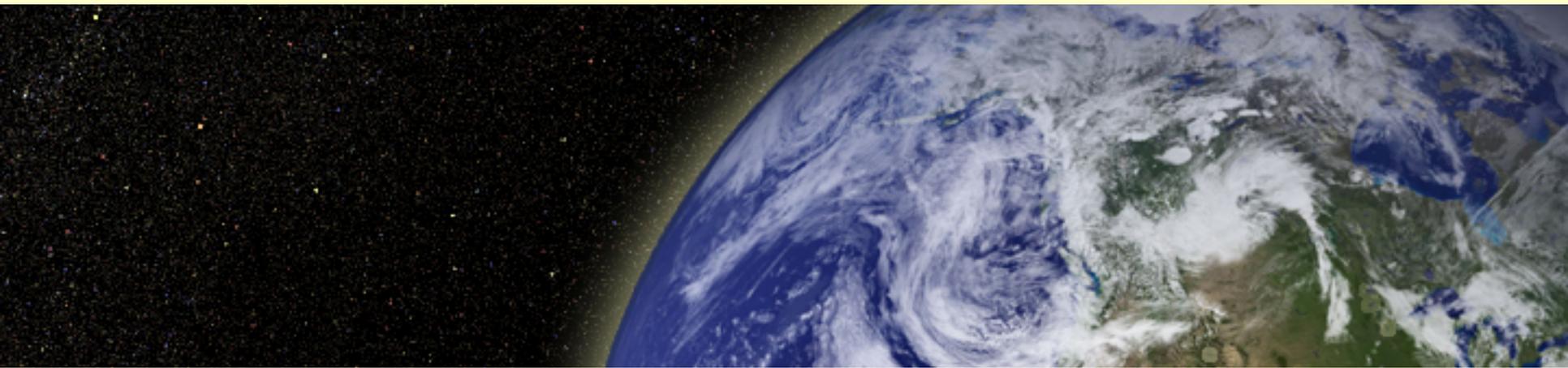


NOAA NESDIS Satellite Operations and Applications Towards Severe Weather

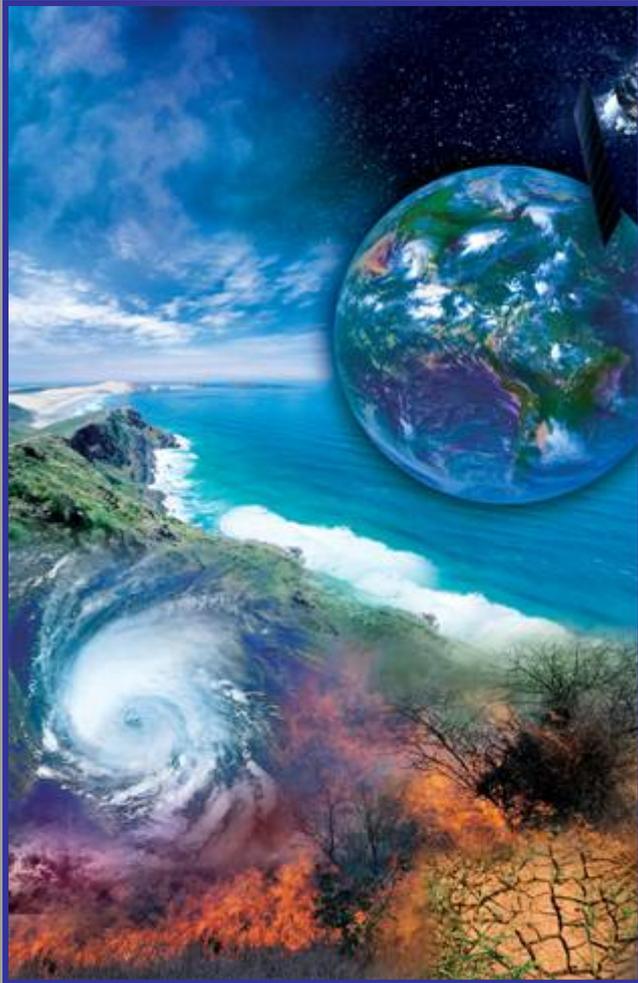


Tom Renkevans
Satellite Products and Services Division
NOAA / NESDIS / OSPO
March 4, 2011

2011 National Severe Weather Workshop

Session IV – Remote Sensing and General Session

NOAA Satellite and Information Service: National Environmental Satellite, Data, and Information Service (NESDIS)



NESDIS is dedicated to serving society by providing timely access to global environmental data from satellites and other sources to promote, protect, and enhance the Nation's economy, security, environment, and quality of life.



Supporting NOAA's Mission: Why are satellite-based observations key?

Continuous imaging and sounding of weather in the Western Hemisphere help save lives and minimize property damage from severe weather

Global imaging and sounding for medium and long-range weather forecasting and climate analysis

- 🌐 Input into numerical weather prediction models

Assisting with disaster mitigation through monitoring

- 🌐 Severe Weather
- 🌐 Precipitation
- 🌐 Fires and smoke
- 🌐 Volcano eruptions
- 🌐 Dust storms and other air quality issues

Impacting the general public and their decision making

- 🌐 NOAA satellite images are on TV every day

Supporting a broad range of environmental monitoring

- 🌐 Weather, climate, oceans, coasts, and ecosystems



NOAA Satellite Program Overview



Missions Operations Division (MOD):

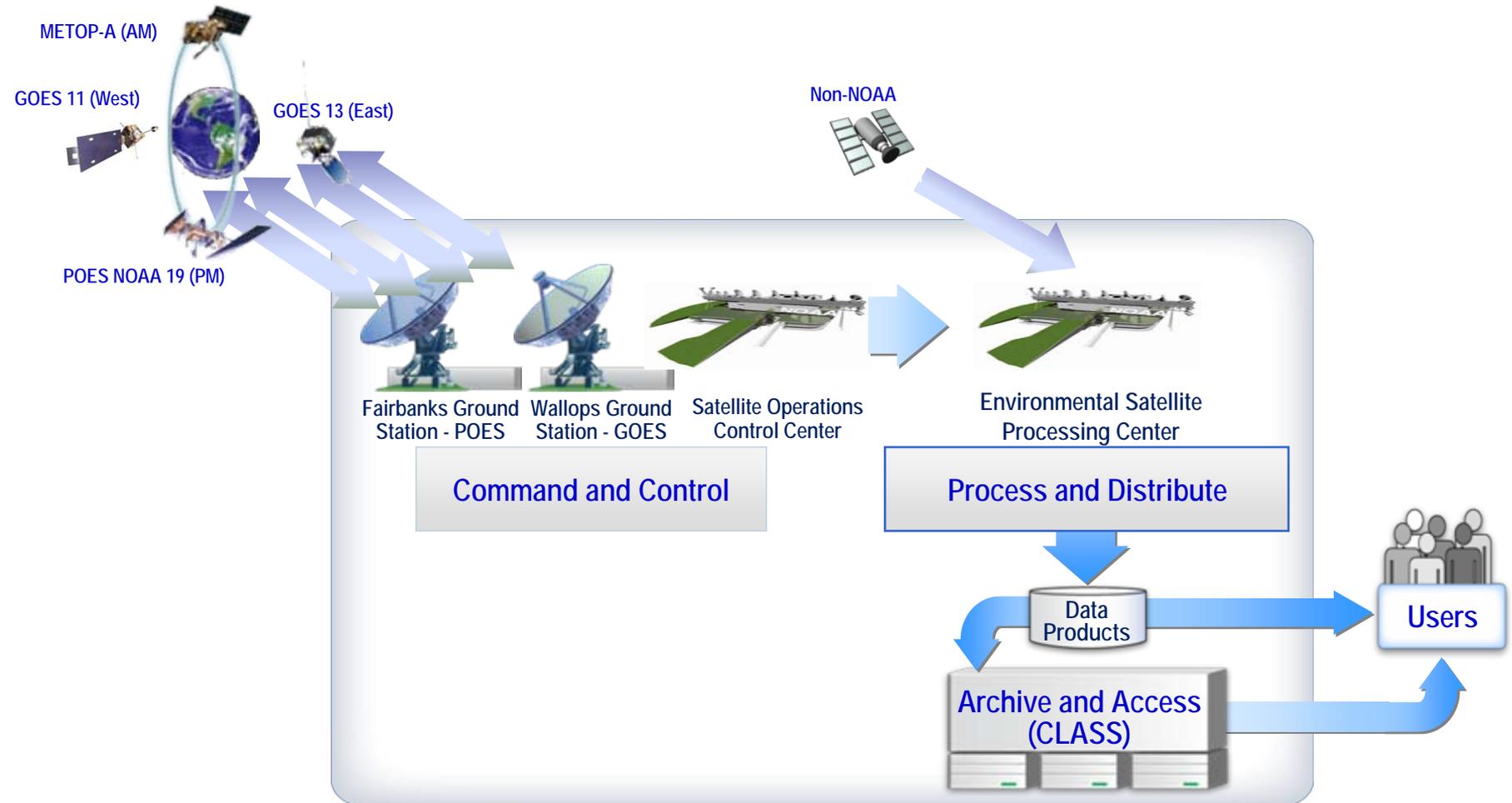
- Manages the launch (w/NASA), operation and maintenance of NOAA's environmental satellites.
- Ensures the lasting operation of NOAA's satellites through operations of ground system receive stations in Wallops Island, VA; Fairbanks, AK; and Suitland, MD.
- Command, control, communicate with GOES, POES, DMSP on-orbit satellites on a 24 by 7 basis.
- Acquires data from GOES, POES, DMSP, and Jason-2
- Manages the operational processing system that converts satellite data (GOES, POES, DMSP, Jason-2) into environmental products for users.

Satellite Products and Services Division (SPSD):

- Provides analysis and interpretation of satellite data.
- Leverages relevant non-NOAA satellite data to enhance products (NASA, Foreign environmental satellites).
- Interface between NESDIS and the user community.
- Manages the direct services (DCS, Argos) and the Search and Rescue system (SARSAT).



Satellite Information Flow





Command and Data Acquisition Stations

Wallops CDA

Located at Wallops Island Virginia

24/7 Operations – Command, Telemetry and Mission Data

- Supports GOES, POES, Jason-2, NASA ACE programs

LRIT, DCS (Local Readout Ground Station (LRGS)) and EMWIN

<http://www.wcda.noaa.gov/>

Fairbanks CDA

Located at Gilmore Creek Alaska

24/7 Operations – Command, Telemetry and Mission Data

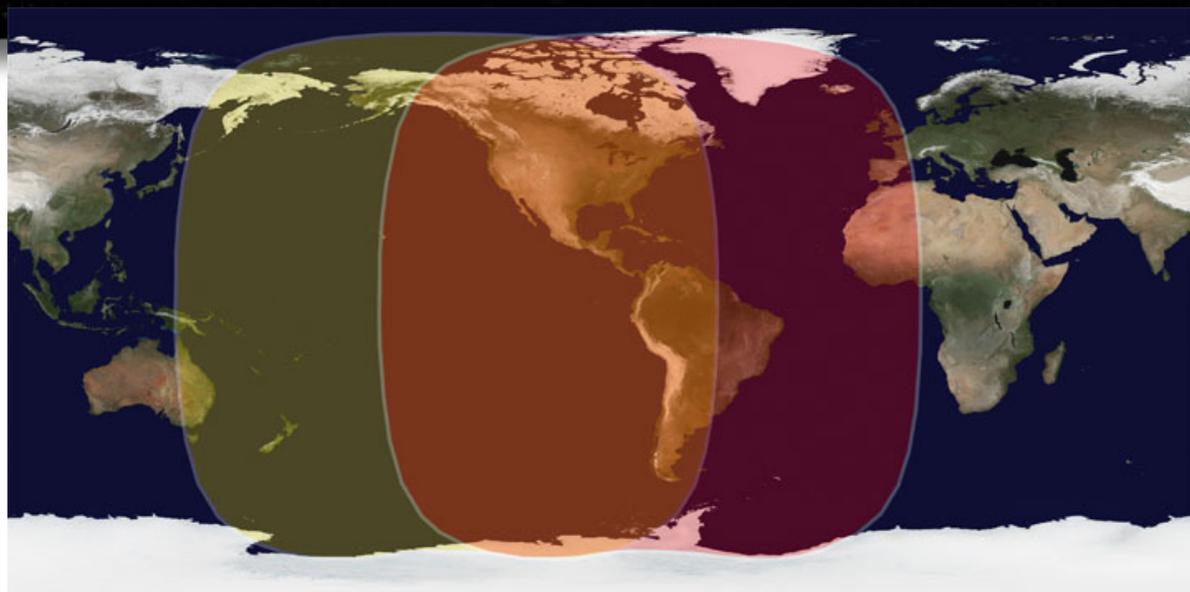
- Supports POES, DMSP, Jason-2, COSMIC programs
- Backup site for GOES West

<http://www.fcdas.noaa.gov/>





Geostationary Satellites (GOES)



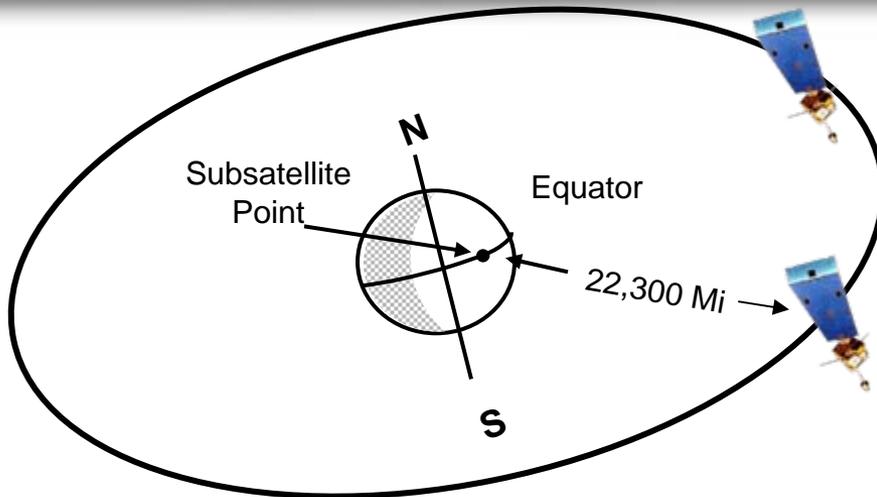
- Weather sentinel – constant monitoring of Hurricanes, Severe Storms, and more
- Input to weather models, forecasts, and warnings
- Sea surface temperature monitoring for fisheries and climate
- Winds for aviation
- Solar imagery for communication satellites, utility companies, and astronaut safety
- Environmental data collection from buoys, stream gauges, etc.
- Satellite-aided Search and Rescue

- 35,800 km high
- Two Satellite System continuously monitors the Western Hemisphere
- Northern Hemisphere Imaged every 15 minutes



GOES Constellation

Primary Requirement: Continuity of Capability



GOES I-M (8-12) series operational since 1994 Two operational satellites and on-orbit spare

- 🌐 GOES-10 deorbited - was at 60° W in support of South America December 2, 2006 – December 1, 2009
- 🌐 GOES-11 operational as GOES West at 135° W - June 21, 2006
- 🌐 GOES-12 providing coverage of South America at 60° W - May 11, 2010

GOES N/O/P (13/14/15)

- 🌐 GOES-13 operational as GOES-East at 75° W – April 14, 2010
- 🌐 GOES-14 in Z-axis storage at 105° W – launched June 27, 2009
- 🌐 GOES-15 in earth pointing 'storage' at 90° W with space instruments on - launched March 4, 2010



Upcoming GOES Activities

- 🌐 GOES West Replacement
 - 🌐 GOES-14 or GOES-15
 - Date – likely late 2011
- 🌐 Shifted Frame Support for GOES-East Spring Eclipse period, similar to this past fall eclipse
 - 🌐 Potential consideration for similar support for GOES-West in the future
- 🌐 Stray Light Correction for GOES-N/O/P Series
 - 🌐 Contamination of data from stray light largely surrounding equinoxes
 - 🌐 Studies conducted



Direct Readout Services

Emergency Managers Weather Information Network (EMWIN):

🌐 NOAA satellites relay critical information to users across the country.

🌐 <http://www.weather.gov/emwin/index.htm>



Low Resolution Image Transmission (LRIT):

🌐 NOAA satellites are used to relay satellite and weather products to users in remote locations, that do not have landlines or internet connections.

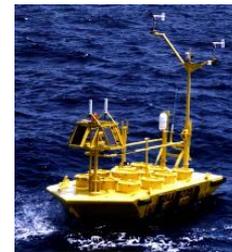
🌐 <http://www.noaasis.noaa.gov/LRIT/>



Data Collection:

🌐 NOAA satellites are used to collect and relay scientific data from around the globe.

🌐 <http://www.noaasis.noaa.gov/DCS/>
<http://www.noaasis.noaa.gov/ARGOS/>



Search and Rescue:

🌐 NOAA satellites are used to relay distress alerts from aviators, mariners and land-based users.

🌐 <http://www.sarsat.noaa.gov/>





Satellite Analysis Branch

**Branch within NOAA / NESDIS Office of Satellite Product Operations,
located in Camp Springs, MD**

**Serves as NOAA/NESDIS focal point for providing high quality, real time
global satellite-derived products, interpretive analyses, and other
information.**

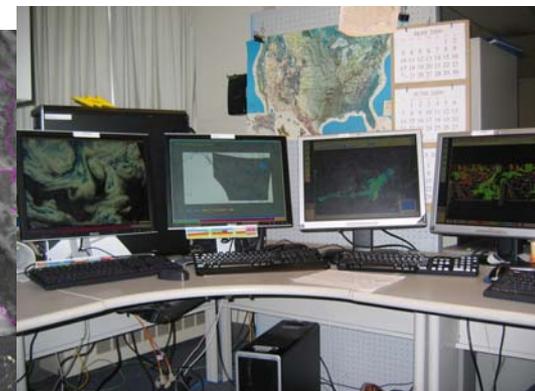
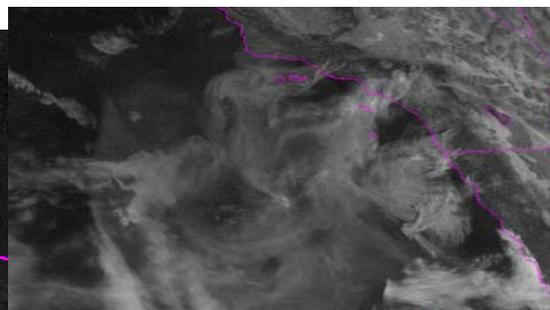
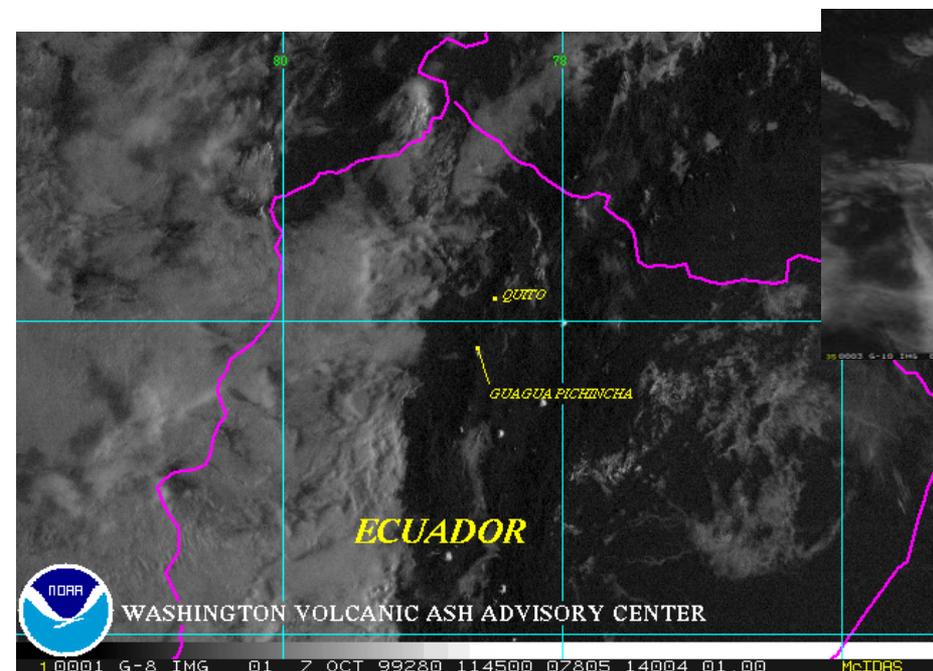
**These services support domestic and international meteorological
warnings and forecasts, numerical weather models, climate analyses,
and other initiatives within the Federal government.**





Satellite Analysis Branch Hazard Monitoring

- 24 x 7 Operations
- Interactive (man-machine mix) products
- Near realtime hazards-related product generation
 - Smoke & Fire, Volcanoes, Tropical Cyclones, Heavy Precipitation, Oil Spills

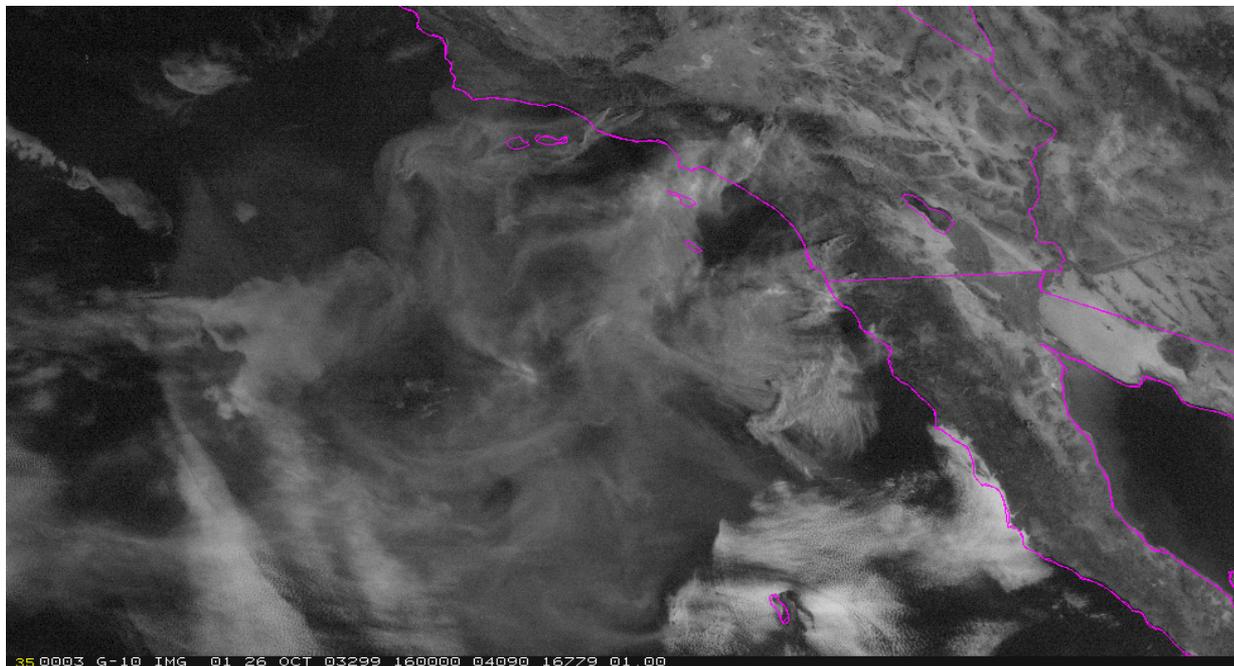
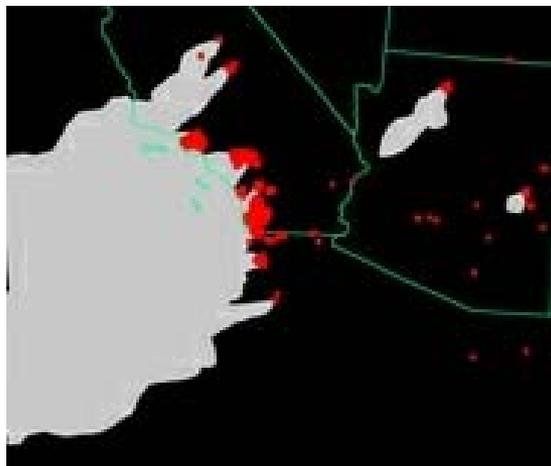




Smoke and Fire Products

Case: October 2003 Southern California Wildfires

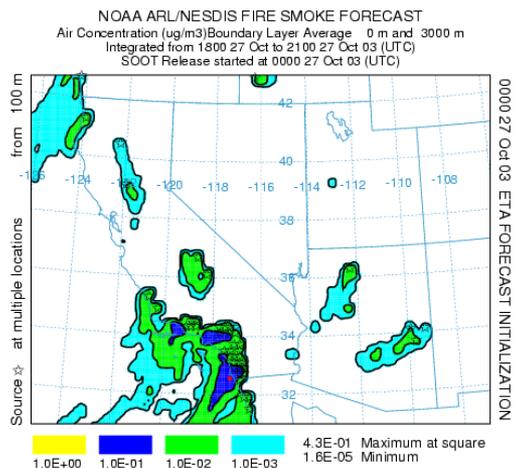
<http://www.ssd.noaa.gov/PS/FIRE/>



Top Left: Cut out section of daily smoke and fire analysis produced by SAB. Fires are red points, while smoke is grey.

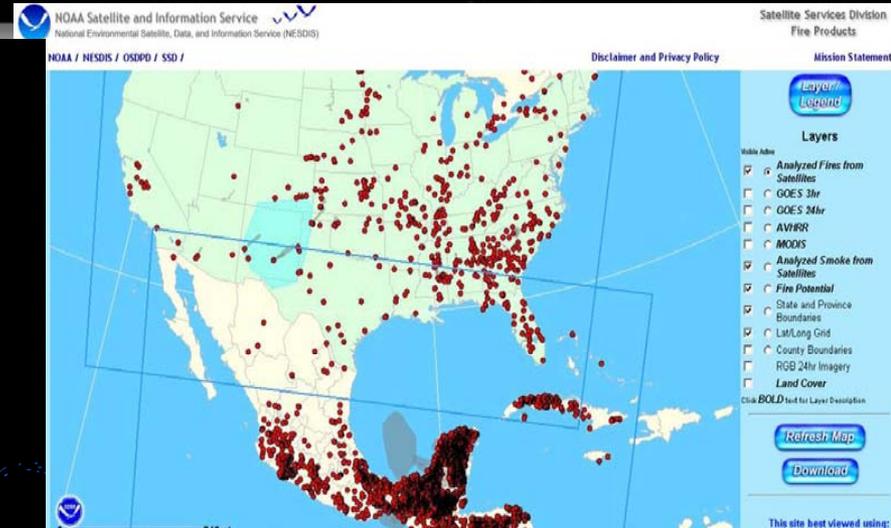
Bottom Left: Forecast smoke dispersion from wildfires run by ARL's HYSPLIT model. Source points are added by fire analysts at SAB.

Above: Visible loop of smoke from Southern California Fires.



HMS Graphical Outputs JPEG, GIS, KML Formats

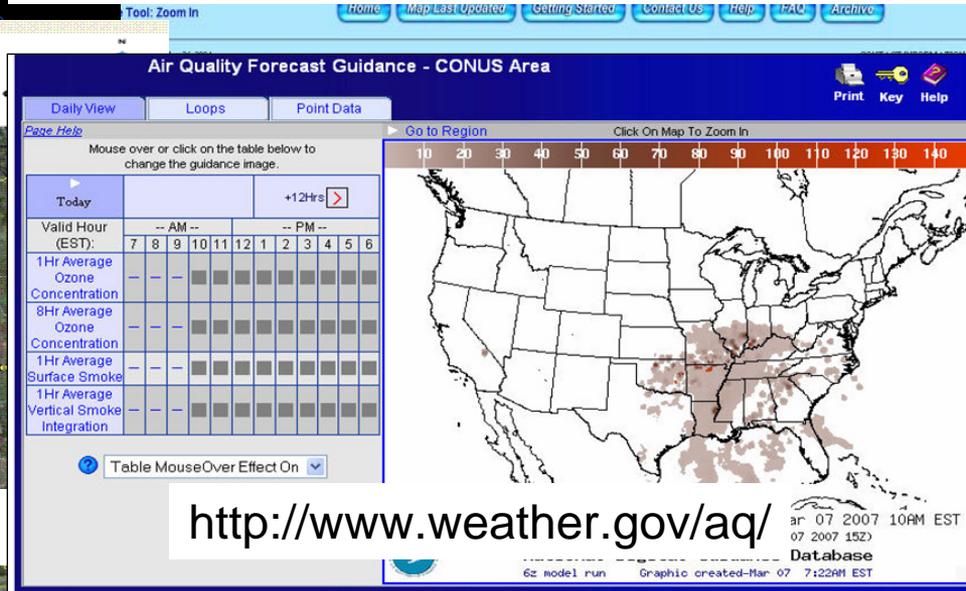
<http://www.ssd.noaa.gov/PS/FIRE/hms.html>



<http://www.firedetect.noaa.gov/viewer.htm>



<http://www.ssd.noaa.gov/PS/FIRE/kml.html>



<http://www.weather.gov/aq/>



Precipitation Program

24/7/365 monitoring of precipitation with emphasis on satellite analysis, short term trends and rainfall estimates

Supporting NCEP/HPC, NWS WFO, RFCs

- Heavy rainfall / flash flooding
- Moderate to heavy winter precipitation
 - West Coast winter storms
 - Great Lakes snows
- excessive rainfall area
- 0-6 hr rainfall guidance
- precipitation trends
- satellite tropical rainfall
- satellite rainfall estimates

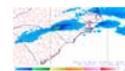
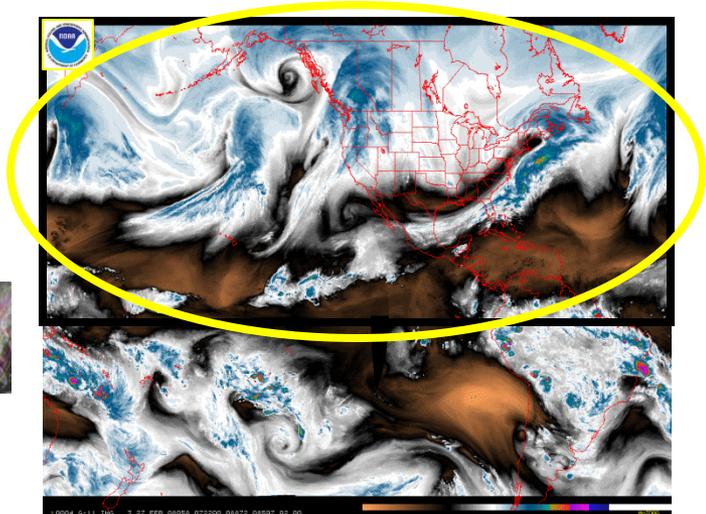
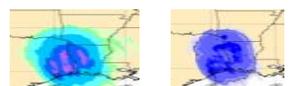
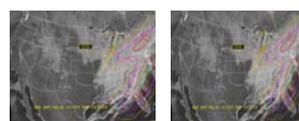
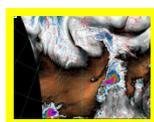


Satellite (SPENES) discussion messages

12-planet chat messages

graphical analysis

satellite rainfall estimates



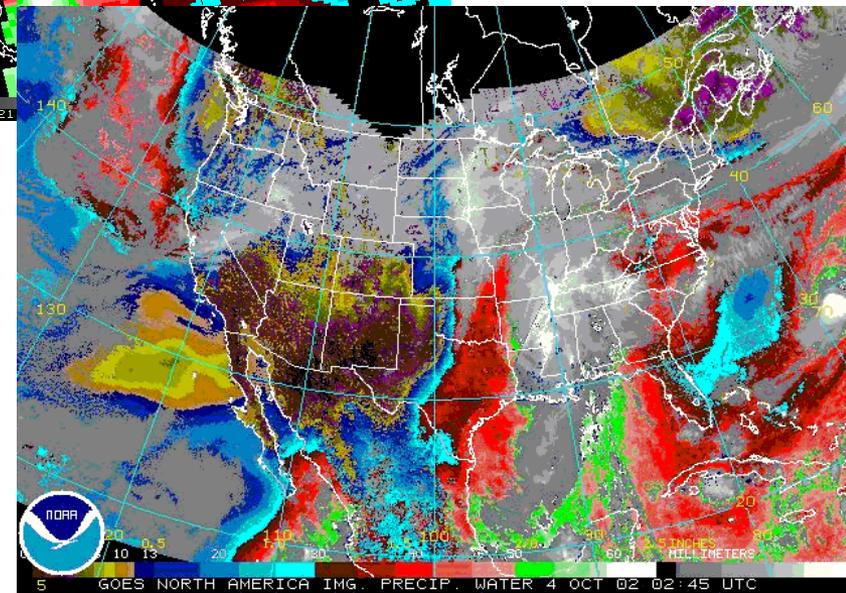
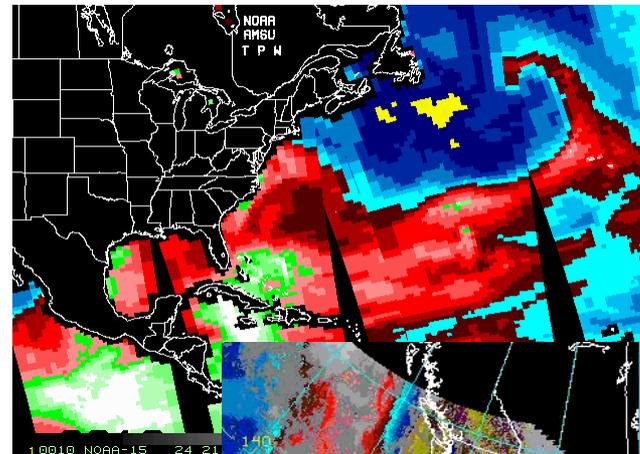


SAB Precipitation Analysis

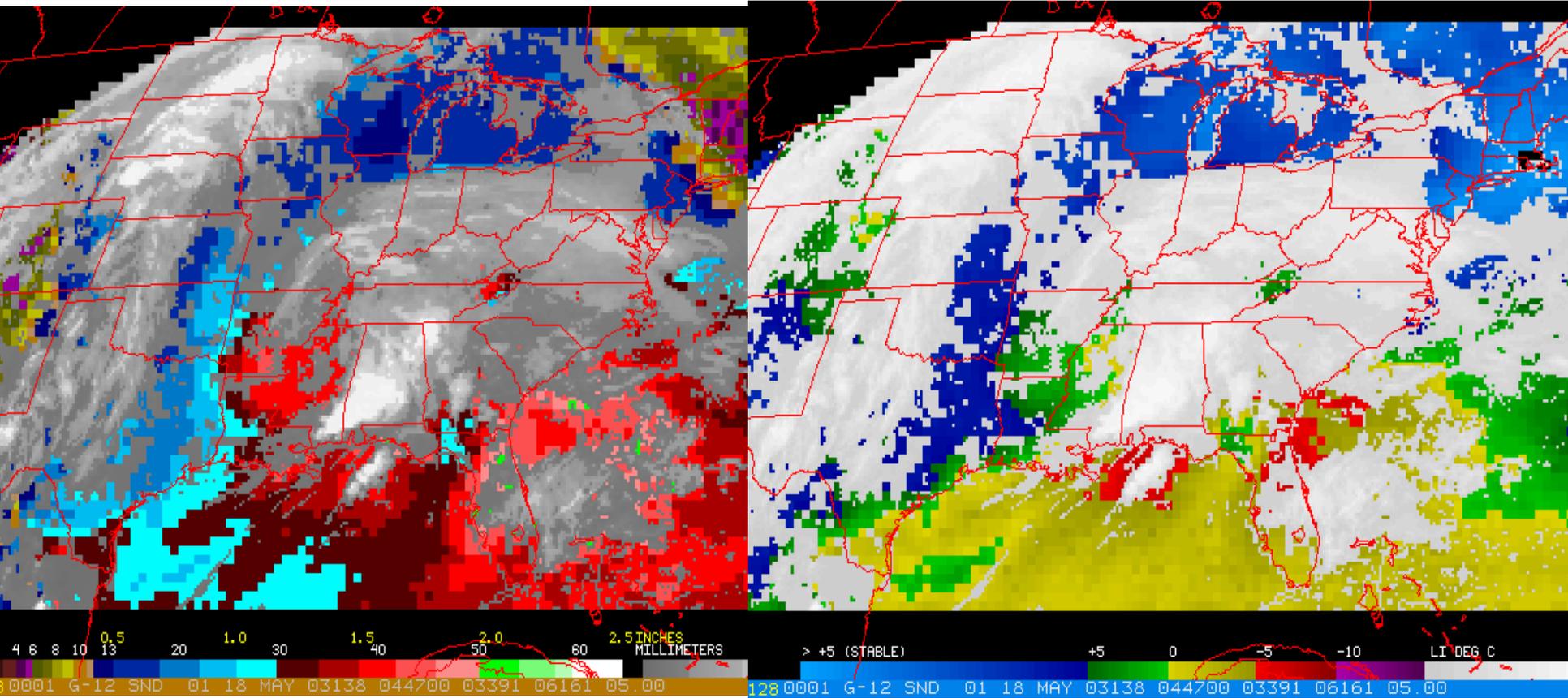
Heavy Rain/Snow Analysis and NOWCasting

Animated imagery used to identify movements and trends in specific meteorological parameters such as Precipitable Water, Rain Rate, Cloud Liquid Water, Jet Streams, waves, Vorticity centers, etc.

Analysis of data given to NWS HPC as part of Precipitation forecasts and to NWS offices in Satellite Precipitation Estimate Messages



GOES Derived Product Imagery: For Flooding and Severe Weather



<http://www.ssd.noaa.gov/PS/PCPN/pcpn-na.html>

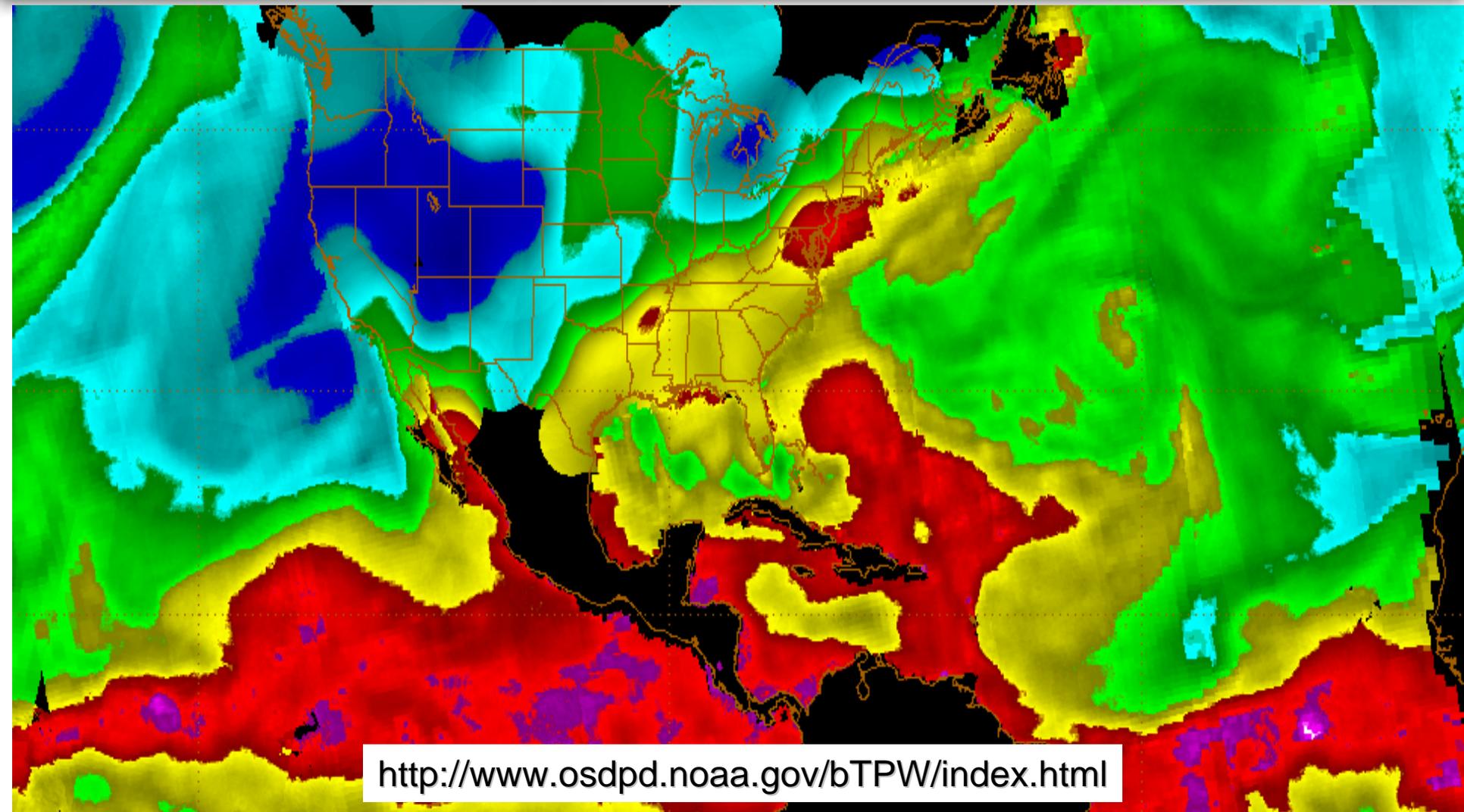
Total Precipitable Water (TPW):

Lifted Index (LI):





Total Precipitable Water from Multiple Satellites

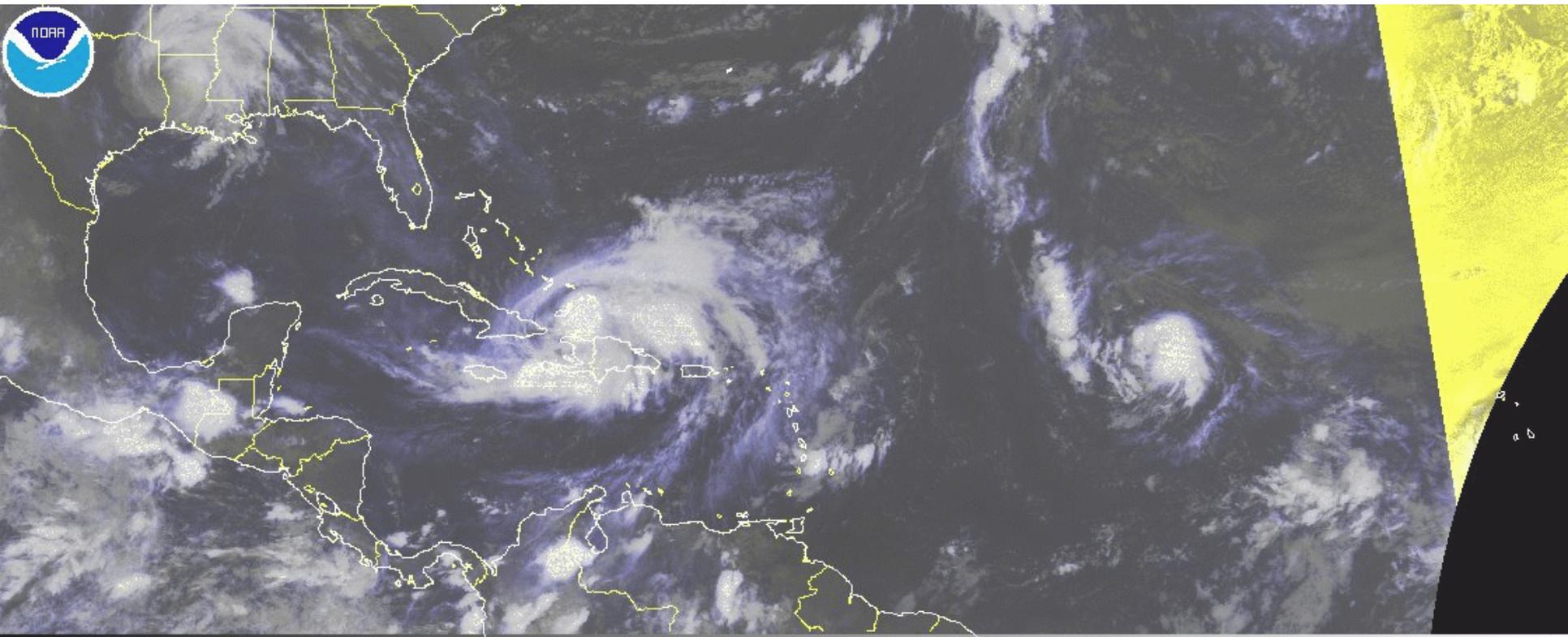


<http://www.osdpd.noaa.gov/bTPW/index.html>





Tropical Program



1

GOES-EAST RGB IMAGE [CH1>CH1>CH4] - SEP 2 08 07:45 UTC

McIDAS

TS-Gustav

Hurr-Hanna

TS-Ike

TD-Josephine



Tropical Satellite Imagery on the Web

- Tropical Cyclone Sectors

North Atlantic

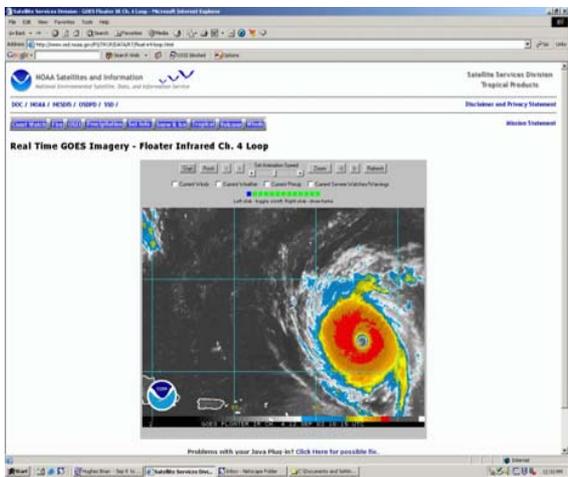
www.ssd.noaa.gov/PS/TROP/trop-atl.html

North Pacific

www.ssd.noaa.gov/PS/TROP/trop-epac.html

- "Floater" Sectors

<http://www.ssd.noaa.gov/PS/TROP/floaters.html>



Atlantic and Caribbean Tropical Satellite Imagery - Satellite Services Division - Mozilla Firefox

File Edit View Go Bookmarks Tools Help

<http://www.ssd.noaa.gov/PS/TROP/trop-atl.html>

Satellite Services Div... Winds SSD Tropical Links FNMOC Satellite Dat... SAB FADD Check Page FADD - Home Index of /SSD

Atlantic and Caribbean Tropical Satellite Imagery

[Link to old Atlantic page \(POES Microwave images/loops\)](#)

CURRENT TIME (based on your computer's time):

UTC Local

All Floaters Quick-Link	Storm Floater 1 All Images	Storm Floater 2 All Images	Storm Floater 3 All Images	Storm Floater 4 All Images
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West Atlantic

Central Atlantic

East Atlantic (MET-8)

Gulf of Mexico

Caribbean

East Coast

Northwest Atlantic

North Atlantic

Northeast Atlantic (MET-8)

POES Sea Surface Temperatures

Image [Atlantic](#) [Pacific](#)

Loop [Atlantic](#) [Pacific](#)

Polar Image Composites

[Atlantic](#) [Pacific](#)

Floaters

[Atlantic](#) [Pacific](#)

System Status

[Bulletins](#) [Special Messages](#)

Storm Floater 1			Storm Floater 2		
Single Image		Image Loop (Toggle Lat/Lon)	Single Image		Image Loop (Toggle Lat/Lon)
With Lat/Lon	No Lat/Lon		With Lat/Lon	No Lat/Lon	
Visible	Visible	Visible	Visible	Visible	Visible
Shortwave	Shortwave		Shortwave	Shortwave	
Water Vapor	Water Vapor		Water Vapor	Water Vapor	
AVN	AVN	AVN	AVN	AVN	AVN
RGB	RGB		RGB	RGB	

[Floater 1 Page \(all imagery\)](#)

[Floater 2 Page \(all imagery\)](#)

Done



Satellite Product Distribution via Web Pages

<http://www.osdpc.noaa.gov/>

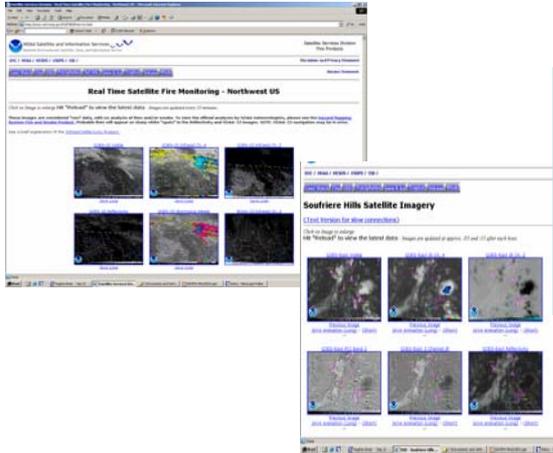
The Geostationary Satellite Server
(<http://www.goes.noaa.gov>)

Real time satellite data over large regions.

Viewing global or synoptic scale events using visible, infrared, and water vapor images and loops.



Specialized imagery and synoptic scale viewing of events on the Satellite Products and Services Division (<http://www.ssd.noaa.gov>) web pages. Derived products for hazard monitoring (fire, volcano, tropical, heavy precipitation)





Specialized GOES Satellite Imagery

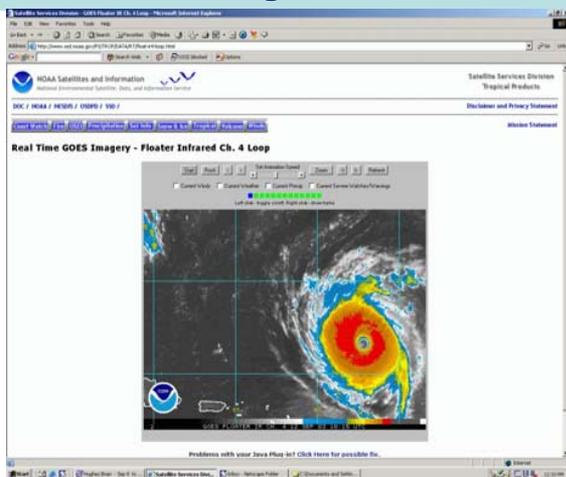
WFO specific web pages with more detail and options

<http://www.osdpd.noaa.gov/ml/imagery/land.html>

- East and West Coast, Regional, and WFO sectors available
 - Loops of Visible, 3.9µm, Water Vapor, IR (with multiple enhancements)
- Various overlays available (loop dependent)
 - Hurricane forecast points, radar, surface plots, watch/warnings, roads, counties

For real time tracking of hurricanes, see

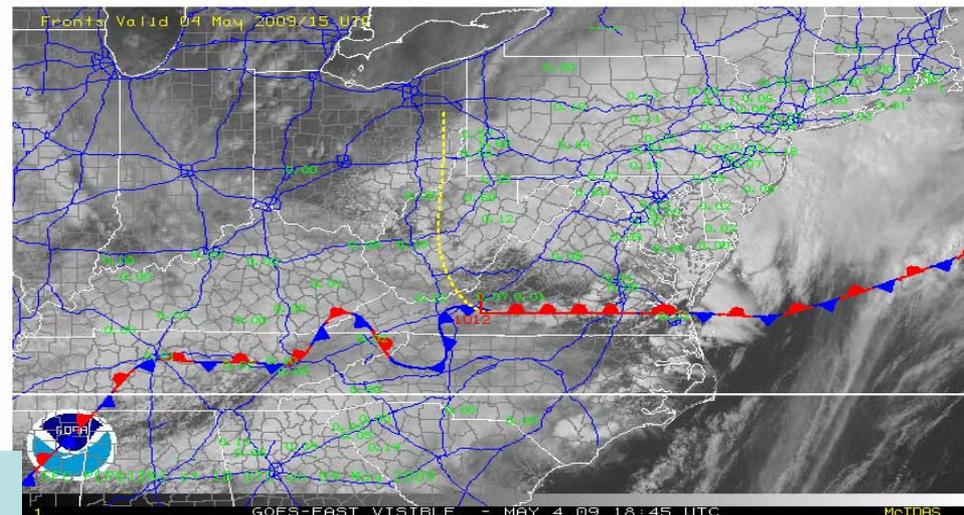
<http://www.ssd.noaa.gov/PS/TROP/floaters.html>



Mid-Atlantic - Visible Loop

County
 Roads
 LatLon
 WatchWarn
 Radar
 NWS Fronts
 Temp
 Dew Point
 MSLP
 Trop Pts
 HI
 WC

 Stn Plot
 Wind
 Gusts
 HDW-low
 HDW-mid
 HDW-high
 Precip
 T-Precip
 Snow
 RH
 PW
 LI



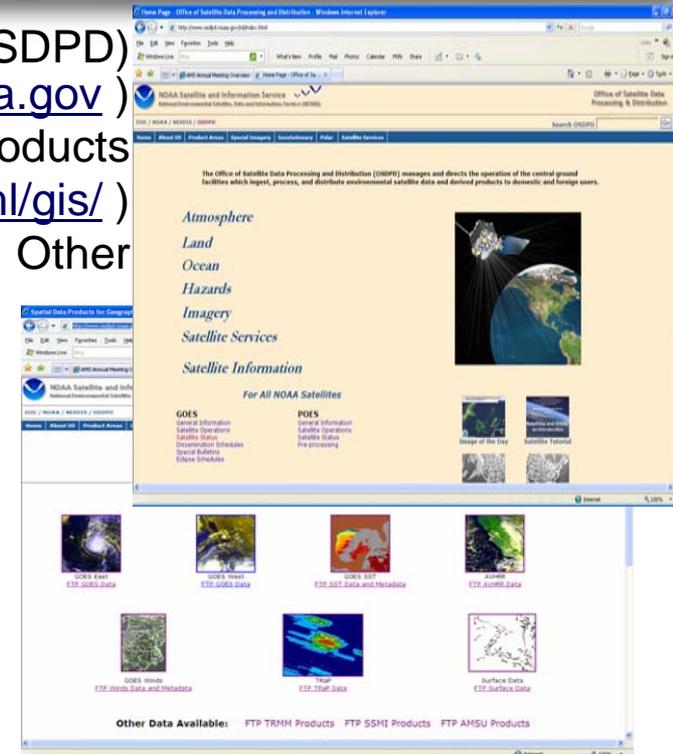
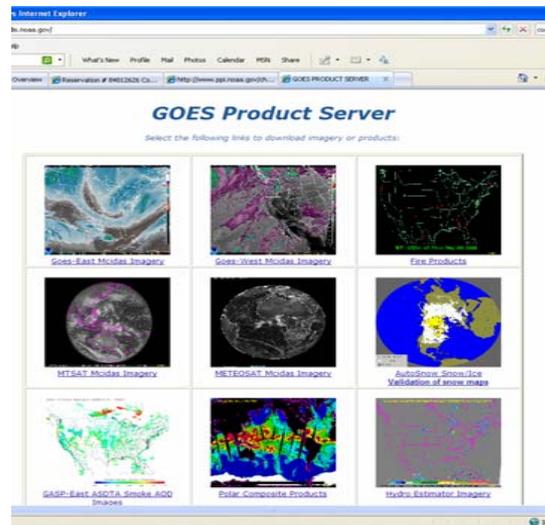
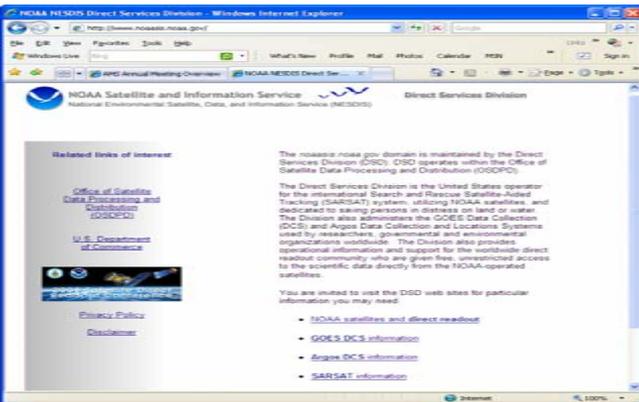
<http://www.nhc.noaa.gov/mobile/index.html>

Satellite Product Distribution via OSDPD Web Pages

<http://www.osdpd.noaa.gov/>

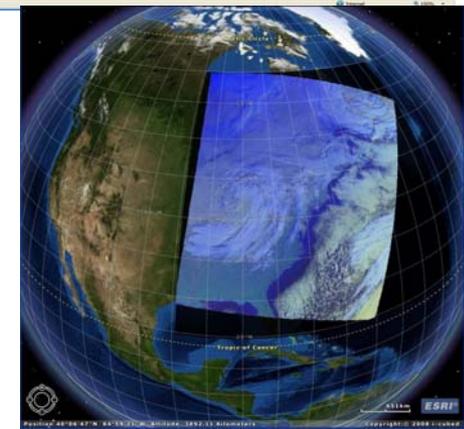
Office of Satellite Data Processing and Distribution (OSDPD)
(<http://www.osdpd.noaa.gov>)

Links to operational satellite products and images and GIS Products
(<http://www.osdpd.noaa.gov/ml/gis/>)
Satellite Imagery, SST, Winds, Fire, Smoke, Other



Focus on Direct Readout information (GVAR, LRIT, DCS, HRPT, APT, ARGOS)
(<http://noaasis.noaa.gov>)

Public Product Servers
<http://satepsanone.nesdis.noaa.gov/>
<ftp://satepsanone.nesdis.noaa.gov/>
Images, Products, Various Formats





Future Opportunities

- 🌐 NOAA's Satellite Direct Readout Conference
 - 🌐 Miami, FL April 4-8
 - 🌐 <http://directreadout.noaa.gov/miami11/>
 - Registration now open
- 🌐 7th GOES Users' Conference (with NWA)
 - 🌐 Birmingham, Alabama
 - 🌐 October 15-21





Thank you!

Thomas.Renkevens@noaa.gov

Questions?

