Introduction to VIIRS and MODIS imager data acquired at NWS Forecast Office Guam

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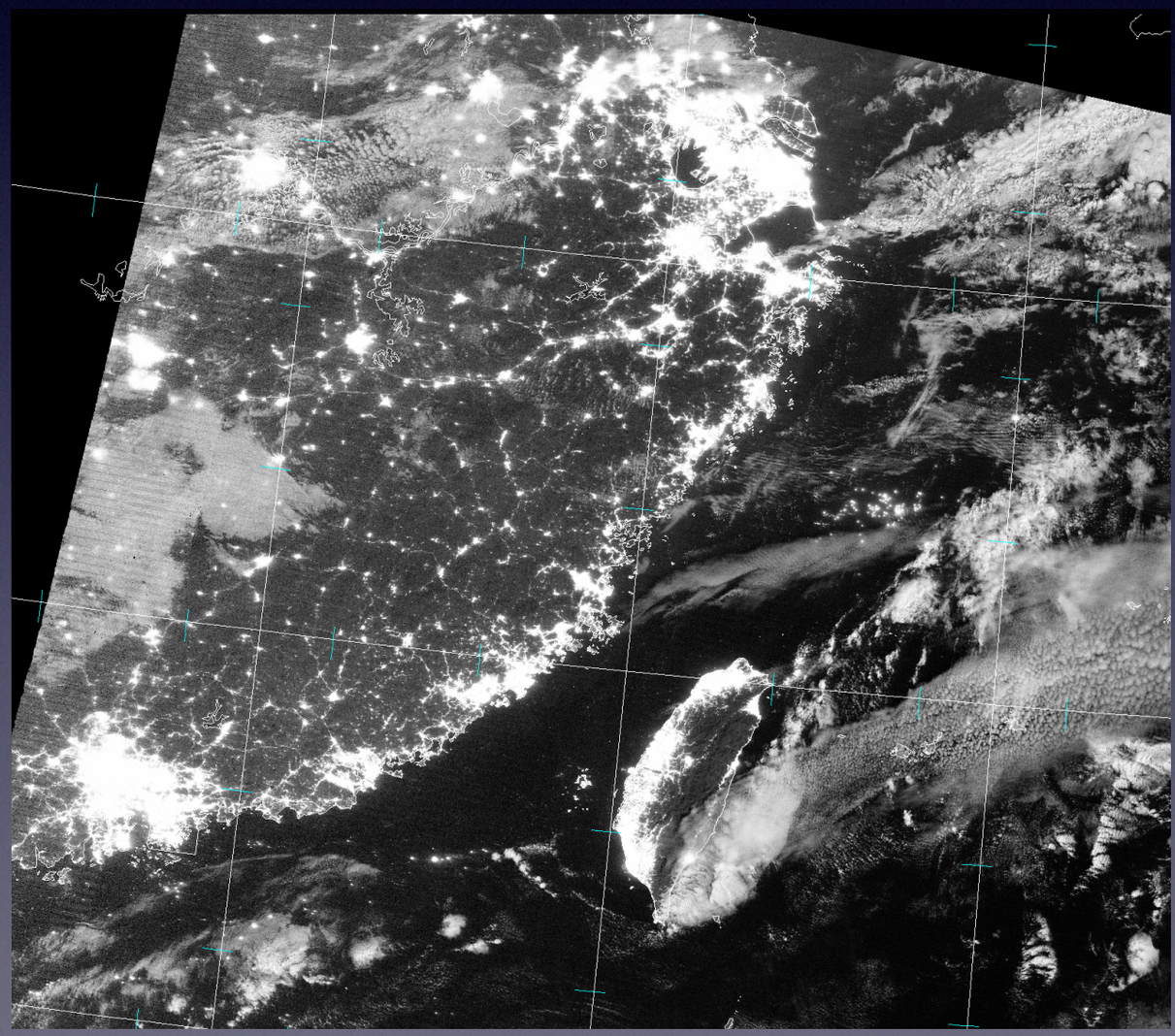
April 2018

3.0 meter X/L-band Antenna at NWS Guam

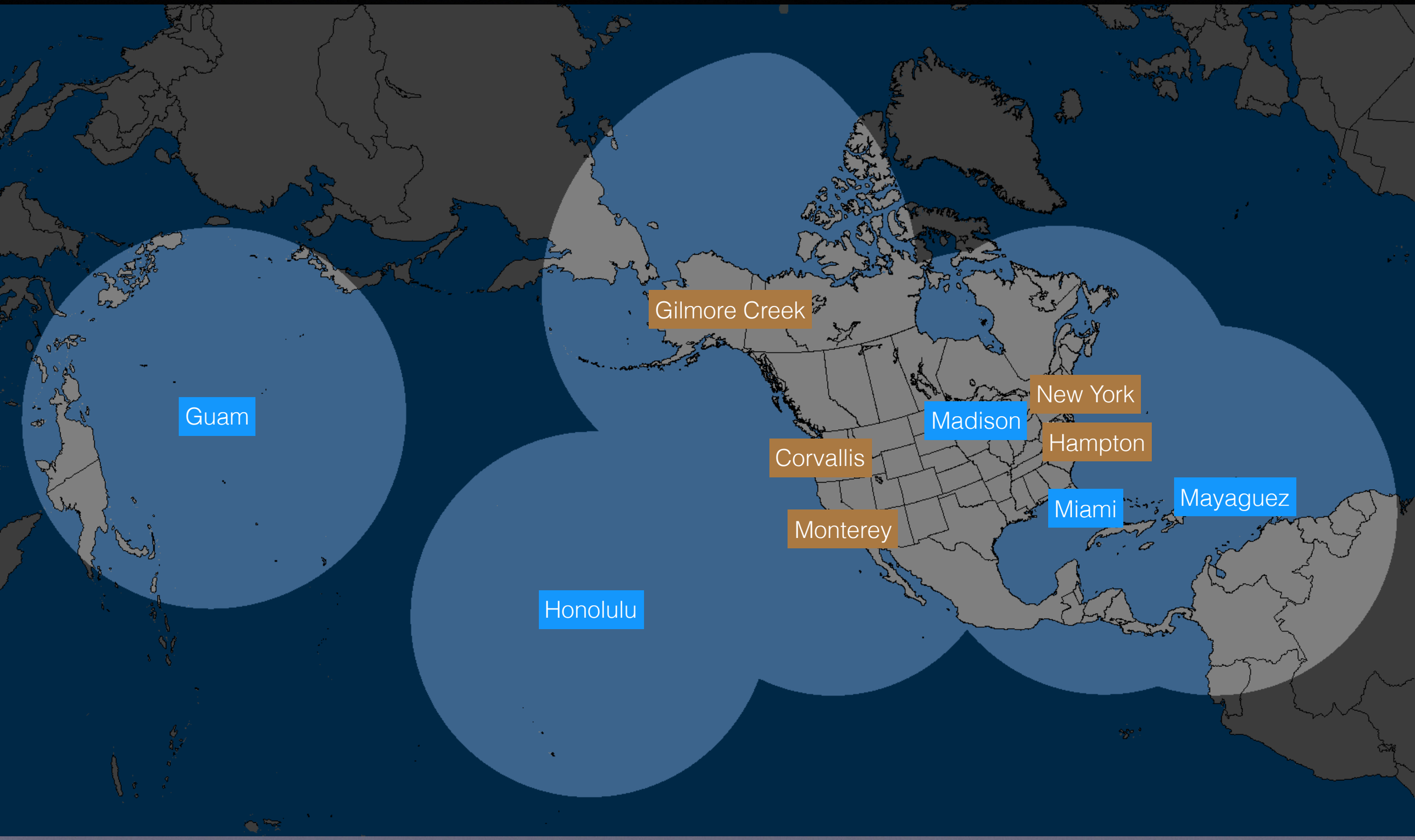


VIIRS Day/Night Band 2017/02/16 17:07 UTC

Overview

- A new 3.0-meter X/L-band antenna was installed at NWS Guam in Feb 2017 to receive data directly from meteorological satellites in polar orbit. The antenna receives up to 35 overpasses per day from 10 different satellites.
- Imager and sounder data are acquired and processed in real-time to create imagery, calibrated sensor observations, and derived geophysical products. The products are sent to AWIPS2 at the Guam WFO.
- Sounder data are delivered to NOAA for NWP.

NOAA DB Antenna Network locations and coverage



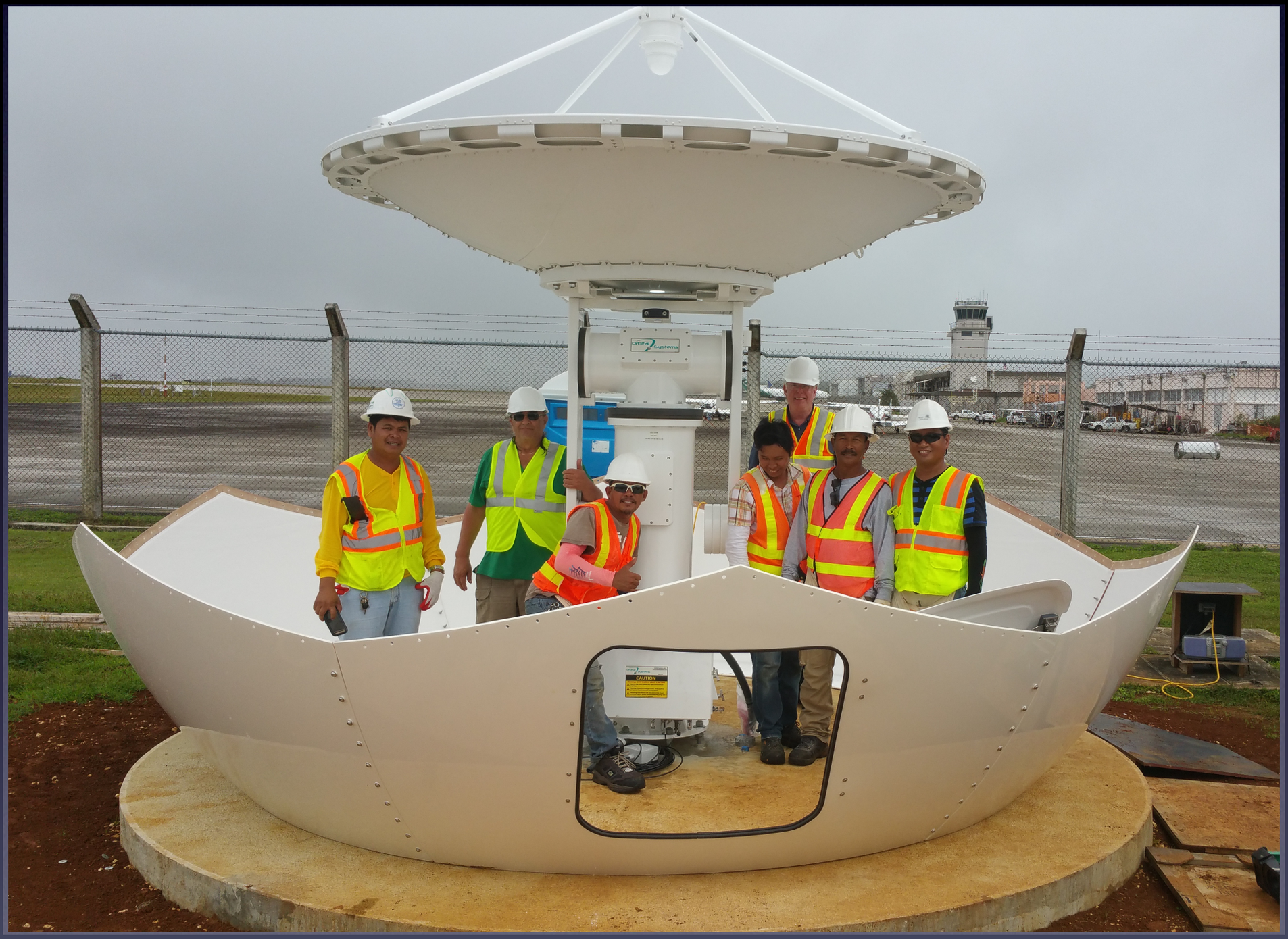
Antenna owned and operated by CIMSS/SSEC

Antenna owned and operated by network partner

NOAA DB Network

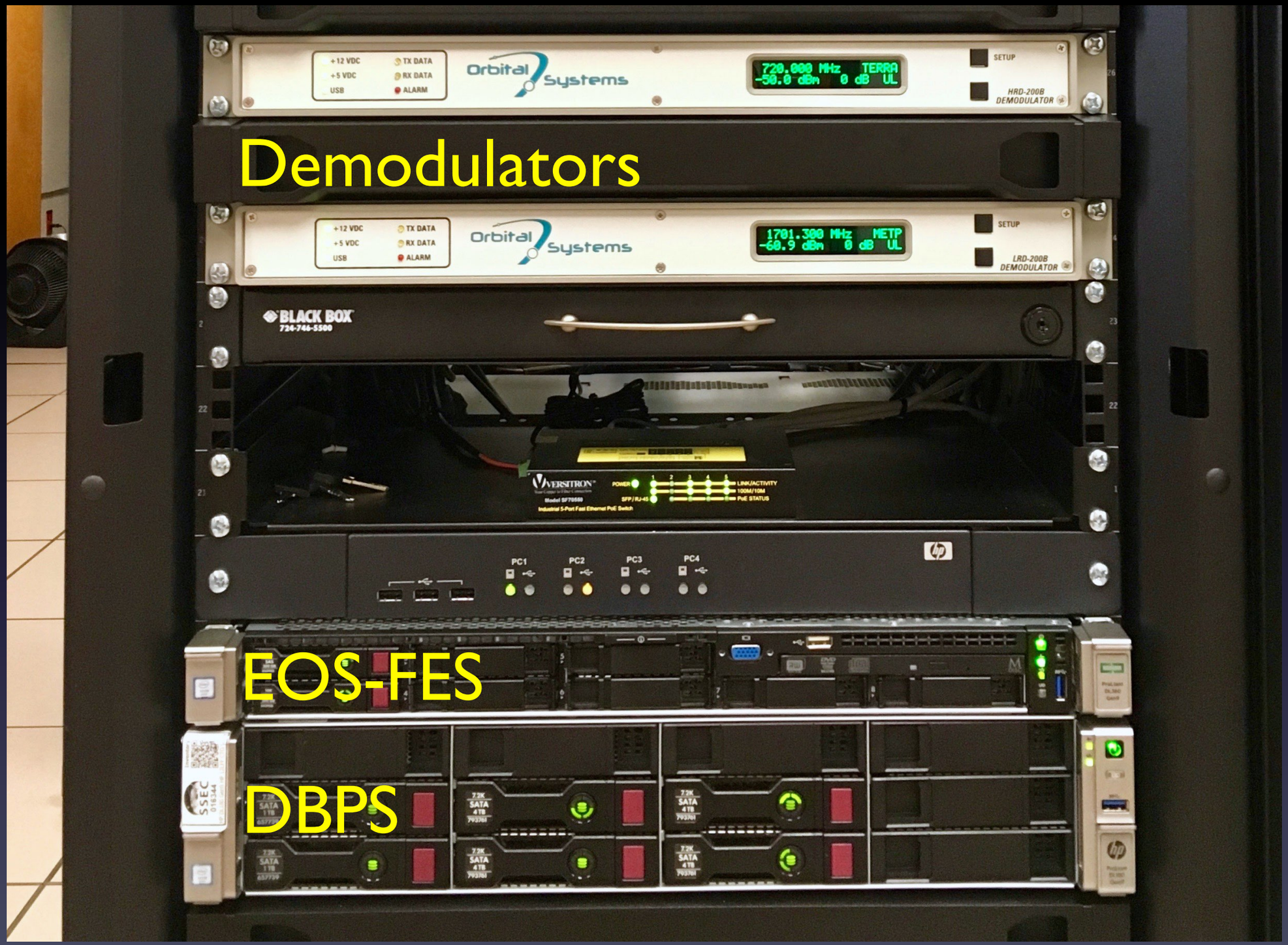
- NOAA/JPSS has funded a network of polar satellite receiving stations across the Pacific and North America.
- The goal is to deliver advanced sounder data (ATMS, CrIS, IASI) to NWP centers with < 30 minute latency for rapid refresh data assimilation.
- CIMSS/SSEC at UW-Madison operates the antennas, acquires and processed the data, and delivers it to end users.
- CrIS, ATMS, and IASI sounder data in BUFR format are delivered to NCEP, distributed on EUMETCAST via a pilot service, and delivered worldwide on GTS.

Guam Antenna System



Orbital Systems 3.0-meter X/L-band antenna and positioner NWS Forecast Office Guam

Guam Reception and Processing Hardware



Orbital Systems HRD and LRD demodulators (receivers), EOS-FES reception server, and DBPS processing server

Honolulu Antenna in motion

Worldwide X-band Antenna Sites

Direct Broadcast Processing System

- "Direct Broadcast" is the real-time transmission of sensor observation data from the spacecraft to a ground station.
- The receiving system converts the RF transmission from the spacecraft to digital packets of sensor data. (Level 0 products).
- The Direct Broadcast Processing System converts the sensor data to calibrated and geolocated sensor observations (Level 1 products), geophysical parameters (Level 2 products), and images.

Supported Satellites

The system supports reception and processing of data from

1. NOAA-20 and Suomi NPP (NOAA)
2. Terra and Aqua (NASA)
3. Metop-A and Metop-B (EUMETSAT)
4. NOAA-18 and NOAA-19 (NOAA)
5. GCOM-W1 (JAXA)
6. SARAL (ISRO/CNES)

Guam 24-hour tracking schedule

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- OrbitalSystems::print_schedule 1.13 starting at Sun Apr 15 06:35:12 2018.


Tracking Schedule for Pedestal_1 on 15-Apr-2018 06:35:12

ITEM  SAT                  DIR  EL  MODE   START                  END                    OVR  IDLE
--------------------------------------------------------------------------------------------
72096 NOAA 19              N    15  DAY    15-Apr-2018 07:08:22  15-Apr-2018 07:18:40  0    1
72092 SARAL                S    37  DAY    15-Apr-2018 07:50:31  15-Apr-2018 08:02:47  0    1
72091 SARAL                S    14  DAY    15-Apr-2018 09:31:03  15-Apr-2018 09:40:15  0    1
72106 NOAA 18              N    89  NIGHT  15-Apr-2018 09:49:05  15-Apr-2018 10:02:42  0    1
72088 METOP-B              N    08  NIGHT  15-Apr-2018 10:13:52  15-Apr-2018 10:20:39  0    1
72101 METOP-A              N    33  NIGHT  15-Apr-2018 10:52:13  15-Apr-2018 11:04:32  0    1
72098 TERRA                N    17  NIGHT  15-Apr-2018 11:43:15  15-Apr-2018 11:52:46  0    1
72099 METOP-B              N    60  NIGHT  15-Apr-2018 11:52:46  15-Apr-2018 12:03:25  0    1
72115 METOP-A              N    16  NIGHT  15-Apr-2018 12:33:10  15-Apr-2018 12:43:26  0    1
72097 TERRA                N    25  NIGHT  15-Apr-2018 13:20:07  15-Apr-2018 13:30:48  0    1
72095 NPP                  S    22  NIGHT  15-Apr-2018 14:55:43  15-Apr-2018 15:07:07  0    1
72090 JPSS1                S    85  NIGHT  15-Apr-2018 15:44:35  15-Apr-2018 15:57:58  0    1
72108 GCOM-W1              S    68  NIGHT  15-Apr-2018 16:03:48  15-Apr-2018 16:15:45  0    1
72109 AQUA                 S    67  NIGHT  15-Apr-2018 16:15:45  15-Apr-2018 16:20:39  0    1
72116 NPP                  S    25  NIGHT  15-Apr-2018 16:35:32  15-Apr-2018 16:47:17  0    1
72117 NOAA 19              S    62  NIGHT  15-Apr-2018 18:03:16  15-Apr-2018 18:16:42  0    1
72112 SARAL                N    12  DAY    15-Apr-2018 18:54:52  15-Apr-2018 19:03:25  0    1
72113 NOAA 19              S    08  NIGHT  15-Apr-2018 19:46:41  15-Apr-2018 19:53:35  0    1
72089 SARAL                N    42  DAY    15-Apr-2018 20:31:53  15-Apr-2018 20:44:20  0    1
72103 NOAA 18              S    10  DAY    15-Apr-2018 20:48:21  15-Apr-2018 20:56:21  0    1
72110 NOAA 18              S    55  DAY    15-Apr-2018 22:26:13  15-Apr-2018 22:39:41  0    1
72107 METOP-B              S    13  DAY    15-Apr-2018 22:44:21  15-Apr-2018 22:53:48  0    1
72100 METOP-A              S    50  DAY    15-Apr-2018 23:24:02  15-Apr-2018 23:37:04  0    1
72139 TERRA                S    16  DAY    15-Apr-2018 23:57:17  16-Apr-2018 00:06:37  0    1
72140 METOP-B              S    39  DAY    16-Apr-2018 00:22:43  16-Apr-2018 00:35:22  0    1
72135 METOP-A              S    10  DAY    16-Apr-2018 01:06:08  16-Apr-2018 01:14:14  0    1
72134 TERRA                S    26  DAY    16-Apr-2018 01:34:08  16-Apr-2018 01:44:53  0    1
72132 NPP                  N    07  DAY    16-Apr-2018 02:06:42  16-Apr-2018 02:12:55  0    1
72120 JPSS1                N    33  DAY    16-Apr-2018 02:53:07  16-Apr-2018 03:05:30  0    1
72121 AQUA                 N    24  DAY    16-Apr-2018 03:05:30  16-Apr-2018 03:11:02  0    1
72150 NPP                  N    65  DAY    16-Apr-2018 03:42:50  16-Apr-2018 03:56:08  0    1
72146 JPSS1                N    17  DAY    16-Apr-2018 04:34:10  16-Apr-2018 04:44:34  0    1
72147 AQUA                 N    17  DAY    16-Apr-2018 04:44:34  16-Apr-2018 04:48:06  0    1
72124 NOAA 19              N    28  DAY    16-Apr-2018 05:15:21  16-Apr-2018 05:27:37  0    1
```

More than just 1 or 2 passes per day!

11

Supported Sensors

Multispectral Imagers

VIIRS x 2, MODIS x 2, AVHRR x 4

Infrared Sounders

CrIS x 2, IASI x 2, AIRS, HIRS x 4

Microwave Sounders

ATMS x 2, AMSU x 4, MHS x 4

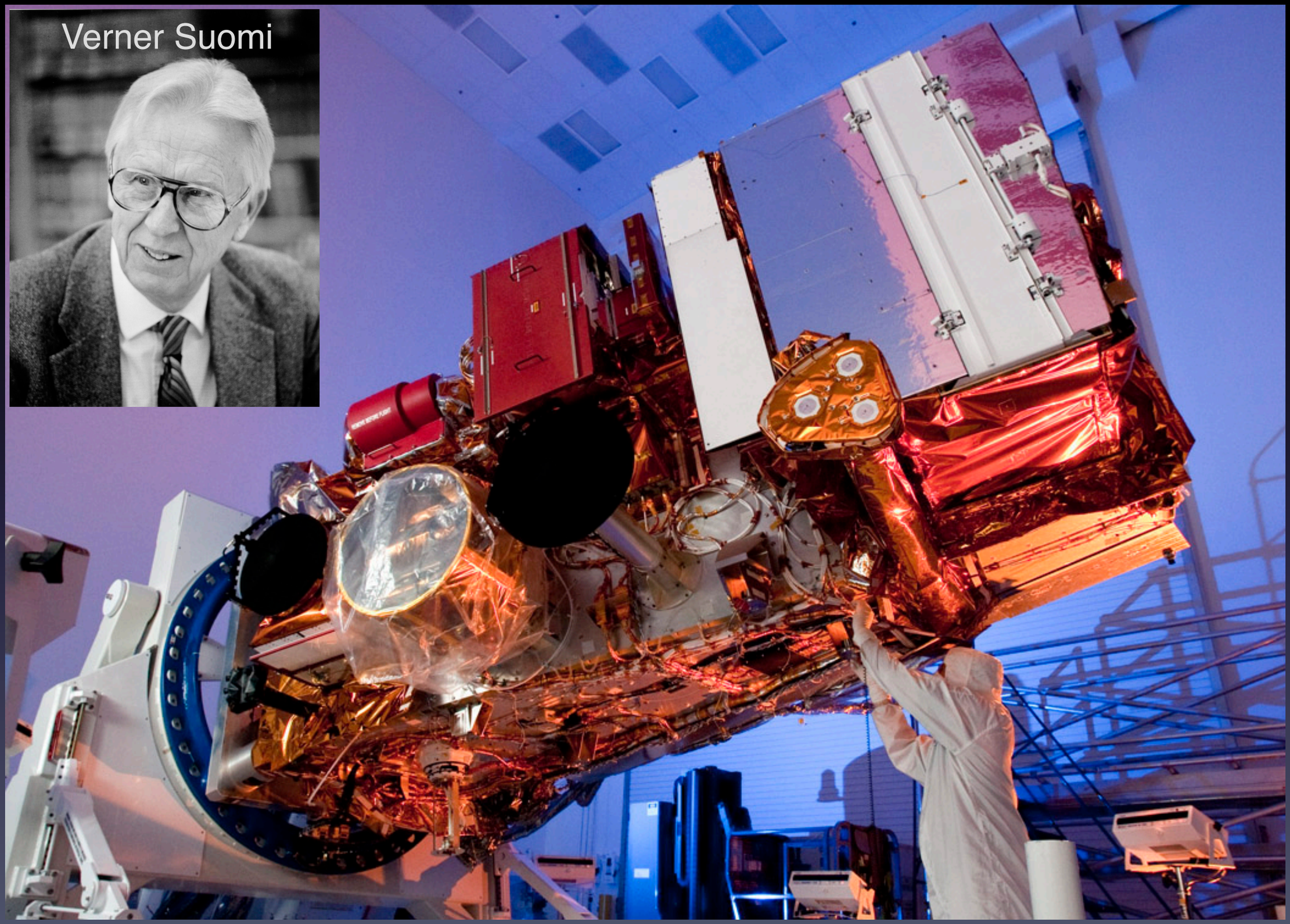
Total of 27 sensors

Note: ARGOS Data Collection System data are also acquired from SARAL, NOAA-18, NOAA-19, Metop-A, Metop-B

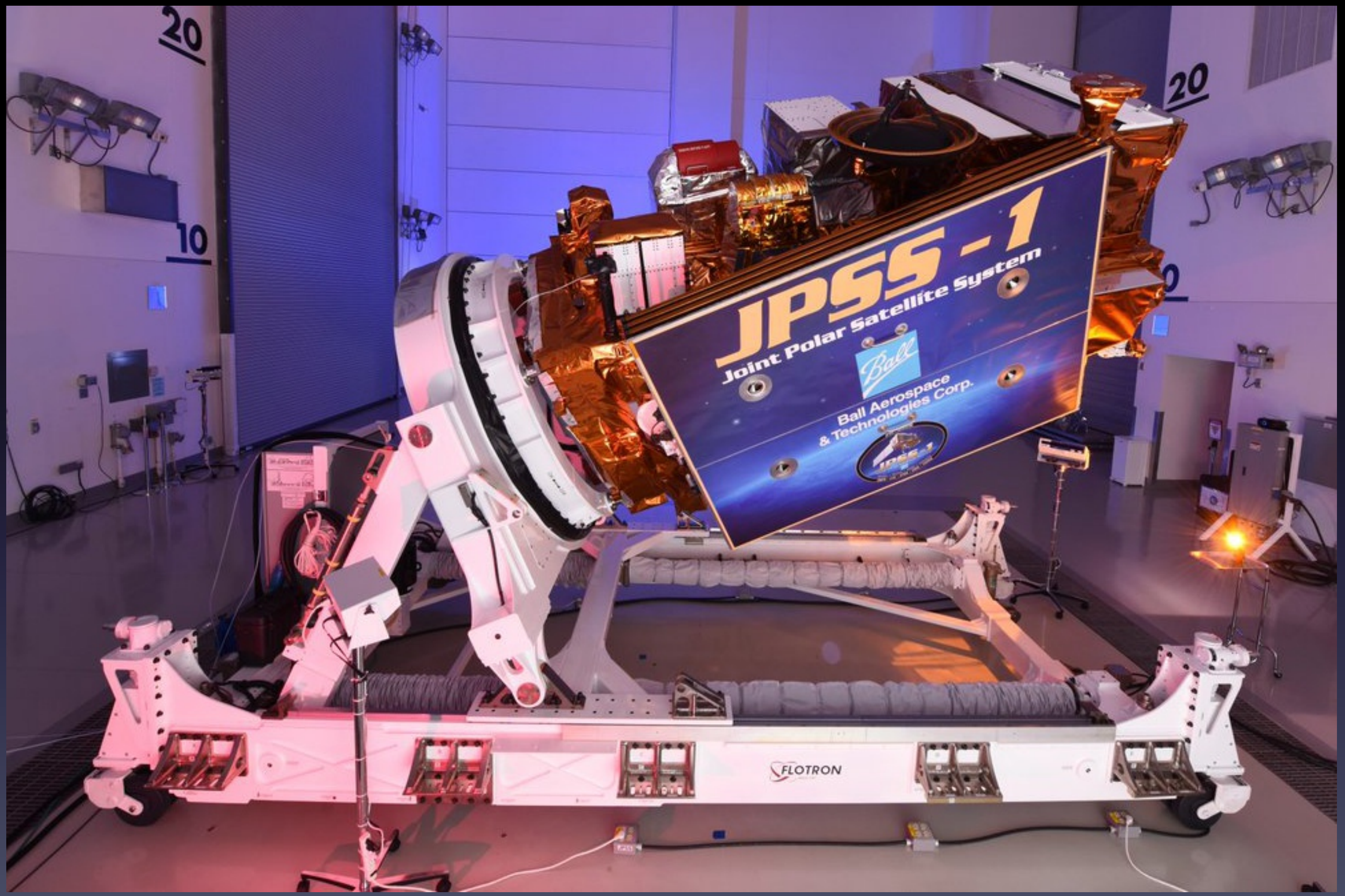
Potential Benefits to NWS

1. Spatial resolution: Thermal infrared at 375 meters; visible and near-IR at 375 or 250 meters (4 satellites)
2. Geophysical products: SST, Clouds, Rain Rate, Aerosols, Temperature, Moisture
3. Day/Night imaging: Optical imaging at night (2 satellites)
4. Microwave: Sounding and imaging (7 satellites)
5. Low latency: Image products are available within 10-15 minutes

Suomi NPP (launched October 2011)



JPSS-1/NOAA-20 (launched Nov 2017)



SNPP/JPSS-1 Sensor Suite

Supported in CSPP LEO

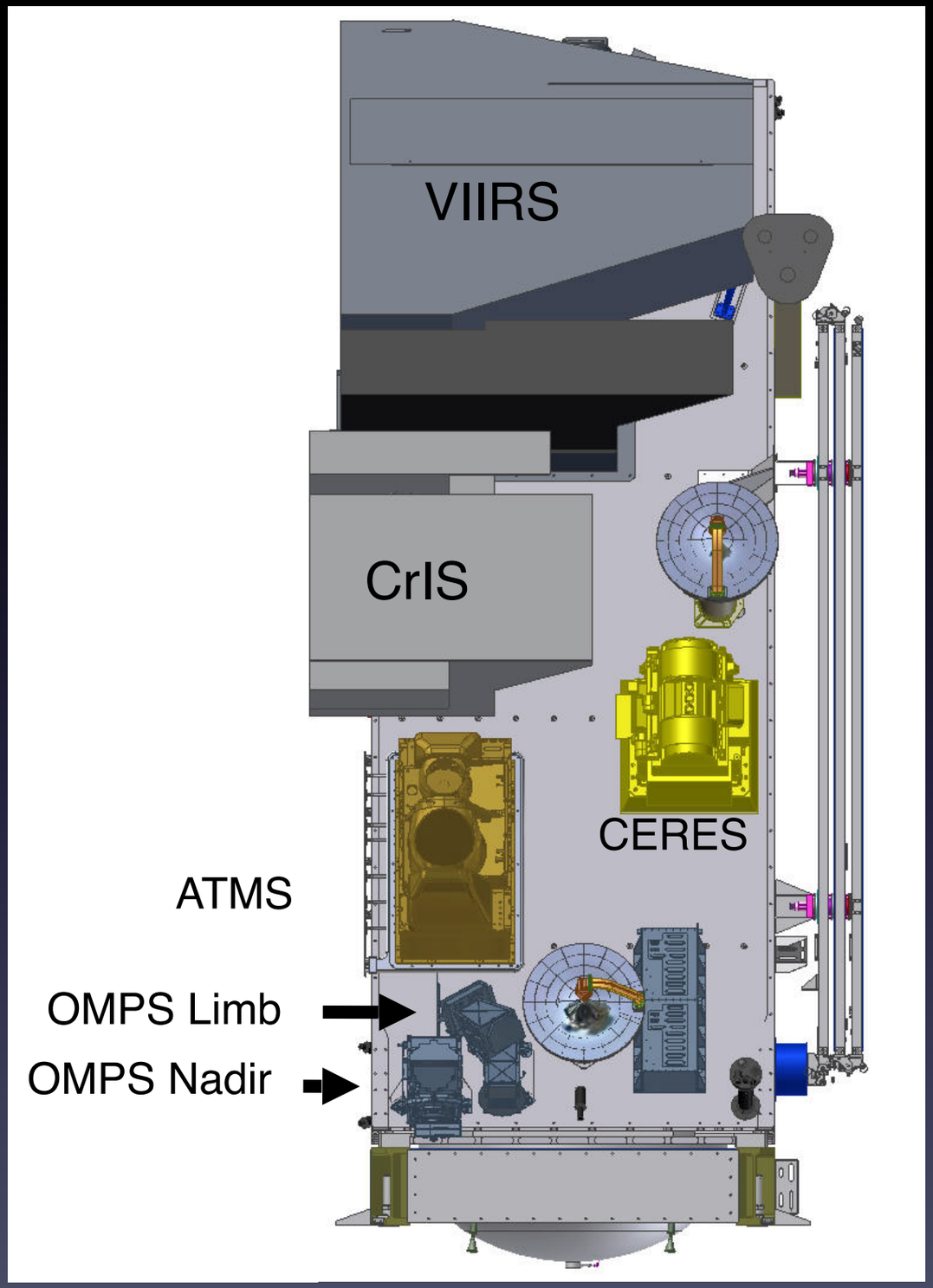
VIIRS – Medium Resolution Visible & Infra-red Imager

CrIS – Fourier Transform Spectrometer for IR Temperature and Moisture sounding

ATMS – Microwave sounding radiometer

OMPS – Total Ozone Mapping and Ozone Profile measurements

CERES - Earth Radiation Budget



Terra

Launched: Dec. 18, 1999

10:30 am descending node

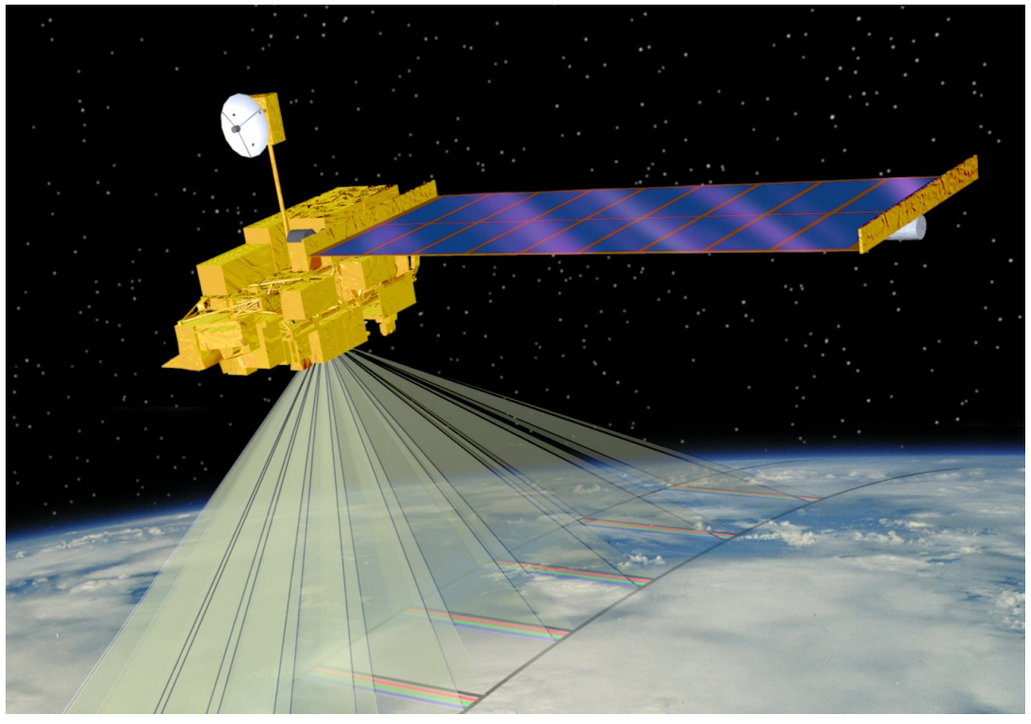
ASTER: Hi-res imager

CERES: Broadband scanner

MISR: Multi-view imager

MODIS: Multispectral imager

MOPITT: Limb sounder



Expected lifetime > 15 years

Aqua

Launched: May 4, 2002

1:30 pm ascending node

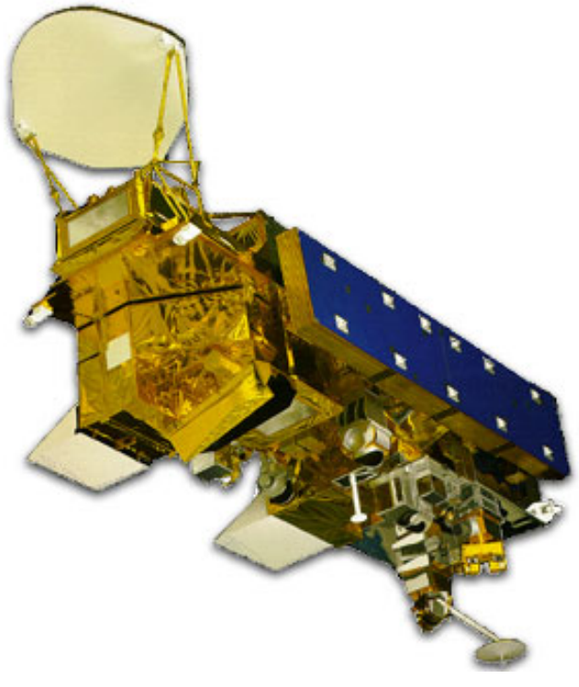
AIRS: Infrared sounder

AMSR-E: Microwave scanner

AMSU: Microwave scanner

CERES: Broadband scanner

MODIS: Multispectral imager



Expected lifetime > 15 years

VIIRS (NOAA-20, SNPP)

VIIRS is a multispectral imager with 22 bands from 0.4 microns to 12 microns.

Spatial resolutions are 375 m (6 bands), and 750 m (16 bands).

Shortwave calibration is provided by onboard solar diffuser.

Thermal infrared calibration is provided by blackbody and deep space views.

MODIS (Terra, Aqua)

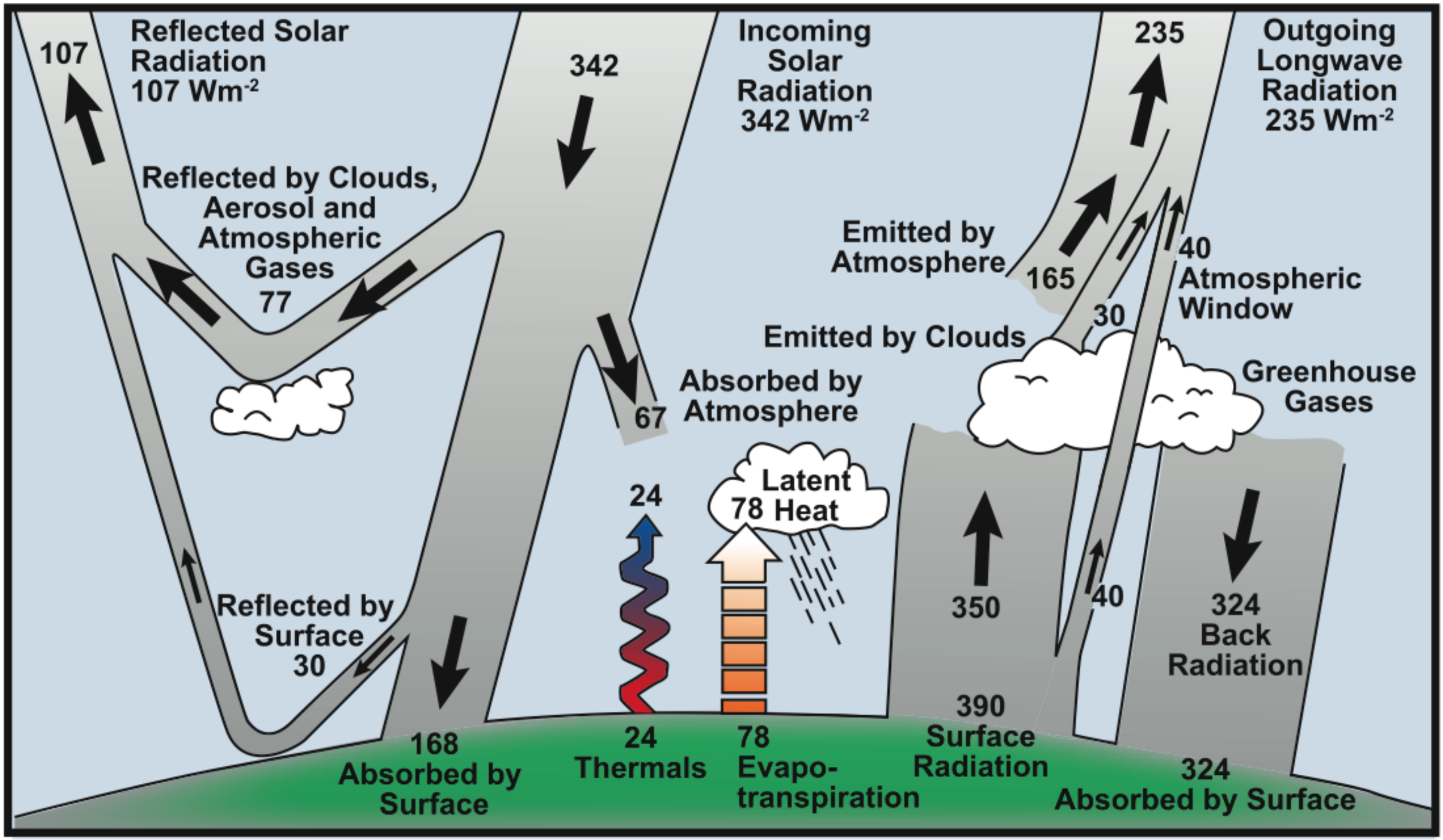
MODIS is a multispectral imager with 36 bands from 0.4 microns to 14 microns.

Spatial resolutions are 250 m (2 bands), 500 m (5 bands), and 1000 m (29 bands).

Shortwave calibration is provided by onboard solar diffuser.

Thermal infrared calibration is provided by blackbody and deep space views.

Global Energy Budget



From IPCC Report 2015

Reflected Solar Bands

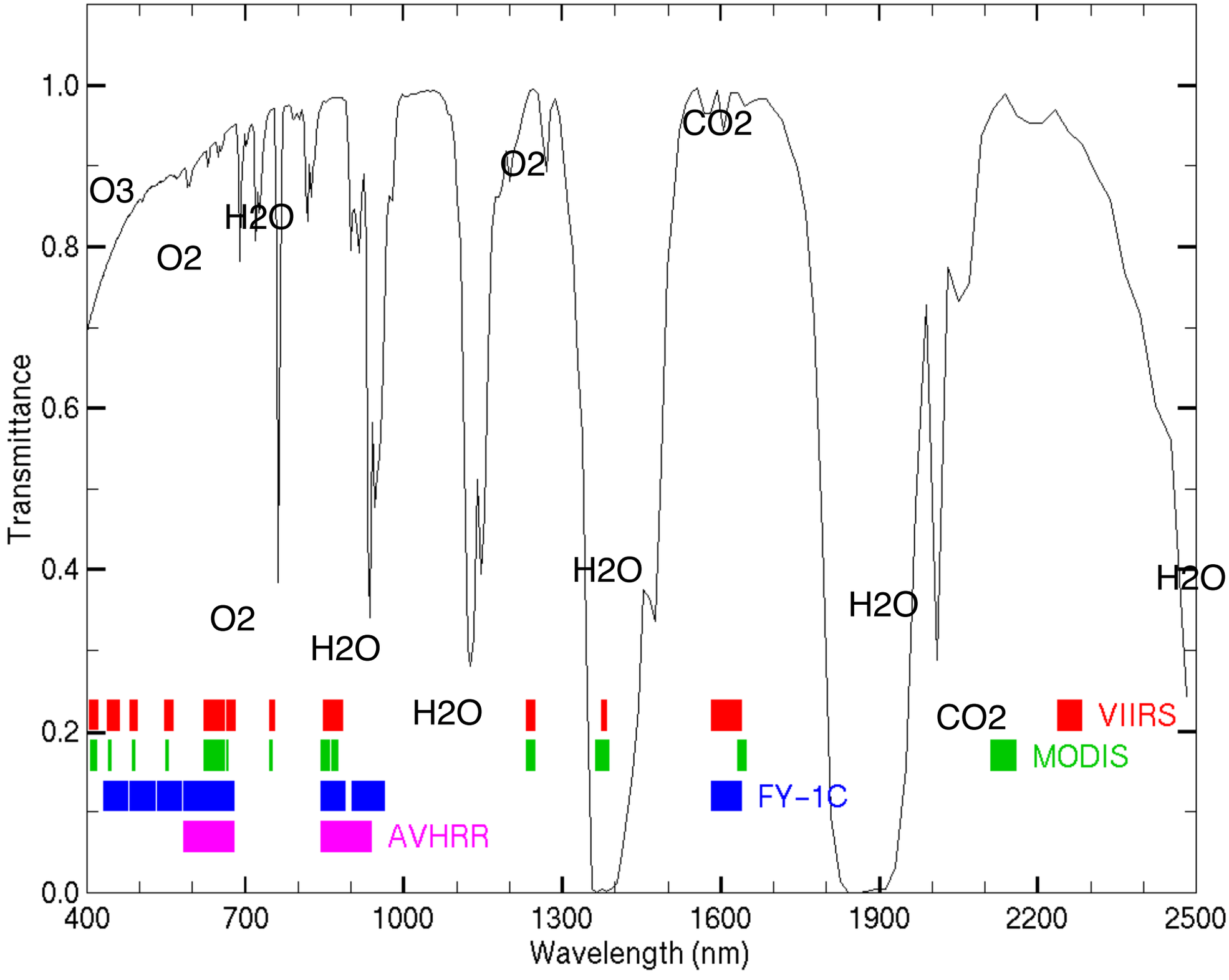
- Reflected solar bands primarily sense photons reflected and scattered from the atmosphere and surface at wavelengths from 0.4 to 2.2 microns.
- The primary source of these photons is incoming solar radiation.
- Since the sun is the primary energy source for these bands, they normally operate only during the day.

MODIS Reflected Solar Bands

Primary Use	Band	Bandwidth[1]	Spectral Radiance[2]	Required SNR[3]	Spatial Resolution
Land/Cloud/Aerosols Boundaries	1	620 - 670	21.8	128	250 meters
	2	841 - 876	24.7	201	
Land/Cloud/Aerosols Properties	3	459 - 479	35.3	243	500 meters
	4	545 - 565	29.0	228	
	5	1230 - 1250	5.4	74	
	6	1628 - 1652	7.3	275	
	7	2105 - 2155	1.0	110	
Ocean Color/ Phytoplankton/ Biogeochemistry	8	405 - 420	44.9	880	1000 meters
	9	438 - 448	41.9	838	
	10	483 - 493	32.1	802	
	11	526 - 536	27.9	754	
	12	546 - 556	21.0	750	
	13	662 - 672	9.5	910	
	14	673 - 683	8.7	1087	
	15	743 - 753	10.2	586	
	16	862 - 877	6.2	516	
Atmospheric Water Vapor	17	890 - 920	10.0	167	
	18	931 - 941	3.6	57	
	19	915 - 965	15.0	250	
Cirrus Clouds	26	1380			

Visible/Near-Infrared Transmittance Spectrum

MODIS bands are shown in green



Thermal Emissive Bands

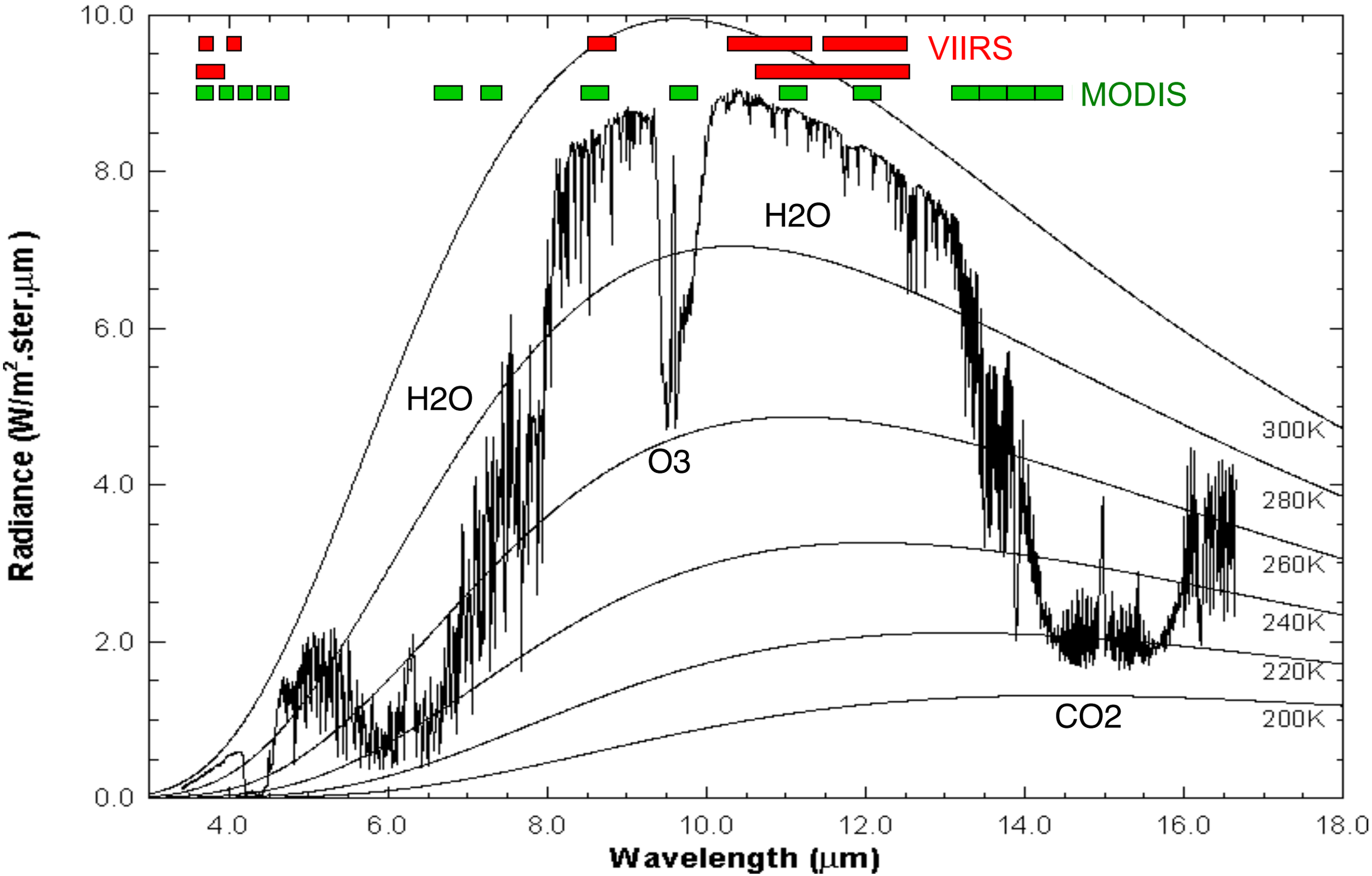
- Thermal emissive bands primarily sense photons emitted from the atmosphere and surface at wavelengths from 3.7 to 14.2 microns.
- The primary source of these photons is emission by the atmosphere, clouds, land surface, and water surface.
- There is a small amount of reflected solar radiation at shorter wavelengths (< 5 microns)
- Since the Earth system is the primary emitting source for these bands, they operate during day and night.

MODIS Thermal Emissive Bands

Primary Atmospheric Application	Band	Bandwidth[1]	$T_{typical}$ (K)	Radiance[2] at $T_{typical}$	$NE^{\Delta}T$ (K) Specification	$NE^{\Delta}T$ (K) Predicted
Surface Temperature	20	3.660-3.840	300	0.45	0.05	0.05
	22	3.929-3.989	300	0.67	0.07	0.05
	23	4.020-4.080	300	0.79	0.07	0.05
Temperature profile	24	4.433-4.498	250	0.17	0.25	0.15
	25	4.482-4.549	275	0.59	0.25	0.10
Moisture profile	27	6.535-6.895	240	1.16	0.25	0.05
	28	7.175-7.475	250	2.18	0.25	0.05
	29	8.400-8.700	300	9.58	0.05	0.05
Ozone	30	9.580-9.880	250	3.69	0.25	0.05
Surface Temperature	31	10.780-11.280	300	9.55	0.05	0.05
	32	11.770-12.270	300	8.94	0.05	0.05
Temperature profile	33	13.185-13.485	260	4.52	0.25	0.15
	34	13.485-13.785	250	3.76	0.25	0.20
	35	13.785-14.085	240	3.11	0.25	0.25
	36	14.085-14.385	220	2.08	0.35	0.35

Thermal Infrared Emission Spectrum

MODIS bands are shown in green



VIIRS Spectral Bands

		Band No.	Wave-length (μm)	Horiz Sample Interval (km Downtrack x Crosstrack)		Driving EDRs	Radi-ance Range	Ltyp or Ttyp	Signal to Noise Ratio (dimensionless) or $NE^{\Delta}T$ (Kelvins)		
				Nadir	End of Scan				Required	Predicted	Margin
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	352 316	441 807	25% 155%
		M2	0.445	0.742 x 0.259	1.60 x 1.58	Ocean Color Aerosols	Low High	40 146	380 409	524 926	38% 126%
		M3	0.488	0.742 x 0.259	1.60 x 1.58	Ocean Color Aerosols	Low High	32 123	416 414	542 730	30% 76%
		M4	0.555	0.742 x 0.259	1.60 x 1.58	Ocean Color Aerosols	Low High	21 90	362 315	455 638	26% 102%
		I1	0.640	0.371 x 0.387	0.80 x 0.789	Imagery	Single	22	119	146	23%
		M5	0.672	0.742 x 0.259	1.60 x 1.58	Ocean Color Aerosols	Low High	10 68	242 360	298 522	23% 45%
		M6	0.746	0.742 x 0.776	1.60 x 1.58	Atmospheric Corr'n	Single	9.6	199	239	20%
		I2	0.865	0.371 x 0.387	0.80 x 0.789	NDVI	Single	25	150	225	50%
		M7	0.865	0.742 x 0.259	1.60 x 1.58	Ocean Color Aerosols	Low High	6.4 33.4	215 340	388 494	81% 45%
CCD		DNB	0.7	0.742 x 0.742	0.742 x 0.742	Imagery	Var.	6.70E-05	6	5.7	-5%
S/MWIR	PV HgCdTe (HCT)	M8	1.24	0.742 x 0.776	1.60 x 1.58	Cloud Particle Size	Single	5.4	74	98	32%
		M9	1.378	0.742 x 0.776	1.60 x 1.58	Cirrus/Cloud Cover	Single	6	83	155	88%
		I3	1.61	0.371 x 0.387	0.80 x 0.789	Binary Snow Map	Single	7.3	6.0	97	1523%
		M10	1.61	0.742 x 0.776	1.60 x 1.58	Snow Fraction	Single	7.3	342	439	28%
		M11	2.25	0.742 x 0.776	1.60 x 1.58	Clouds	Single	0.12	10	17	66%
		I4	3.74	0.371 x 0.387	0.80 x 0.789	Imagery Clouds	Single	270 K	2.500	0.486	415%
		M12	3.70	0.742 x 0.776	1.60 x 1.58	SST	Single	270 K	0.396	0.218	82%
		M13	4.05	0.742 x 0.259	1.60 x 1.58	SST Fires	Low High	300 K 380 K	0.107 0.423	0.063 0.334	69% 27%
LWIR	PV HCT	M14	8.55	0.742 x 0.776	1.60 x 1.58	Cloud Top Properties	Single	270 K	0.091	0.075	22%
		M15	10.763	0.742 x 0.776	1.60 x 1.58	SST	Single	300 K	0.070	0.038	85%
		I5	11.450	0.371 x 0.387	0.80 x 0.789	Cloud Imagery	Single	210 K	1.500	0.789	90%
		M16	12.013	0.742 x 0.776	1.60 x 1.58	SST	Single	300 K	0.072	0.051	42%

MODIS and VIIRS Calibration

- For thermal emissive bands, a full aperture black body (BB) with accurately-known emissivity and temperature, and deep space, are viewed on every scan.
- For reflected solar bands, a full aperture solar diffuser (SD) providing precisely-attenuated sunlight in the visible region of the spectrum is viewed on every scan.
- Since the diffusing surface of the SD may degrade slightly over time on orbit, the sensor also includes a Solar Diffuser Stability Monitor (SDSM) to detect changes in the SD reflected radiance.

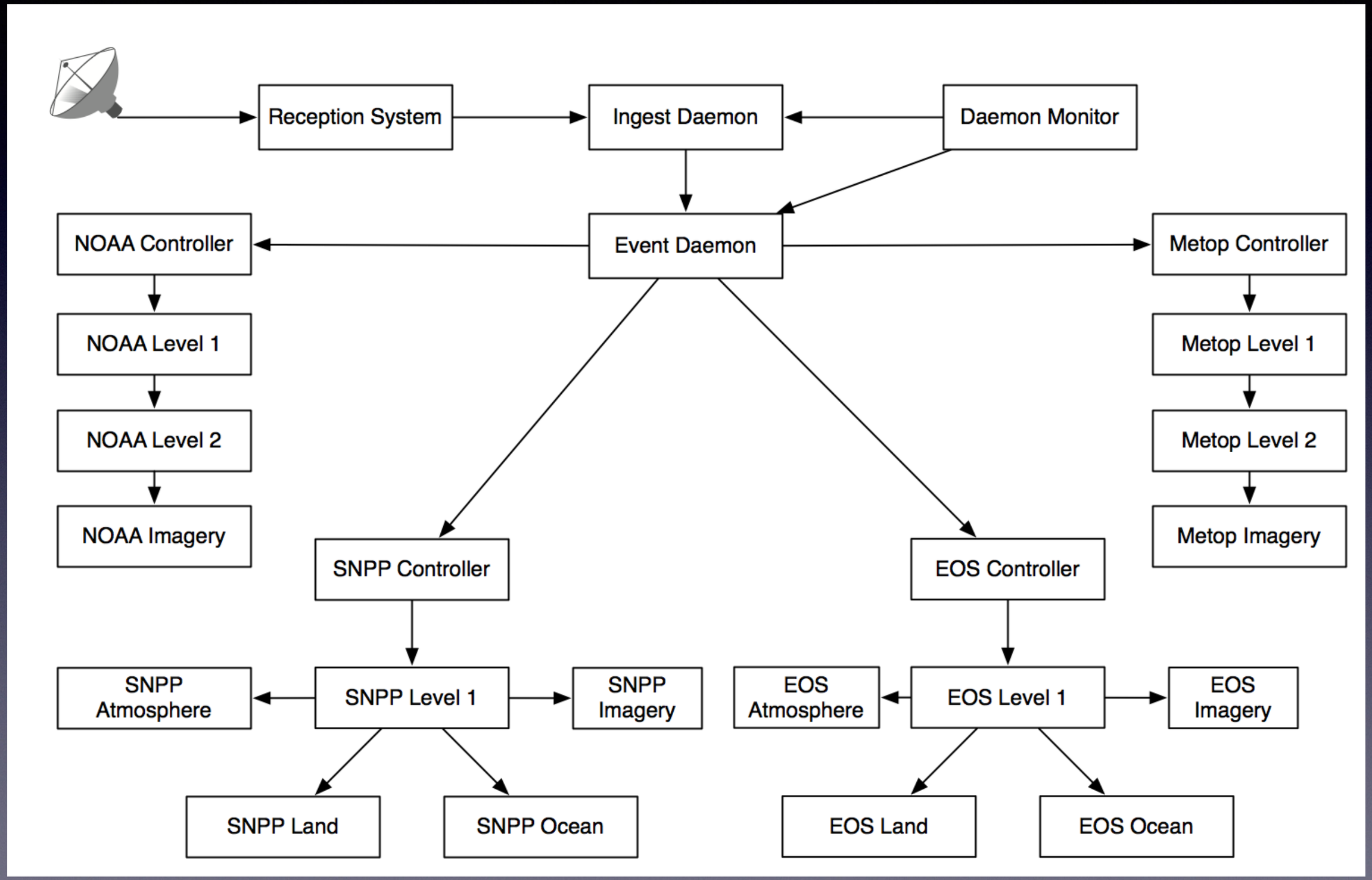
VIIRS compared to MODIS

- VIIRS is the current NOAA operational LEO imager. MODIS is a NASA research imager.
- VIIRS native resolution is 375 and 750 meters (vs. 250 and 1000 meters for MODIS).
- VIIRS has 22 spectral bands while MODIS has 36 spectral bands.
- VIIRS has a thermal infrared band at 375 meter resolution.
- VIIRS has a Day/Night visible band.
- VIIRS has near constant FOV size across the

DBPS Product Types

- Level 1 products are calibrated and geolocated sensor observations, e.g., reflectance, brightness temperature.
- Level 2 products are geophysical parameters derived from the sensor observations, e.g., sea surface temperature, cloud height, vegetation index.
- Images are created from both the Level 1 and Level 2 products, resampled to a map projection.

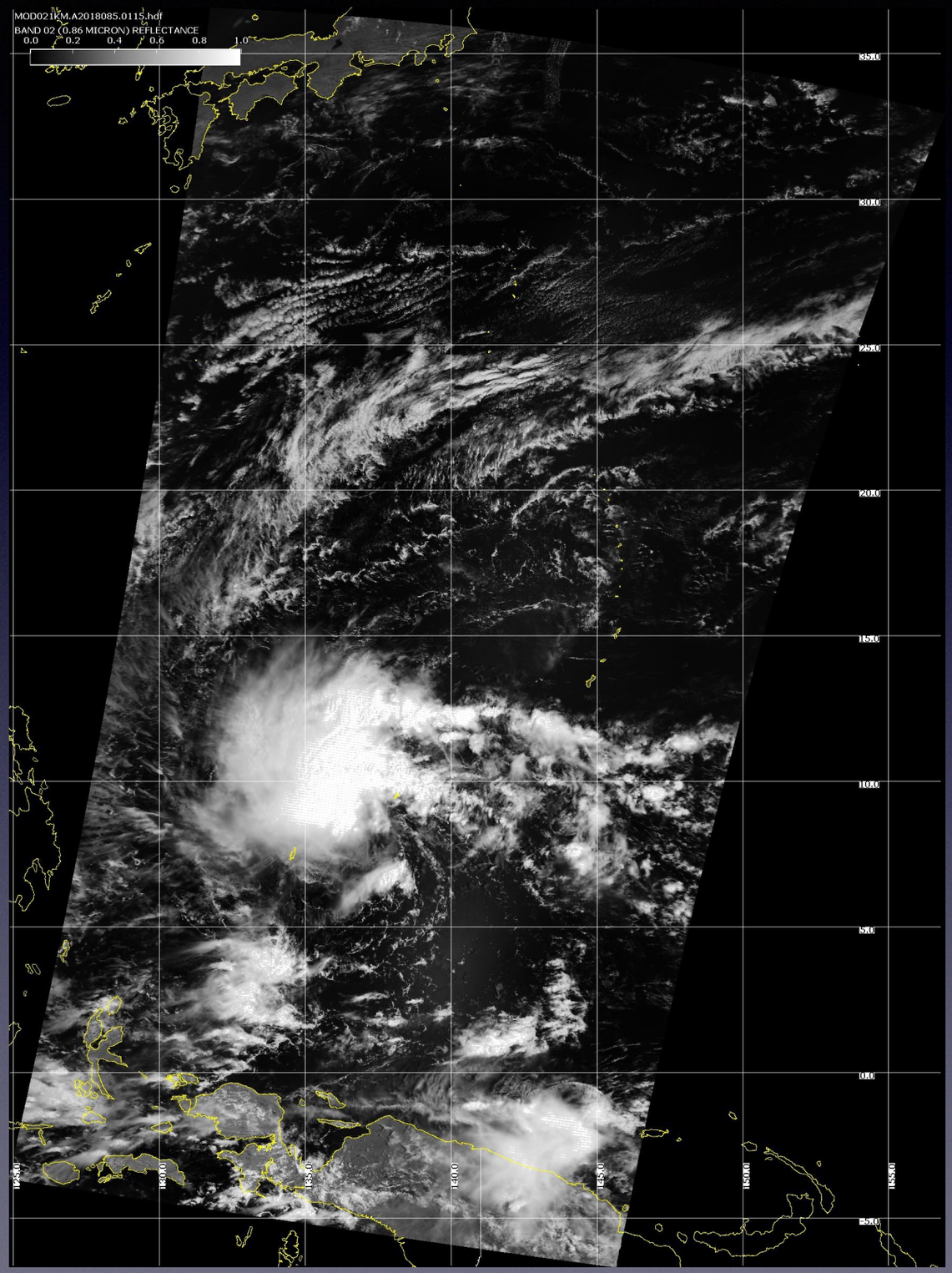
DBPS Data Flow

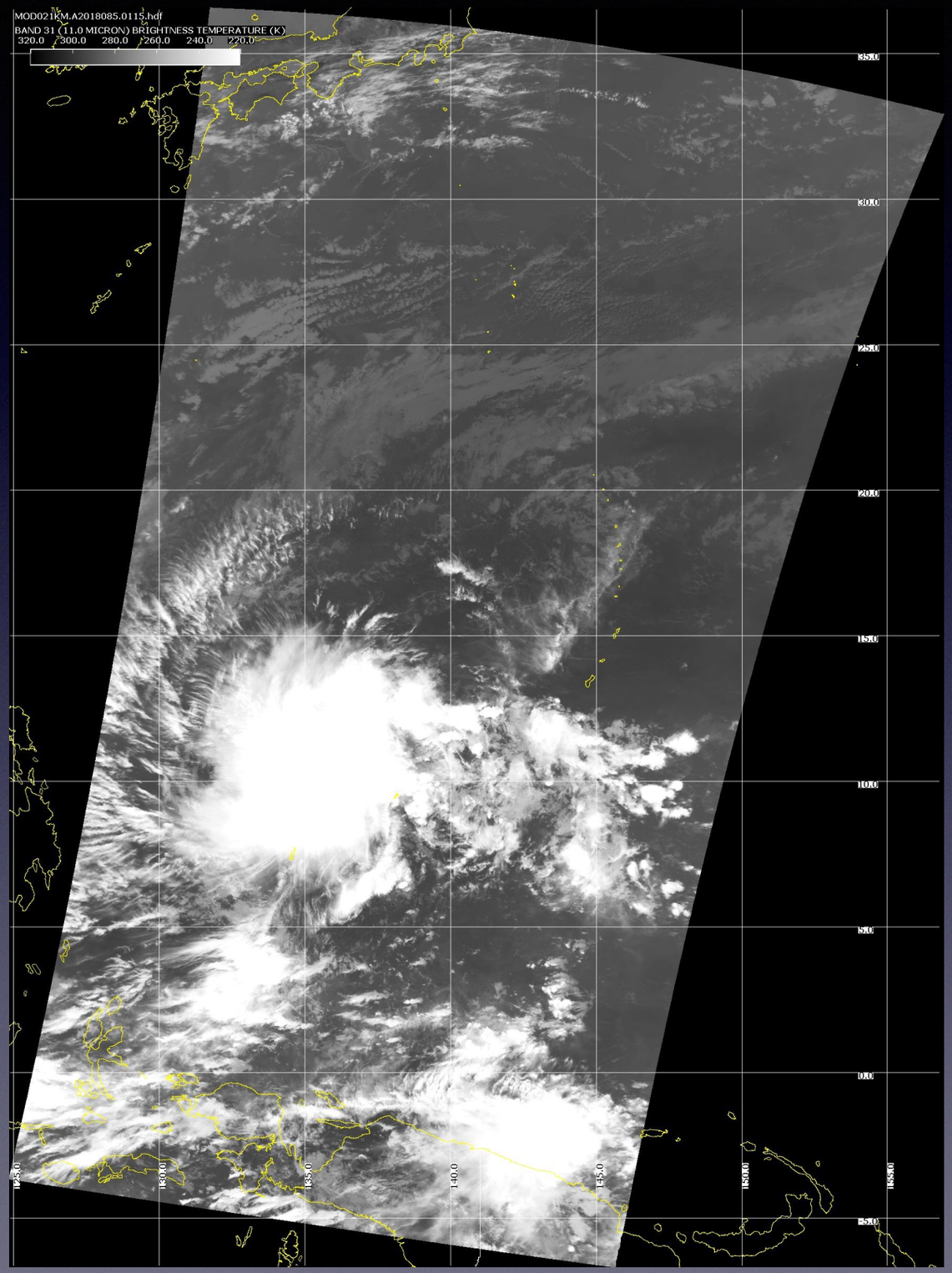


Recent Images from Guam Antenna System

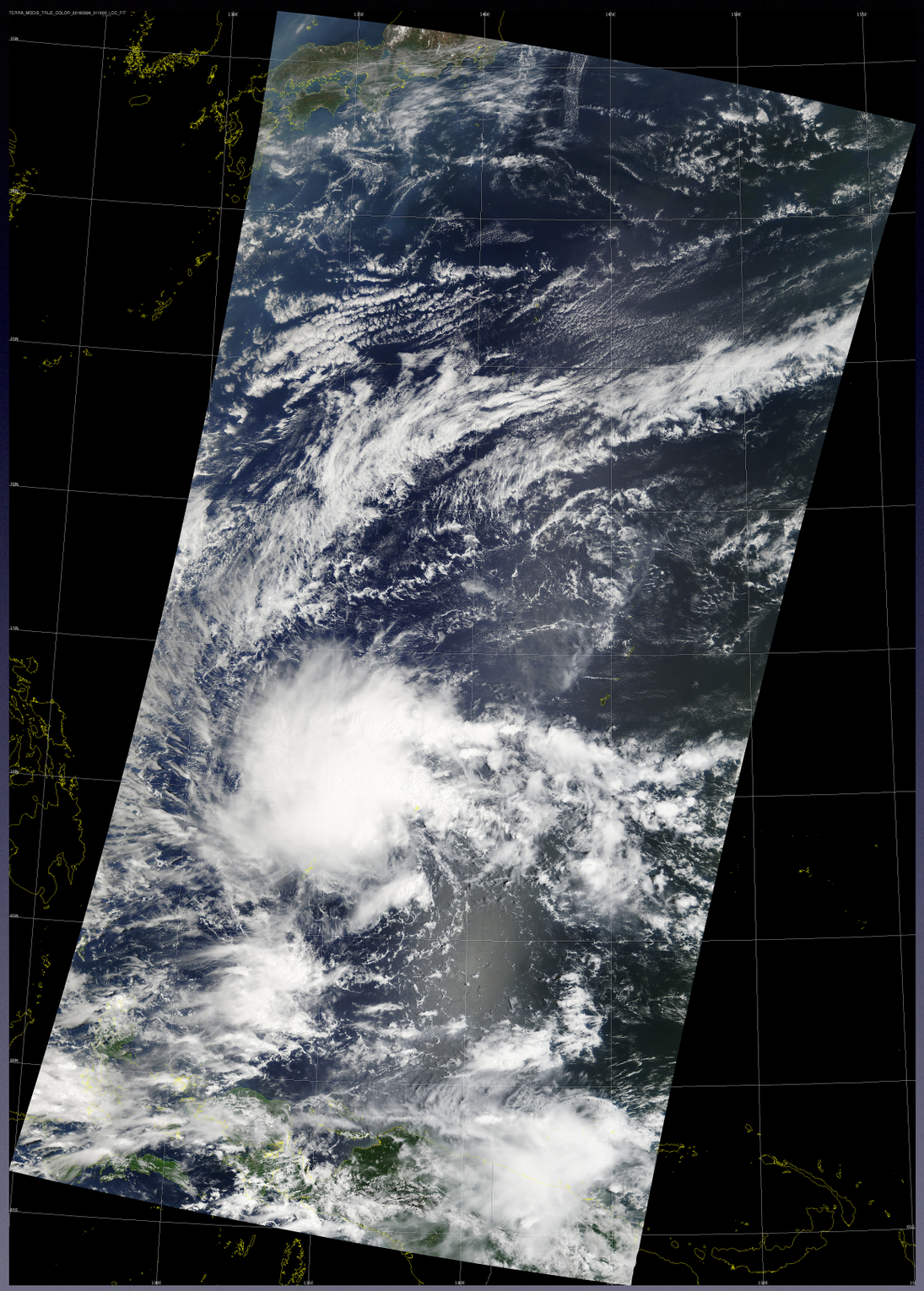
(Created automatically by the DBPS)

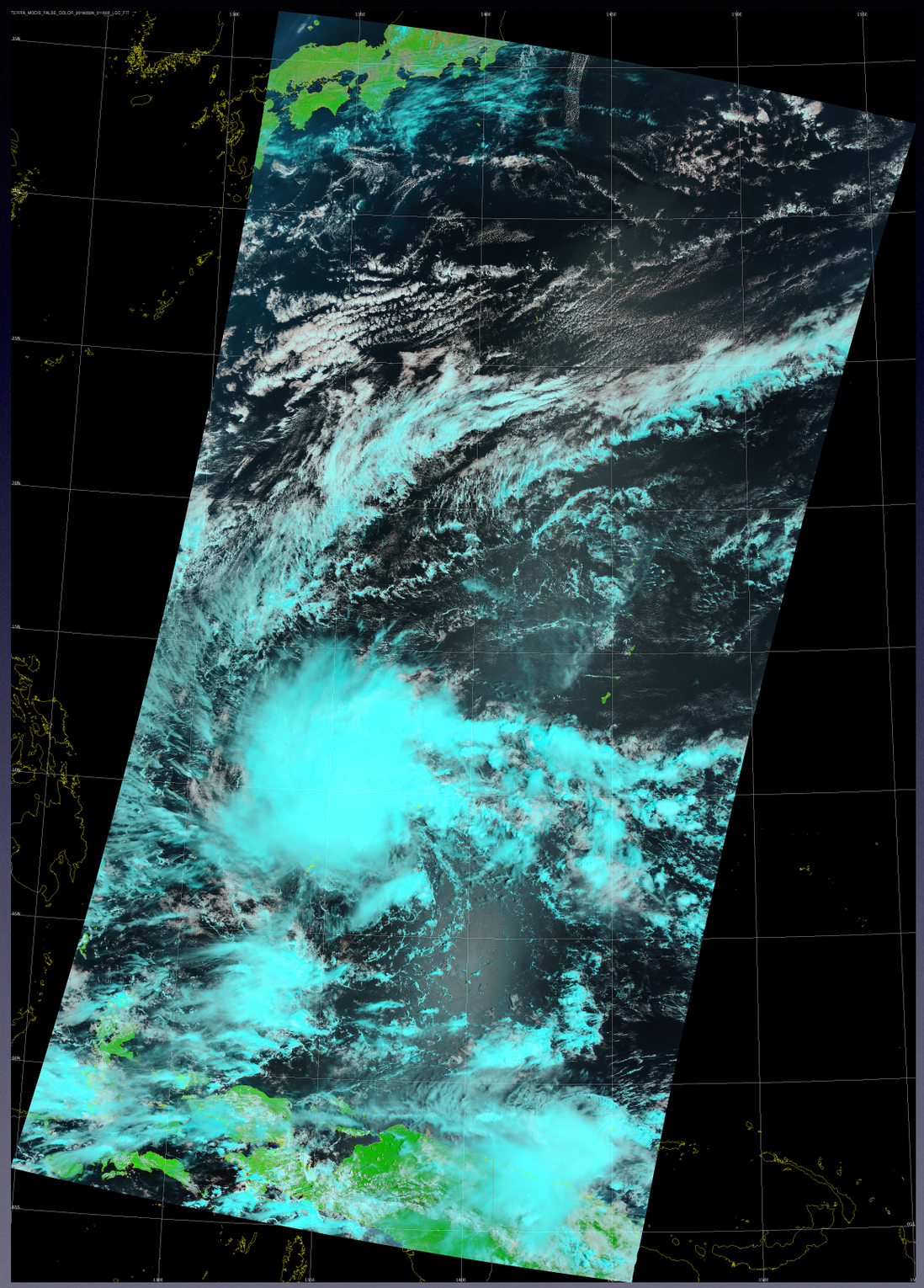
Terra 2018/03/26: MODIS Bands 2 and 31



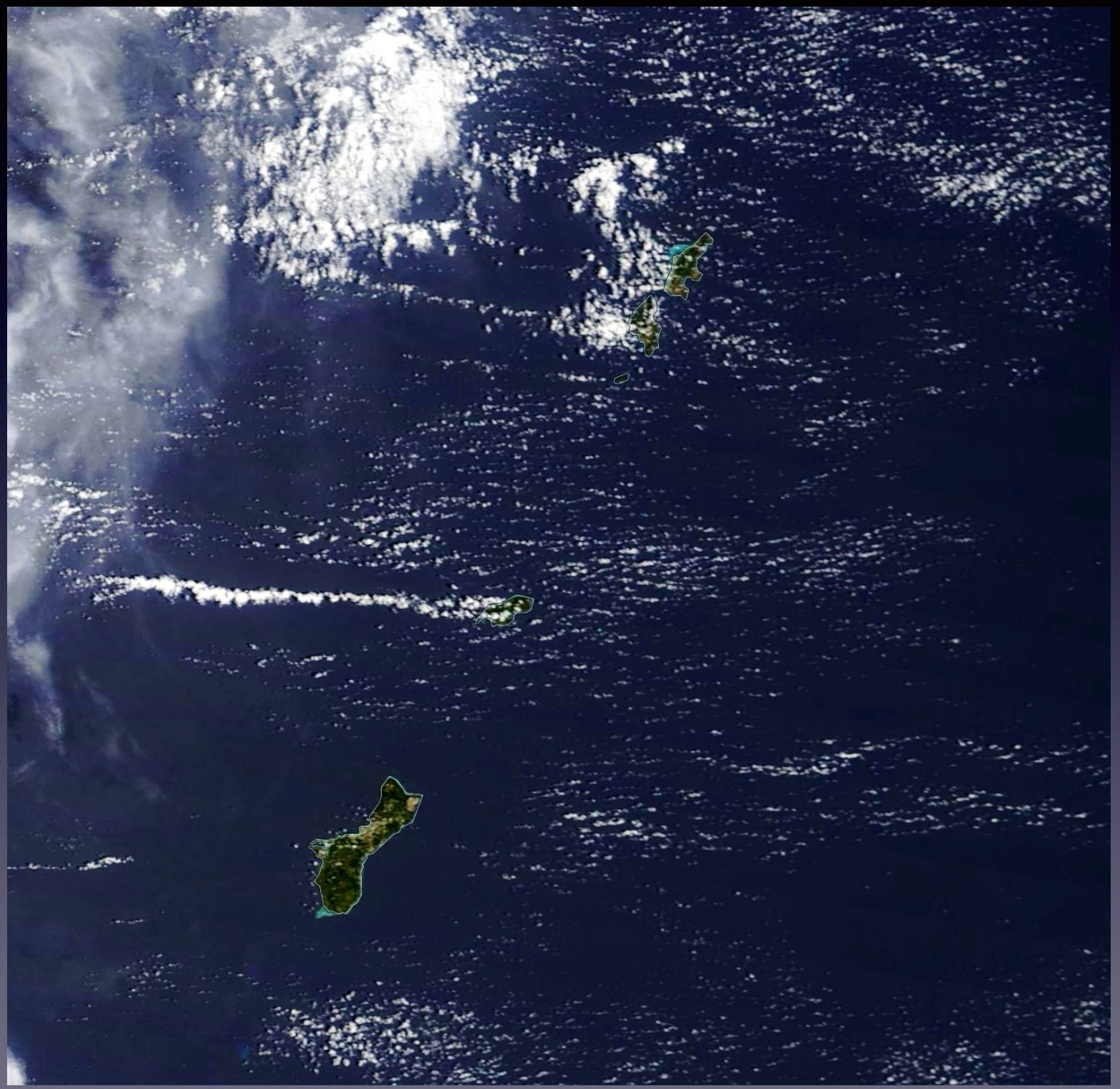


Terra 2018/03/26: MODIS True Color and False Color

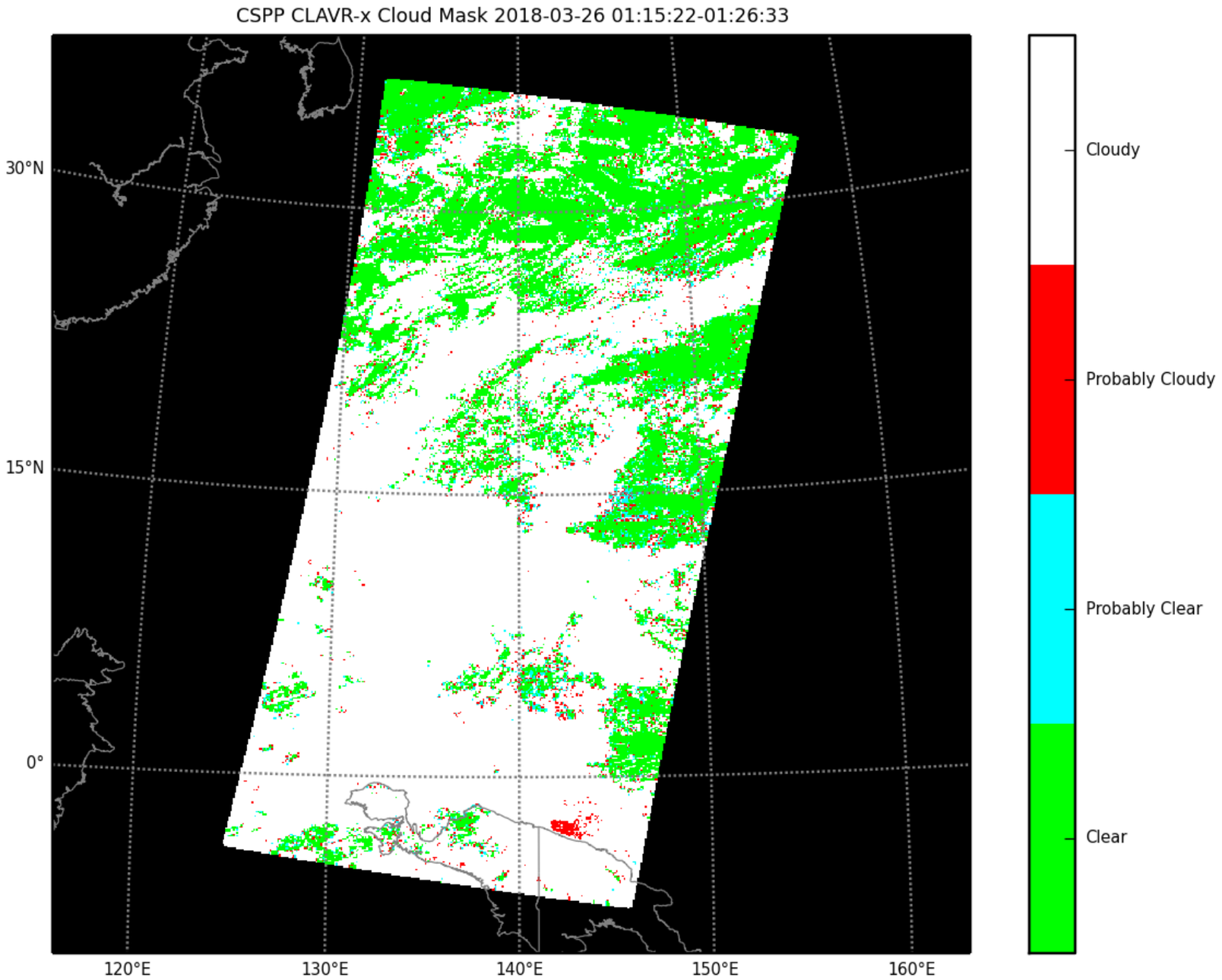




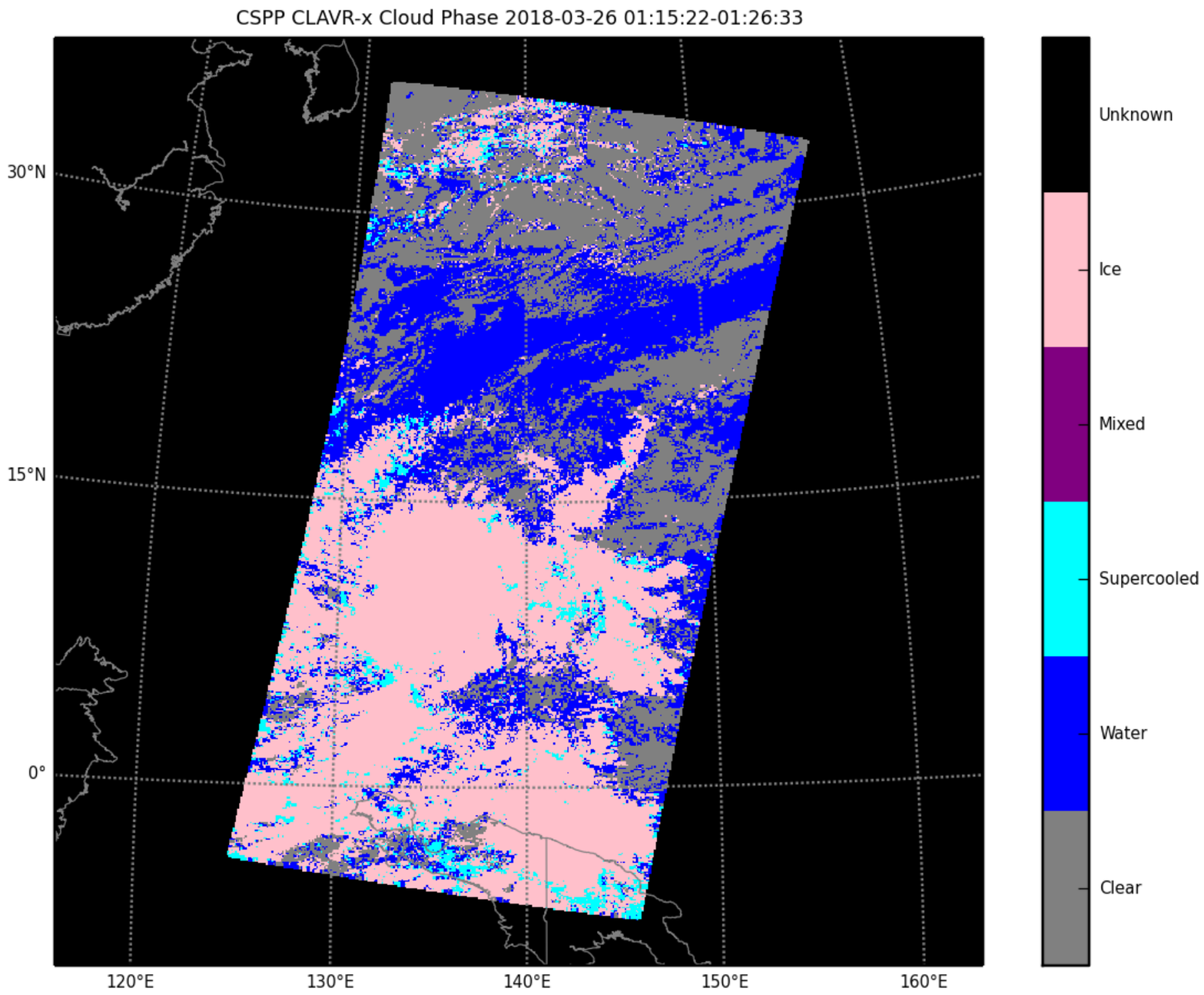
Terra 2018/03/26: MODIS True Color



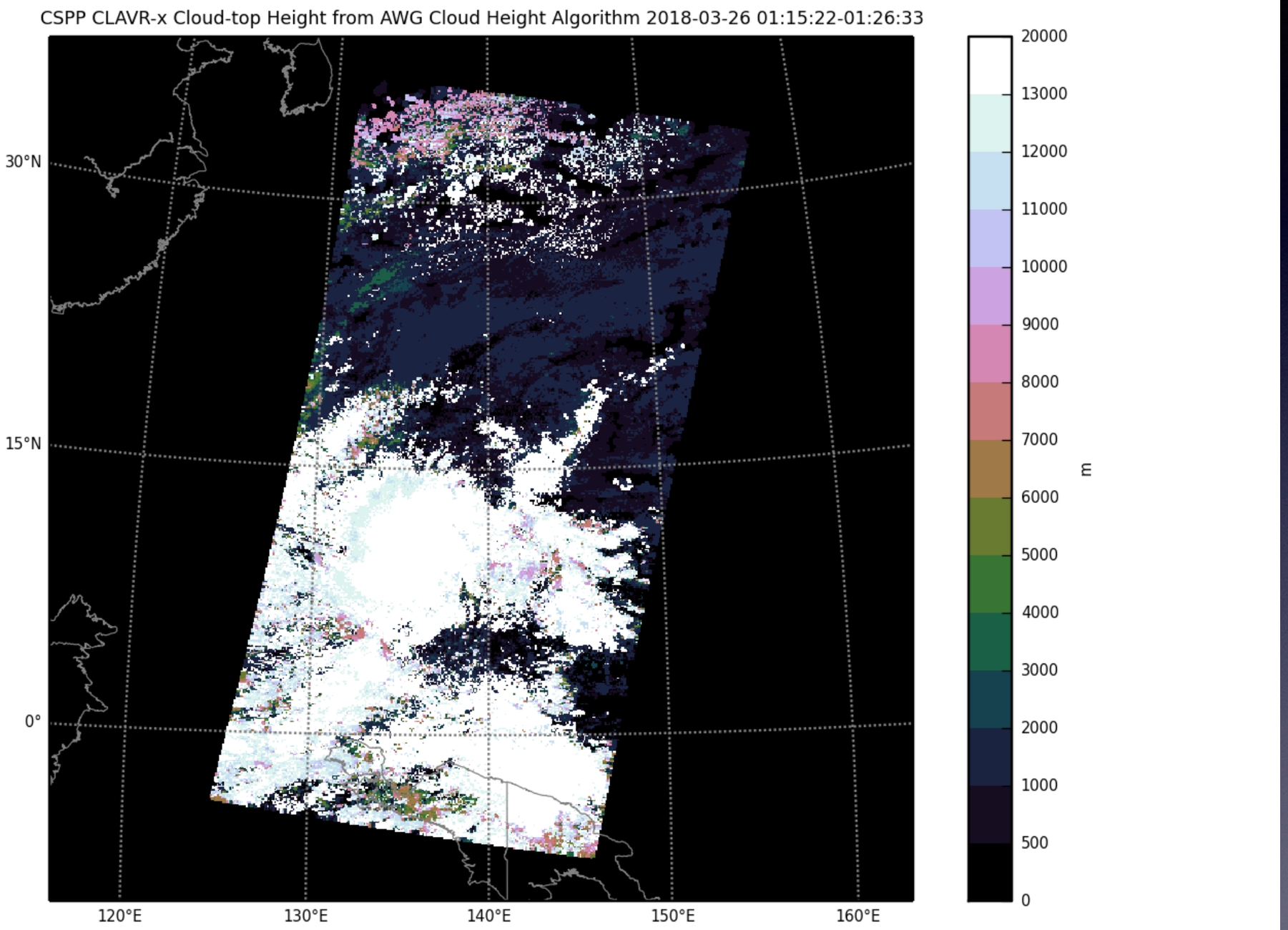
Terra 2018/03/30: MODIS Cloud Mask



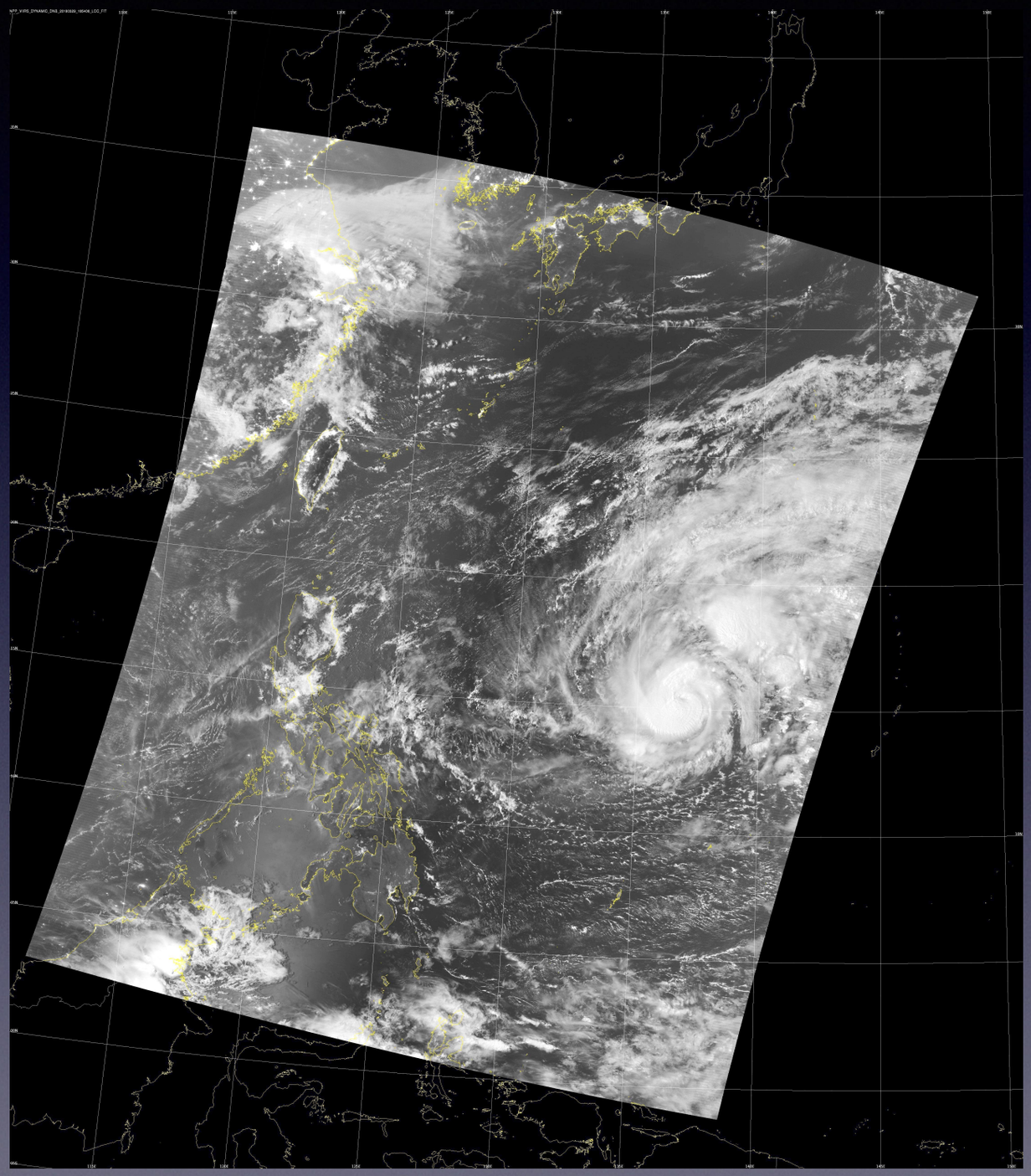
Terra 2018/02/07: MODIS Cloud Phase

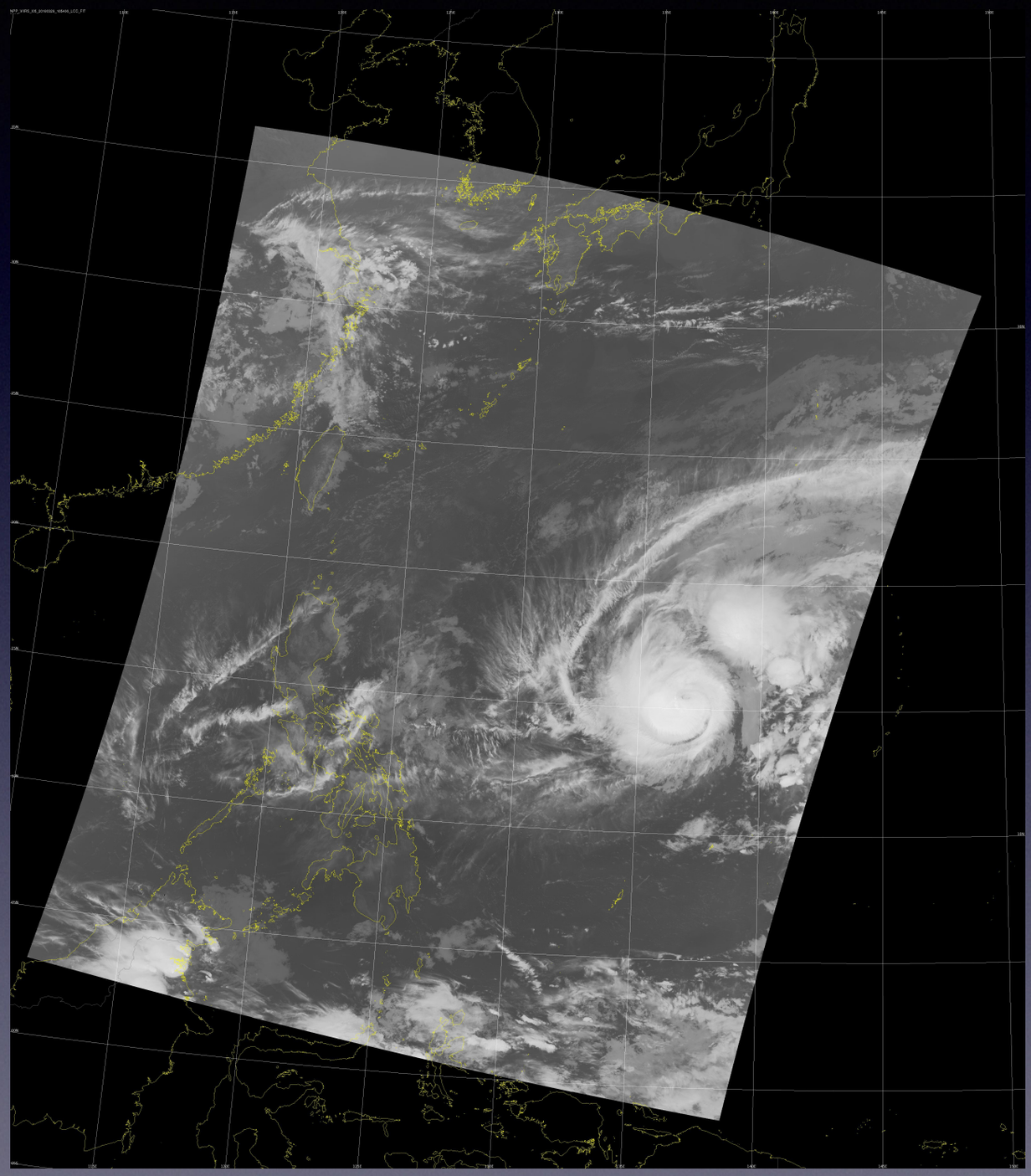


Terra 2018/03/30: MODIS Cloud Height

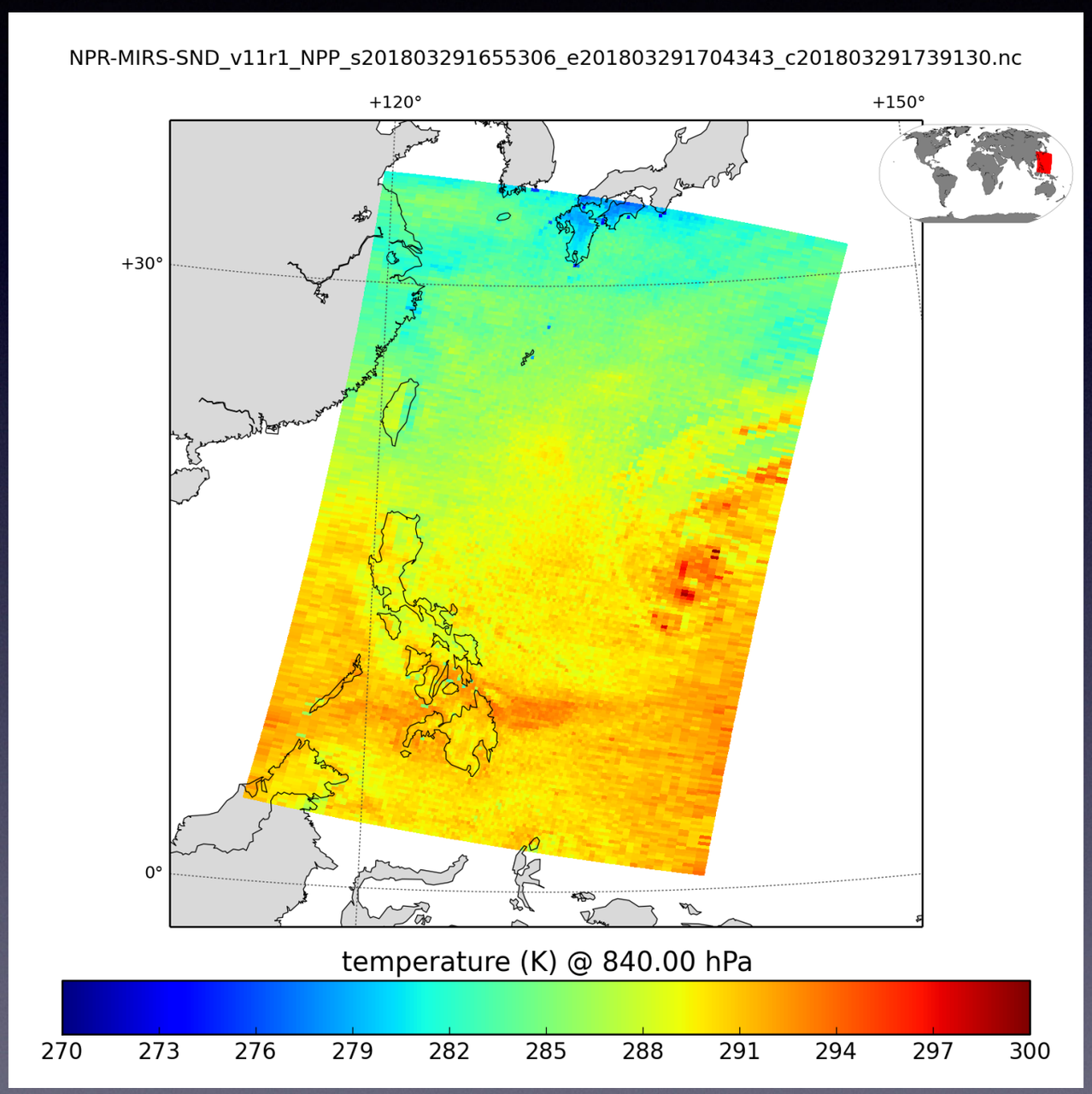


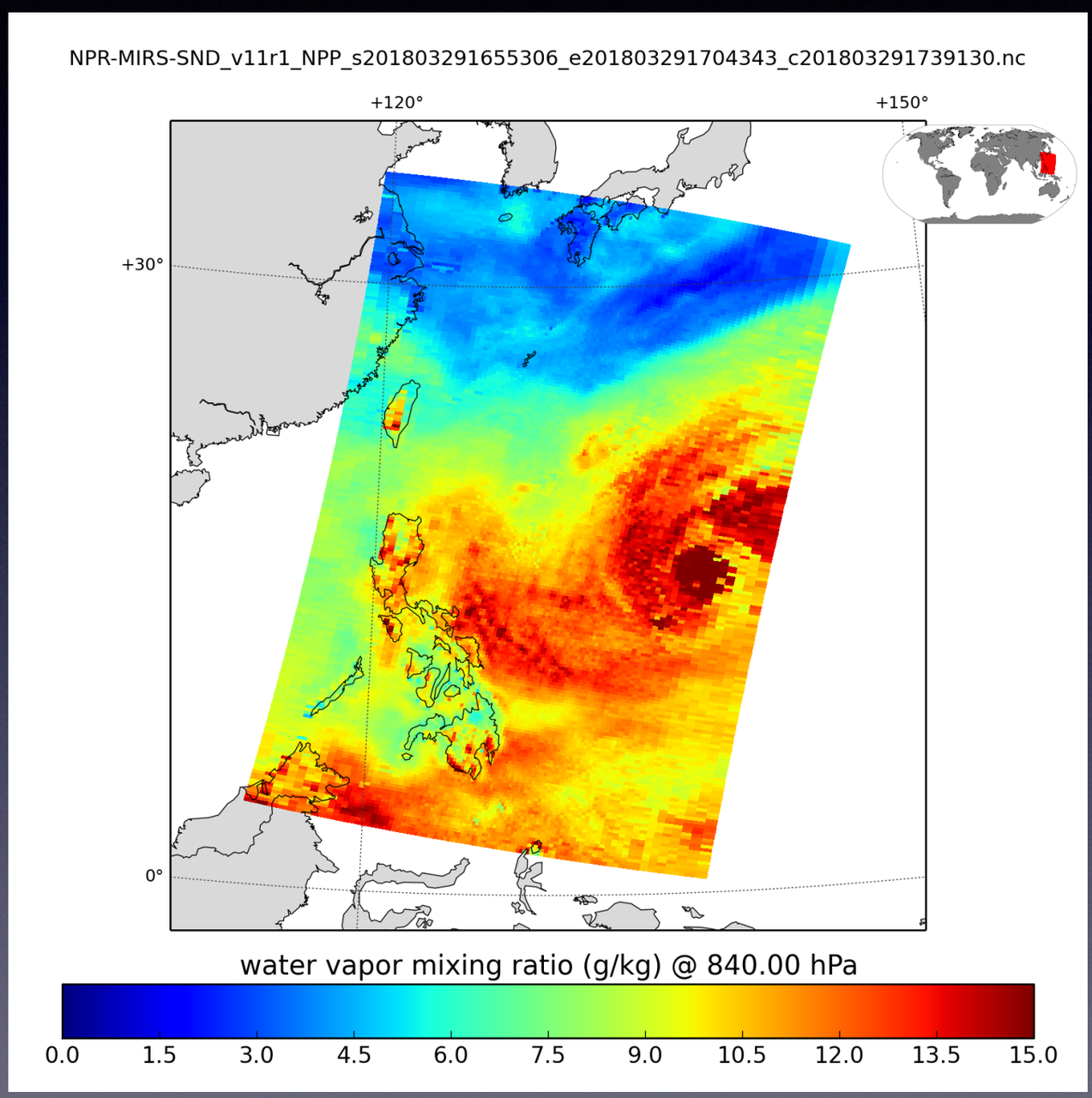
SNPP 2018/03/29:VIIRS Day/Night and Infrared





SNPP 2018/03/29: Temperature and Moisture Retrievals from ATMS Microwave Data



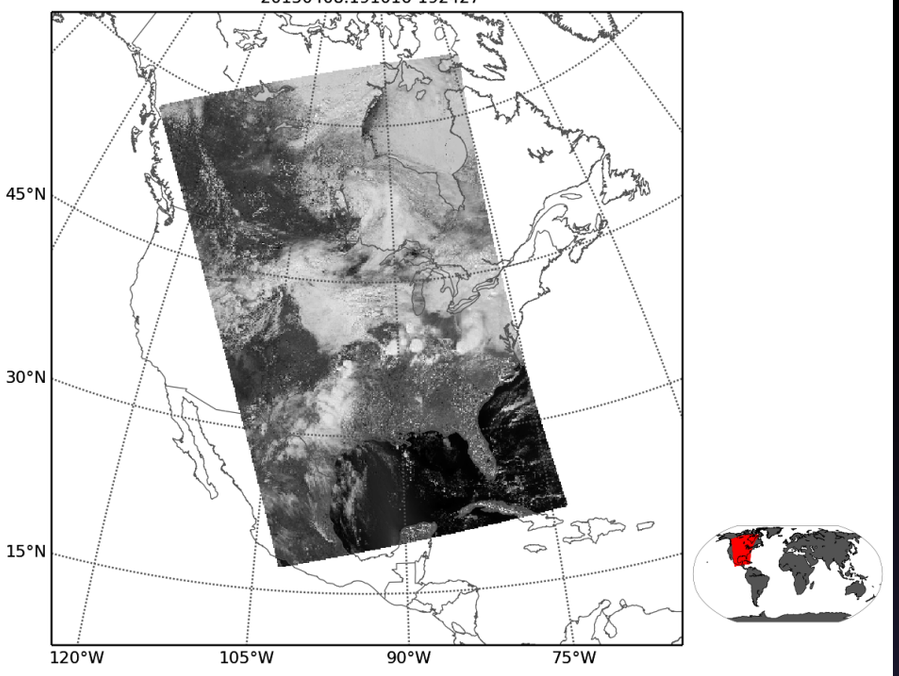


Level 1
Sensor Observation Products

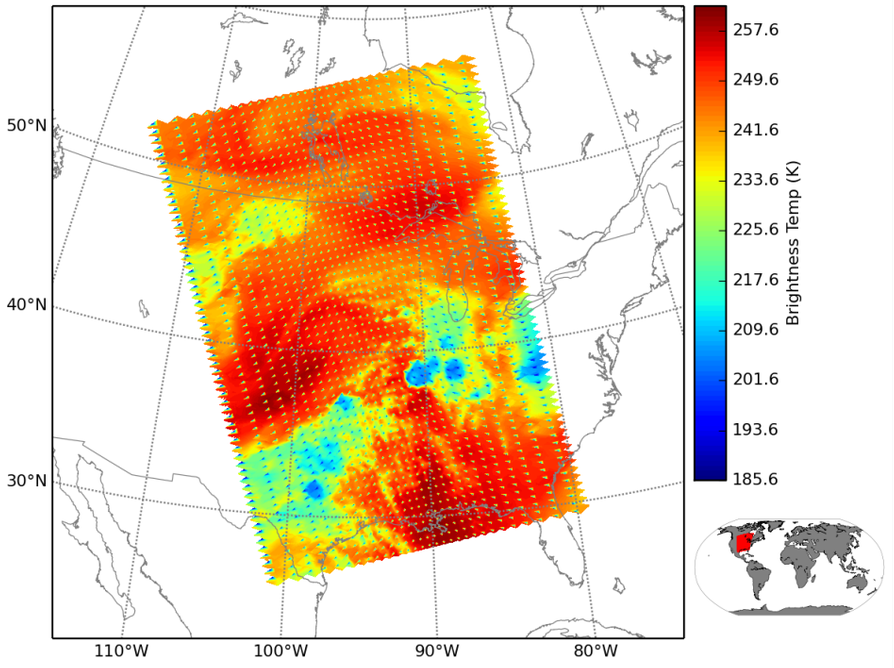
- Reflectance for shortwave solar bands
- Brightness temperature for long wave infrared bands
- Antenna temperature for microwave channels
- Latitude, longitude, sensor zenith and azimuth, solar zenith and azimuth
- Land/sea mask, terrain height
- Imagery resampled to a map projection

SNPP Level 1 Products 2015/04/08 19:10 UTC

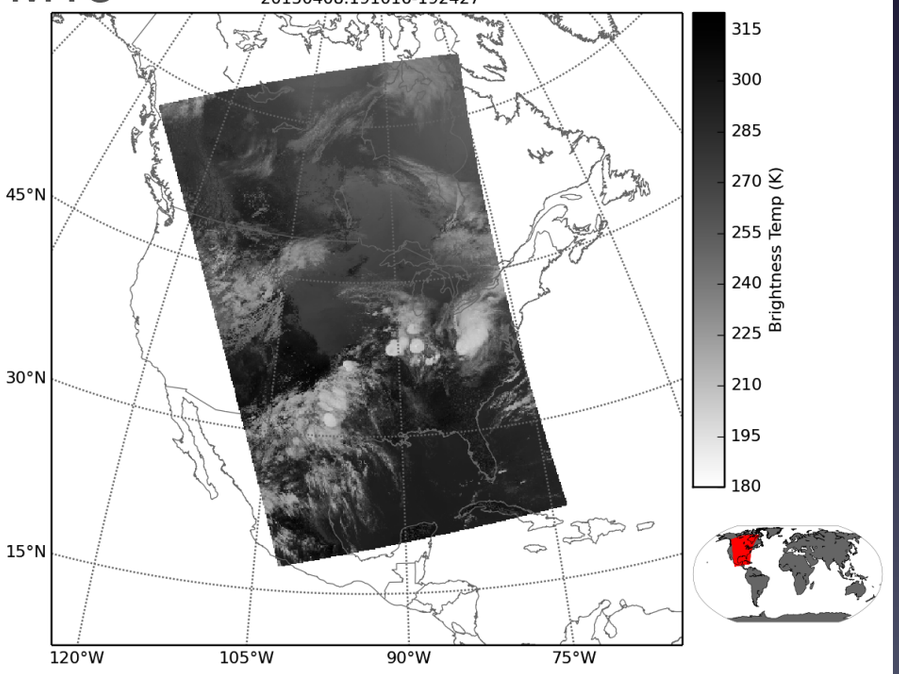
VIIRS M7



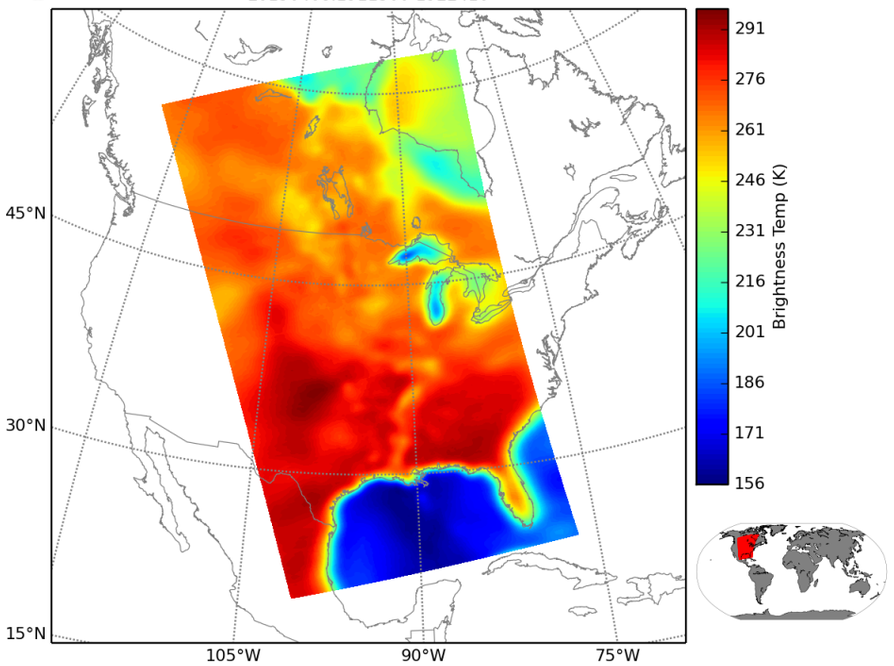
CrIS MW



VIIRS M15

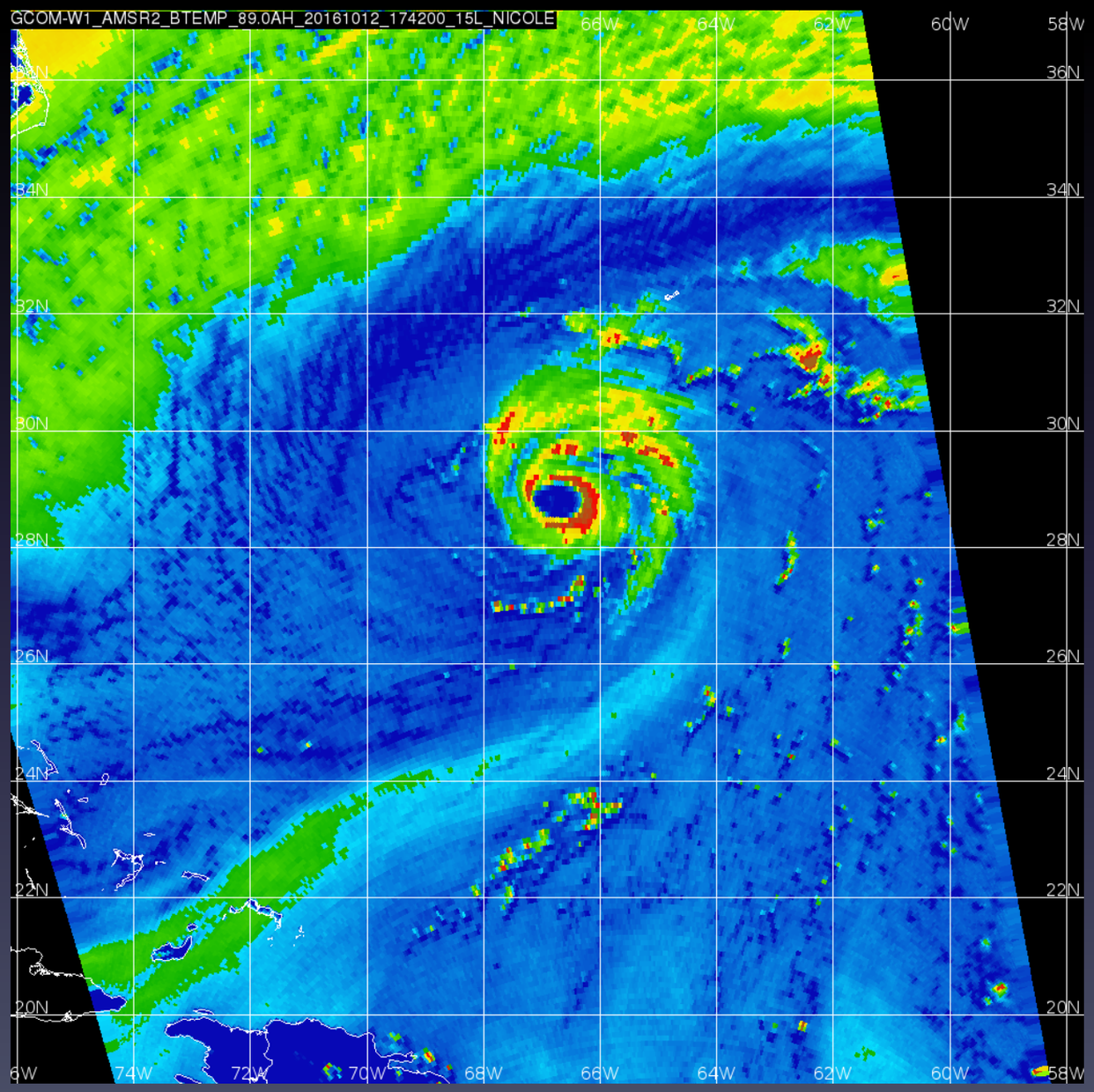


ATMS Ch 2

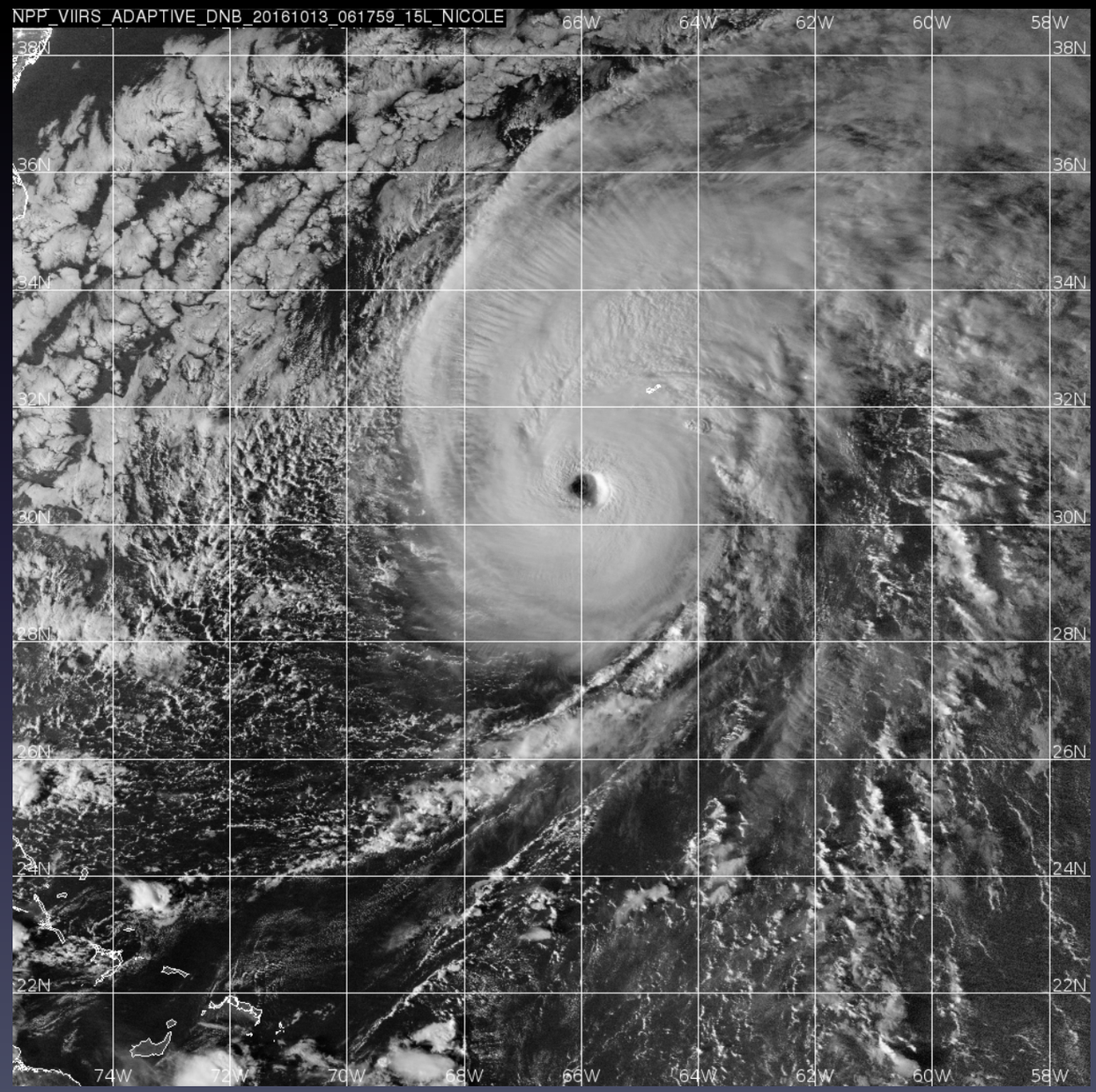


Storm Centered Images

GCOM-W1 AMSR2 89 GHz
2016/10/12 17:42
HURRICANE NICOLE



SUOMI NPP VIIRS DAY/NIGHT
2016/10/13 06:17
HURRICANE NICOLE



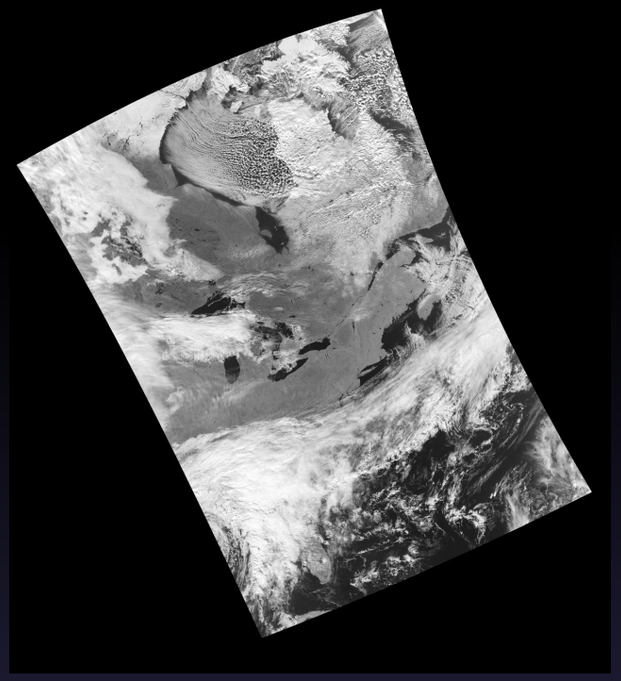
Level 2
Atmosphere Products

- Cloud Mask and Phase
- Cloud Top Pressure, Temperature, Effective Emissivity
- Cloud Optical Depth and Effective Radius
- Aerosol Optical Depth
- Temperature and Water Vapor Profiles
- Total Column Precipitable Water Vapor
- Total Column Ozone
- Rain Rate

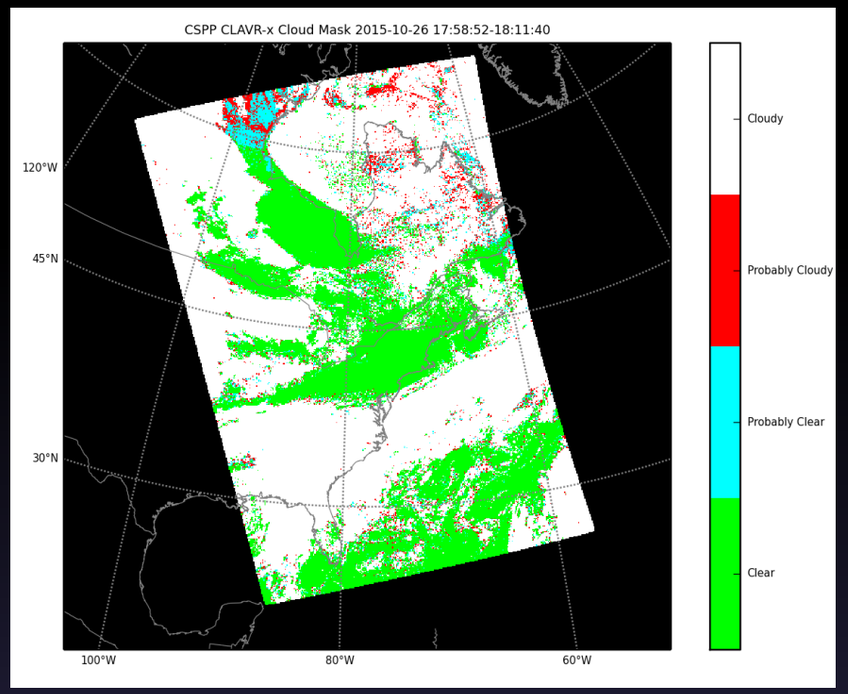
VIIRS and MODIS Cloud Products

SNPP 2015/10/26 17:58 UTC
Terra 2015/10/26 16:10 UTC

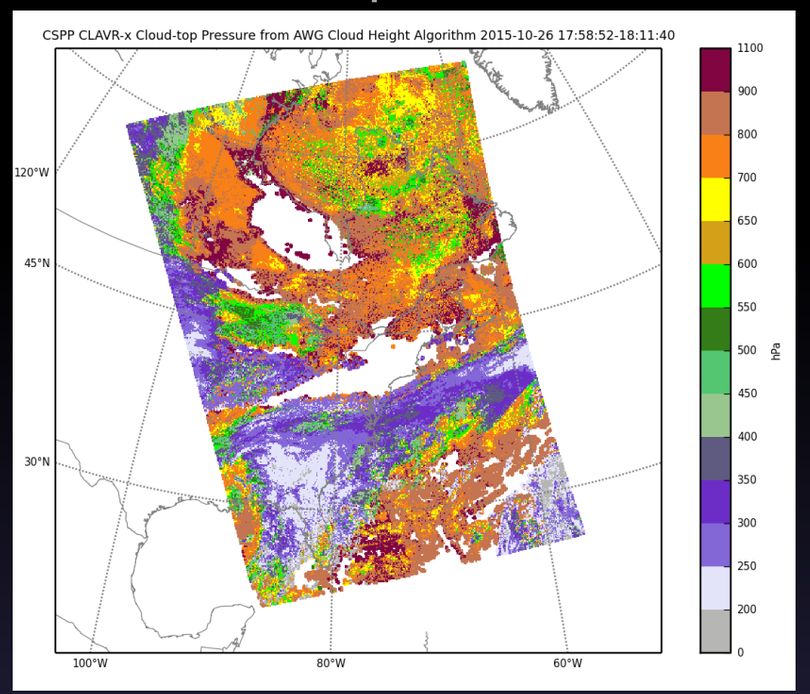
VIIRS 0.87 micron



Cloud Mask

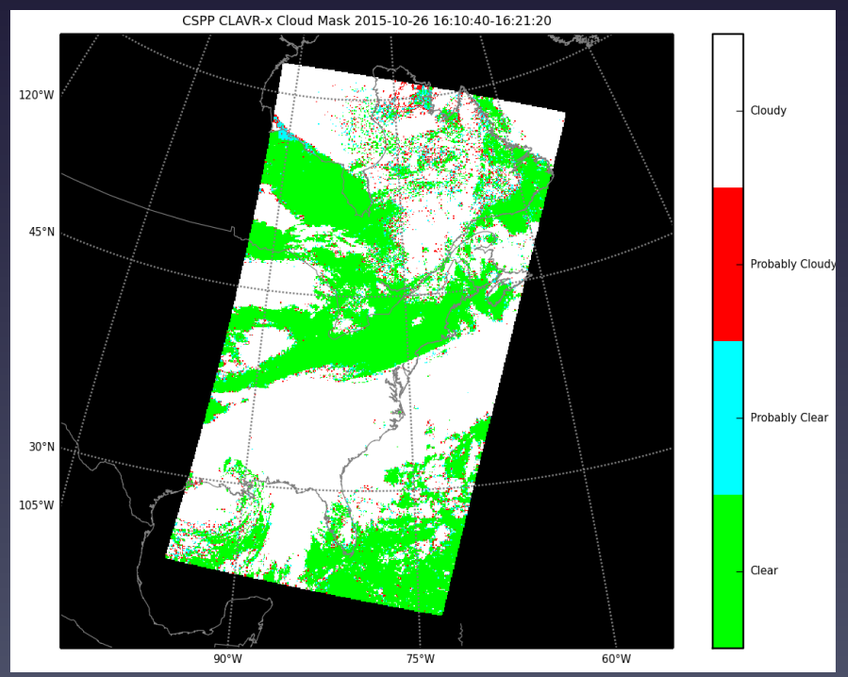


Cloud Top Pressure

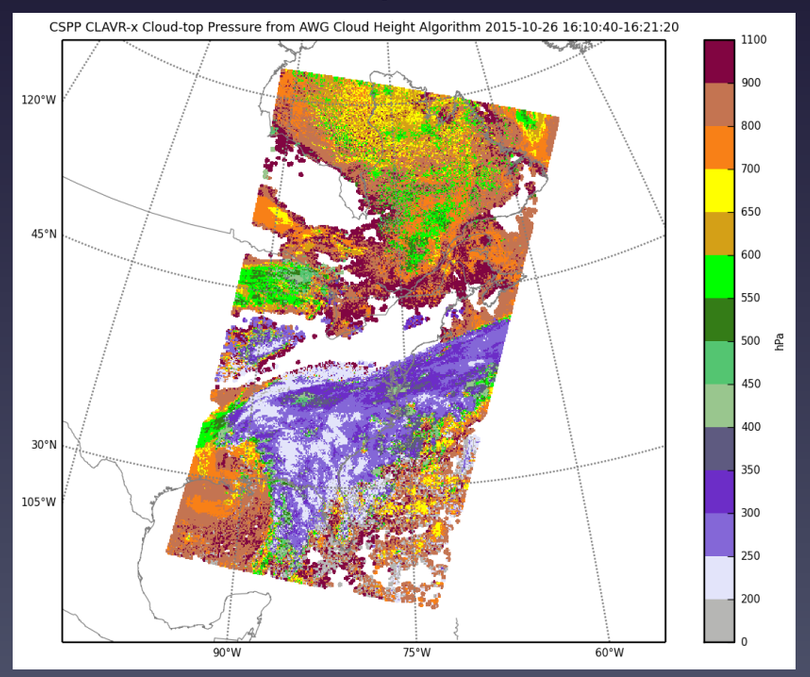


MODIS 0.87 micron

Cloud Mask



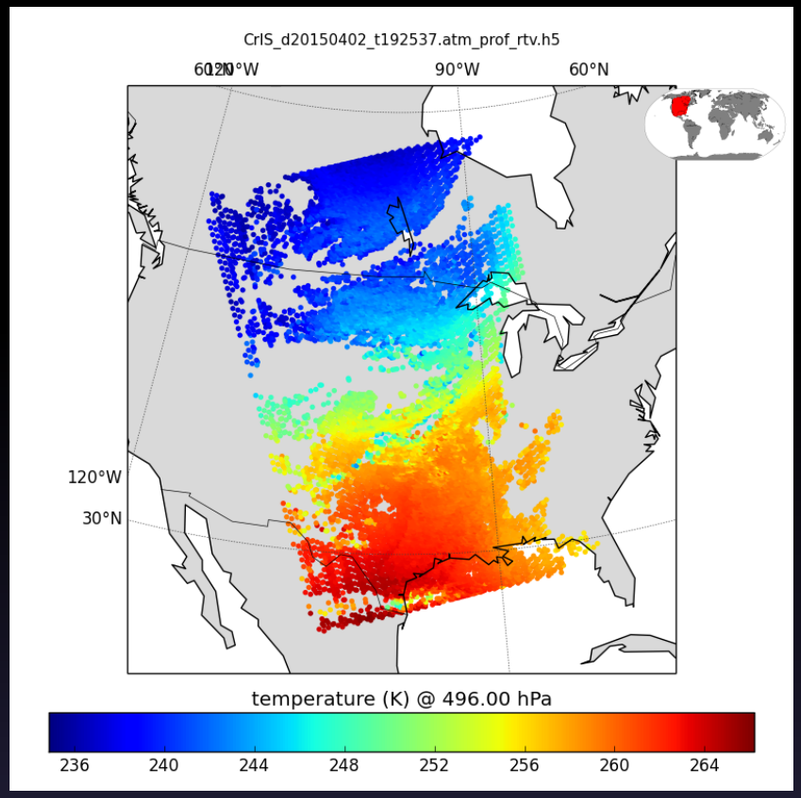
Cloud Top Pressure



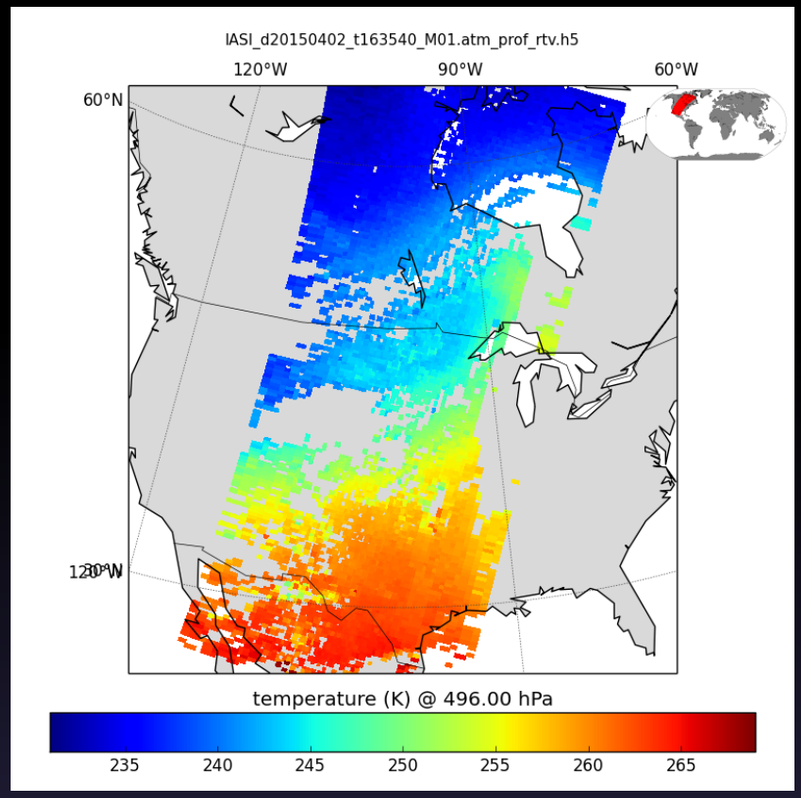
CrIS and IASI Level 2 Temperature/Moisture Products

SNPP 2015/04/02 19:25 UTC
Metop-B 2015/04/02 16:35 UTC

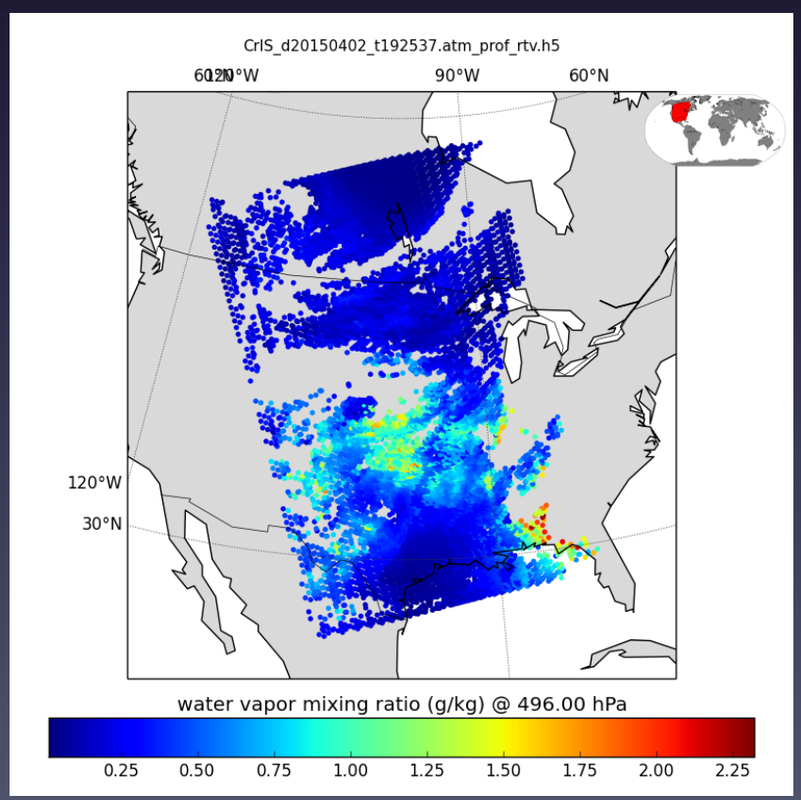
CrIS
Temperature
500 hPa



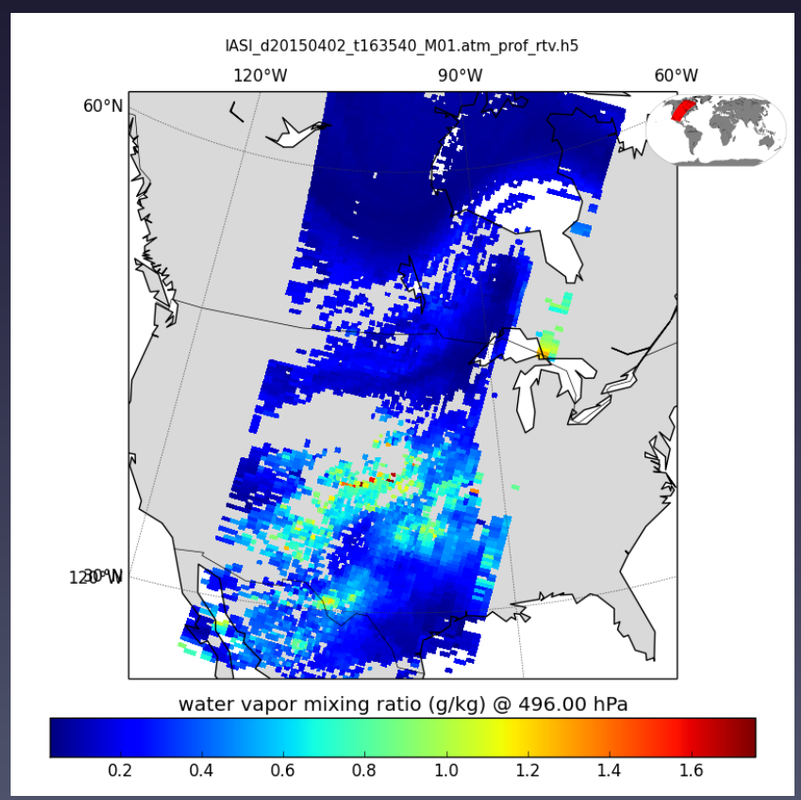
IASI
Temperature
500 hPa



CrIS
Mixing ratio
500 hPa

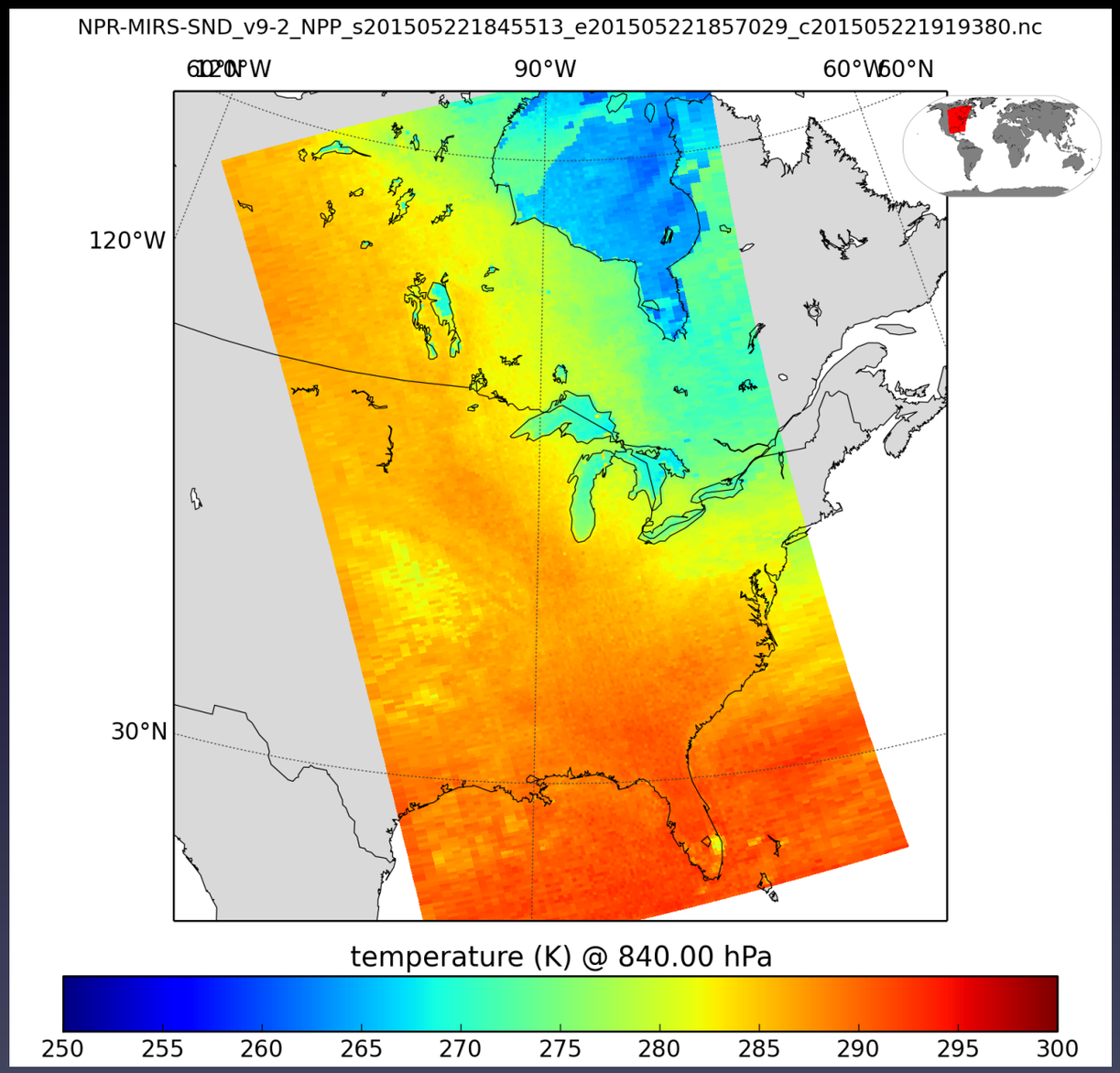


IASI
Mixing ratio
500 hPa

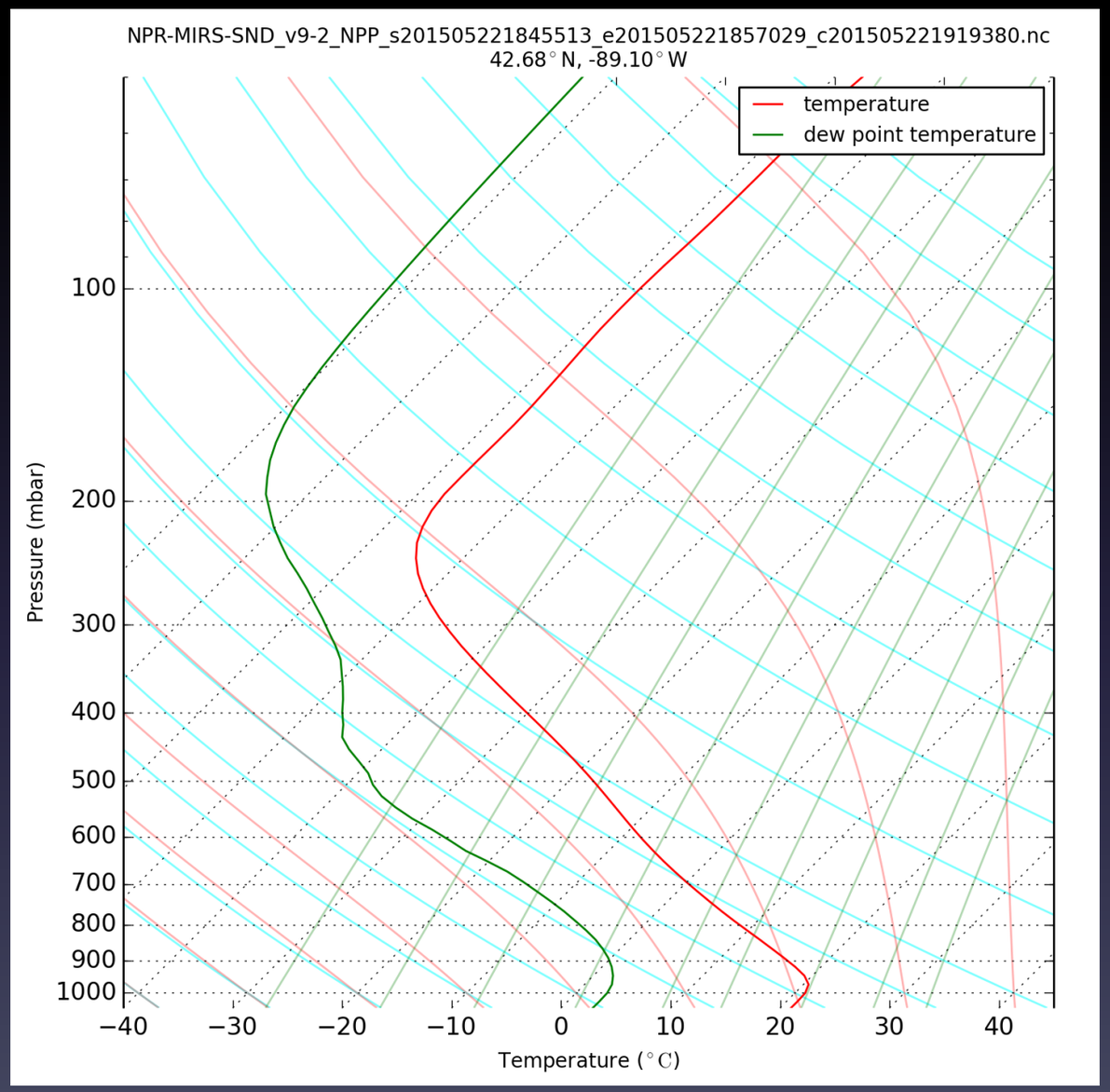


Level 2 Atmospheric Profiles 2015/05/22

SNPP MIRS Temperature (K) 18:57 UTC



SNPP MIRS Skew-T 18:57 UTC
42.68N, 89.10W

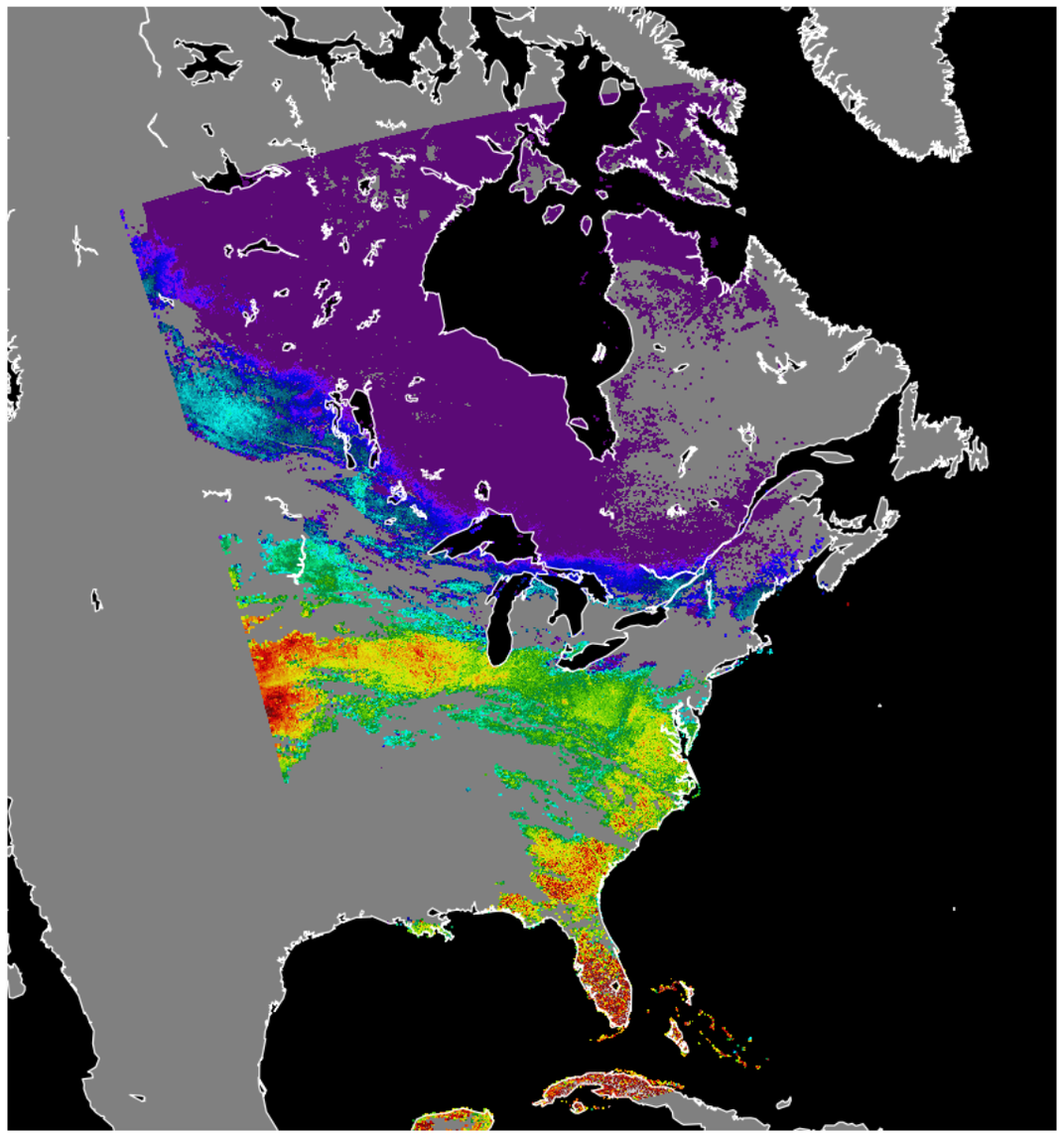


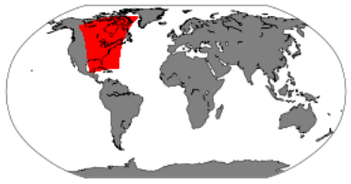
Level 2 Land Products

- Atmospherically Corrected Reflectances
- Fire Detection
- Land Surface Temperature (LST)
- Normalized Difference Vegetation Index (NDVI)
- Enhanced Vegetation Index (EVI)
- Land Surface Reflectance

VIIRS Land Surface Temperature

SNPP 2015/04/05 18:26 UTC



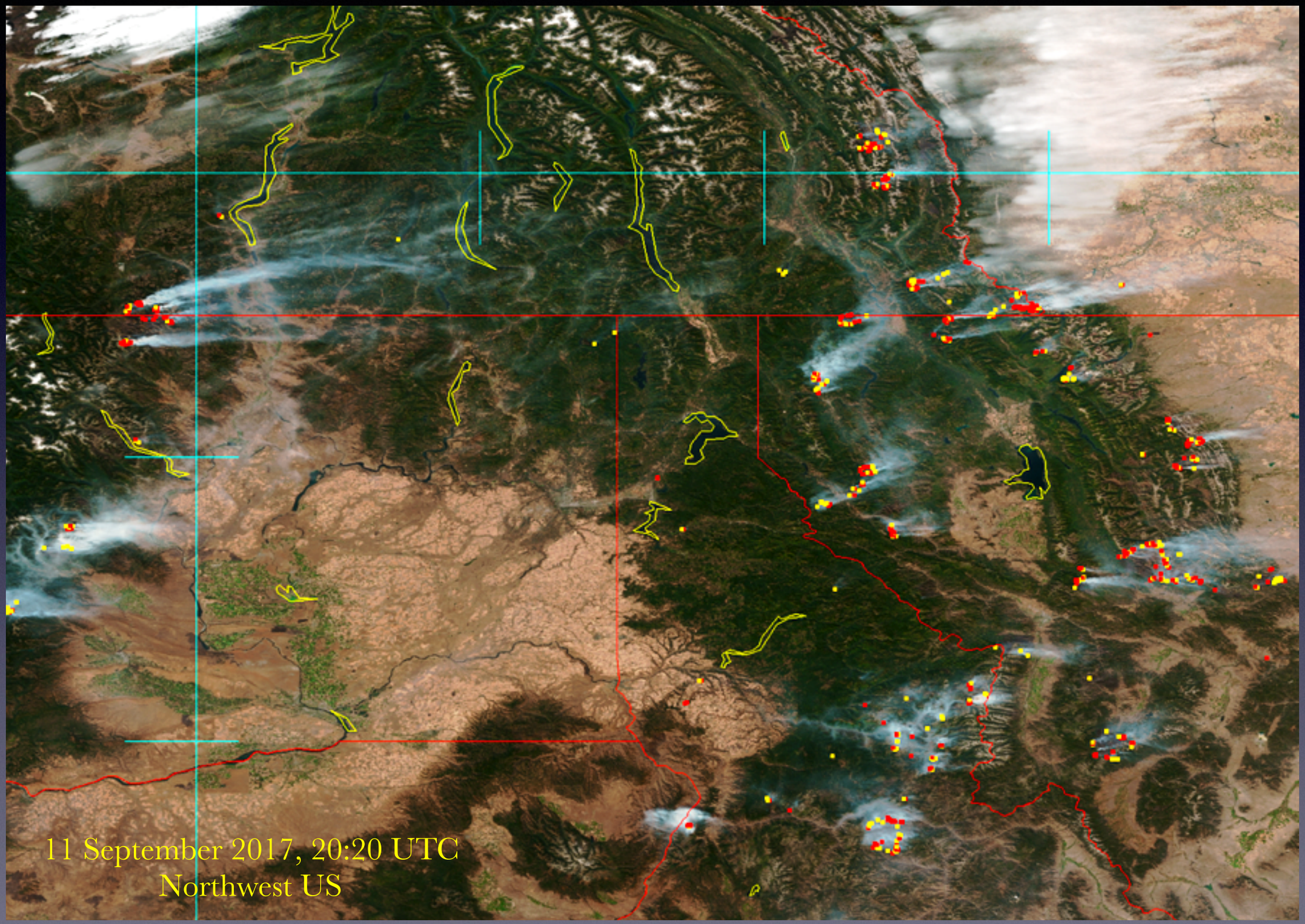


LST

Land Surface Temperature (K)

275 280 285 290 295 300 305 310 315

VIIRS active fire detections on true color imagery



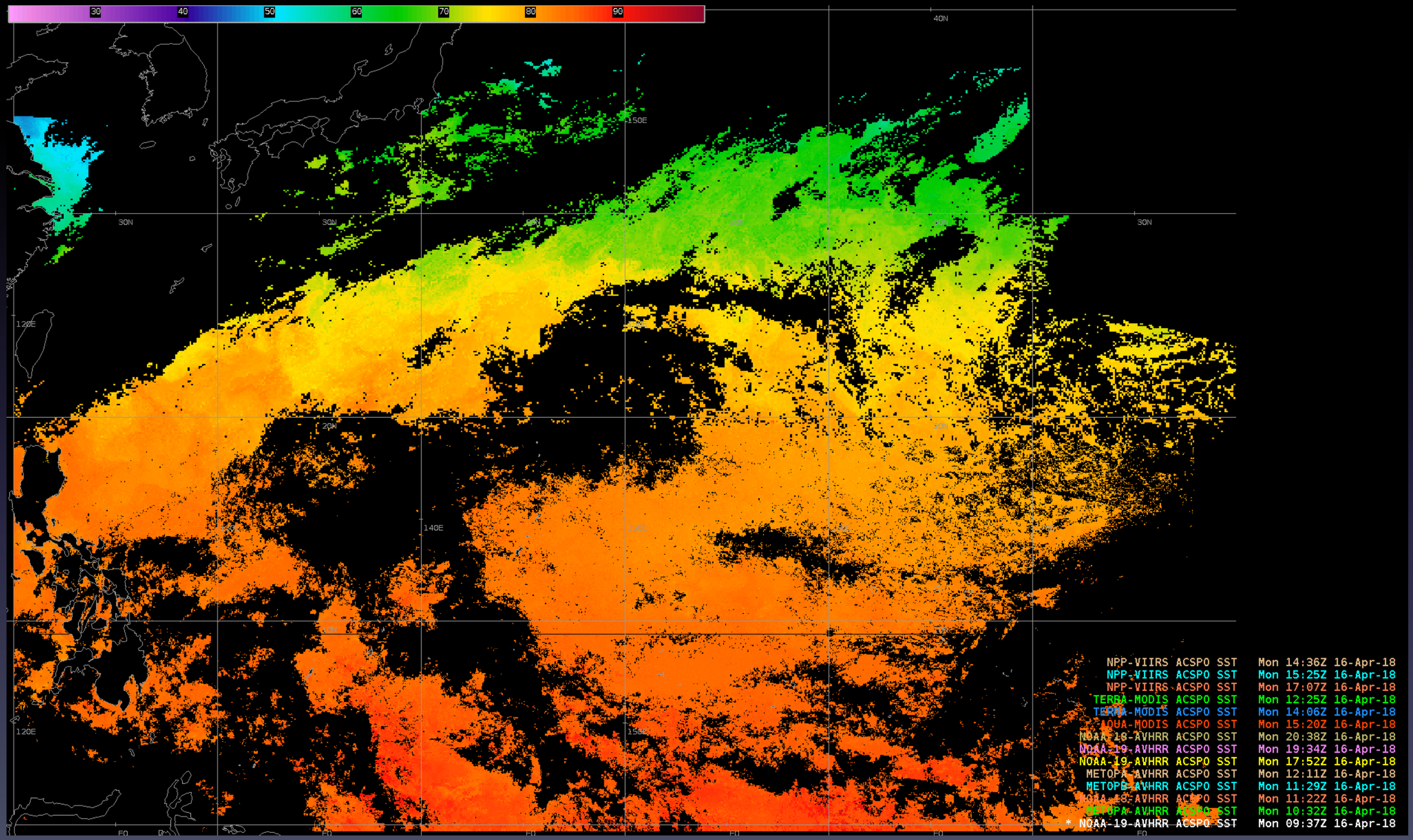
Level 2
Ocean Products

- Chlorophyll-A Concentration
- Sea Surface Temperature (SST)
- Remote sensing reflectances at 412, 443, 488, 531, 551, 667 nm
- Diffuse attenuation coefficient at 490 nm

Guam Polar Orbiter
SST Composite in AWIPS2

2018/04/16

Sea Surface Temperature

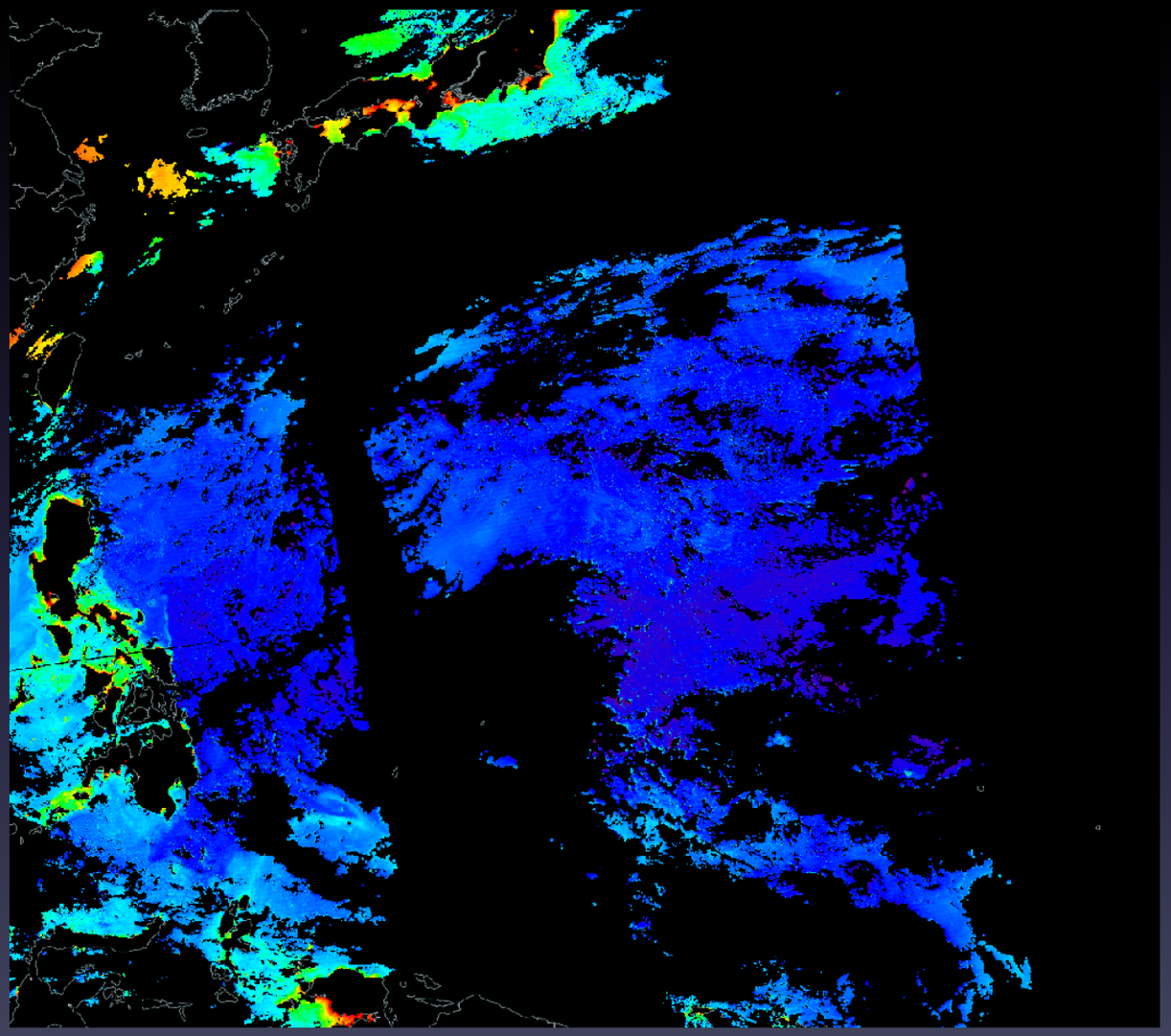


Aqua MODIS
Chlorophyll-A and SST

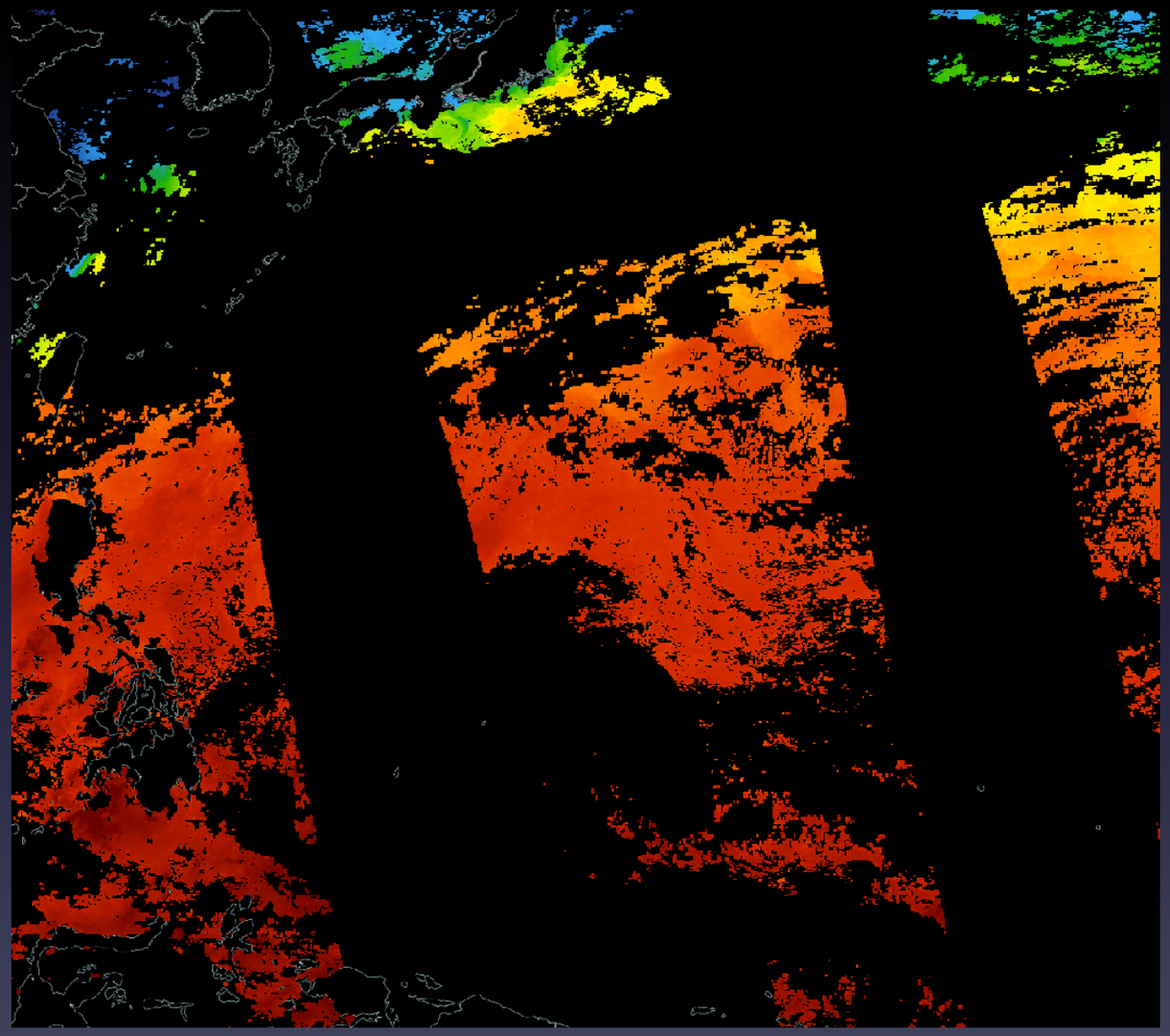
2017/12/03

SSEC

Chlorophyll-A



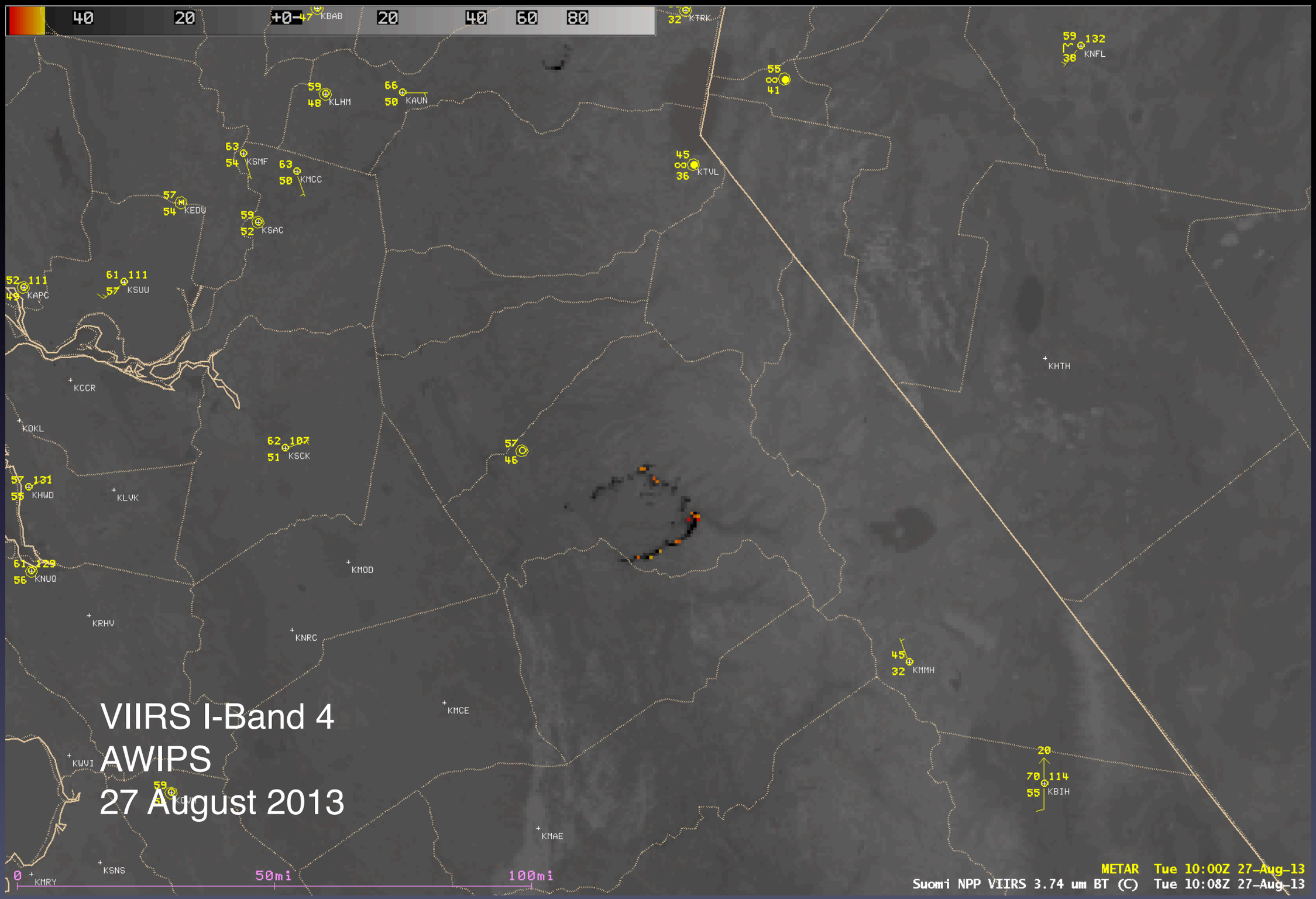
Sea Surface Temperature



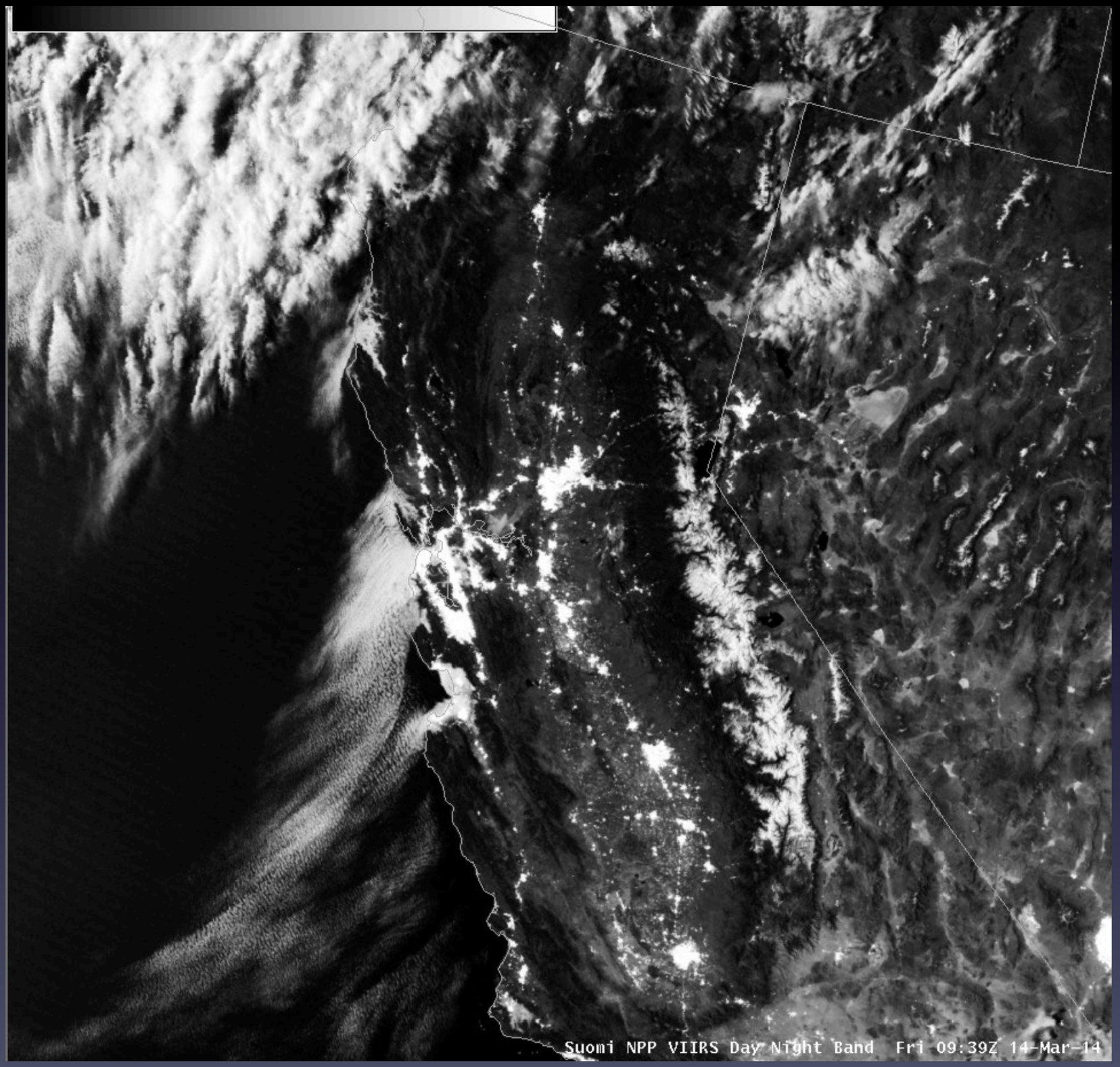
MODIS and VIIRS Products in AWIPS2

Rim Fire in California

250,000 acres burned, 3rd largest in state History



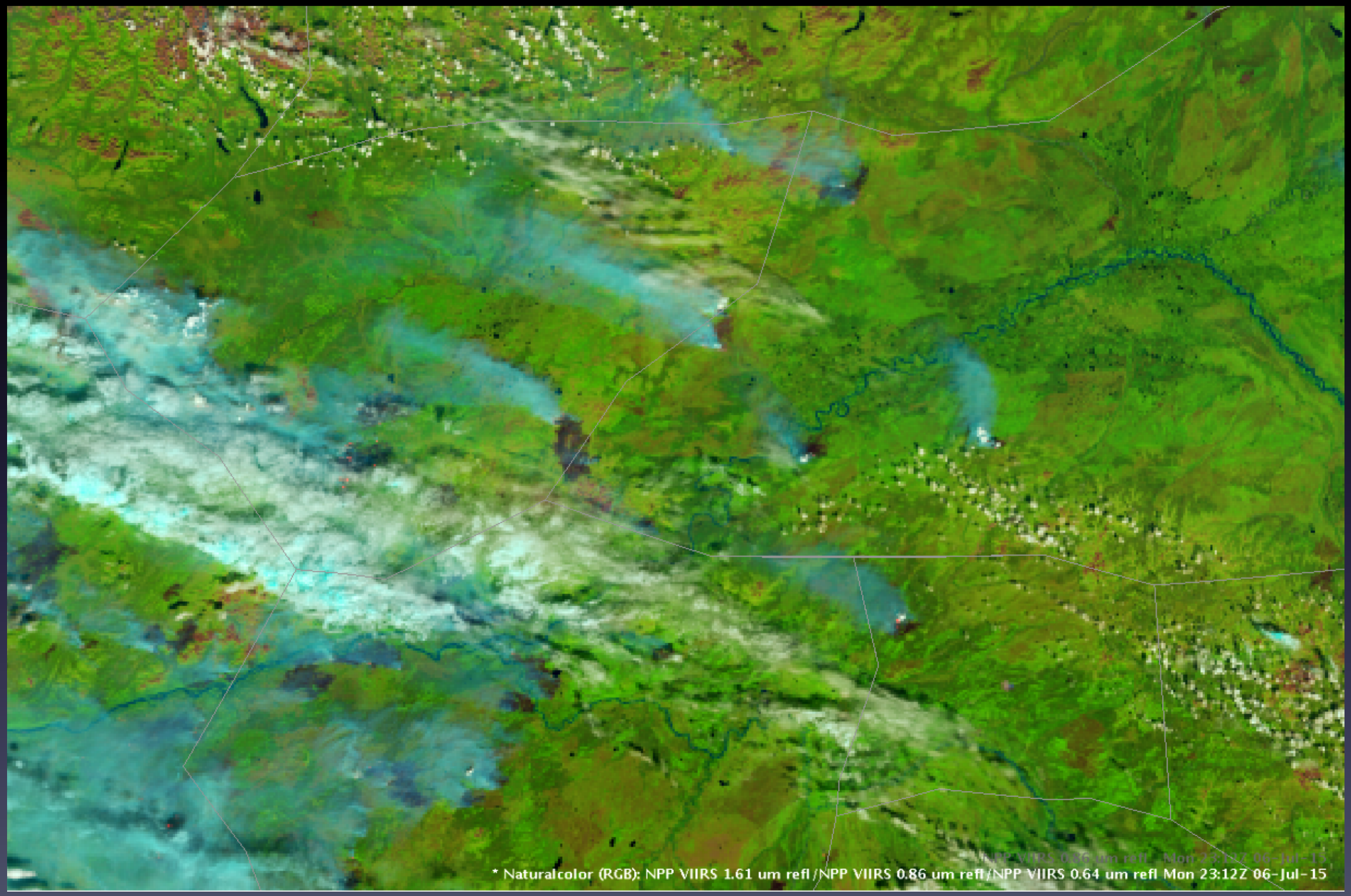
Low Cloud/ Fog Seen by VIIRS DNB at Night



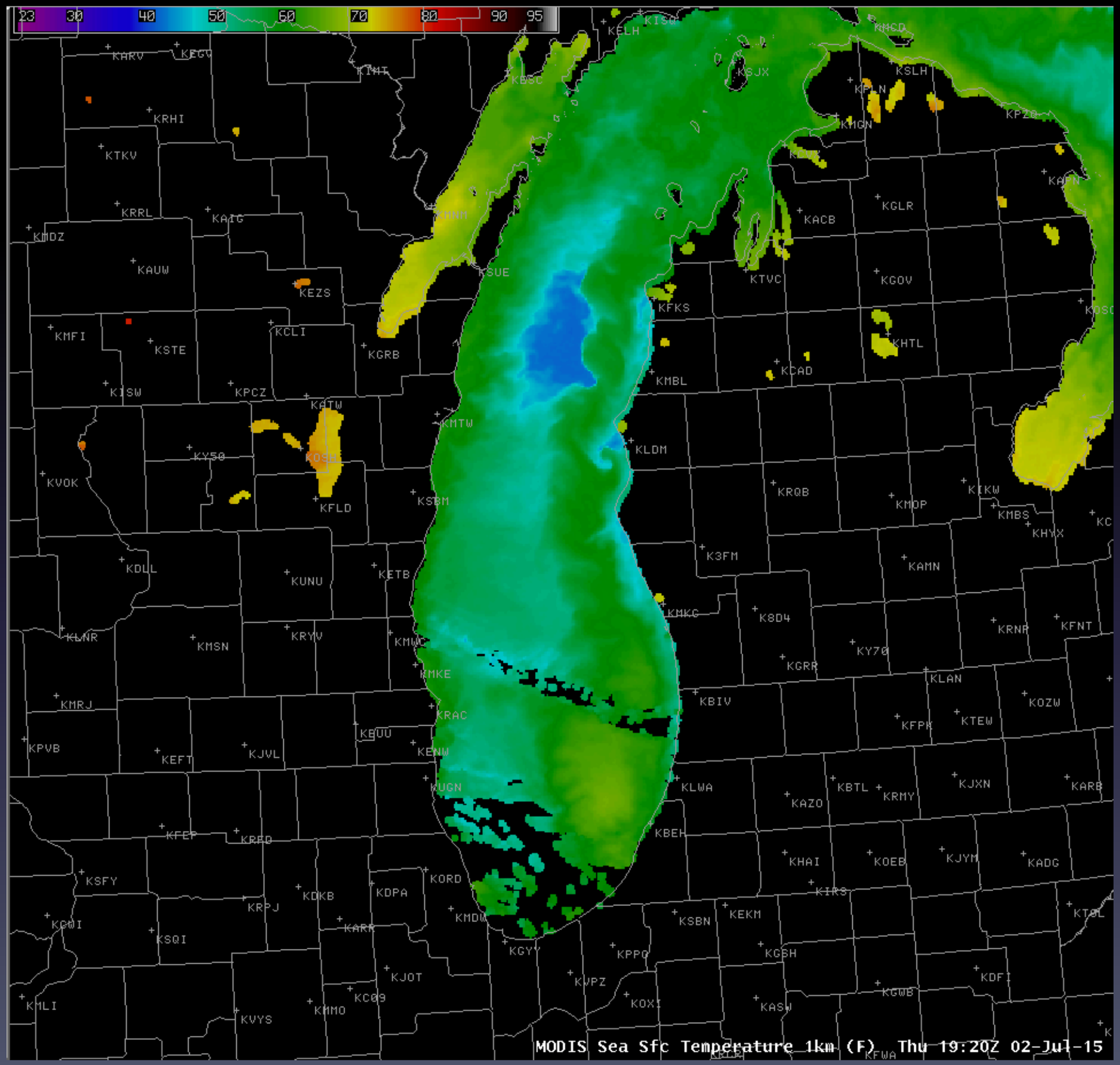
AREA FORECAST DISCUSSION
NATIONAL WEATHER SERVICE
SAN FRANCISCO BAY AREA
443 AM PDT FRI MAR 14 2014

.DISCUSSION...AS OF 4:10 AM PDT FRIDAY...THE DRY TAIL END OF A WEATHER SYSTEM MOVING IN TO THE PACIFIC NORTHWEST IS APPROACHING OUR DISTRICT...AND RESULTING IN ENHANCEMENT OF THE MARINE LAYER AND ***A RETURN OF THE MARINE STRATUS. LATEST GOES FOG PRODUCT IMAGERY ...AND IN RATHER SPECTACULAR DETAIL JUST REC'D SUOMI VIIRS NIGHTTIME HIGH RES VISUAL IMAGE...SHOW COVERAGE ALONG MUCH OF THE COAST FROM PT REYES SOUTH TO THE VICINITY OF THE MONTEREY PENISULA ...AND A BROAD SWATH EXTENDING INLAND ACROSS SAN FRANCISCO AND THROUGH THE GOLDEN GATE TO THE EAST BAY.*** LATEST BODEGA BAY AND FT ORD PROFILER DATA INDICATE A MARINE LAYER DEPTH OF ABOUT 1300 FT. SOME THIN HIGH

VIIRS False Color Imagery in AWIPS-II
GINA Direct Broadcast 6 July 2015



Identifying Fine Scale Water Features



AREA FORECAST DISCUSSION
NATIONAL WEATHER SERVICE
GRAND RAPIDS MI
326 PM EDT THU JUL 2 2015

LATEST UPDATE...

SYNOPSIS/SHORT TERM/LONG TERM/MARINE

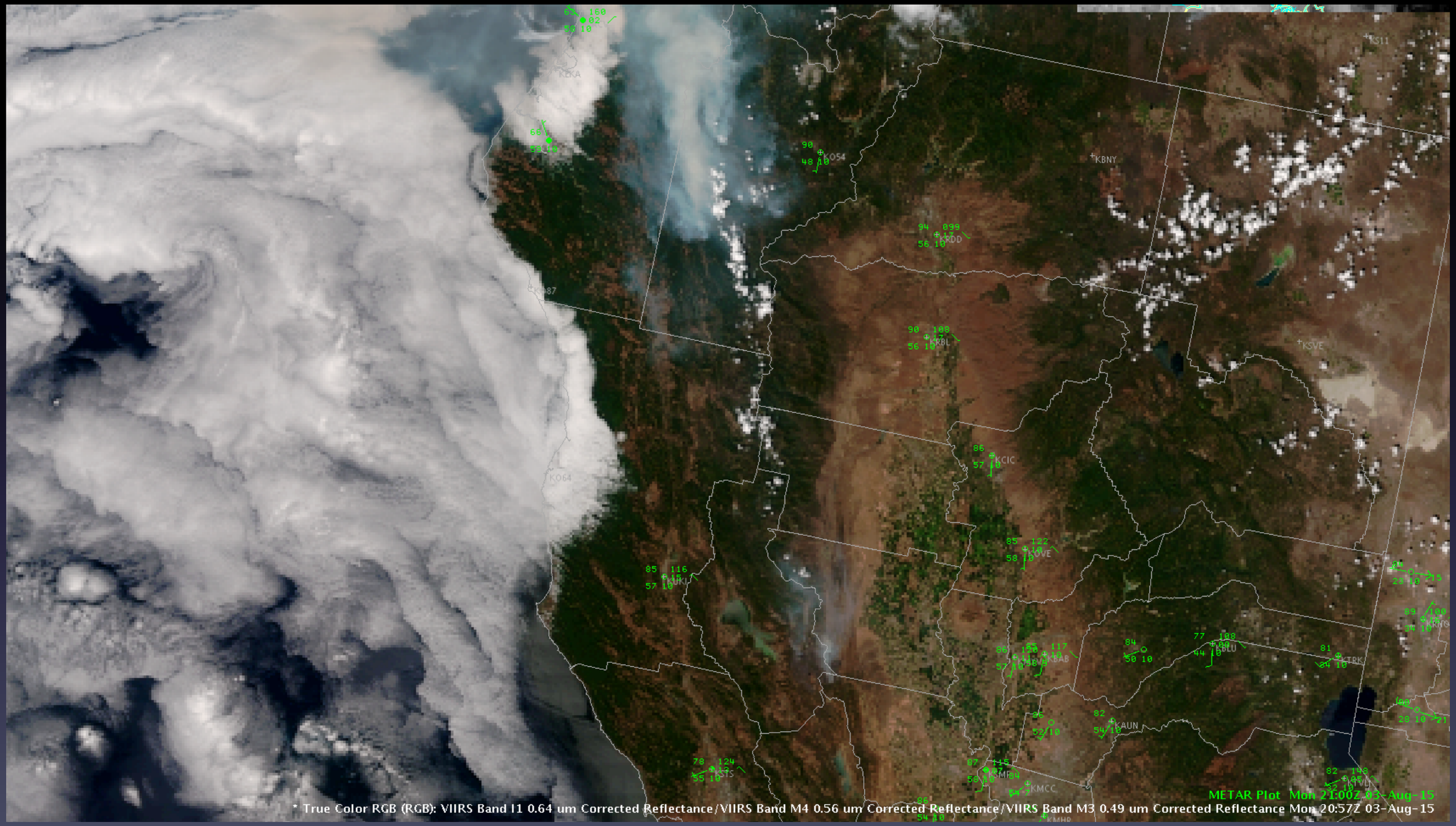
.MARINE...

ISSUED AT 326 PM EDT THU JUL 2 2015

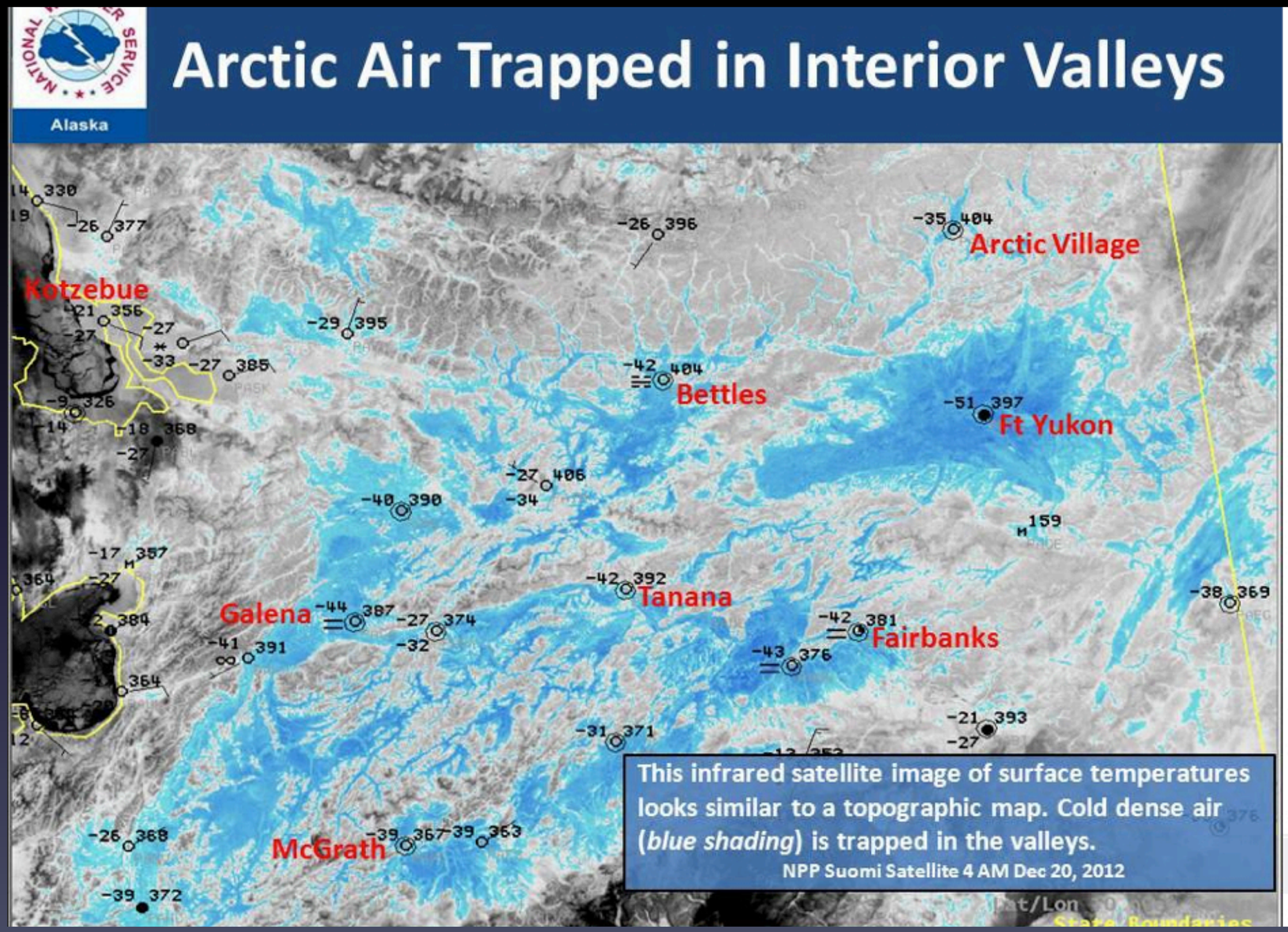
....

ON ANOTHER NOTE...SOME UPWELLING HAS OCCURRED AT THE SHORELINE WITH THE NNE WINDS OVER THE LAST DAY. SOME WATER TEMPS HAVE DROPPED TO NEAR 40F ALONG THE SHORE PER LATEST WATER OBSERVATIONS FROM THE SITES ALONG THE COAST THIS MORNING AND MODIS SATELLITE IMAGERY.

CONUS Example
24 Bit VIIRS True Color Image in AWIPS-II
University of Wisconsin DB Data



VIIRS used by Operational Forecasters
20 Dec 2012
11 µm Brightness Temperatures in AWIPS



US National Weather Service Alaska
Liked · about an hour ago

Very cold temperatures continue to grip interior Alaska as high pressure remains anchored over the state. This infrared satellite image from 4am this morning displays how the cold, dense air settles into the interior valleys. The blue shading indicates areas that are colder than 40 degrees below zero. Surface observations from reporting locations plotted on the image verify that temperatures in the coldest valleys are in the 40s and lower 50s below zero. At higher elevations, temperatures are up to 40 degrees warmer.

The cold air will remain trapped in the valleys until warmer air, clouds, or wind arrive and mix or erode the dense air from the valley floor. The strong gradient of temperature with elevation results in an infrared image similar looking to a topographic map. Can you pick out the Yukon Flats or the dendritic pattern of the river valleys in the Brooks Range?

Like · Comment · Share

31 people like this.

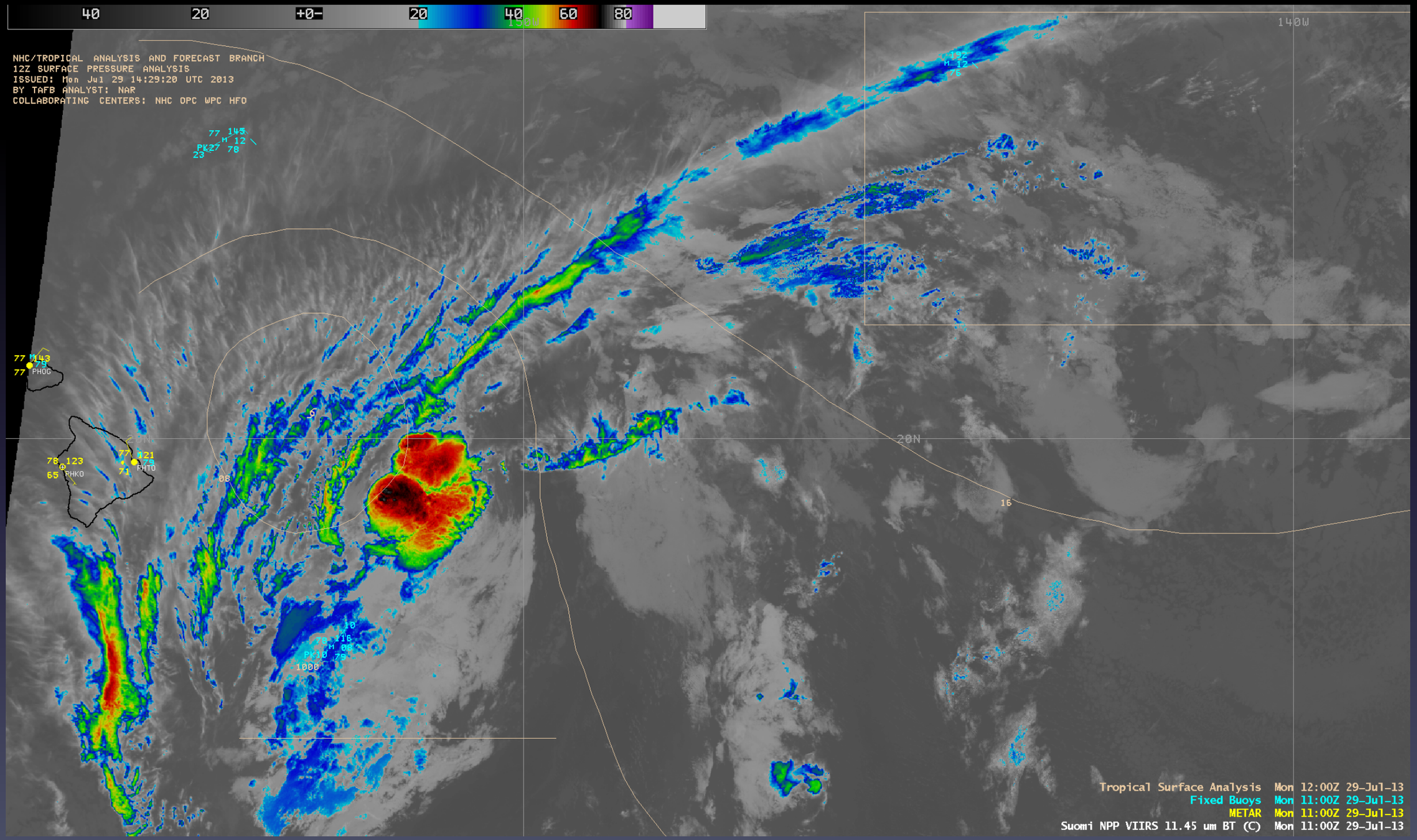
66 shares

Laura Hudson YIKES that's cold!
about an hour ago · Like

Kathy Stone yes. And I have -43.4 at my house right now. It hasn't budged all day. -42 was the 'warmest'.

Write a comment...

Tropical Storm Flossie
VIIRS IR Window 29 July 2013



Tropical Storm Flossie VIIRS Day/Night Band 29 July 2013