NRL Monterey VIIRS imagery comparisons with other sensors

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U.S. Naval Research Laboratory
Marine Meteorology Division
Monterey, CA

U.S. NAVAL RESEARCH LABORATORY

NRL-MMD Satellite Constellation

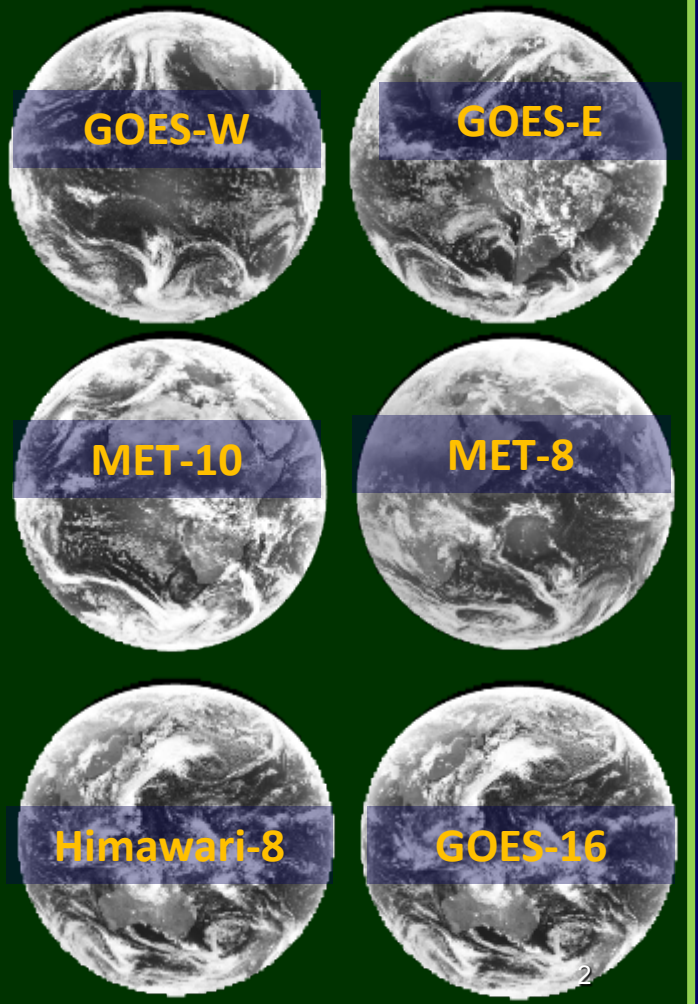
Total Sensors: 36

Low Earth Orbiting (LEO): 30

IR/Vis Imagers:	NOAA	- AVHRR (4)
	METOP	- AVHRR (2)
	DMSP	- OLS (4)
	NASA	- MODIS (2)
	NOAA	- VIIRS
Microwave Imagers:	DMSP	- SSM/I , SSMIS (3)
	NASA	- AMSR-2, GMI, SMOS
	NRL	- WindSat
Micro Sounders:	NOAA	- AMSU (2), MHS (2), ATMS
	METOP	- AMSU (2)
	MeghaTropiques - SAPHIR	
Microwave Radar:	NASA	- GPM
	Foreign	- ASCAT (2), OceanSat-2

Collaborations: FNMOC, AFWA, NASA, NOAA, CIRA

GEO Sensors: 6



U.S. NAVAL RESEARCH LABORATORY

NexSat Products

Standard Products
Visible (daytime)
Visible (night time)
Infrared
Water Vapor
True Color
Pseudo/GEO True Color
Rain Rates
Rain Totals • 3, 6, 12, 24 hours • 2, 3, 4, 5, 6, 7, 10, 12, 14 days
*Winds • Scatterometer (sfc) • GEO o low level o middle level o upper level

Cloud Products
Cloud layers (snow, low-middle, high)
Cirrus cloud detection
Contrail detection
Low cloud detection (night)
Convective cloud top height
Cloud properties • effective radius • optical depth • cloud top temperature • cloud top height • cloud type

Environmental Products
Aerosol amounts (optical depth)
Biomass (vegetation type)
Dust detection • MODIS • VIIRS • MSG (DEBRA)
Fire detection (hot spots)
Lightning detection

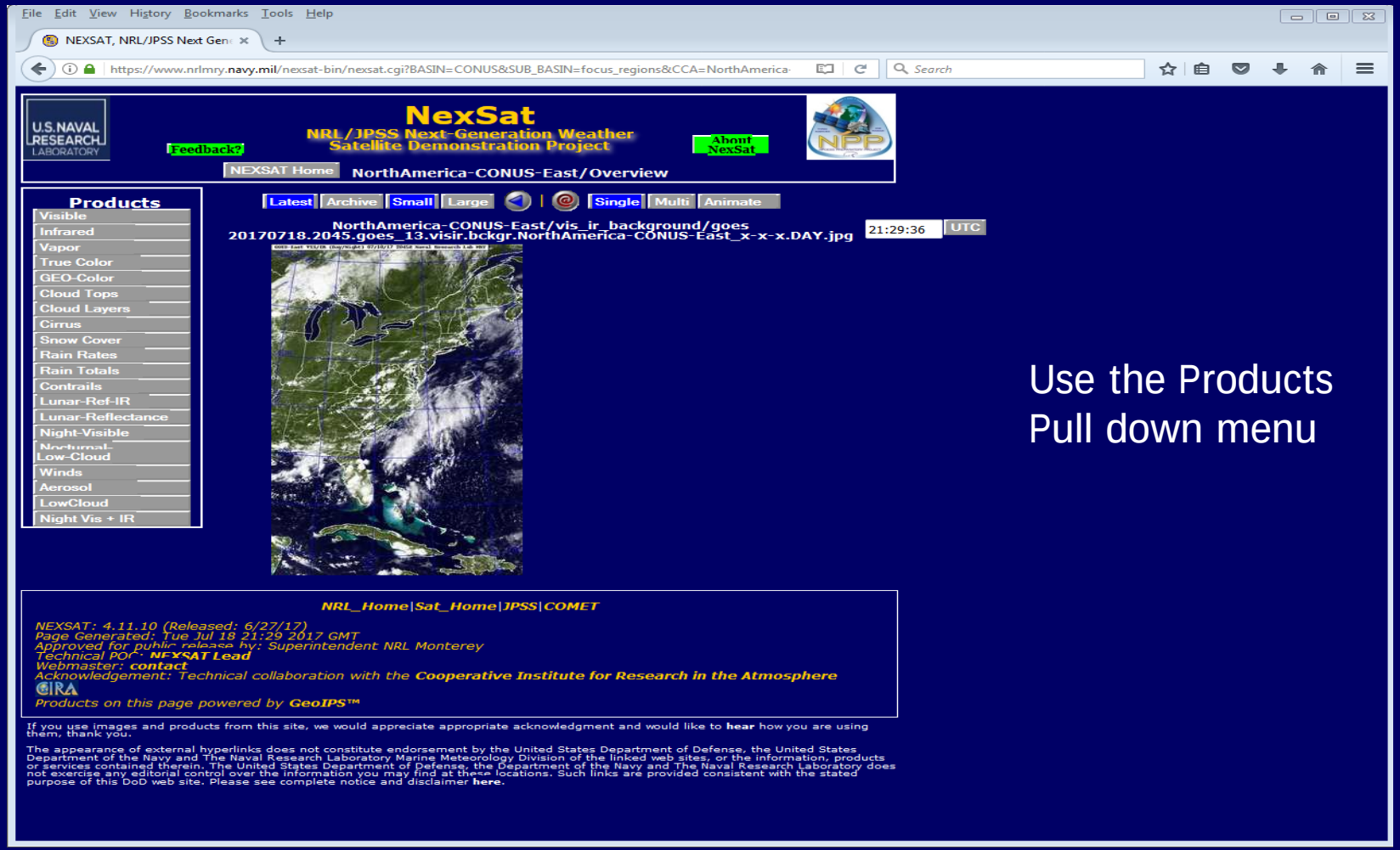
Models	
Navy global (NAVGEM)	NAAPS dust model
Sea Level Pressure	Total AOD
500 mb Heights	Coarse AOD
sfc, 700 500 300 mb Winds	Fine AOD
1000-500 mb Thickness	Concentration [dust]
Surface Temperature	
Jet Stream	

NexSat Home Page

https://www.nrlmry.navy.mil/NEXSAT.html

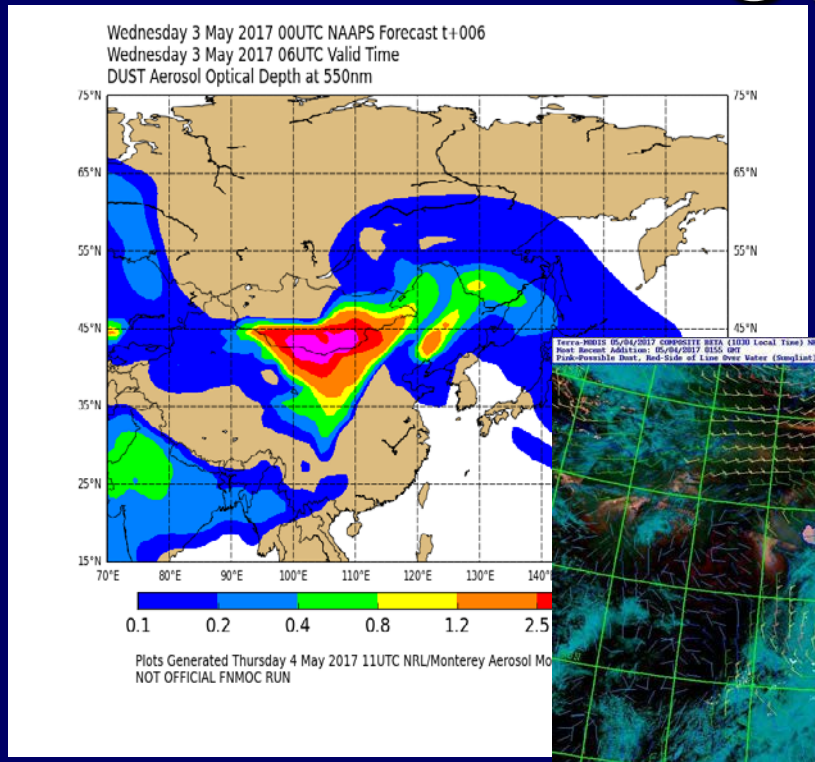


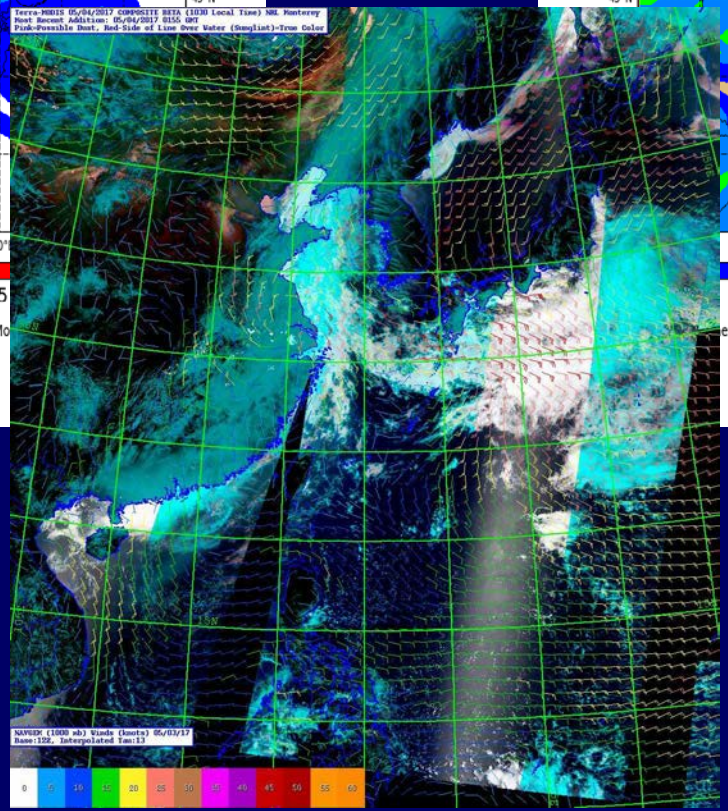
How to find VIIRS imagery on NexSAT

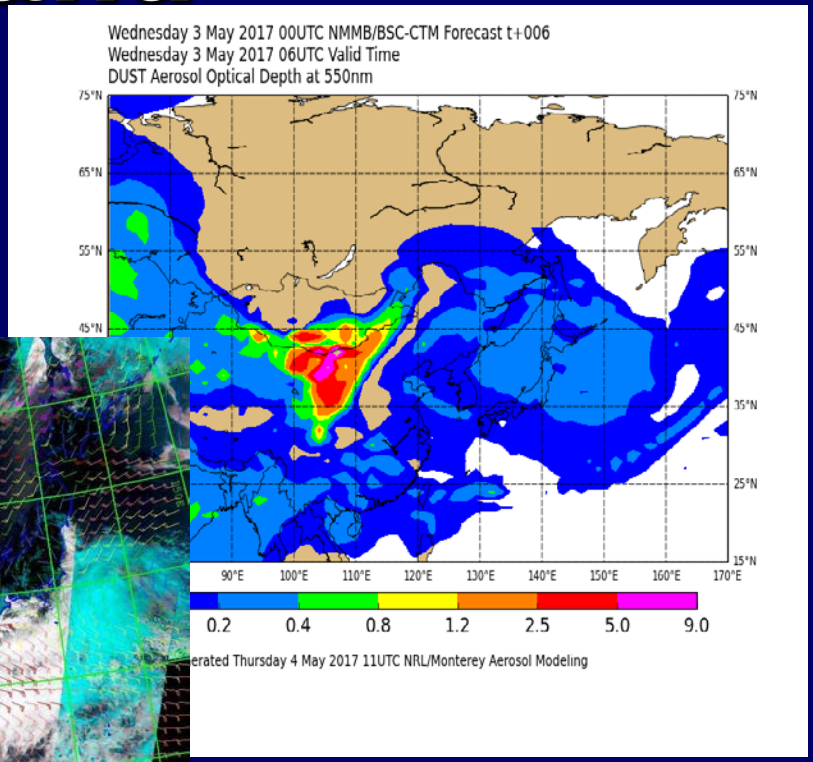


Use the Products Pull down menu

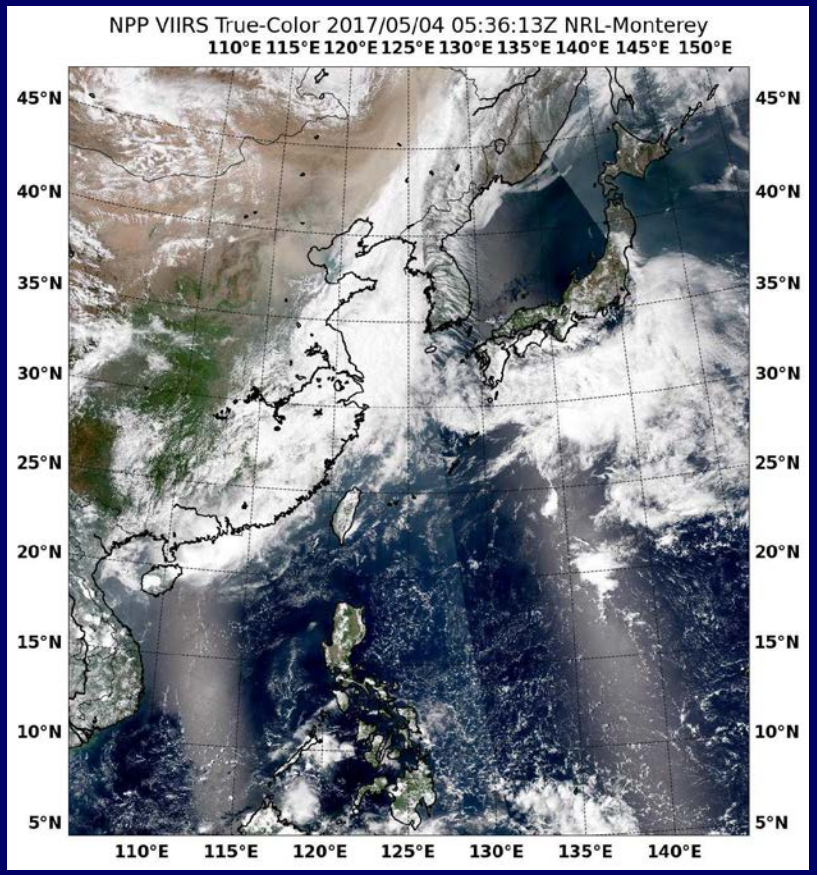
Dust case study over land

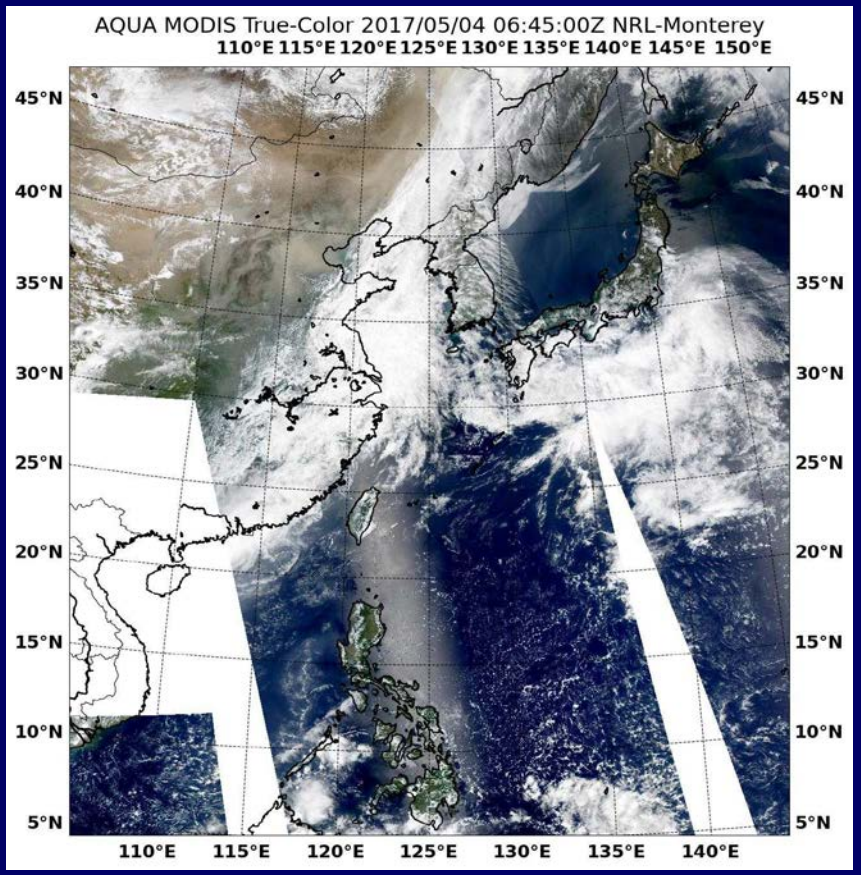




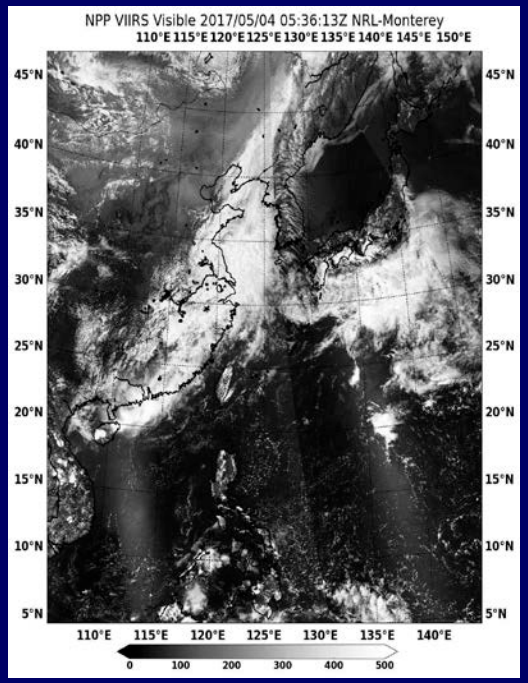


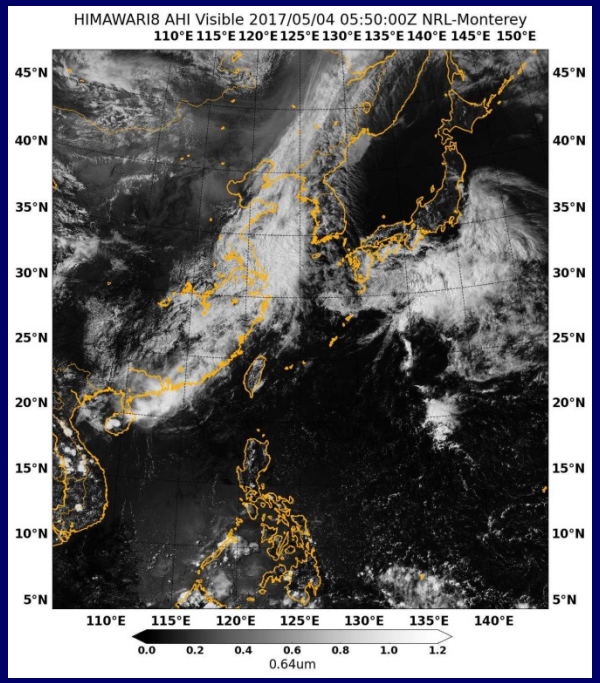
True Color
VIIRS/MODIS

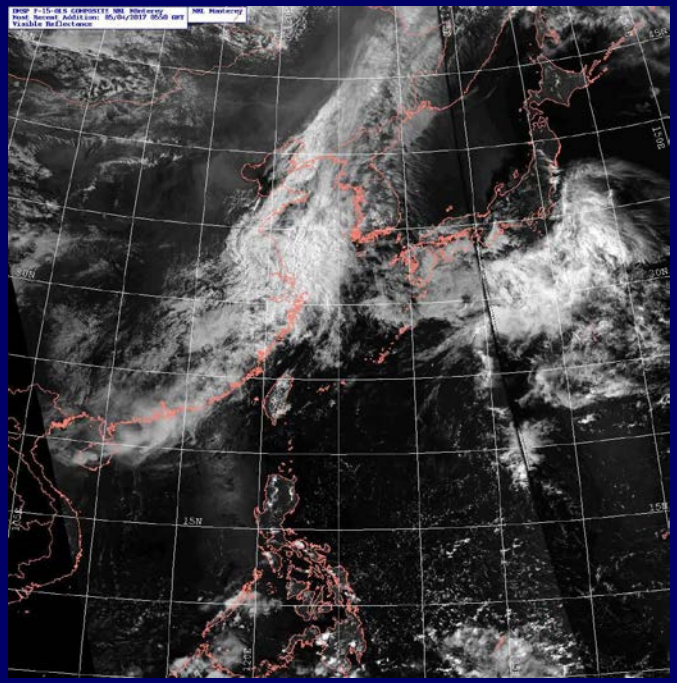




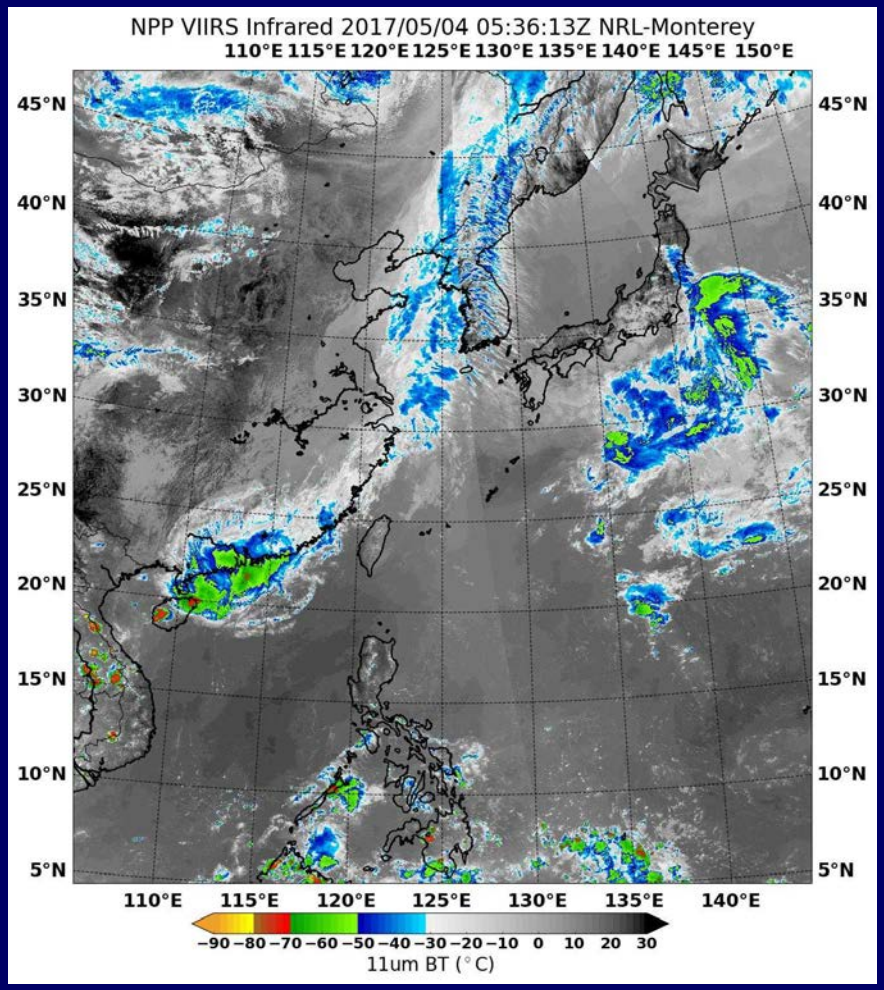
Visible Imagery
VIIRS / Himawari-8 / DMSP

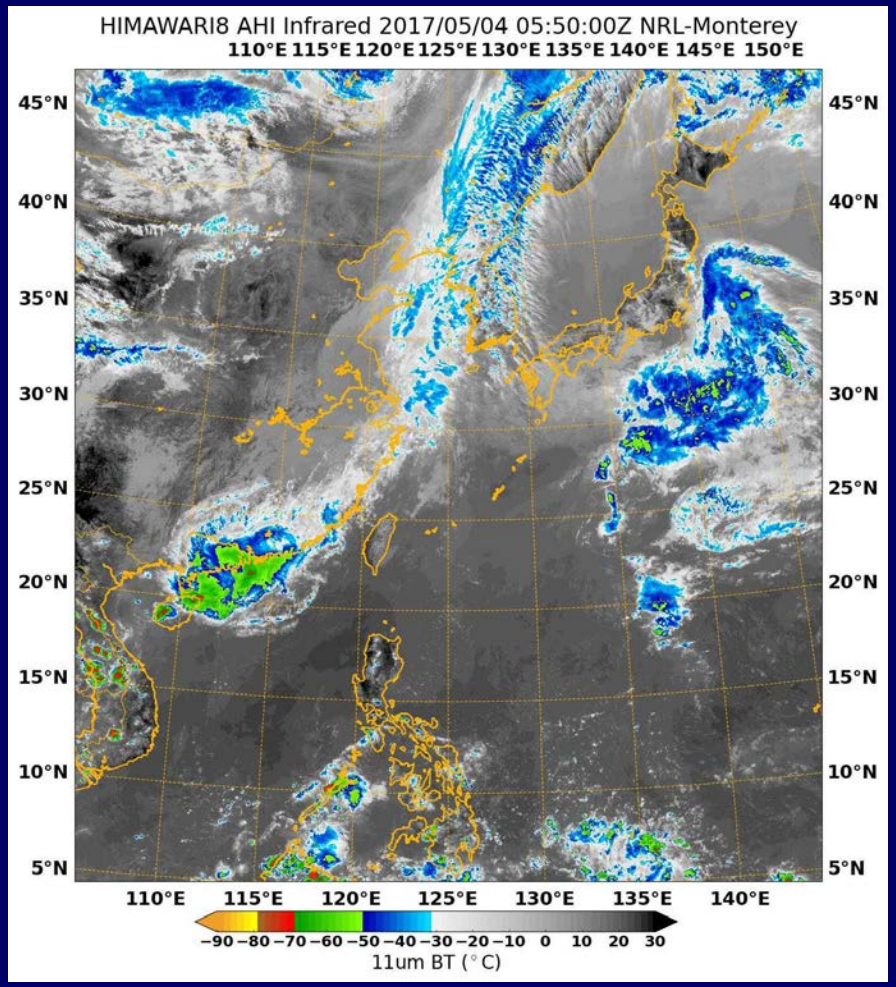




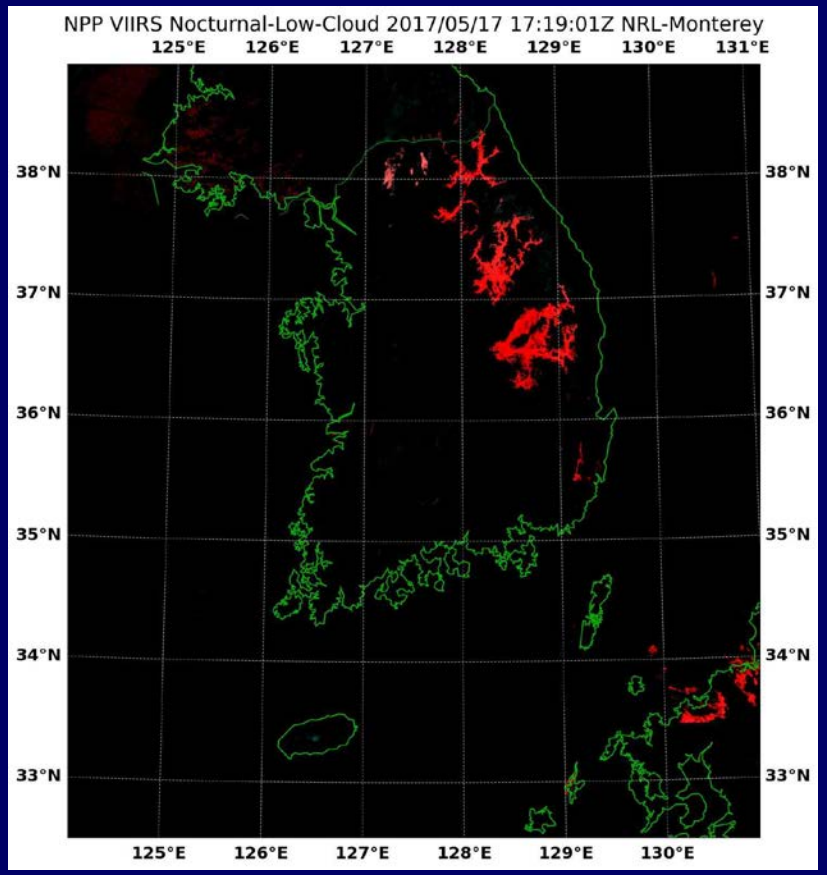


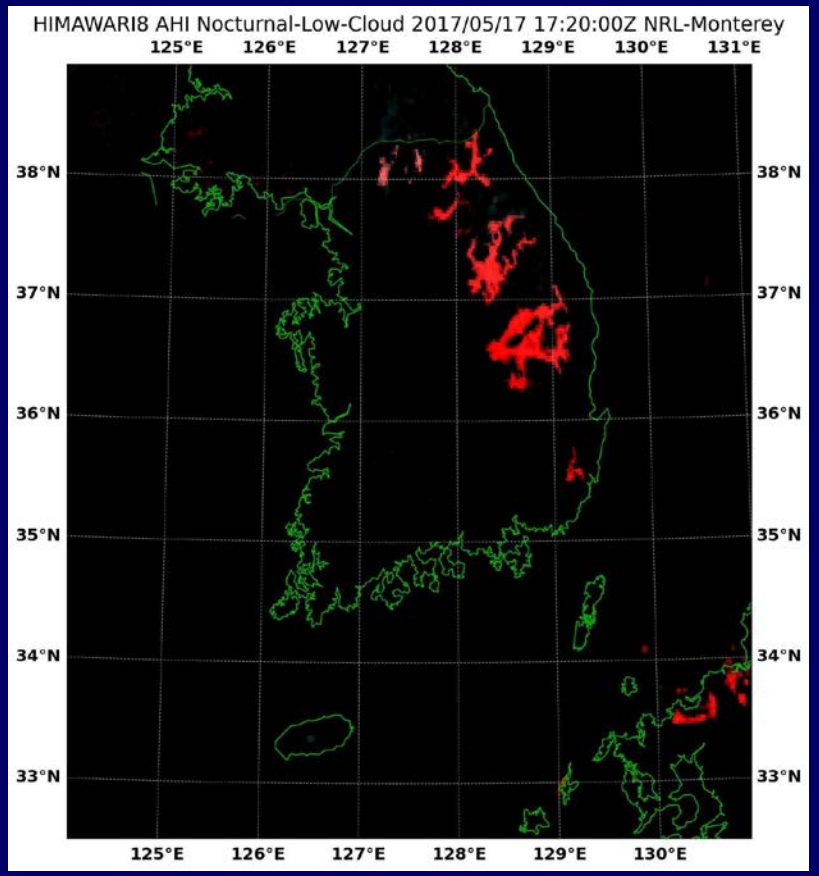
Infrared
VIIRS/AHI





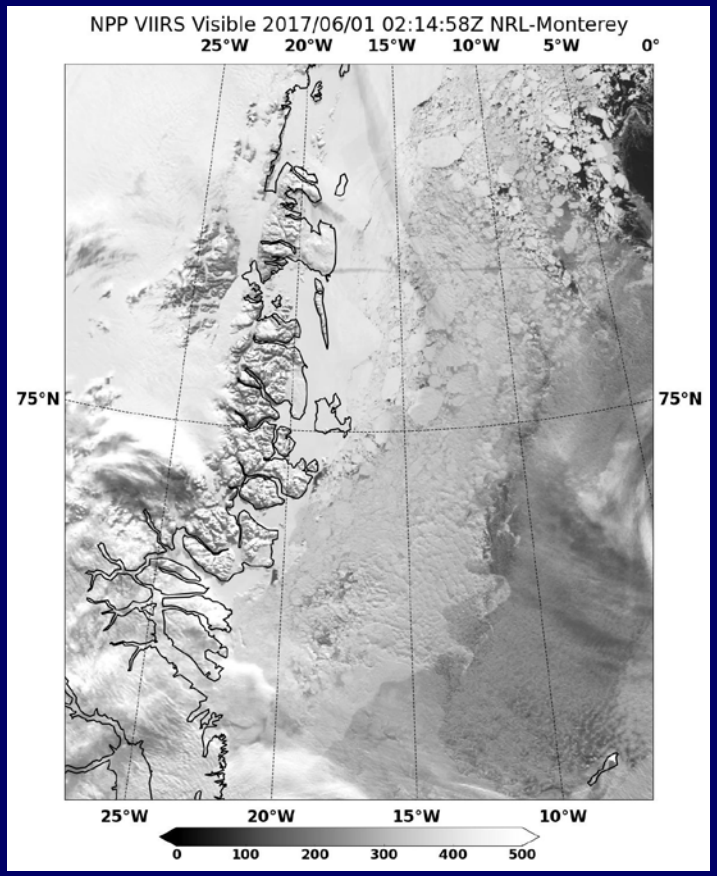
Low Cloud VIIRS/AHI

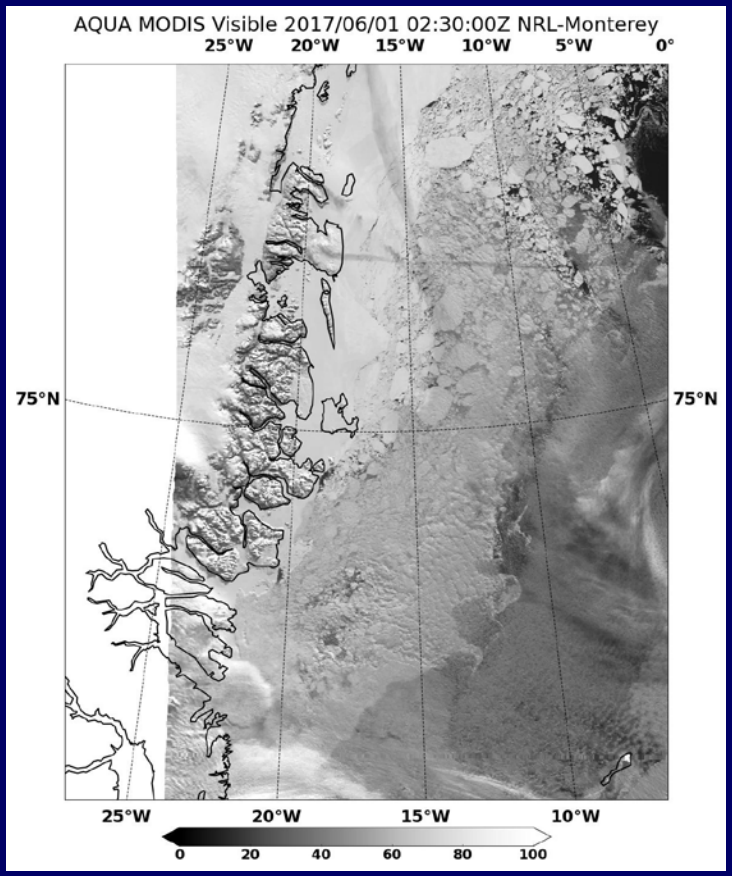




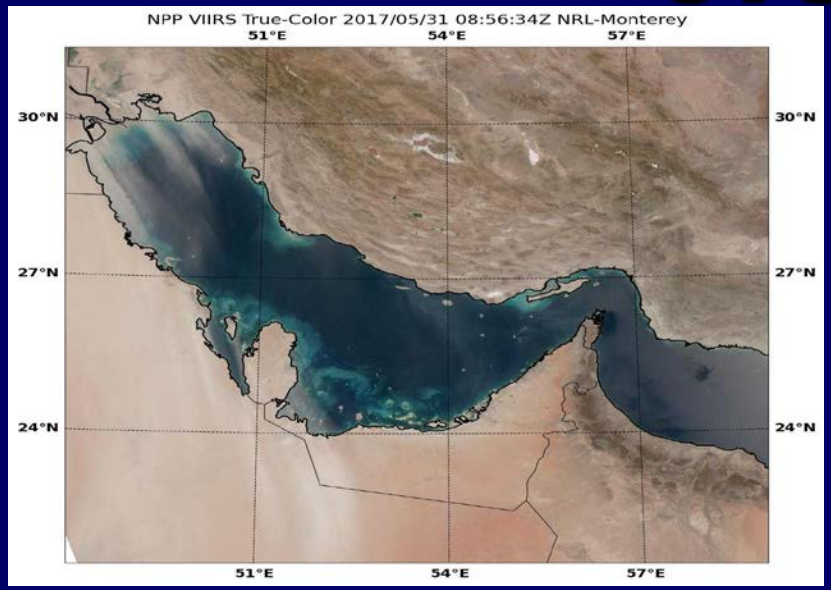
Greenland offshore ice movement

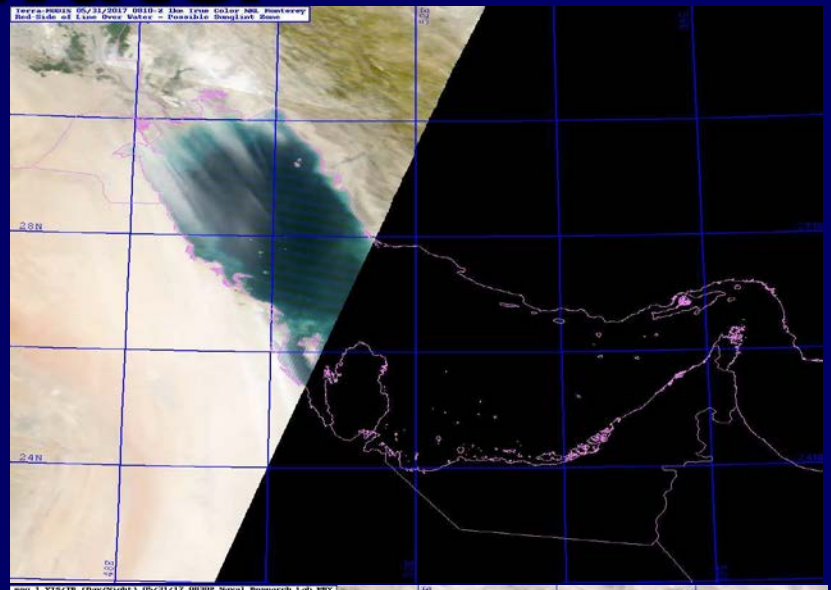
VIIRS/MODIS

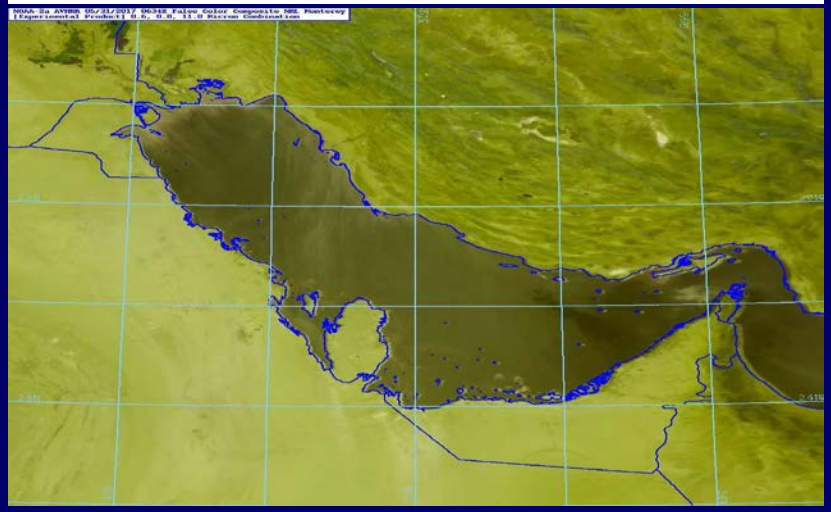


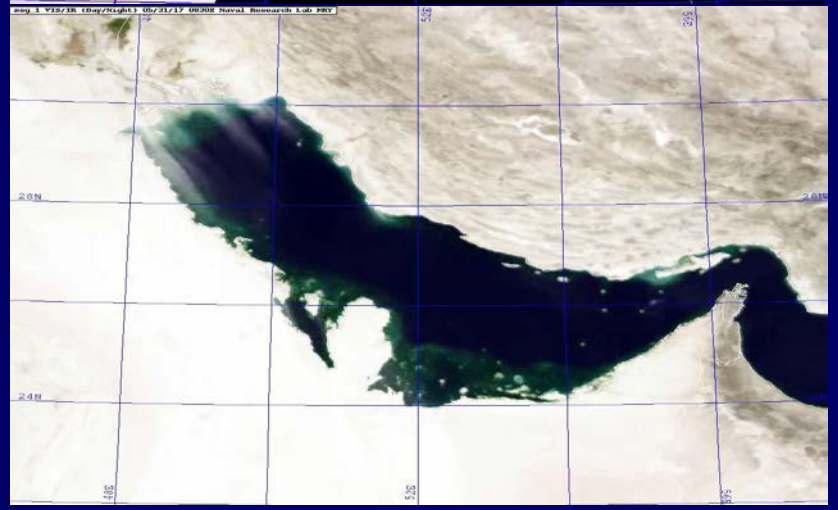


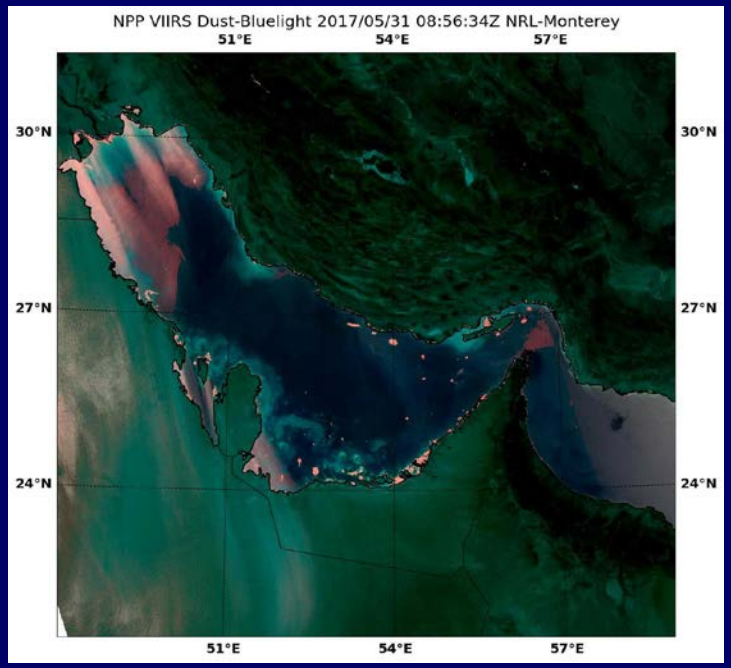
Dust case study over water



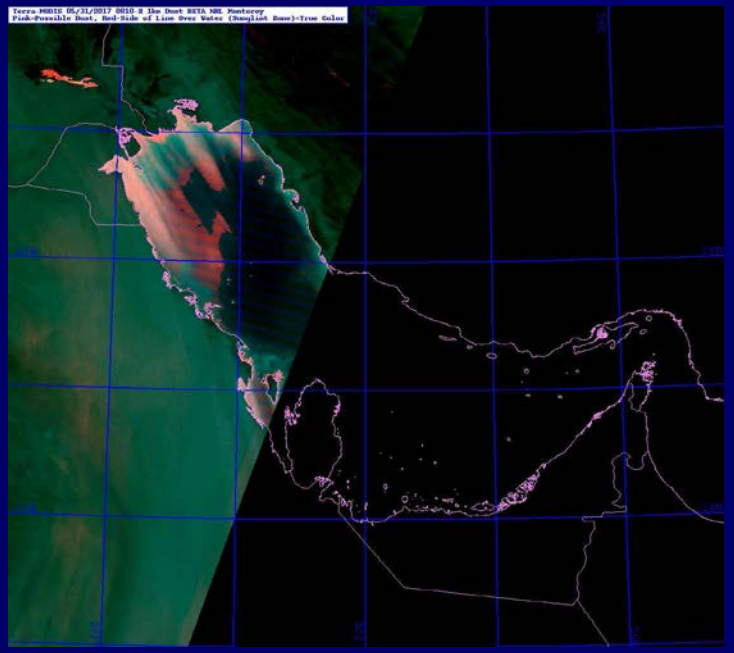


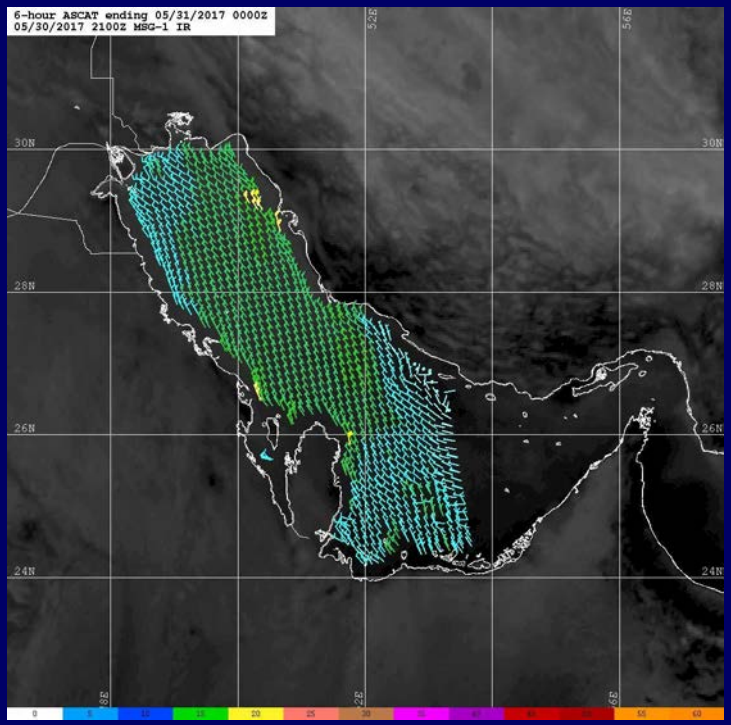




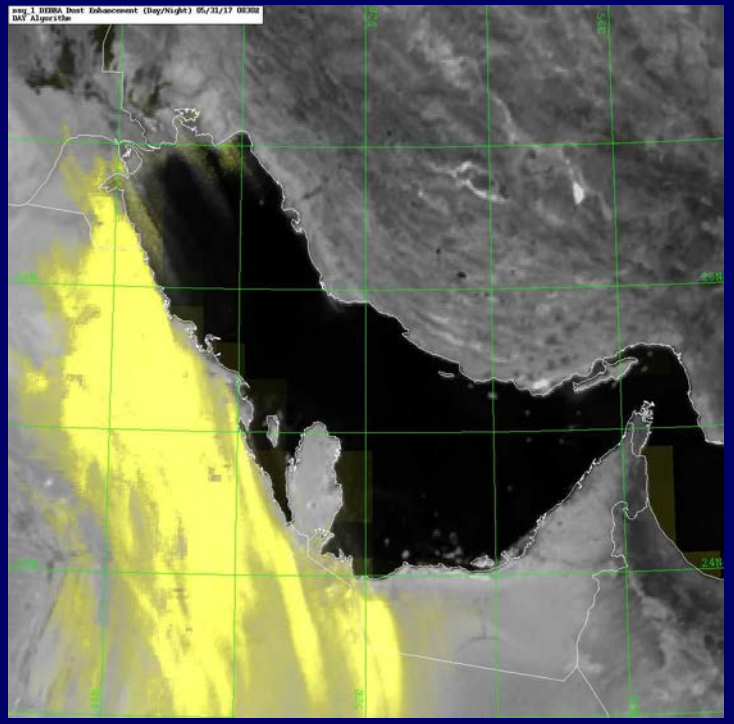


Bluelight
Dust
VIIRS/MODIS

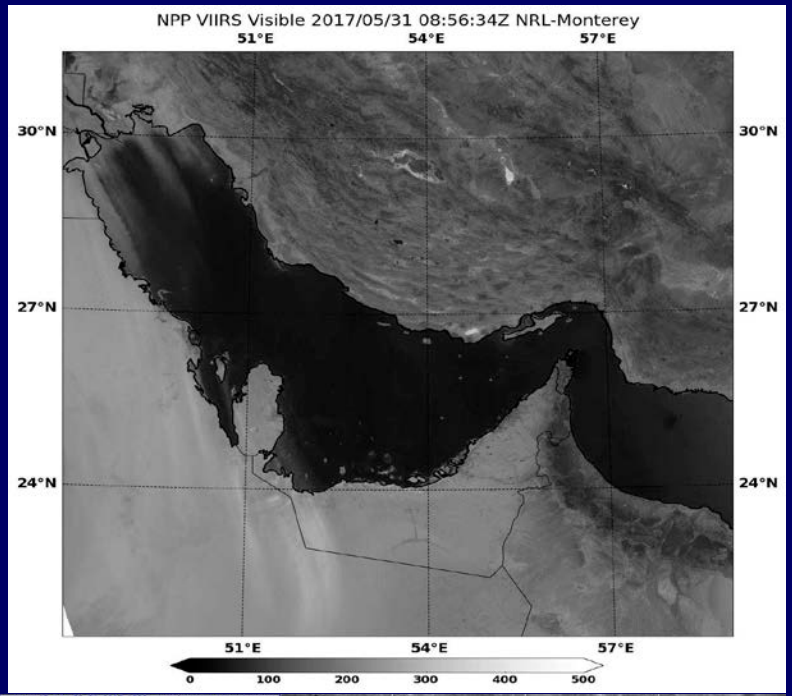


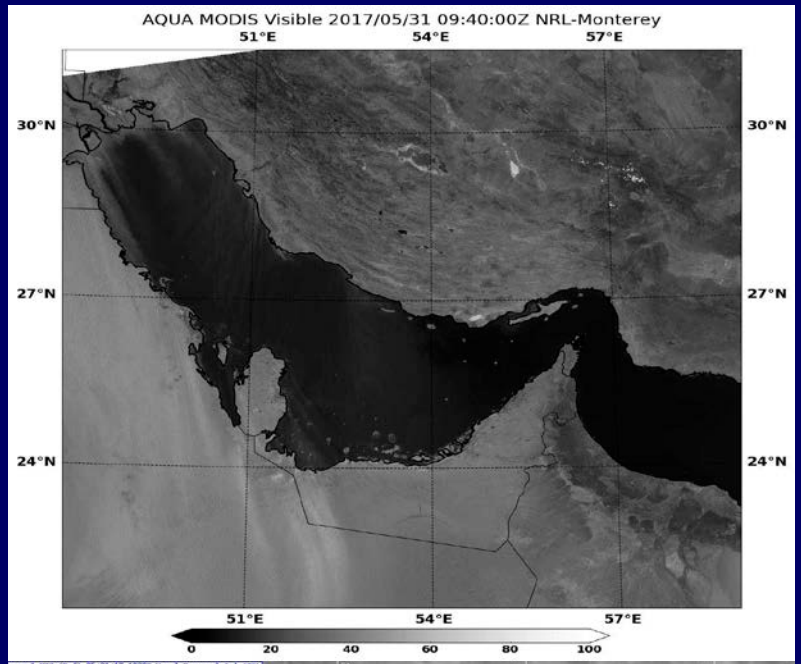


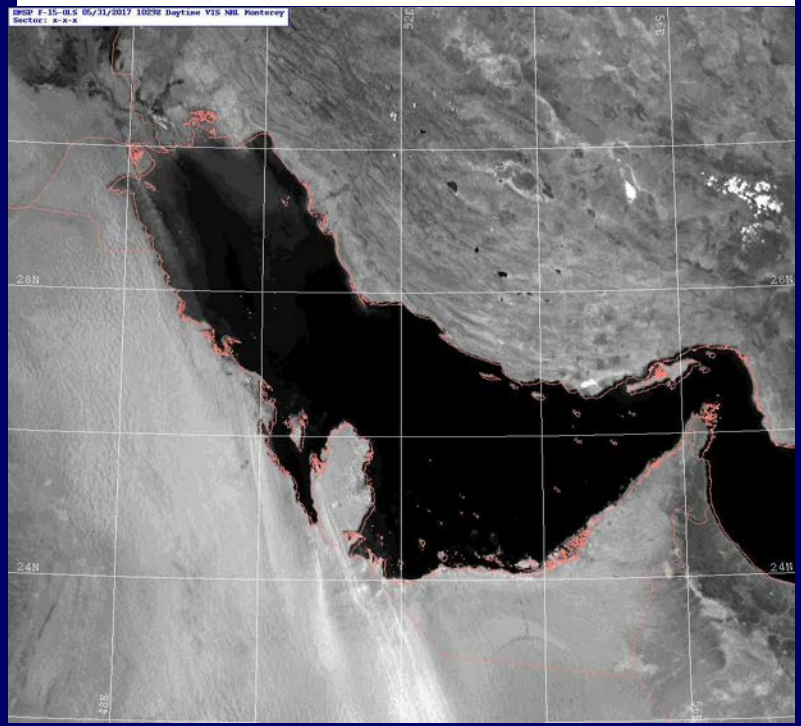
MSG-1
DEBRA

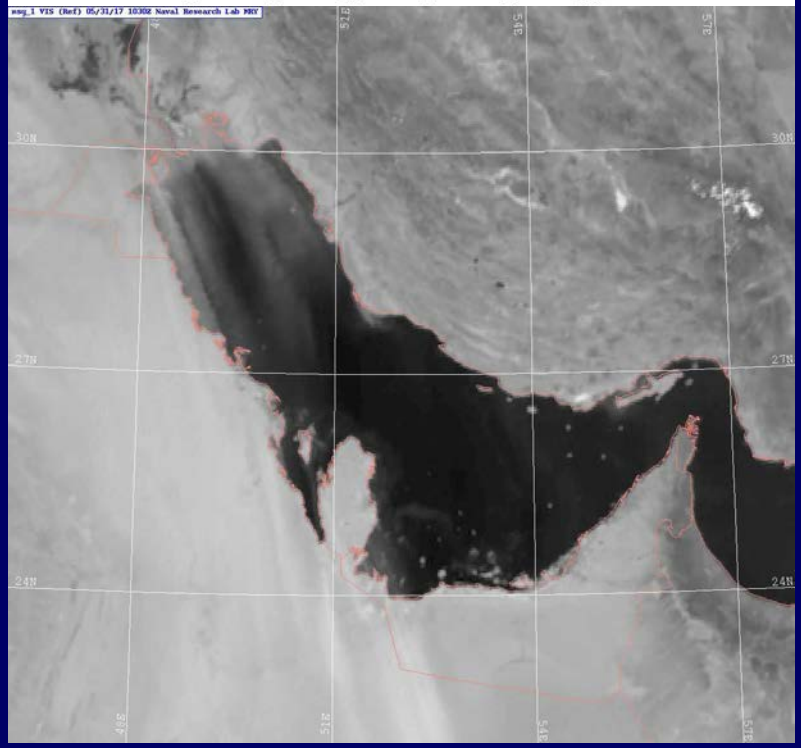


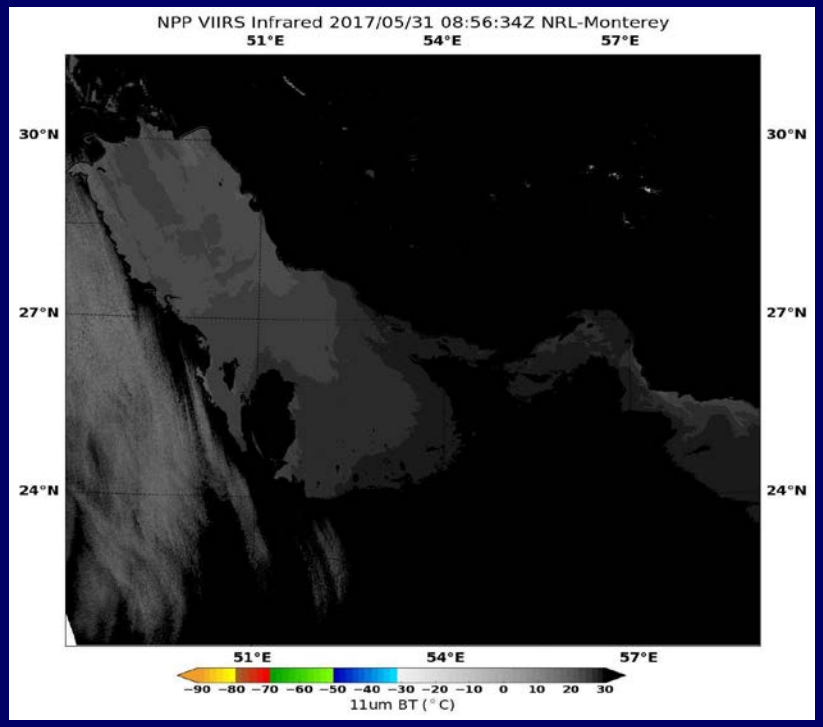
Scatterometer
ASCAT

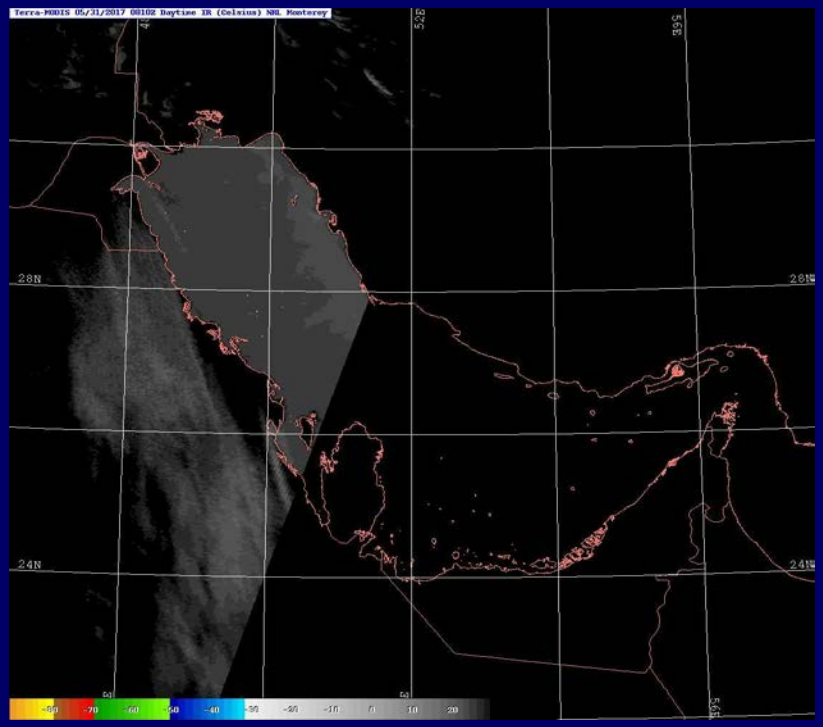

NPP VIIRS Visible 2017/05/31 08:56:34Z NRL-Monterey
51°E
54°E
57°E
30°N
27°N
24°N
0
100
200
300
400
500

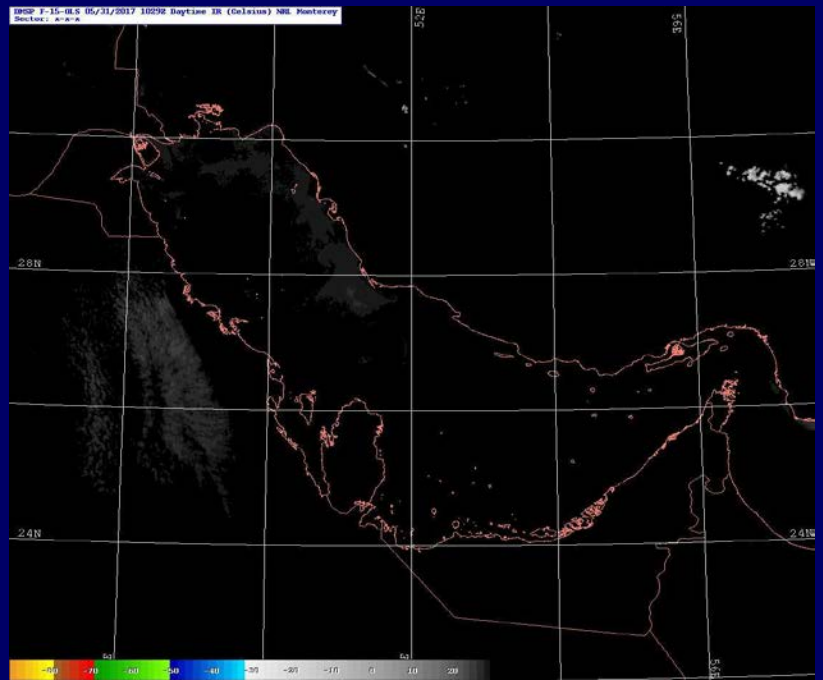

AQUA MODIS Visible 2017/05/31 09:40:00Z NRL-Monterey
51°E
54°E
57°E
30°N
27°N
24°N
0
20
40
60
80
100

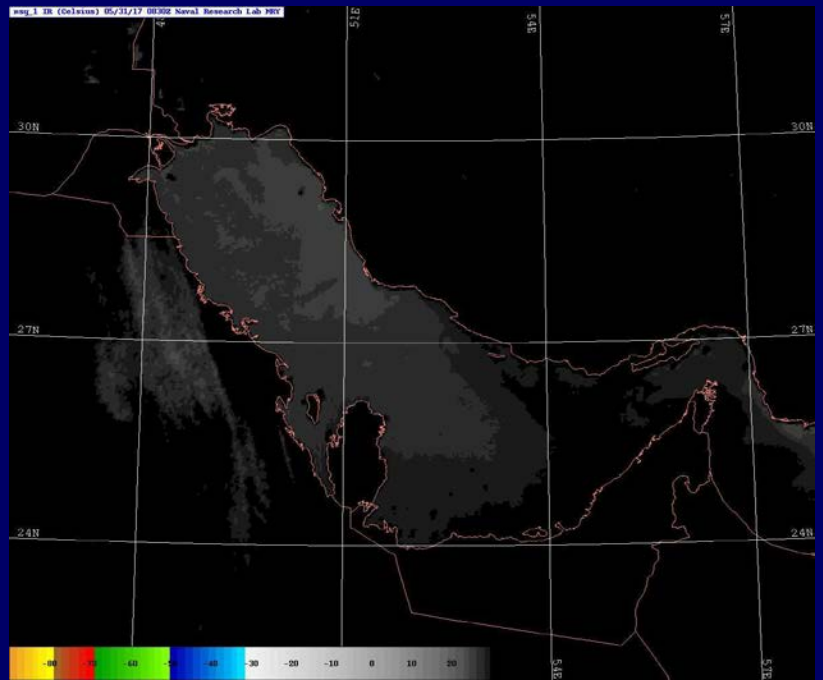

DMSP F-15-OLS 05/31/2017 10292 Daytime VIS NRL Monterey
Sector: x-x-x
28N
24N

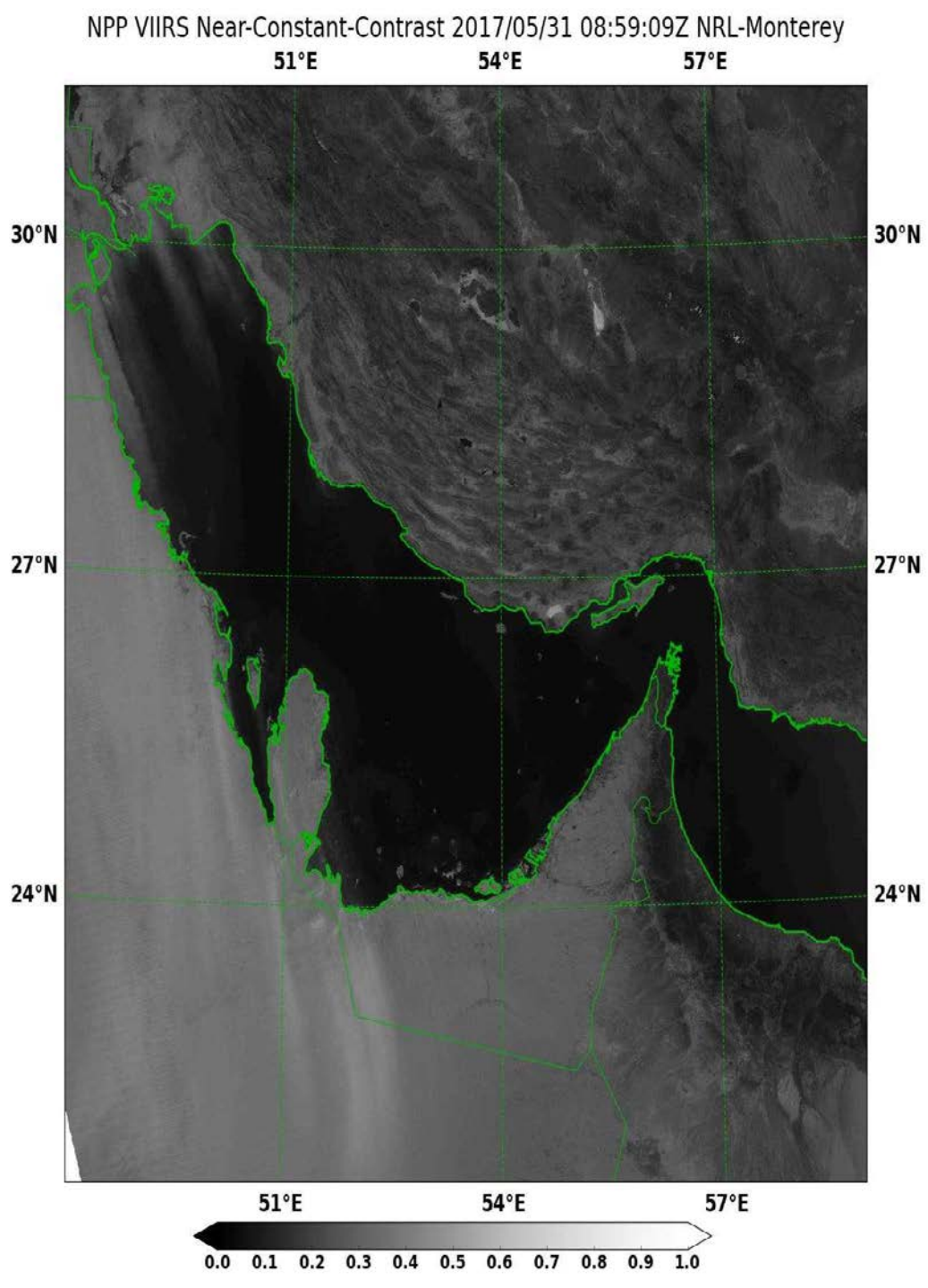

msg_1 VIS (Ref) 05/31/17 10302 Naval Research Lab MRY
30N
27N
24N

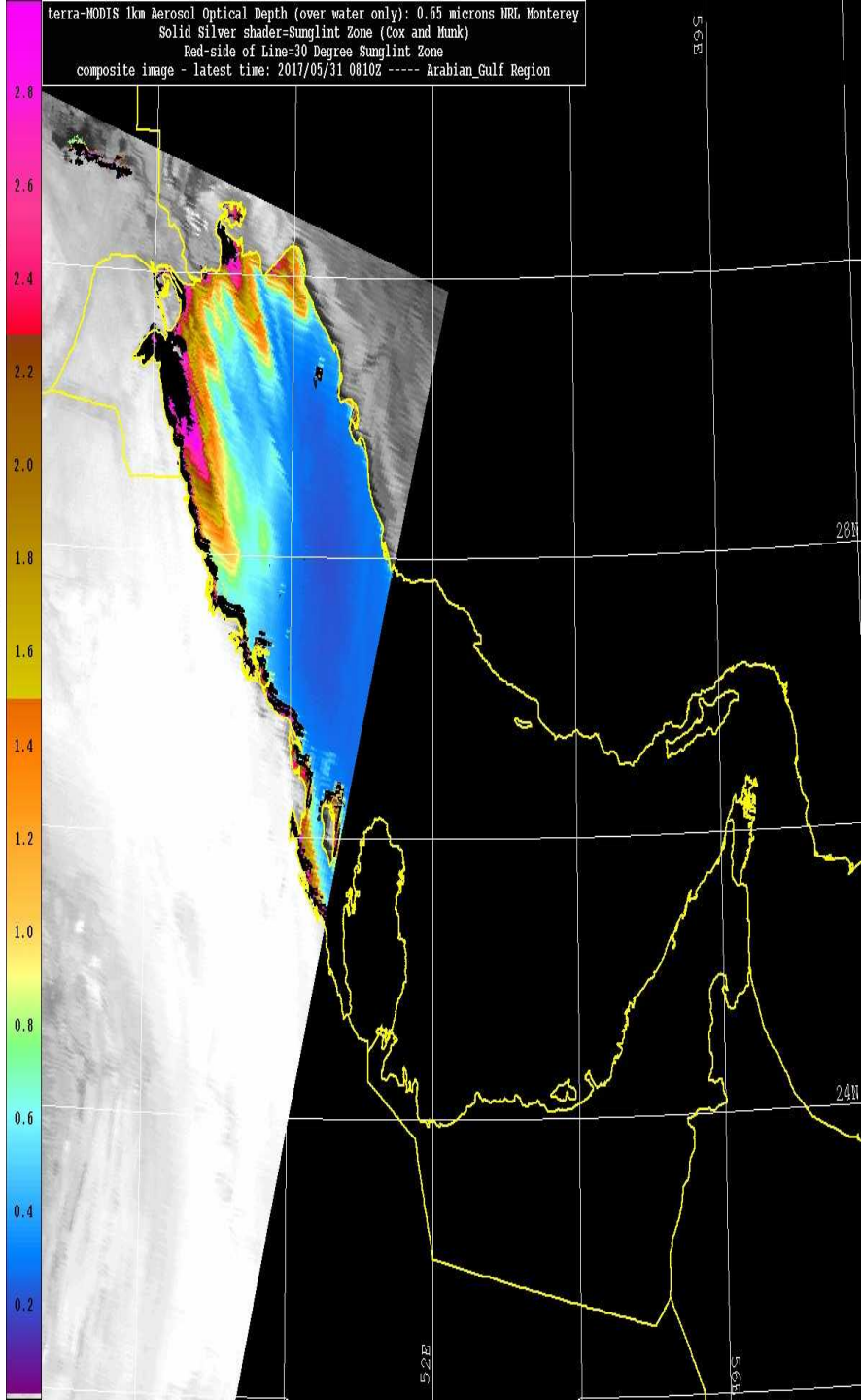

NPP VIIRS Infrared 2017/05/31 08:56:34Z NRL-Monterey
51°E
54°E
57°E
30°N
27°N
24°N
−90 −80 −70 −60 −50 −40 −30 −20 −10 0 10 20 30
11um BT (°C)


Terra-MODIS 05/31/2017 08:10Z Daytime IR (Celsius) NRL Monterey
28N
24N

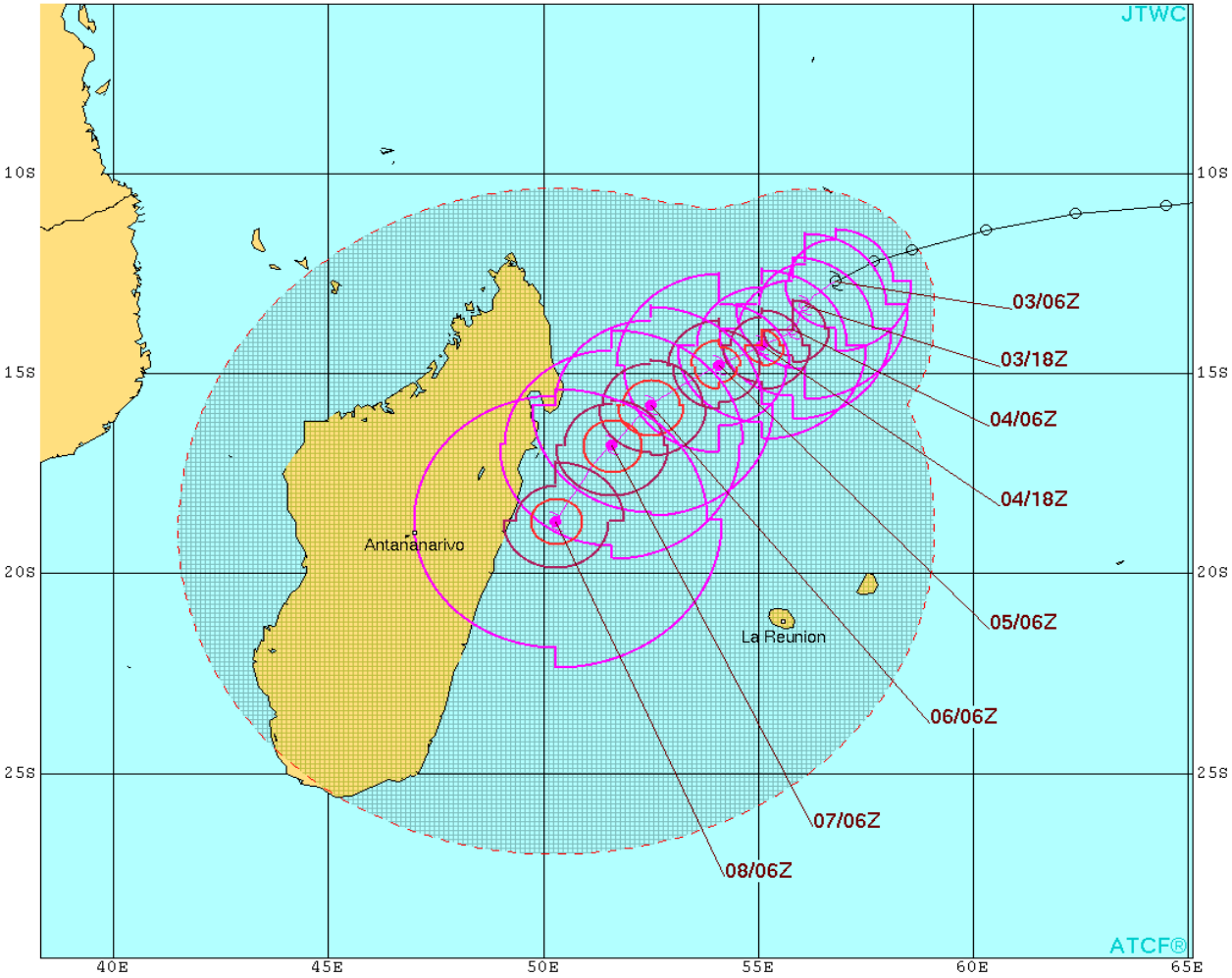

28N
24N


30N
27N
24N


NPP VIIRS Near-Constant-Contrast 2017/05/31 08:59:09Z NRL-Monterey
51°E
54°E
57°E
30°N
27°N
24°N
0.0 0.1 0.2 0.3 0.4 0.5 0.6 0.7 0.8 0.9 1.0


terra-MODIS 1km Aerosol Optical Depth (over water only): 0.65 microns NRL Monterey
Solid Silver shader=Sunglint Zone (Cox and Munk)
Red-side of Line=30 Degree Sunglint Zone
composite image - latest time: 2017/05/31 0810Z ----- Arabian_Gulf Region
2.8
2.6
2.4
2.2
2.0
1.8
1.6
1.4
1.2
1.0
0.8
0.6
0.4
0.2
56E
28N
24N
52E
56E

Tropical cyclone 09S.ENAWO

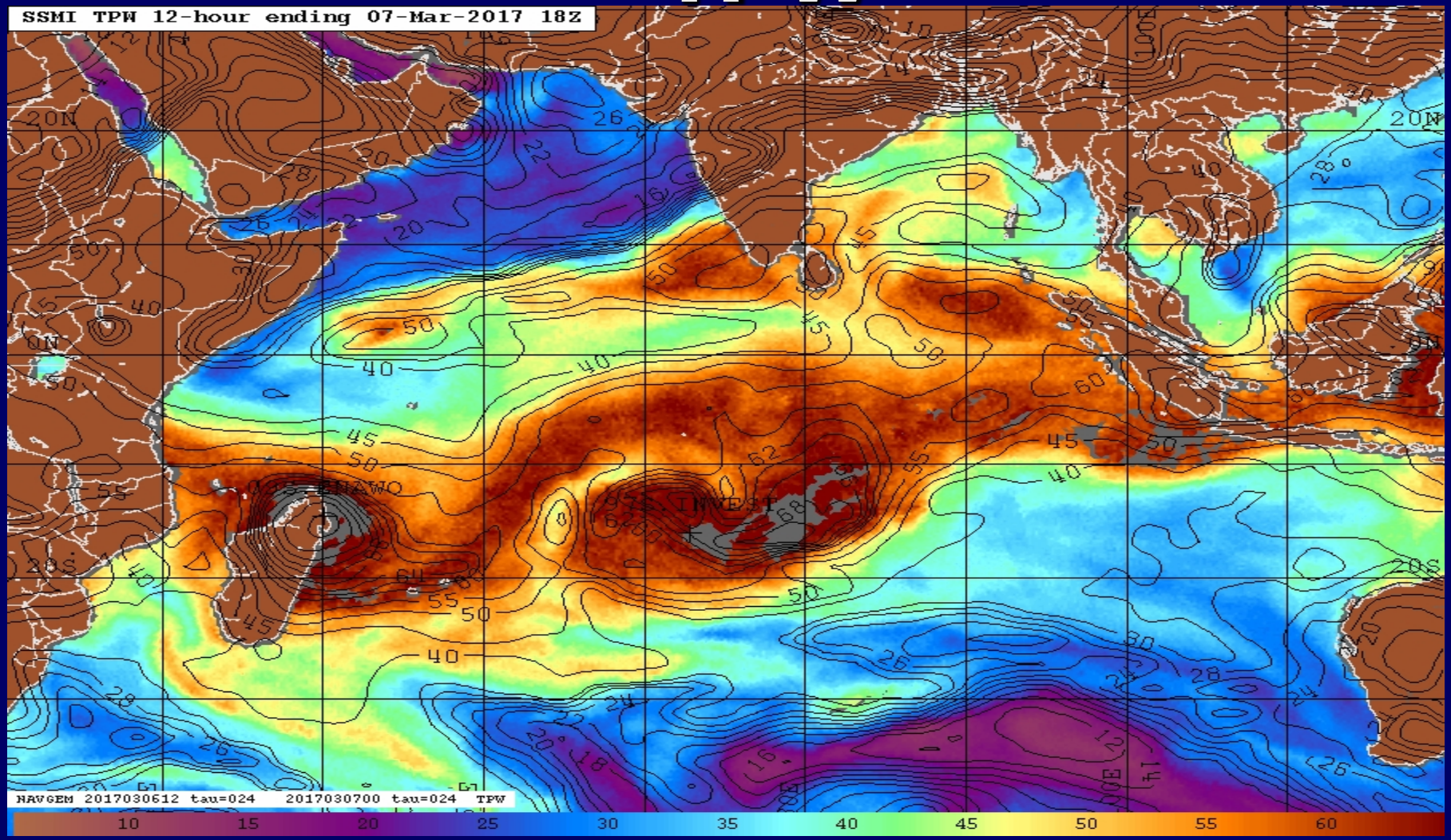


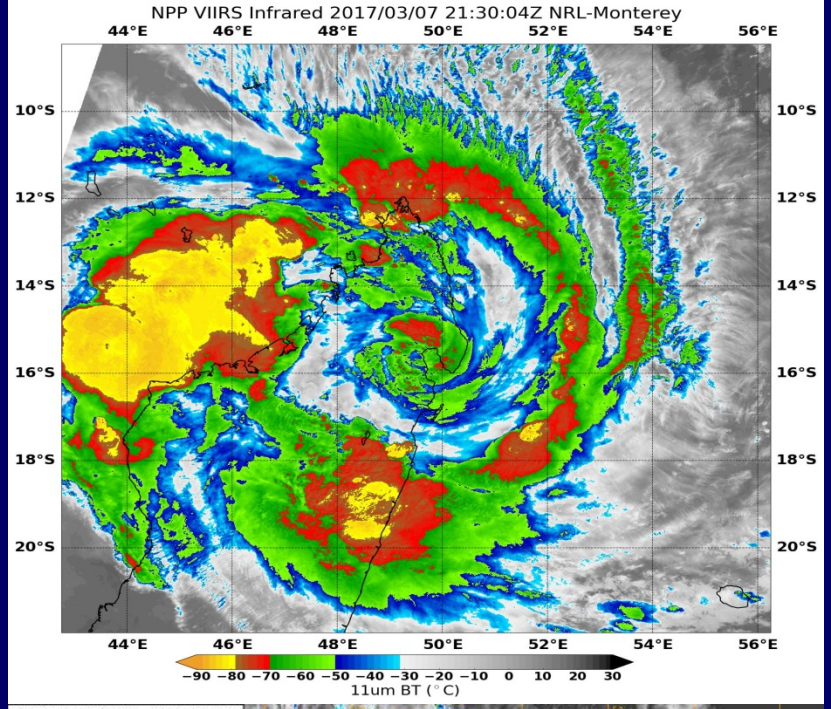
TROPICAL CYCLONE 09S (NINE) WARNING #1
WTXS31 PGTW 030900
030600Z POSIT: NEAR 12.7S 56.8E
MOVING 240 DEGREES TRUE AT 10 KNOTS
MAXIMUM SIGNIFICANT WAVE HEIGHT: 8 FEET
03/06Z, WINDS 035 KTS, GUSTS TO 045 KTS
03/18Z, WINDS 045 KTS, GUSTS TO 055 KTS
04/06Z, WINDS 055 KTS, GUSTS TO 070 KTS
04/18Z, WINDS 070 KTS, GUSTS TO 085 KTS
05/06Z, WINDS 085 KTS, GUSTS TO 105 KTS
06/06Z, WINDS 105 KTS, GUSTS TO 130 KTS
07/06Z, WINDS 120 KTS, GUSTS TO 145 KTS
08/06Z, WINDS 125 KTS, GUSTS TO 150 KTS

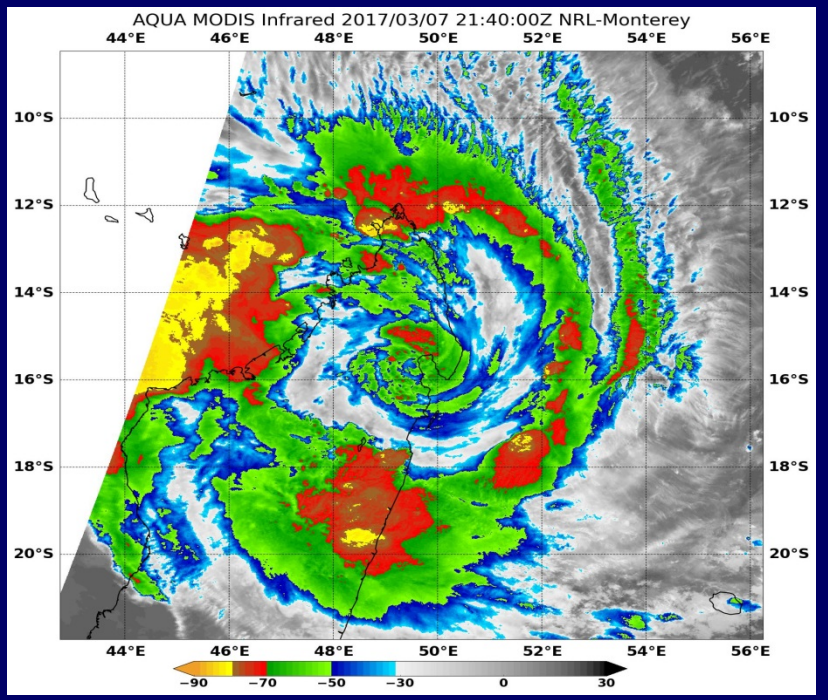
CPA TO:	NM	DTG
PORT_LOUIS	367	05/07Z
ST_DENIS	298	07/21Z

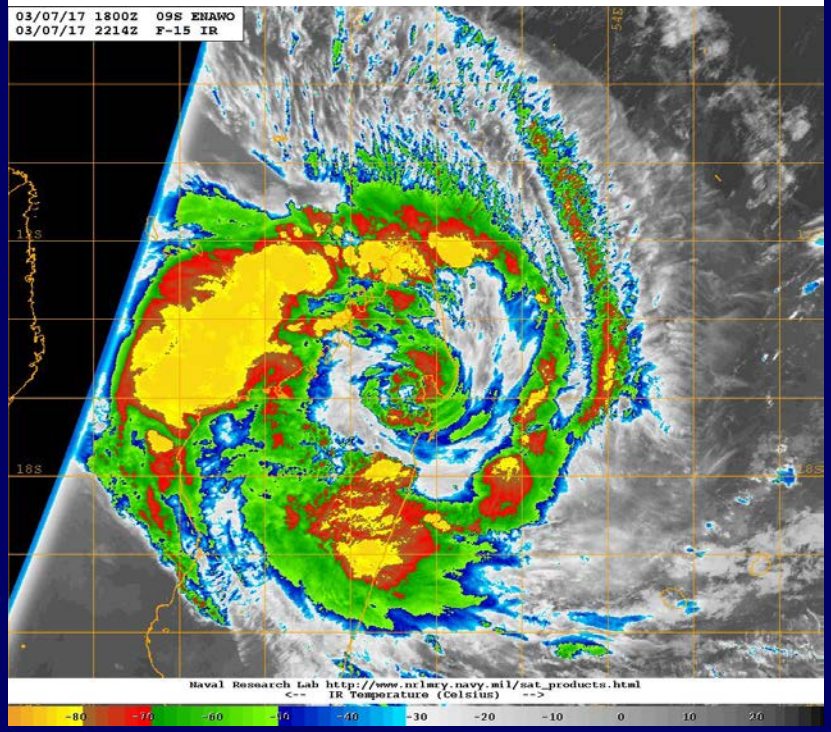
○ LESS THAN 34 KNOTS
◔ 34-63 KNOTS
● MORE THAN 63 KNOTS
PAST 6 HOURLY CYCLONE POSITS IN BLACK
FORECAST CYCLONE POSITS IN COLOR

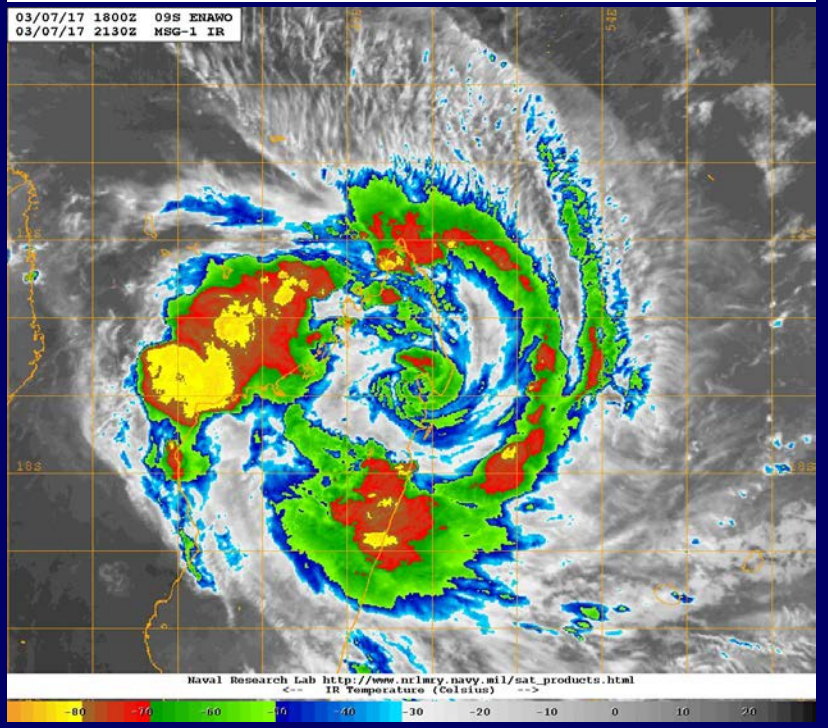
09S.ENAWO
TPW



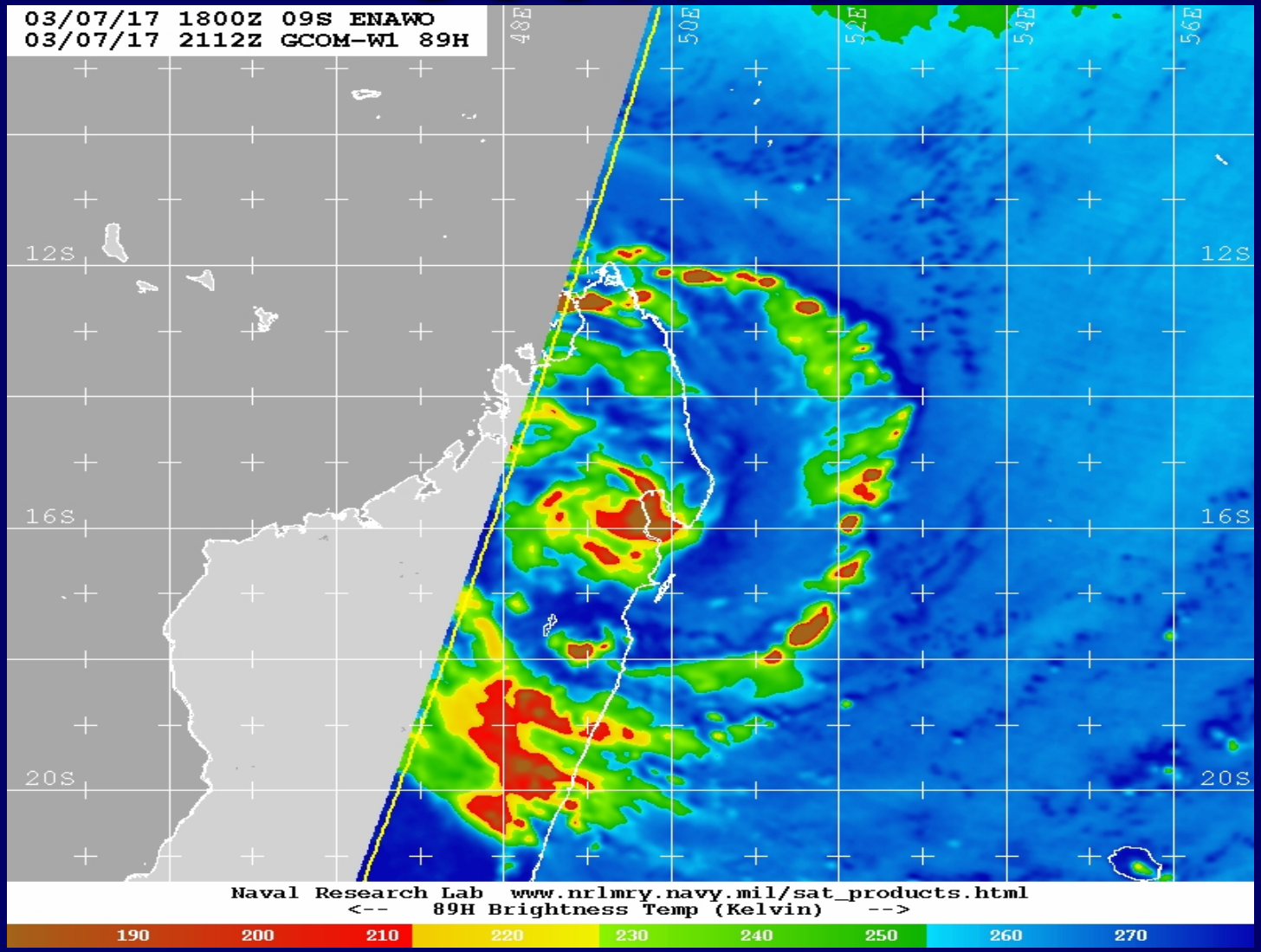

NPP VIIRS Infrared 2017/03/07 21:30:04Z NRL-Monterey
44°E 46°E 48°E 50°E 52°E 54°E 56°E
10°S 12°S 14°S 16°S 18°S 20°S
−90 −80 −70 −60 −50 −40 −30 −20 −10 0 10 20 30
11um BT (°C)

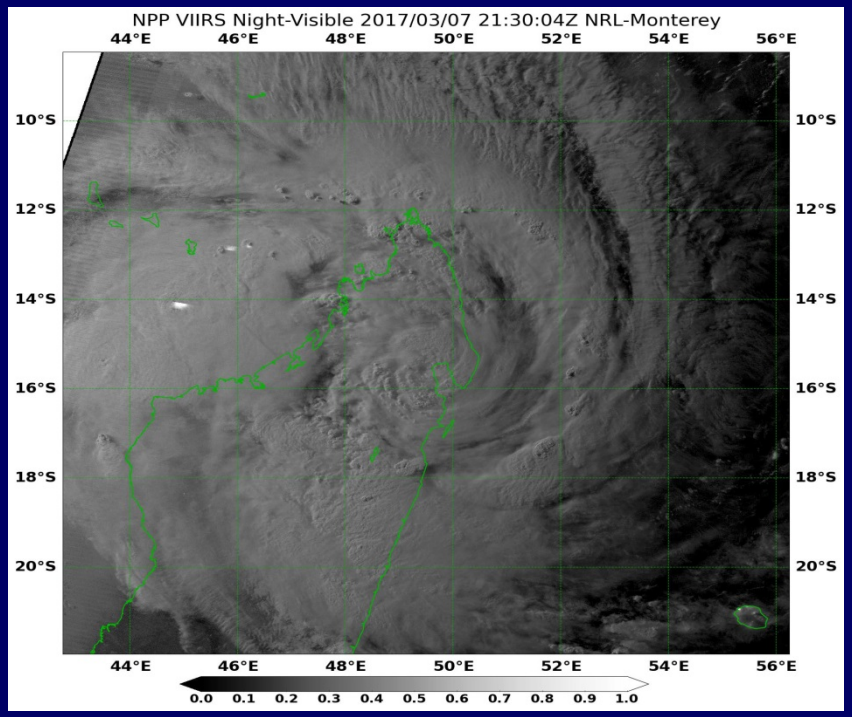

AQUA MODIS Infrared 2017/03/07 21:40:00Z NRL-Monterey
44°E 46°E 48°E 50°E 52°E 54°E 56°E
10°S 12°S 14°S 16°S 18°S 20°S
−90 −70 −50 −30 0 30

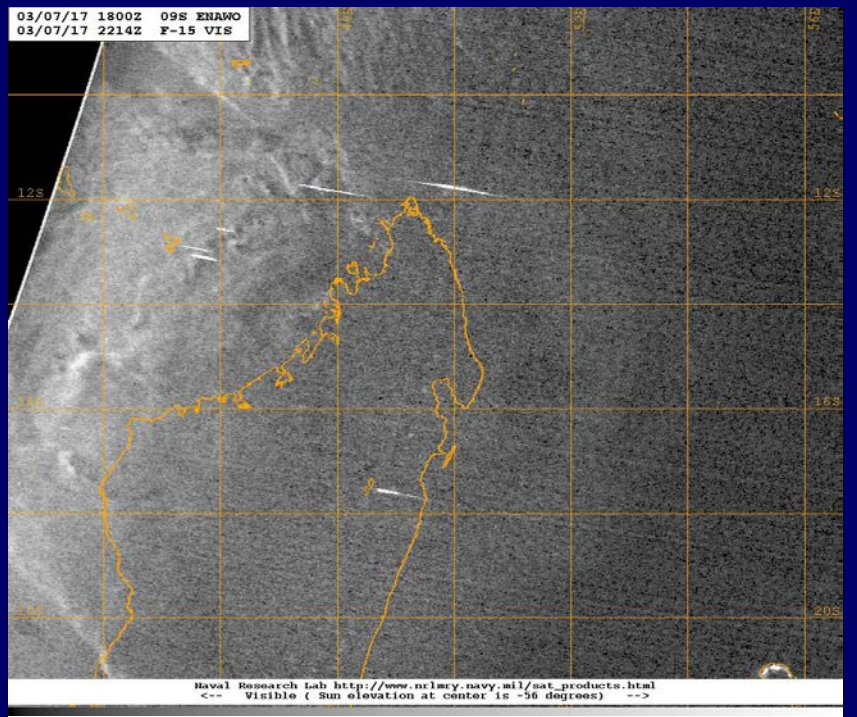

03/07/17 1800Z 09S ENAWO
03/07/17 2214Z F-15 IR
Naval Research Lab http://www.nrlmry.navy.mil/sat_products.html
<-- IR Temperature (Celsius) -->
-80 -70 -60 -50 -40 -30 -20 -10 0 10 20

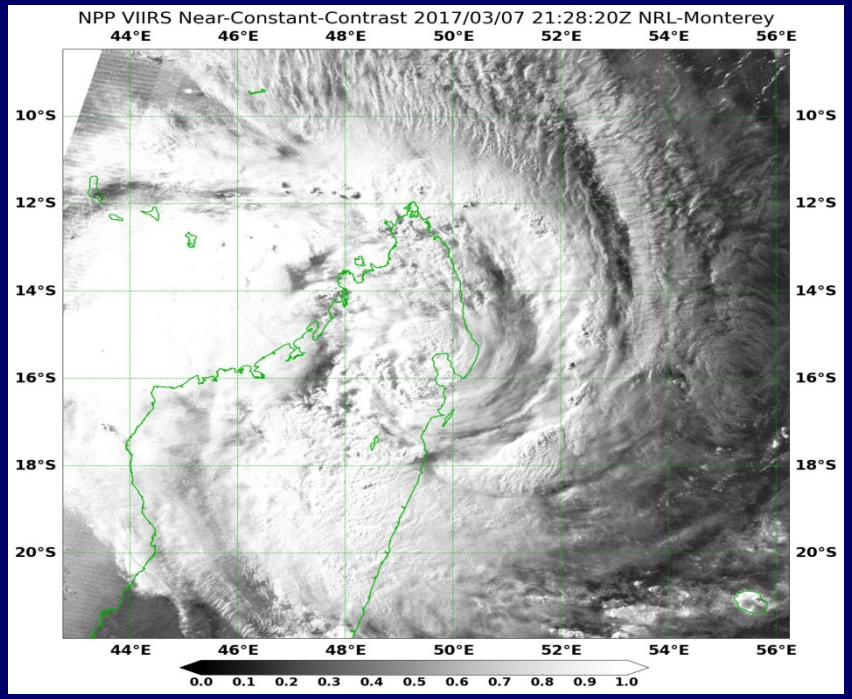

03/07/17 1800Z 09S ENAWO
03/07/17 2130Z MSG-1 IR
Naval Research Lab http://www.nrlmry.navy.mil/sat_products.html
<-- IR Temperature (Celsius) -->
-80 -70 -60 -50 -40 -30 -20 -10 0 10 20

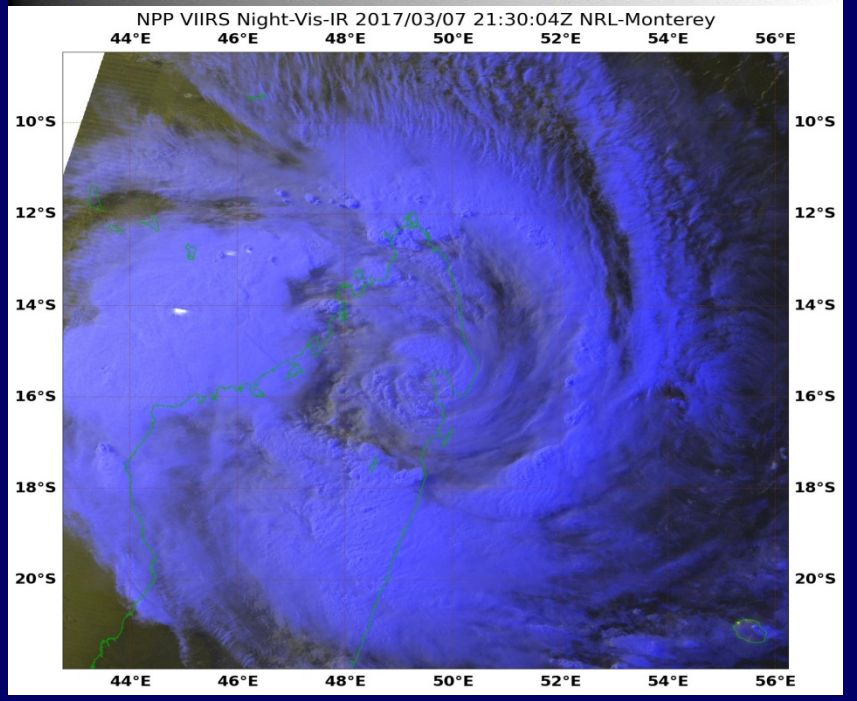
GCOM-W1


03/07/17 1800Z 09S ENAWO
03/07/17 2112Z GCOM-W1 89H
48E
50E
52E
54E
56E
12S
16S
20S
Naval Research Lab www.nrlmry.navy.mil/sat_products.html
<-- 89H Brightness Temp (Kelvin) -->
190
200
210
220
230
240
250
260
270


NPP VIIRS Night-Visible 2017/03/07 21:30:04Z NRL-Monterey
44°E 46°E 48°E 50°E 52°E 54°E 56°E
10°S 12°S 14°S 16°S 18°S 20°S
0.0 0.1 0.2 0.3 0.4 0.5 0.6 0.7 0.8 0.9 1.0


03/07/17 1800Z 09S ENAWO
03/07/17 2214Z F-15 VIS
12S
16S
20S
Naval Research Lab http://www.nrlmry.navy.mil/sat_products.html
<-- Visible (Sun elevation at center is -56 degrees) -->


NPP VIIRS Near-Constant-Contrast 2017/03/07 21:28:20Z NRL-Monterey
44°E 46°E 48°E 50°E 52°E 54°E 56°E
10°S 12°S 14°S 16°S 18°S 20°S
0.0 0.1 0.2 0.3 0.4 0.5 0.6 0.7 0.8 0.9 1.0


NPP VIIRS Night-Vis-IR 2017/03/07 21:30:04Z NRL-Monterey
44°E 46°E 48°E 50°E 52°E 54°E 56°E
10°S 12°S 14°S 16°S 18°S 20°S