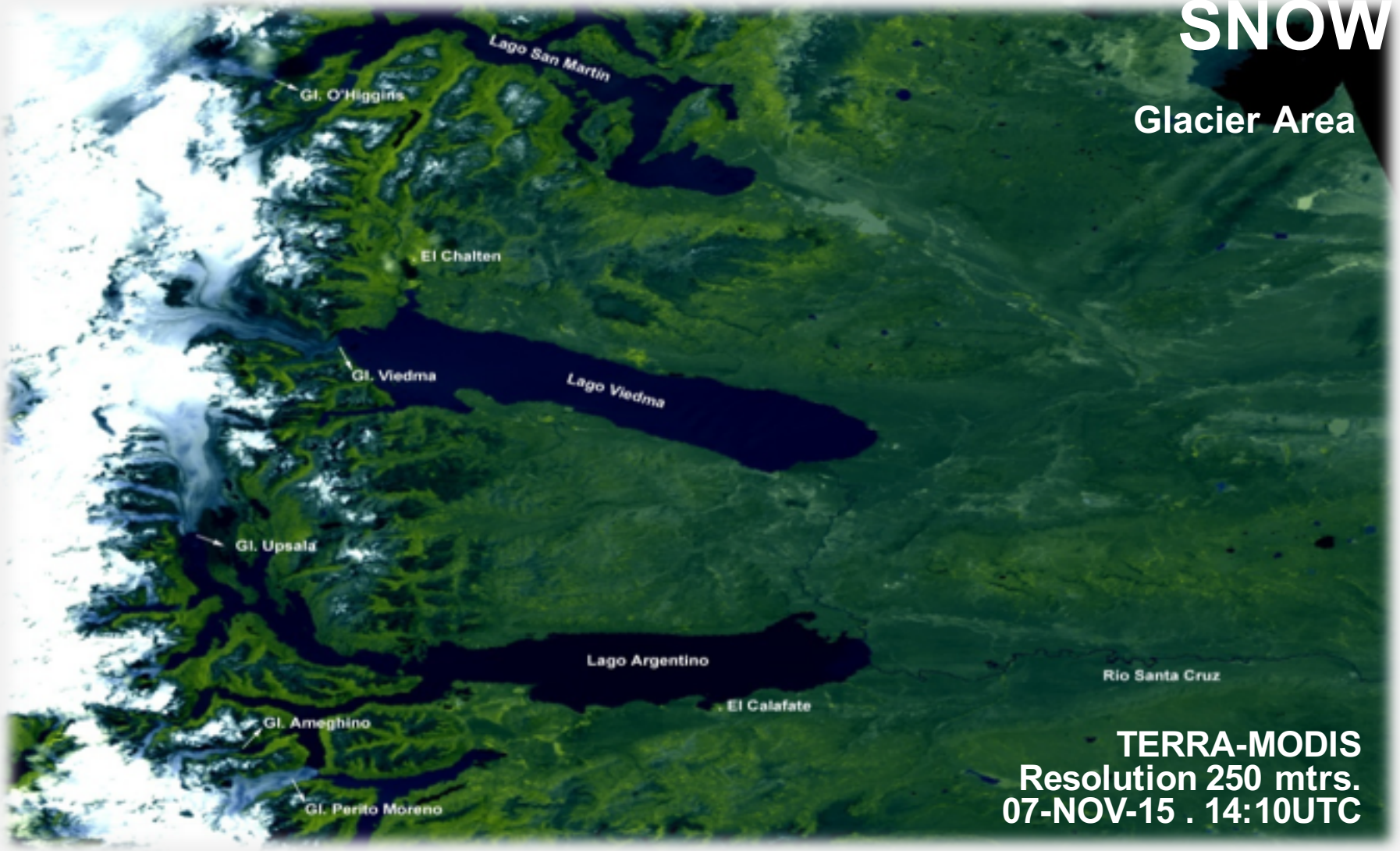


TERRA-MODIS
11-JUN-2015
15:00UTC

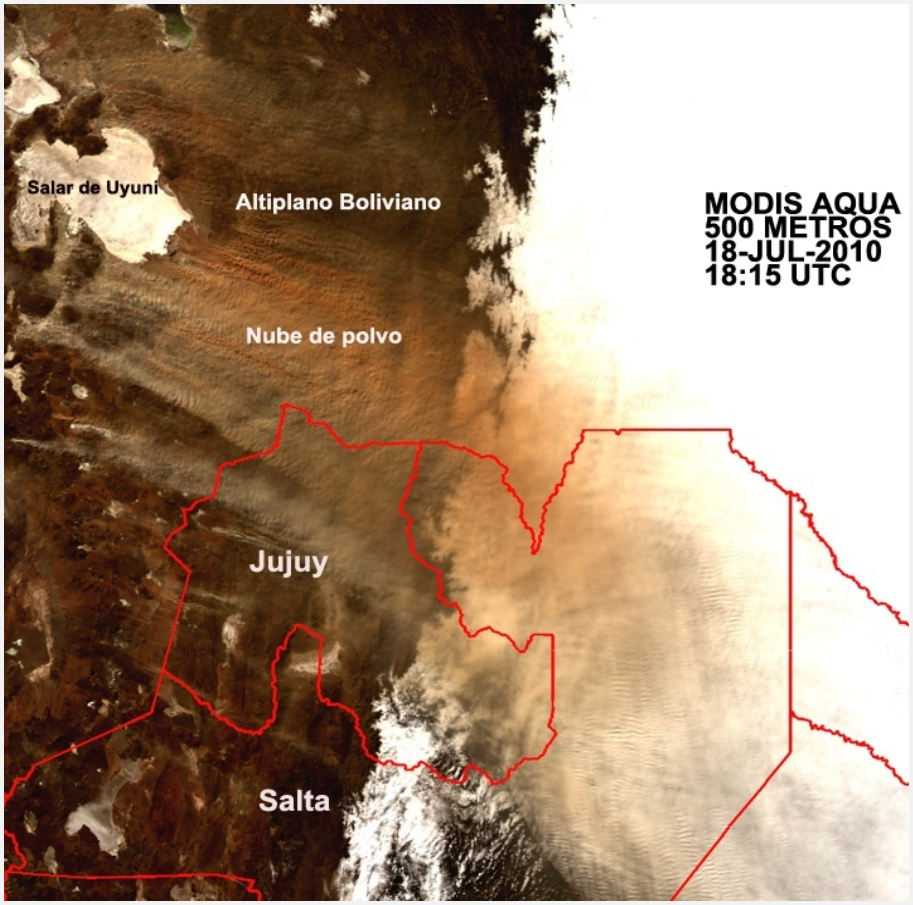


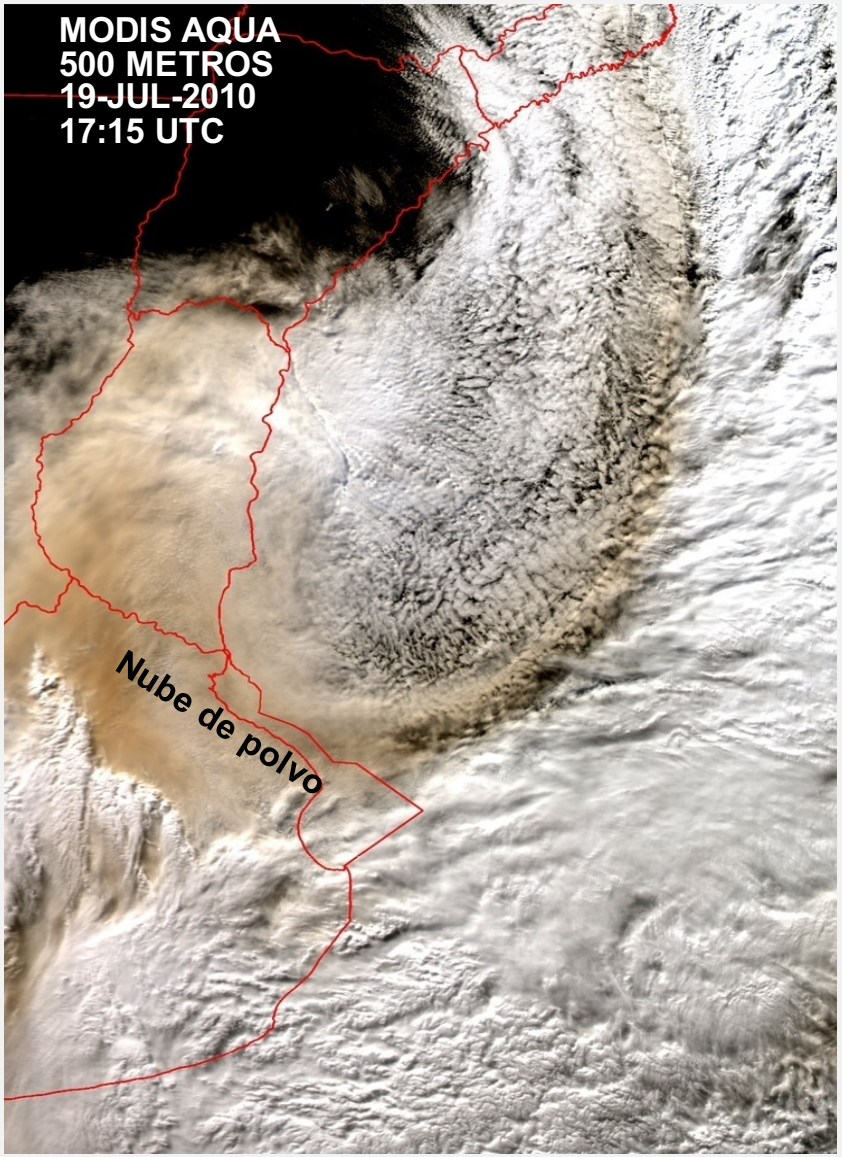
SNOW

Glacier Area



TERRA-MODIS
Resolution 250 mtrs.
07-NOV-15 . 14:10UTC

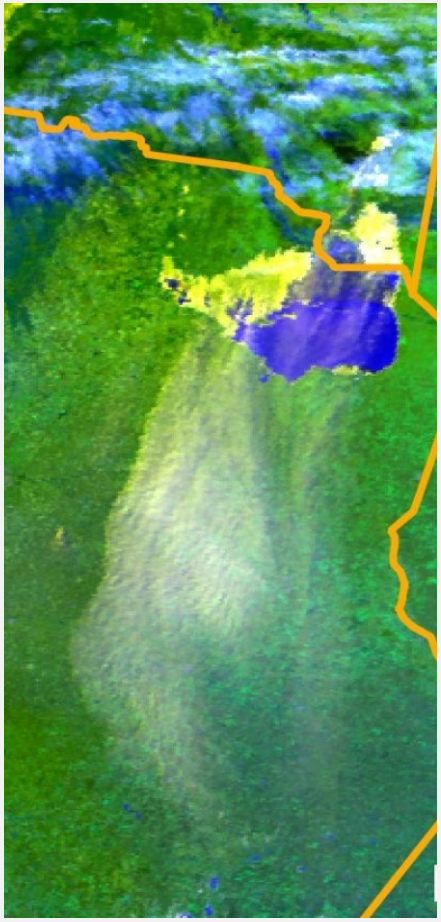

Salar de Uyuni
Altiplano Boliviano
MODIS AQUA
500 METROS
18-JUL-2010
18:15 UTC
Nube de polvo
Jujuy
Salta

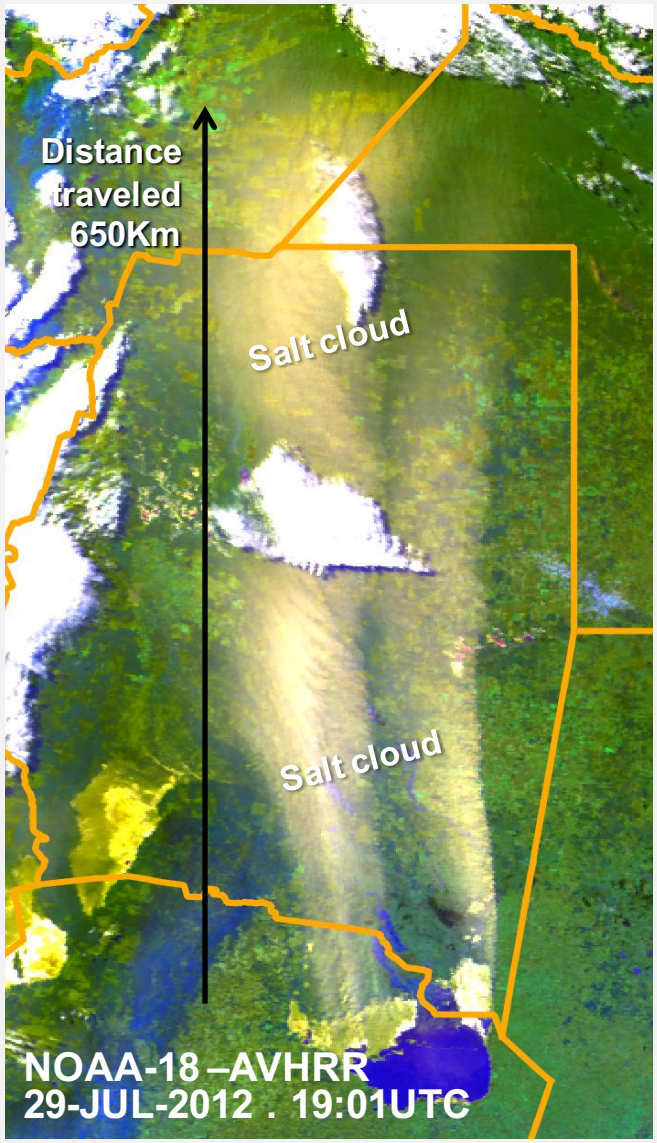

MODIS AQUA
500 METROS
19-JUL-2010
17:15 UTC
Nube de polvo

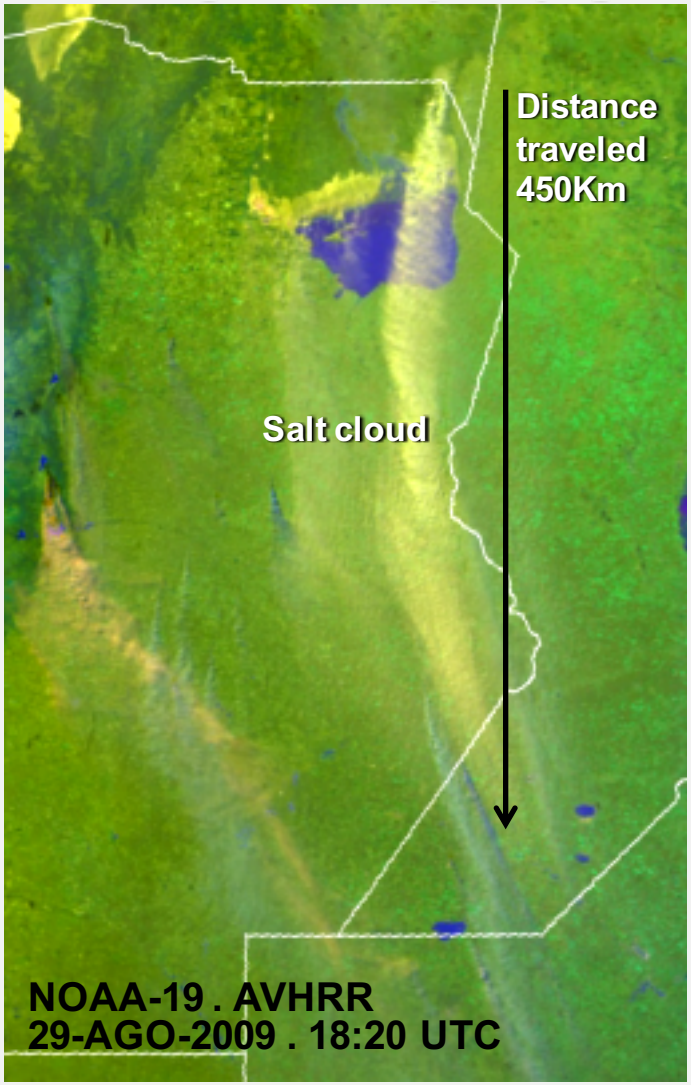
DUST CLOUD

SALT CLOUD

NOAA-18 . AVHRR
08-JUL-2012 . 19:30 UTC



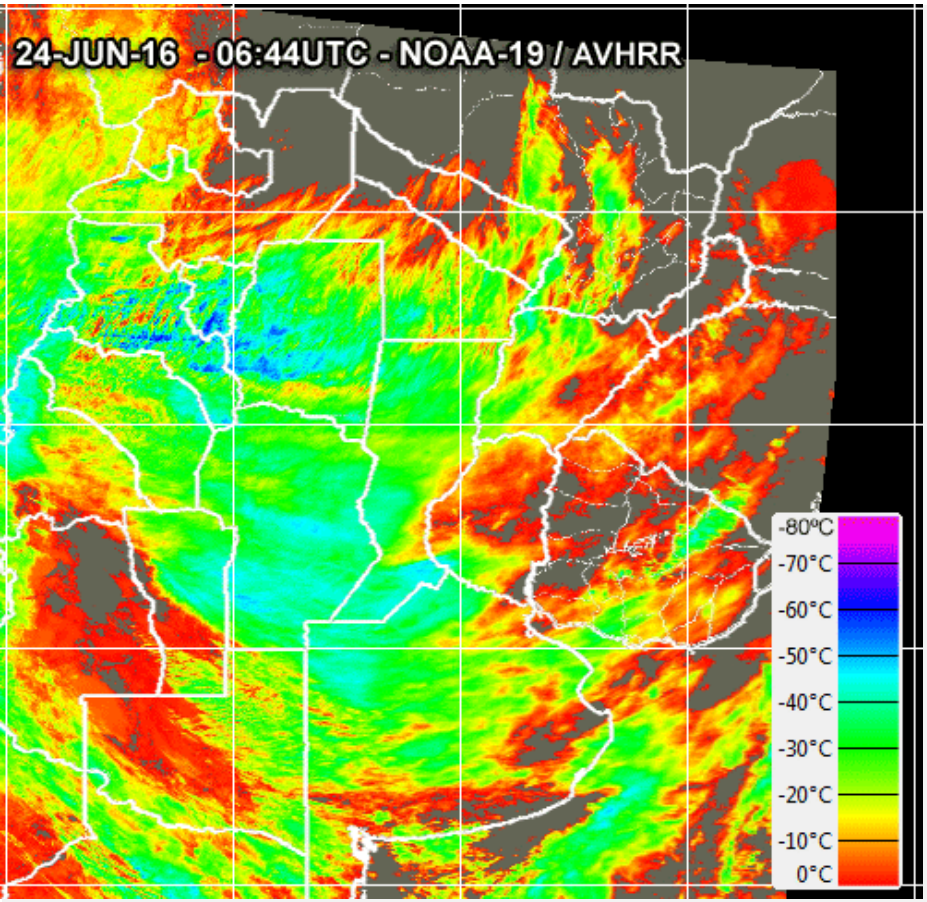




METEOROLOGY

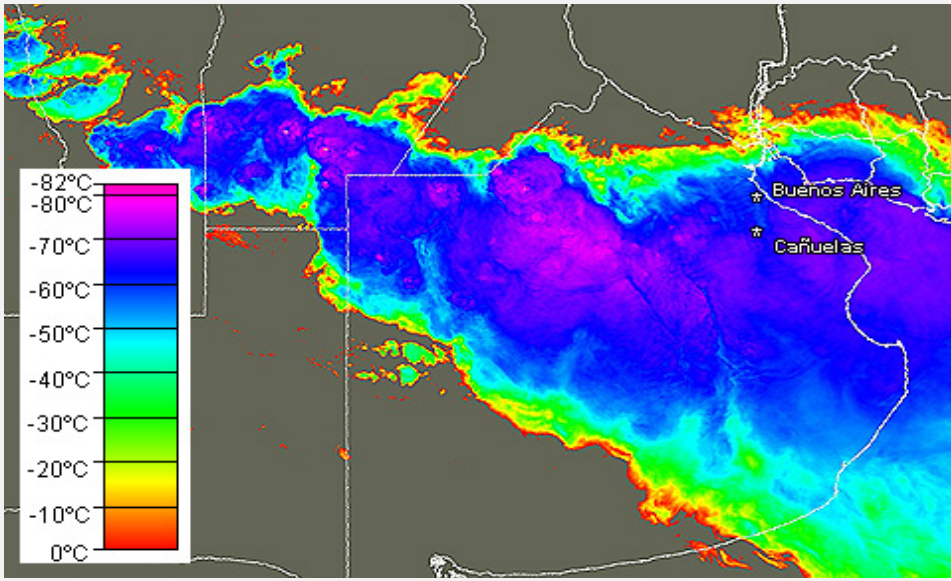
Cloud Top

(Brightness temperature)

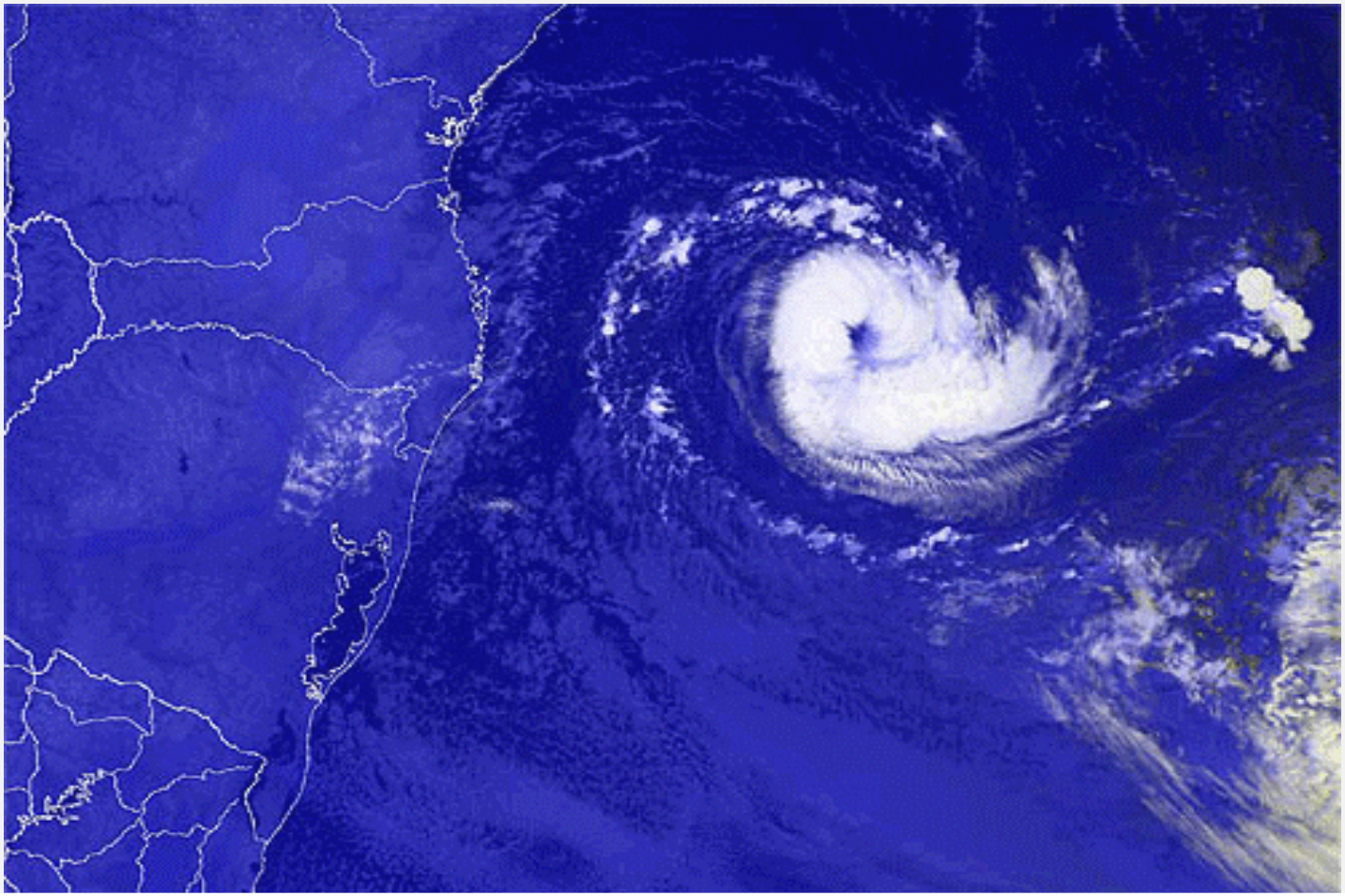


Sequence of cloud top from 24 to 26 of June 2016

Twister in Cañuelas, Pcia. Buenos Aires
NOAA-15 . 21-MAR-08 . 21:49 UTC



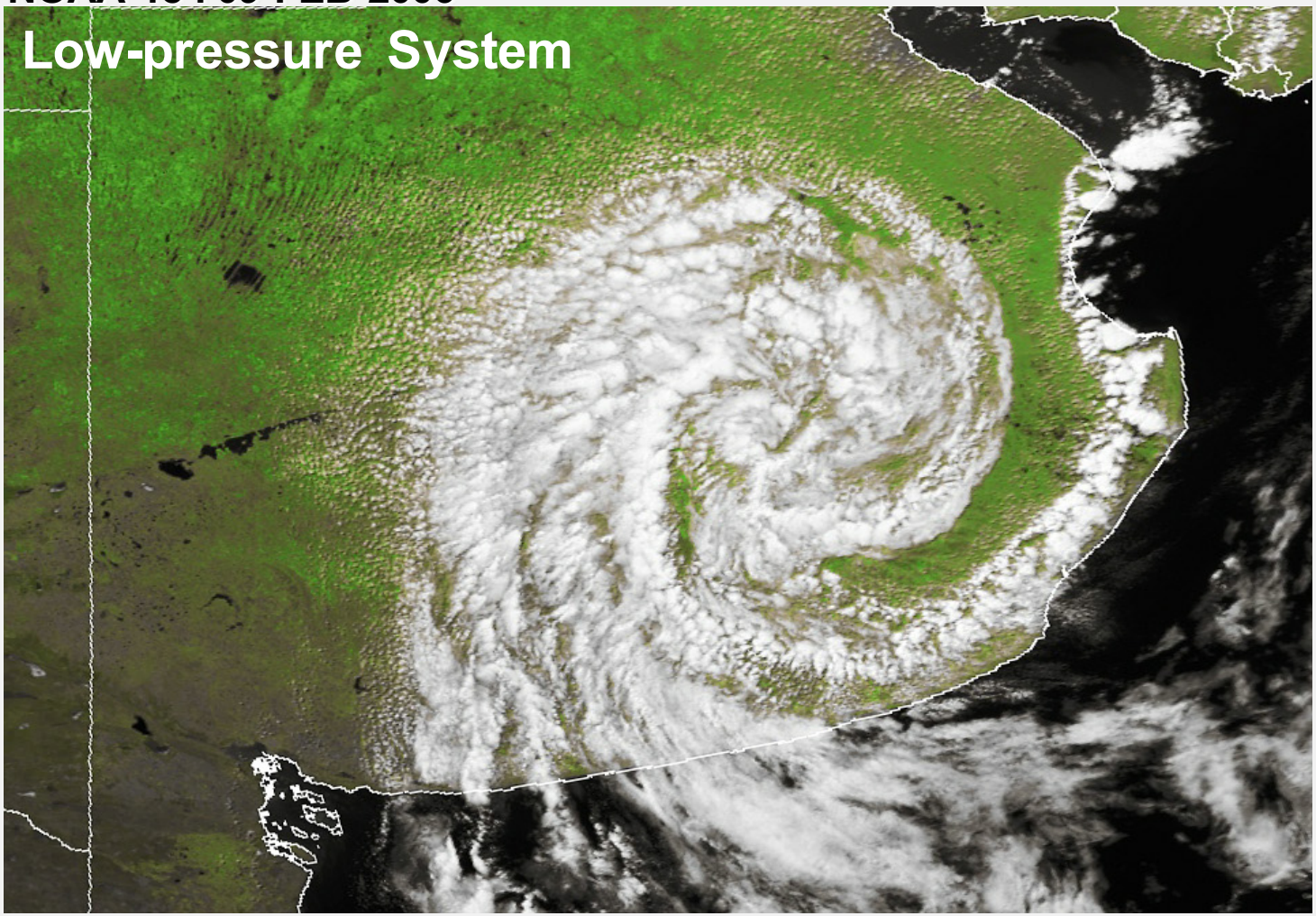
METEOROLOGY



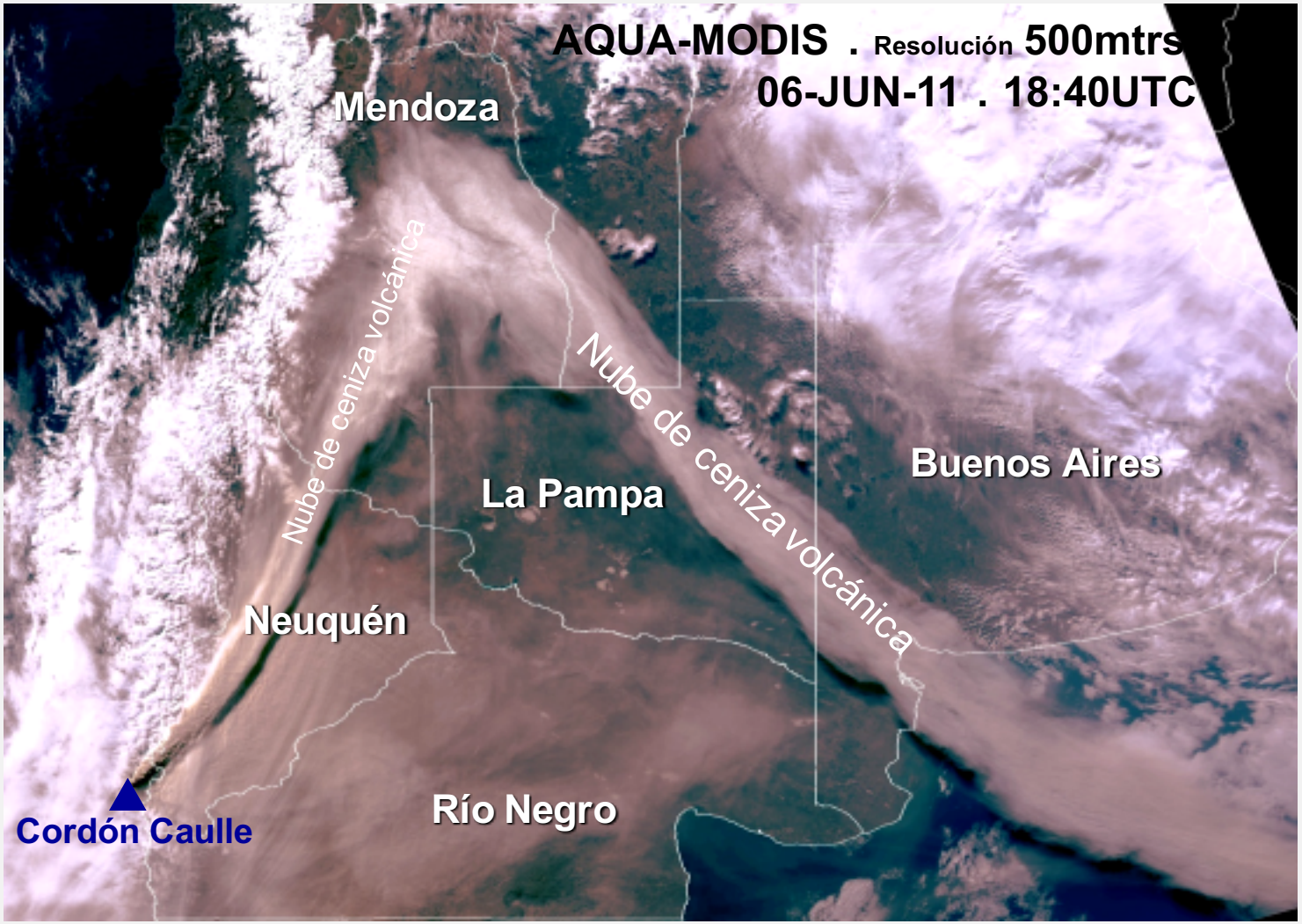
Temporal sequence of the low-pressure system (Hurricane class I) that hit the southern coast of Brazil, from 26-Mar-04 to 28-Mar-04. NOAA-AVHRR SATELLITE SERIES.

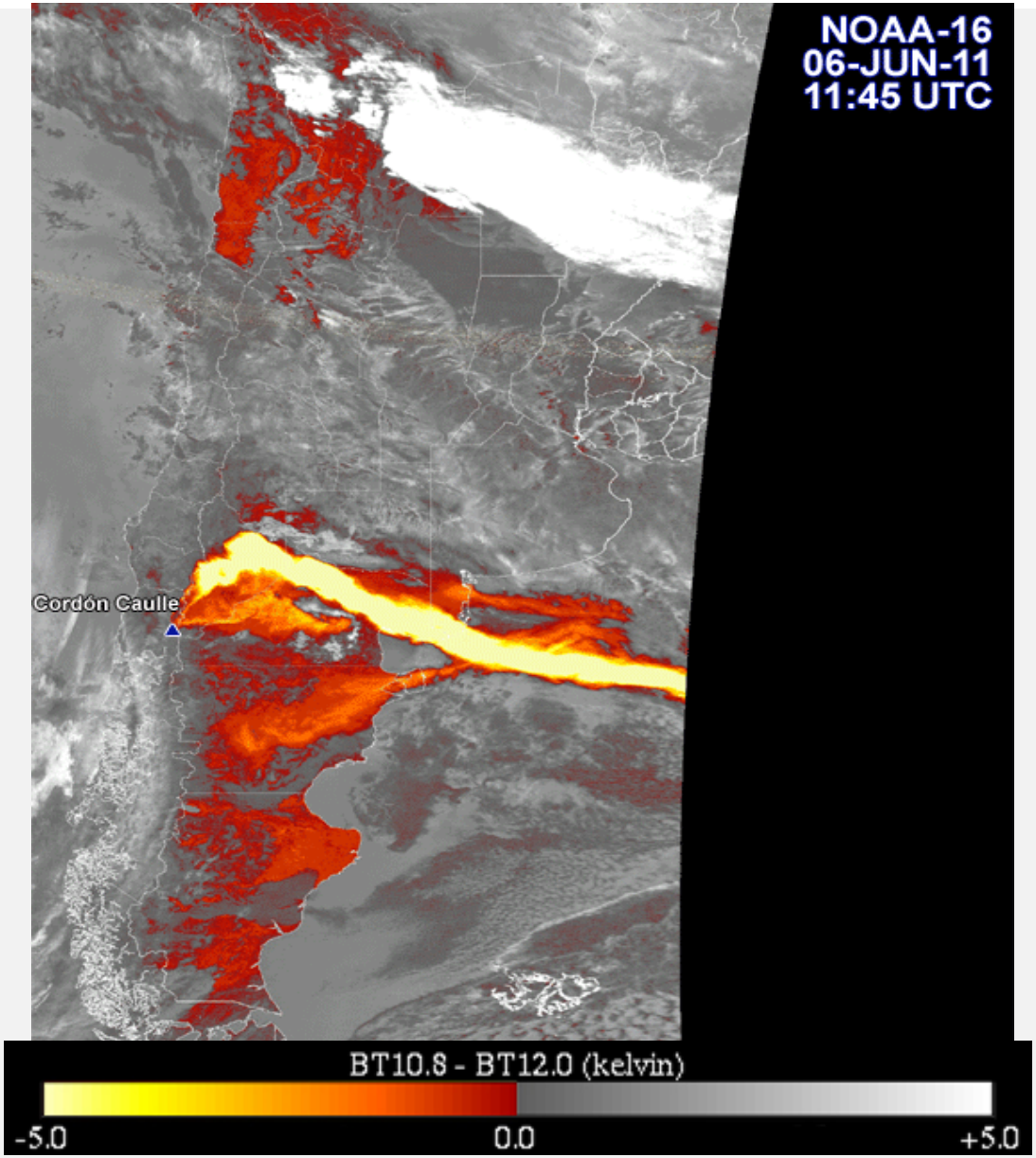
METEOROLOGY

NOAA-18 . 09-FEB-2006



VOLCANOS


AQUA-MODIS . Resolución 500mtrs
06-JUN-11 . 18:40UTC
Mendoza
Nube de ceniza volcánica
Nube de ceniza volcánica
La Pampa
Buenos Aires
Neuquén
Río Negro
Cordón Caulle

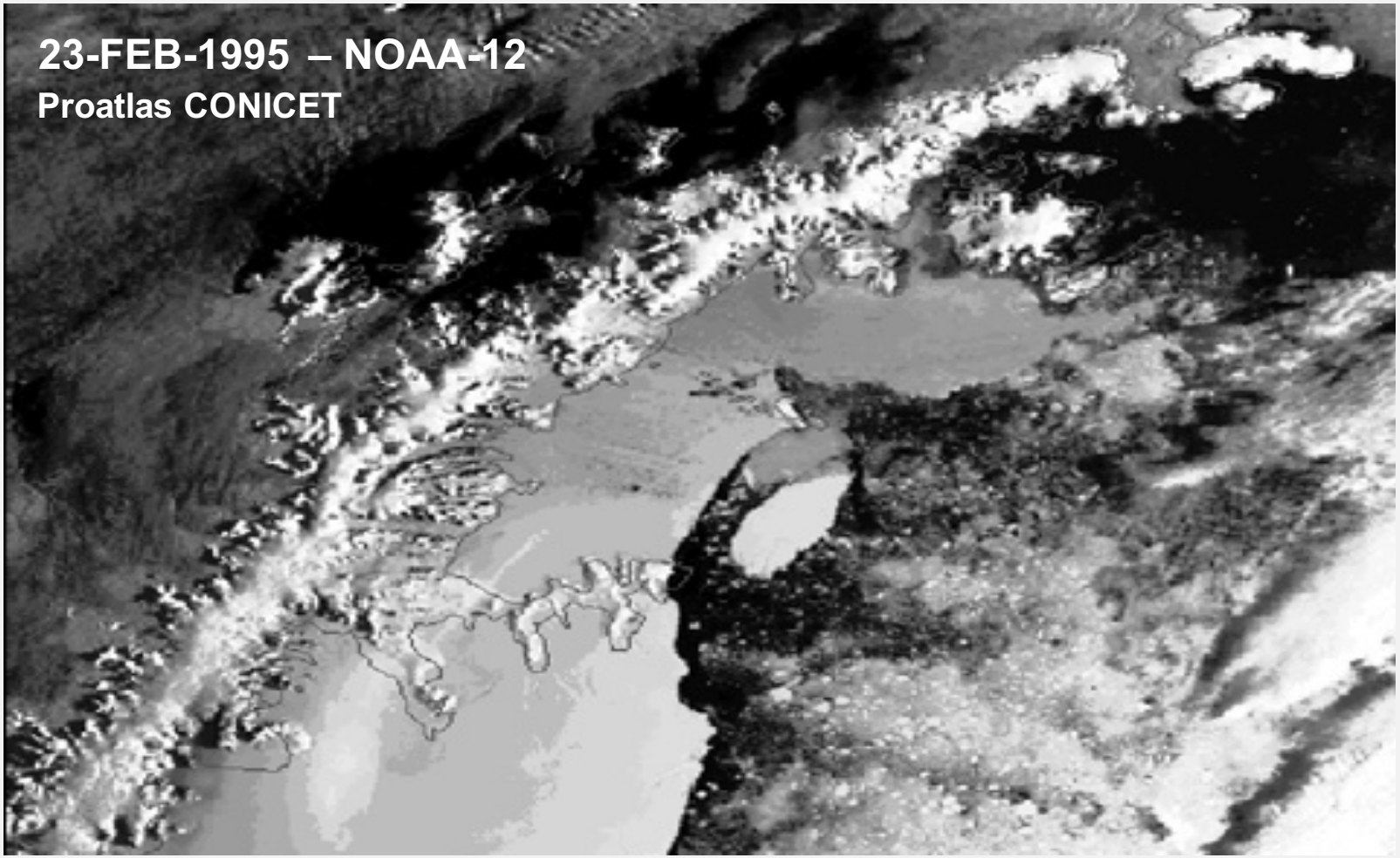


VOLCANOS
Cordón Caulle

From 06 to 08 of June 2011

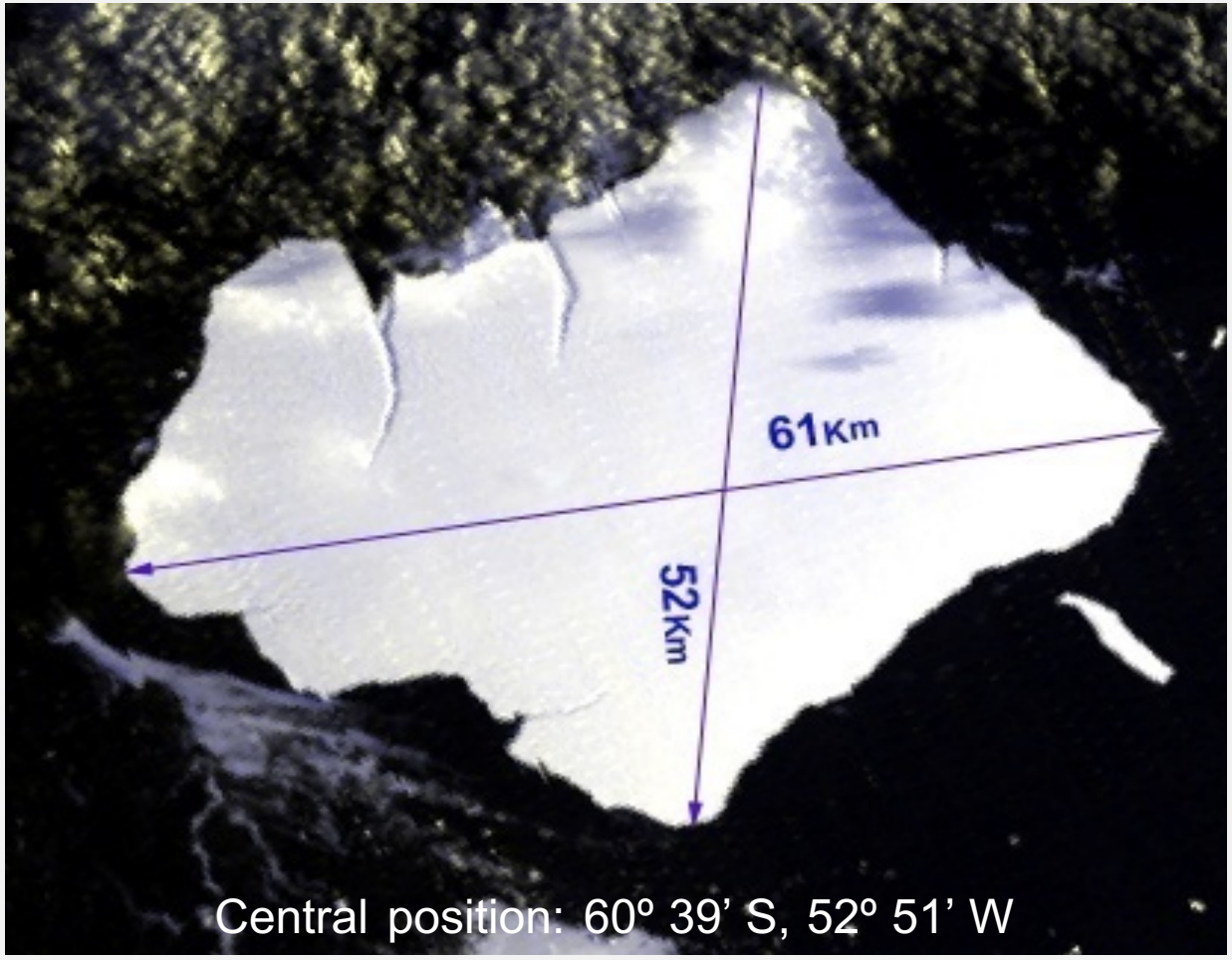
Image of the AVHRR sensor, corresponding to split windows or BTD (TB4 - TB5) process, the particles in suspension that are found in different levels of the atmosphere, belonging to the ashes of Cordón Caulle, are observed in bright yellow shades.

ICEBERG



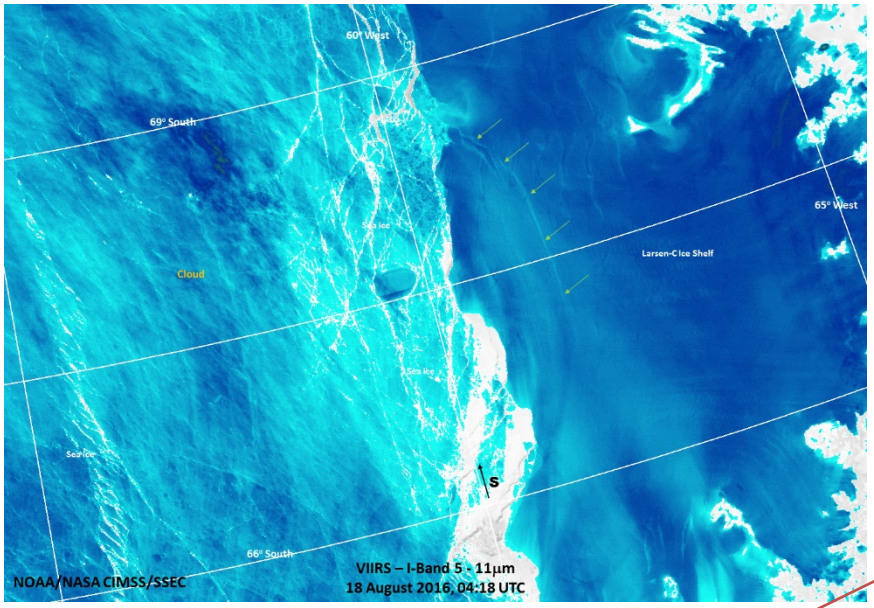
TERRA- MODIS . Resolution: 250 meters
Proyection: STEREOGRAPHIC POLAR
06-JUL-06 - 13:40 UTC

ICEBERG

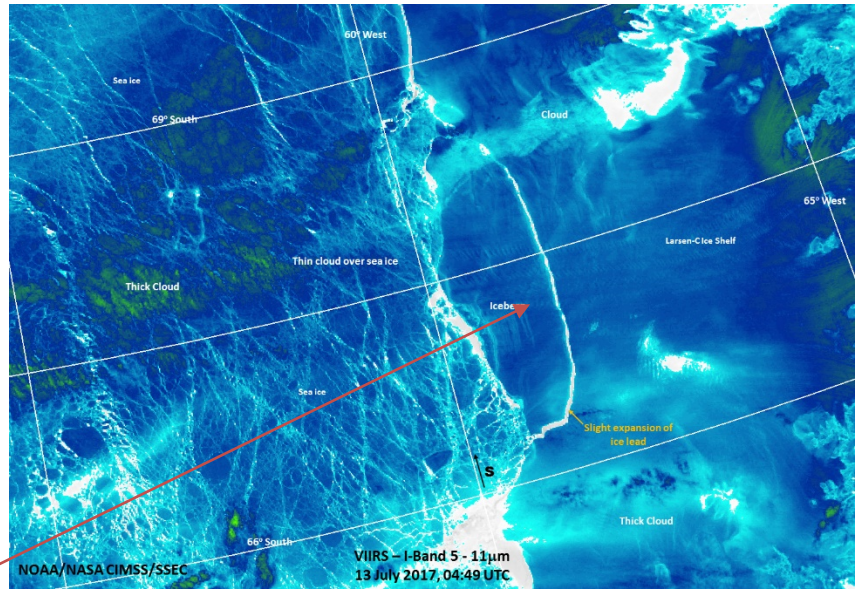


Larsen-C Ice Shelf Break observed by VIIRS

August 18, 2016

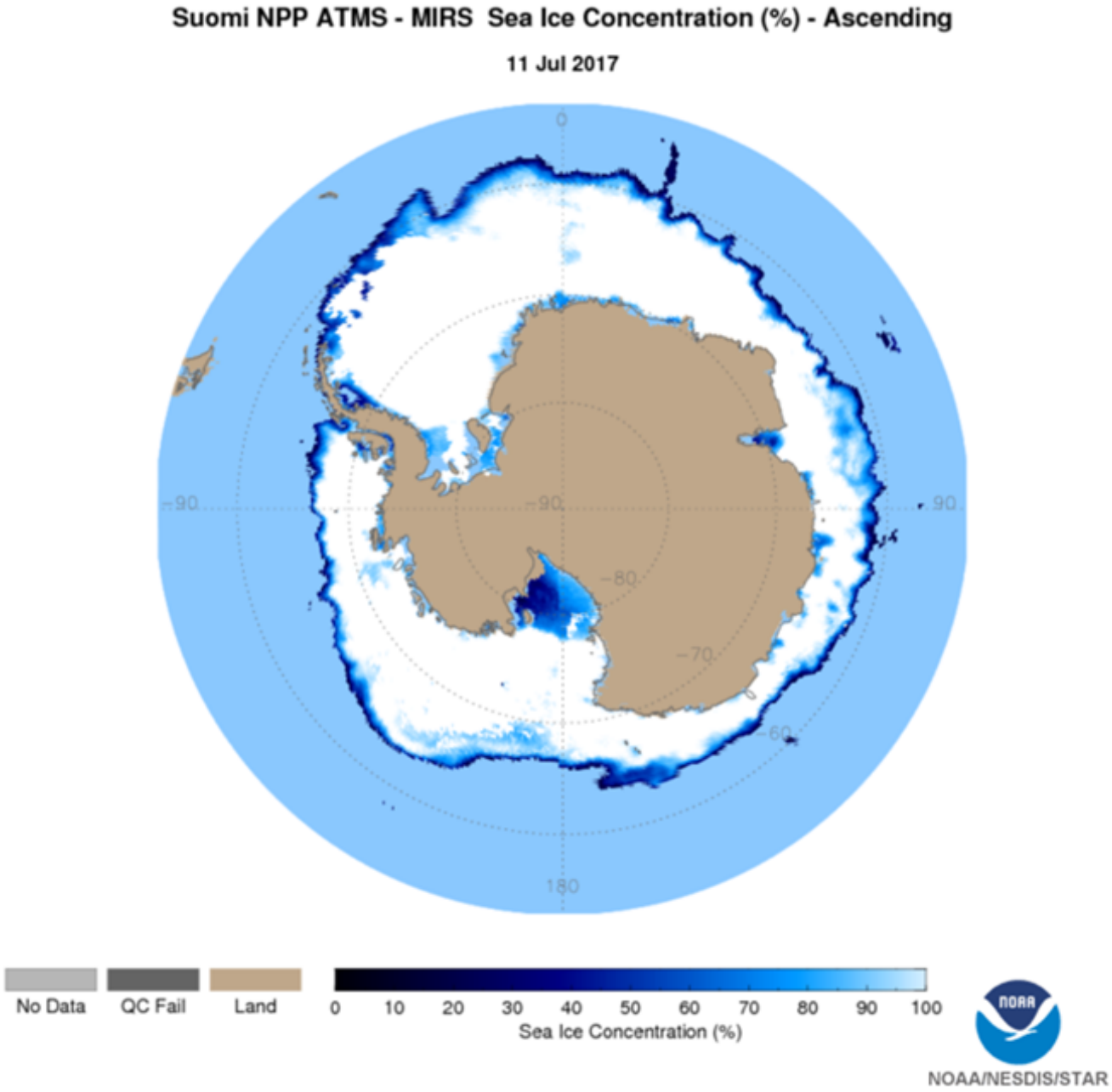


July 13, 2017



Iceberg as detected by VIIRS imager 11 micron band.

ATMS Antarctic Sea Ice Concentration



Servicio Meteorológico Nacional

Dorrego 4019 (C1425GBE)
Buenos Aires · Argentina
Tel: (+54 11) 5167- 6712
smn@smn.gov.ar
www.smn.gov.ar

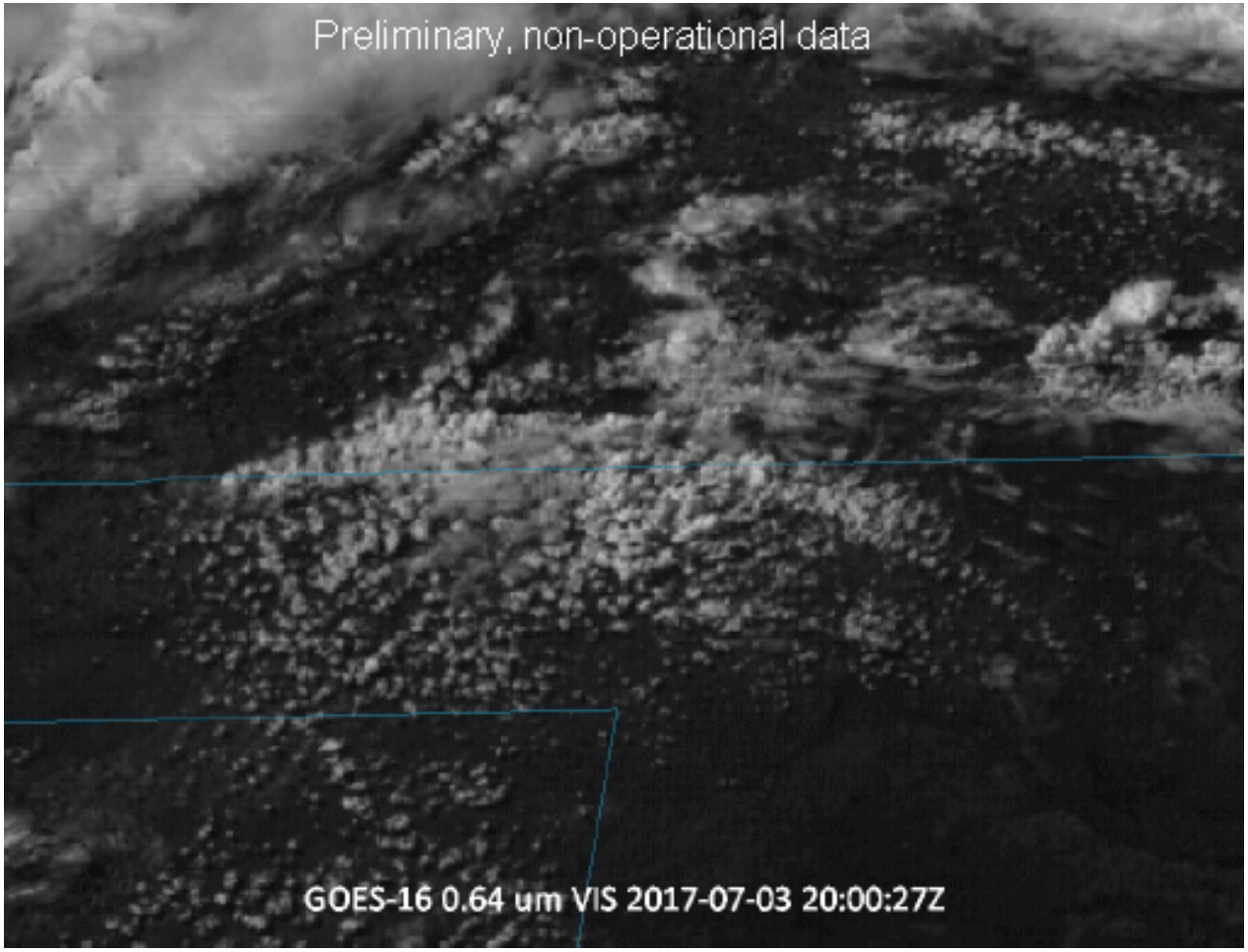
smn.prensa · @smn_argentina · smn_argentina · smnprensa

hrpt@smn.gov.ar

Ministerio de Defensa
Presidencia de la Nación

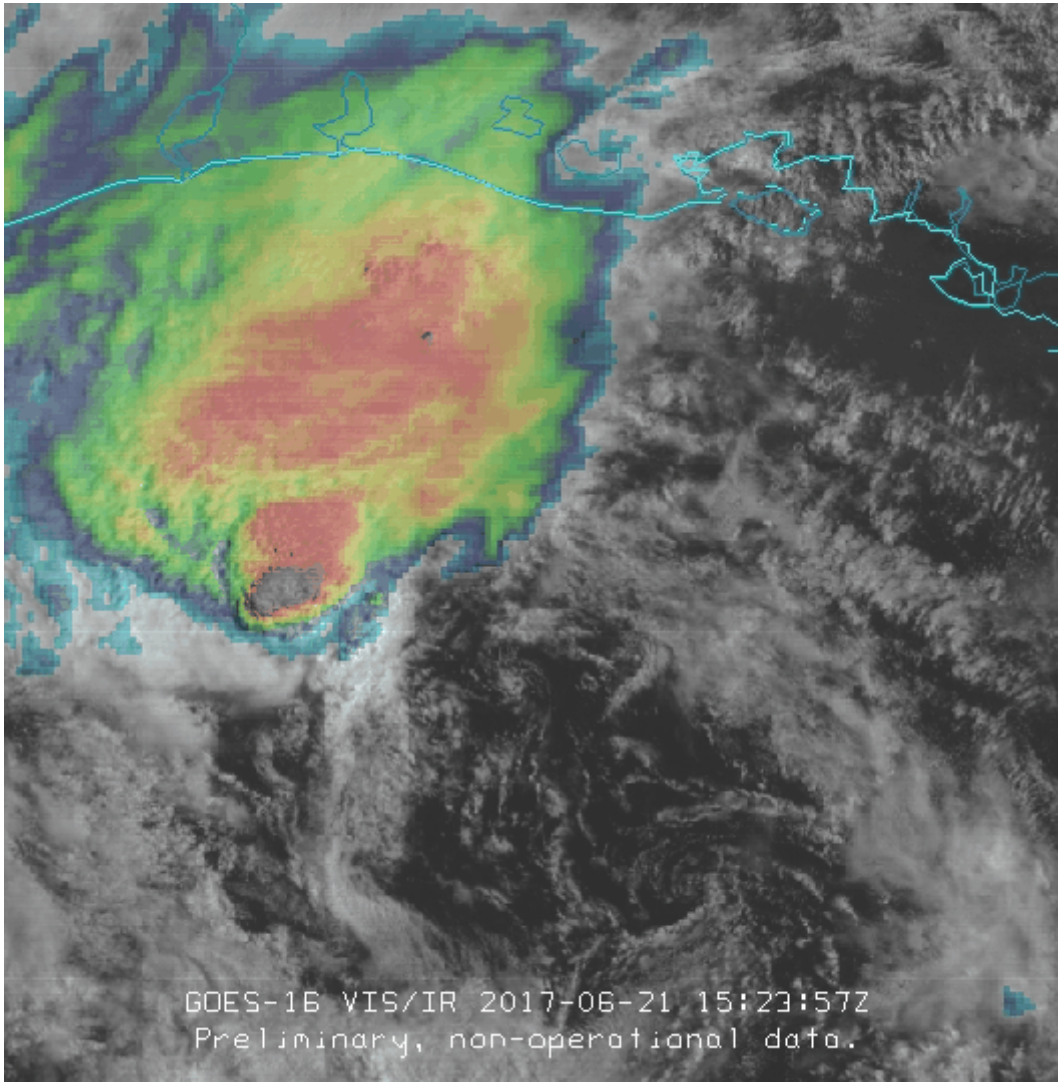
2017 | Año de las Energías Renovables

GOES-16 ABI

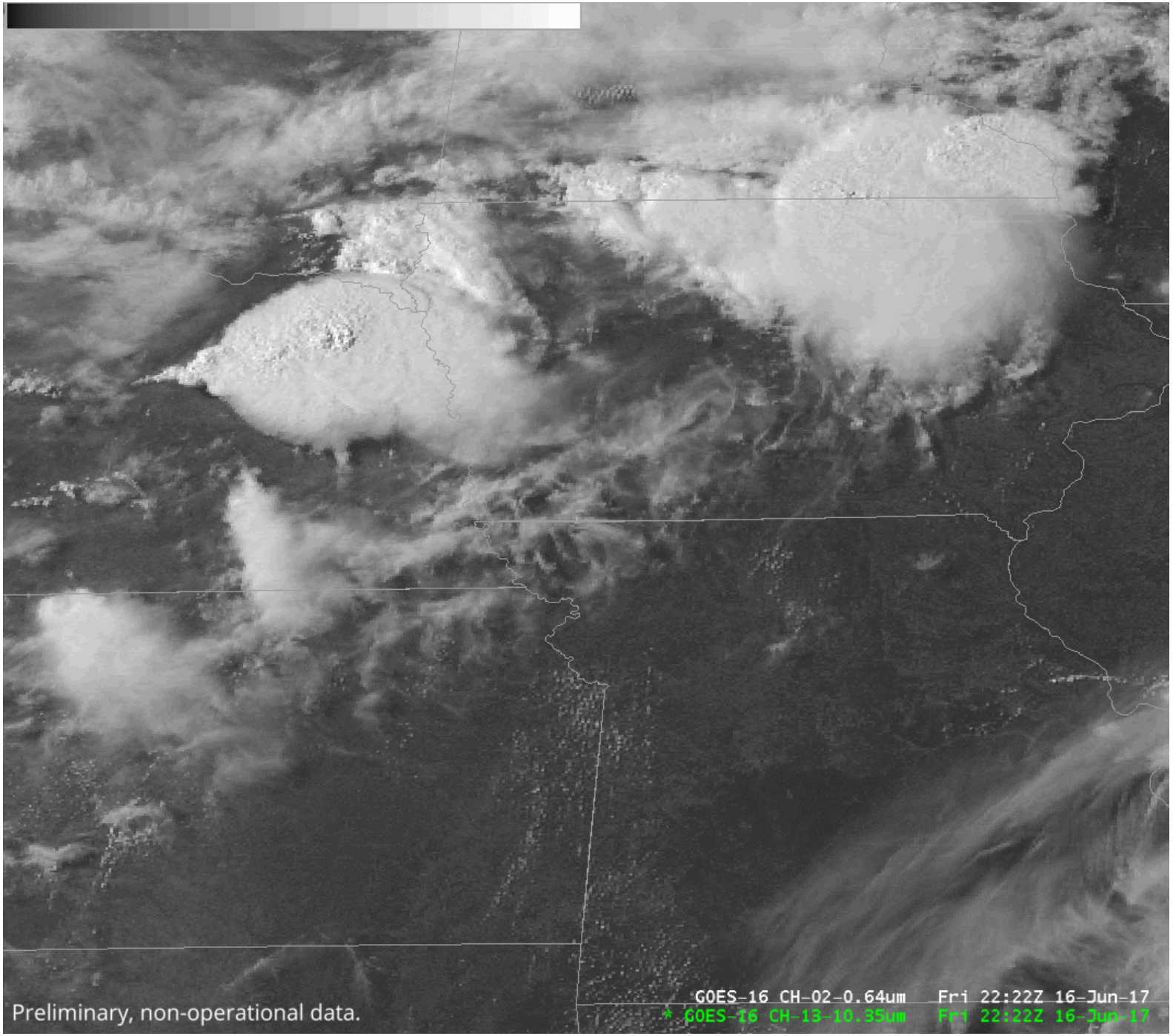


Credit: Bill Line

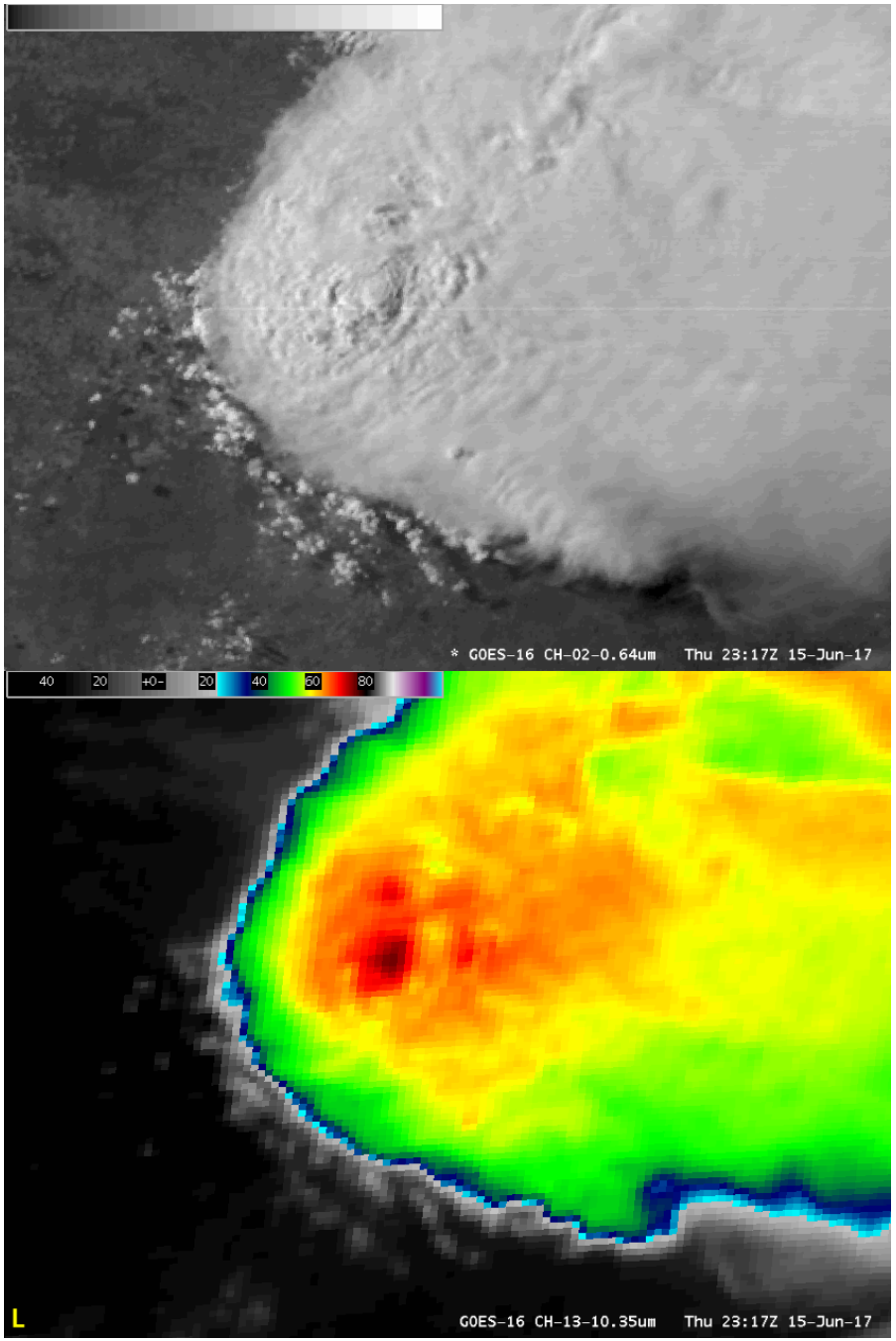
GOES-16 ABI



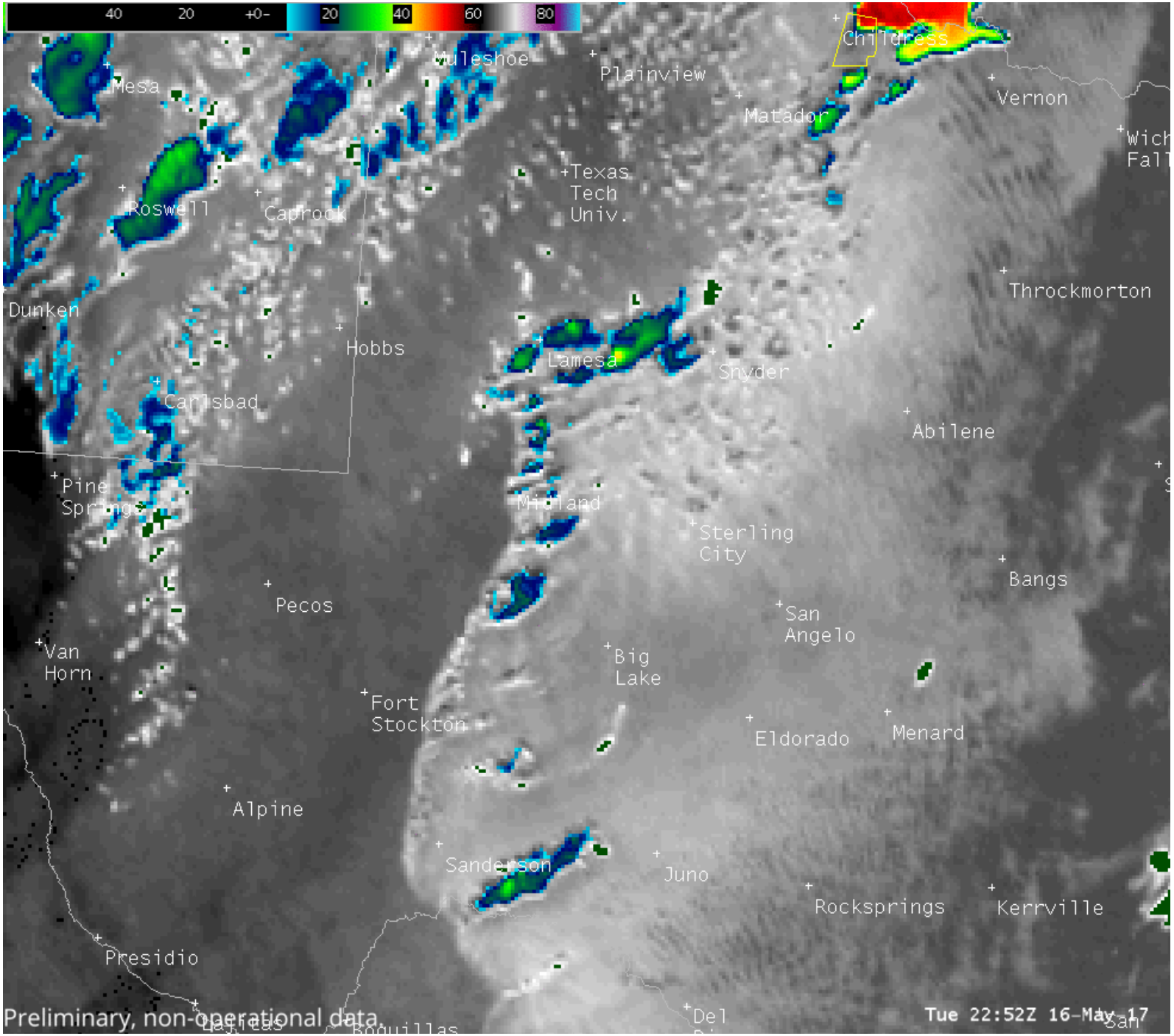
Credit: Bill Line


Preliminary, non-operational data.
GOES-16 CH-02-0.64um Fri 22:22Z 16-Jun-17
* GOES-16 CH-13-10.35um Fri 22:22Z 16-Jun-17

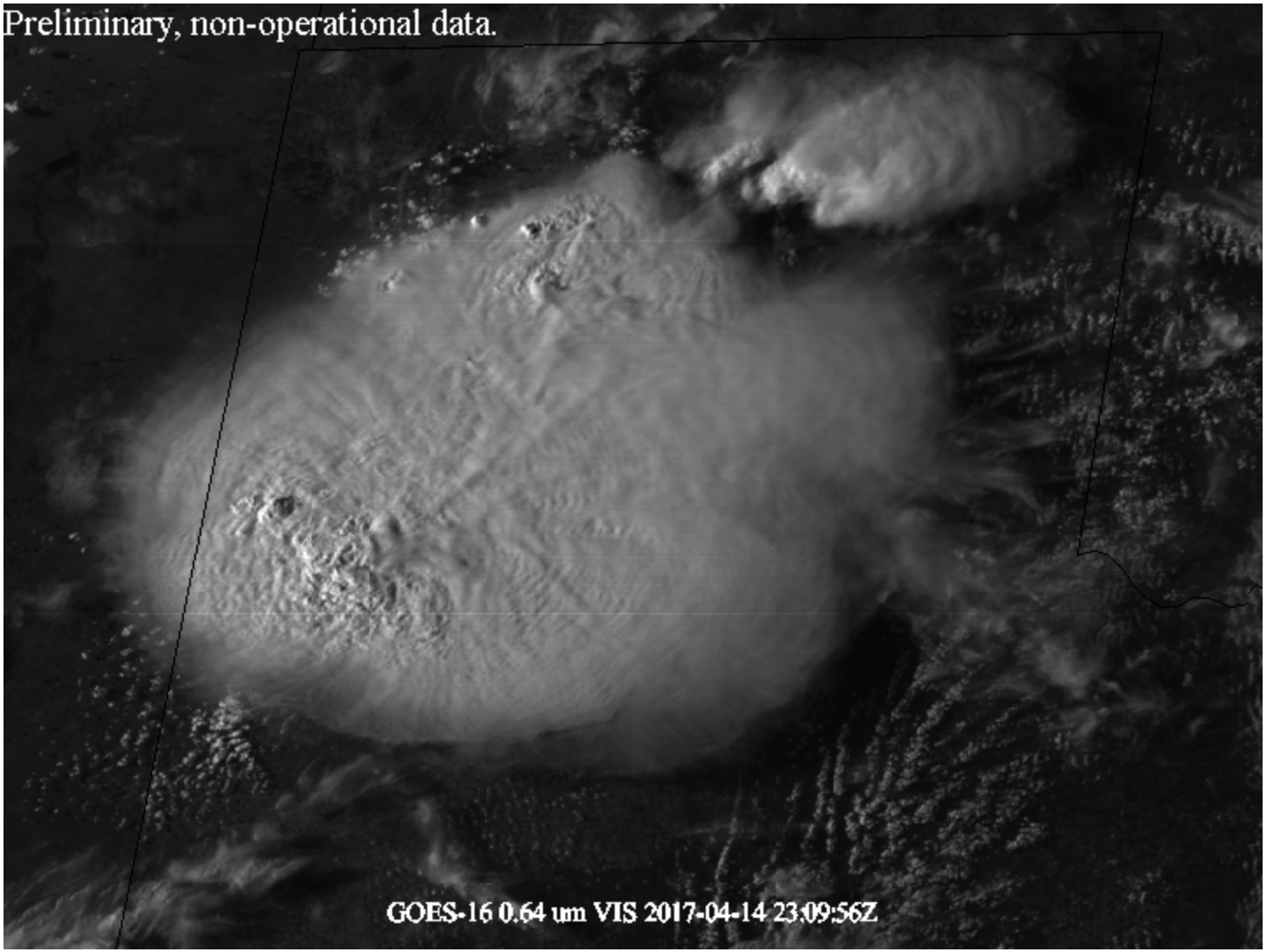
GOES-16 ABI



Credit: Bill Line

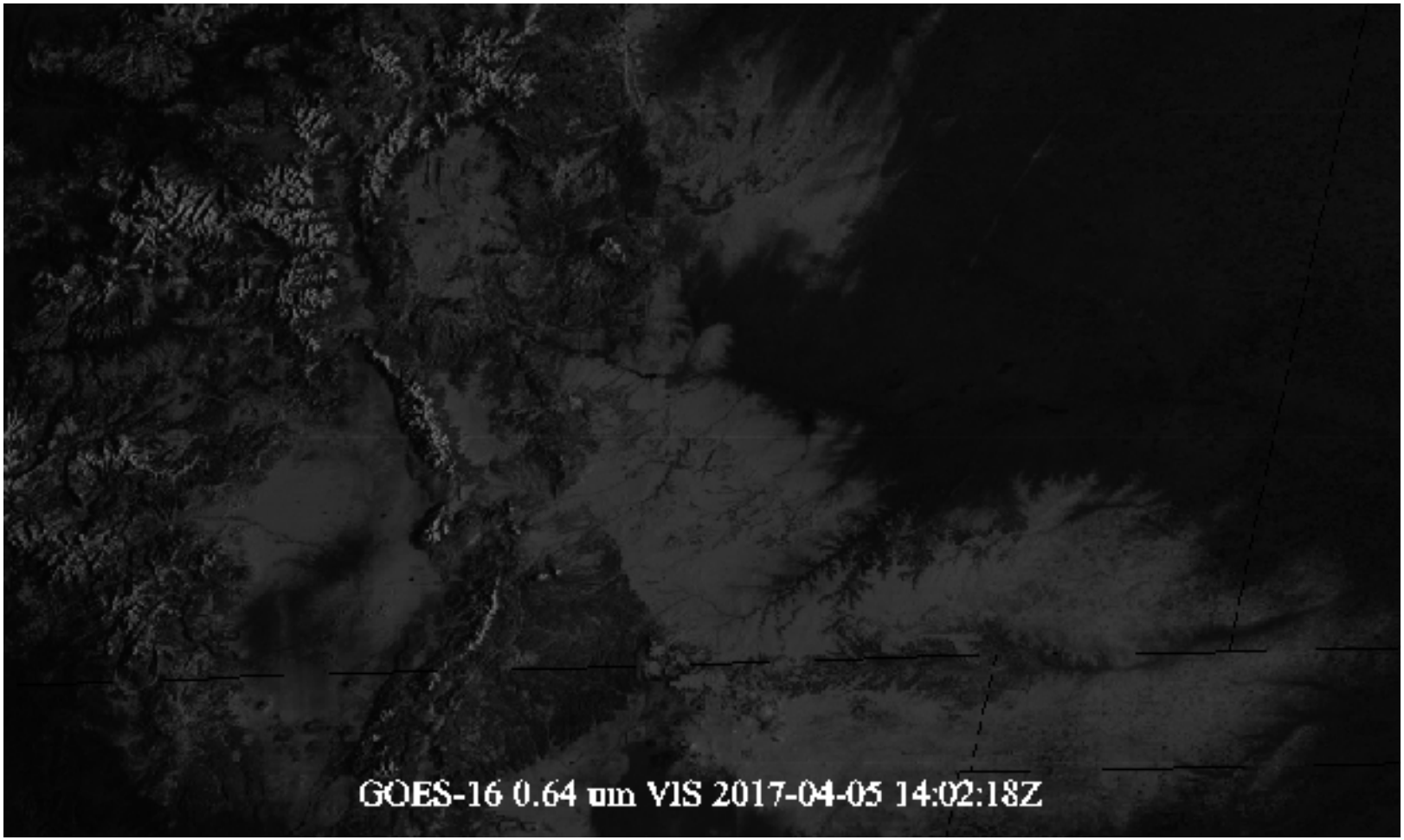

40 20 +0- 20 40 60 80
Muleshoe
Plainview
Chillicothe
Vernon
Matador
Mesa
Roswell
Caprock
Texas Tech Univ.
Throckmorton
Dunken
Hobbs
Lamesa
Snyder
Carlsbad
Abilene
Pine Springs
Midland
Sterling City
Bangs
Pecos
San Angelo
Van Horn
Big Lake
Fort Stockton
Eldorado
Menard
Alpine
Sanderson
Juno
Rocksprings
Kerrville
Presidio
Del
Preliminary, non-operational data.
Tue 22:52Z 16-May-17

GOES-16 ABI



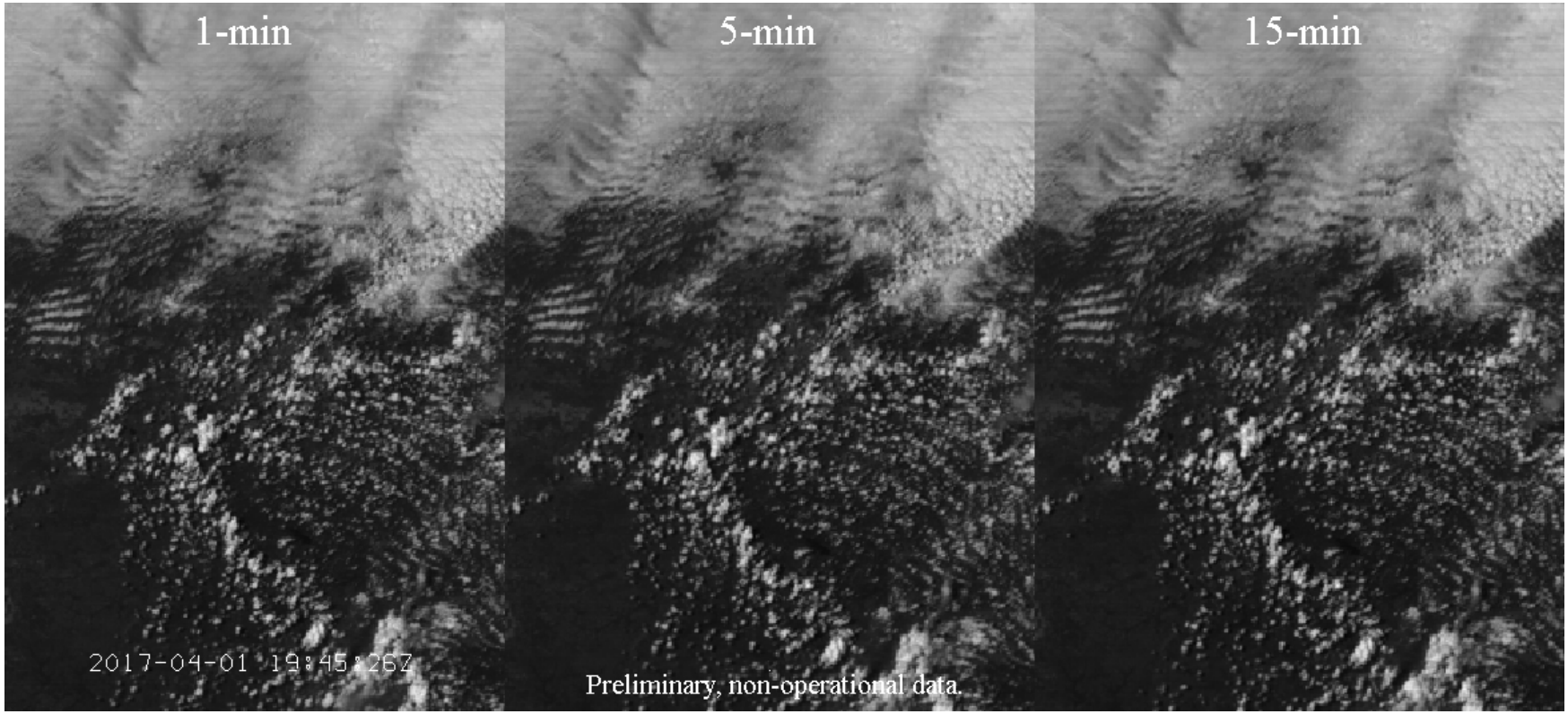
Credit: Bill Line

GOES-16 ABI



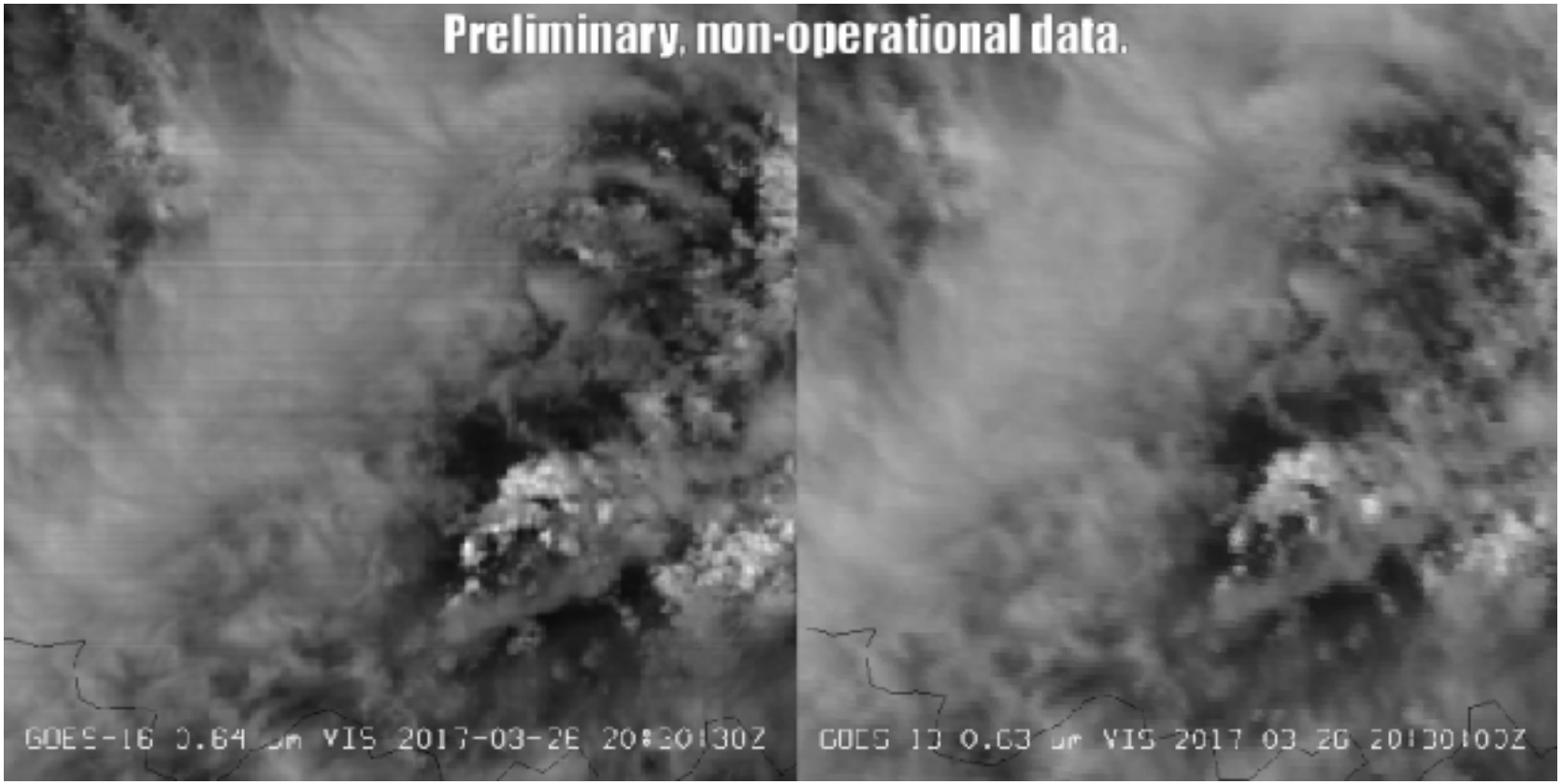
Credit: Bill Line

GOES-16 ABI

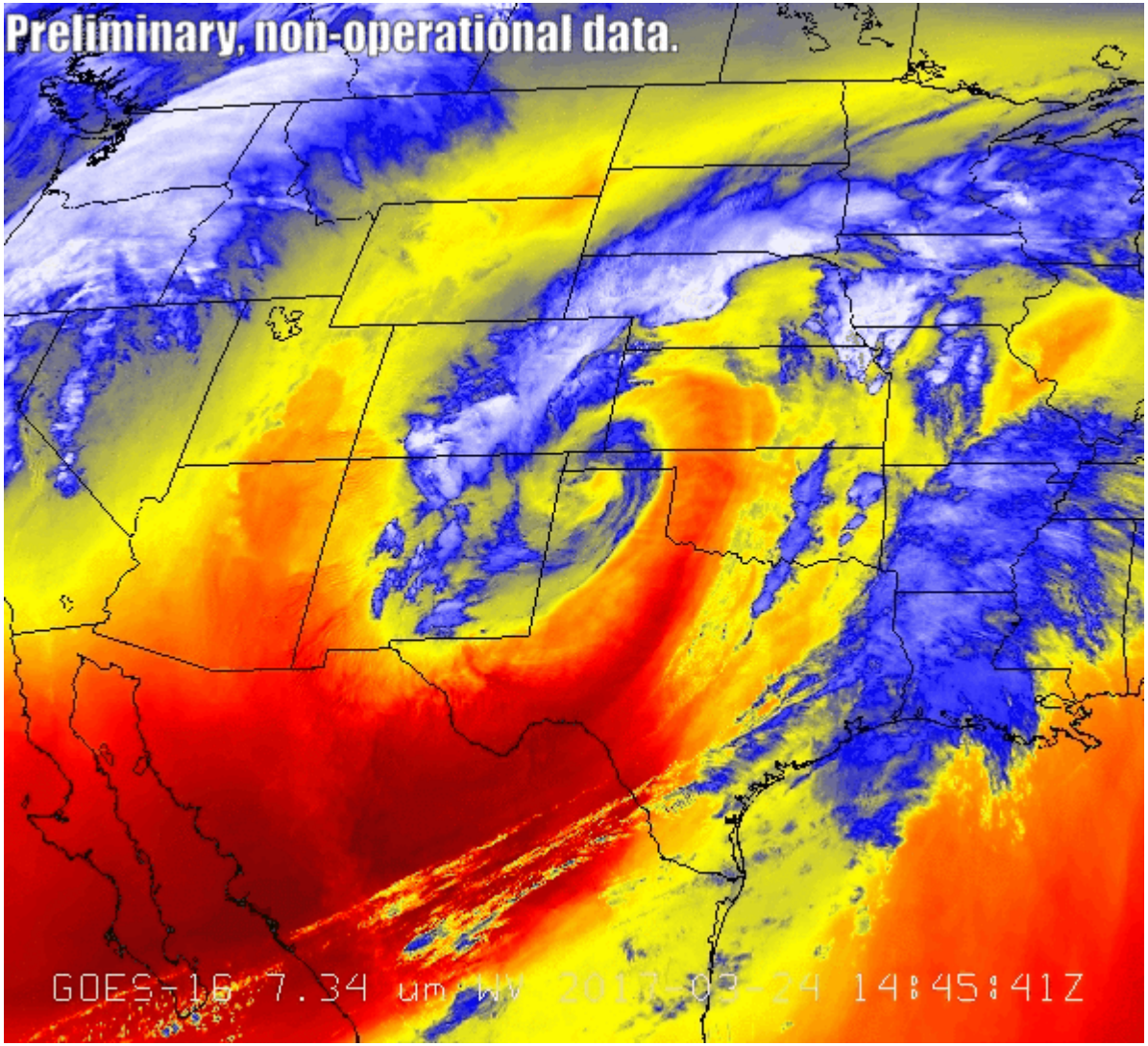


Credit: Bill Line

GOES-16 ABI vs GOES-13 Imager



Credit: Bill Line



GOES-16 ABI

Credit: Bill Line

GOES-16 ABI

Credit: Bill Line

Thanks to many:

JPSS VIIRS Imagery and Sounder Teams

GOES / GOES-R

AWG Imagery Team

CIMSS

CIRA

Department of Remote Sensing and Environmental Applications

NOAA NESDIS

Bill Line, etc.