

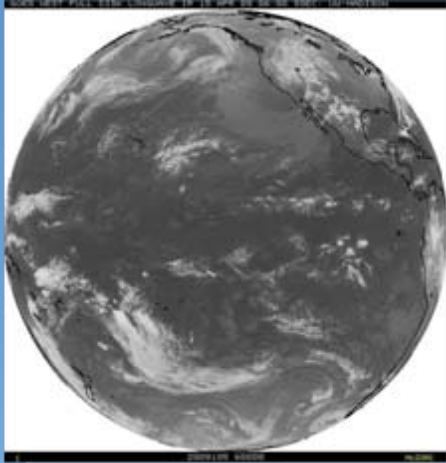
# NOAA's Environmental Satellite Processing Center Update

Brian Hughes  
NOAA/NESDIS Office of Satellite Data  
Processing and Distribution  
Satellite Services Division

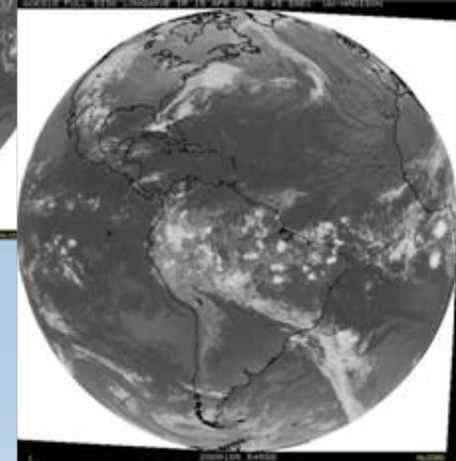
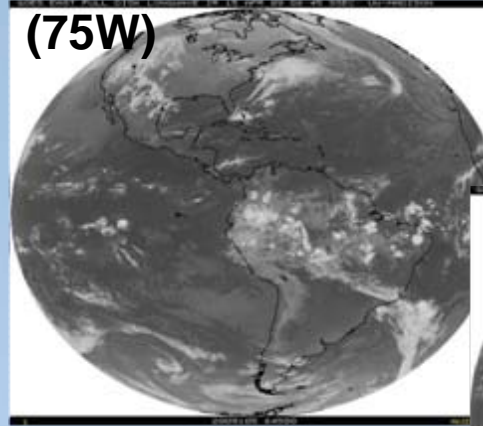


# Current GOES Constellation

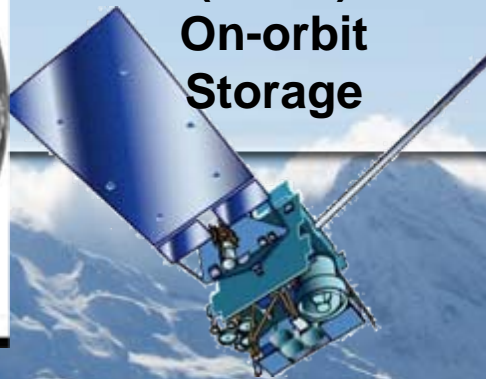
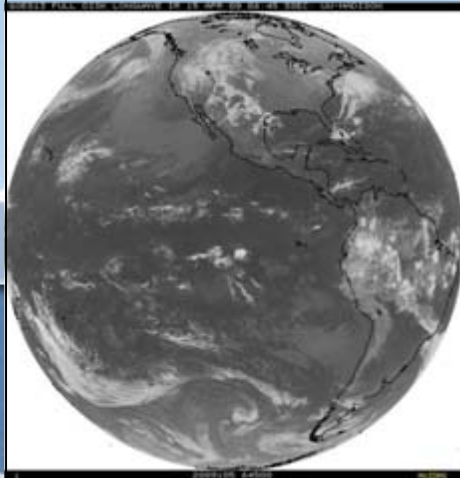
**GOES-11  
(135W) Operational-West**



**GOES-12 Operational-East  
(75W)**



**GOES-13  
(105W)  
On-orbit  
Storage**



**GOES-10  
(60W)  
South America**

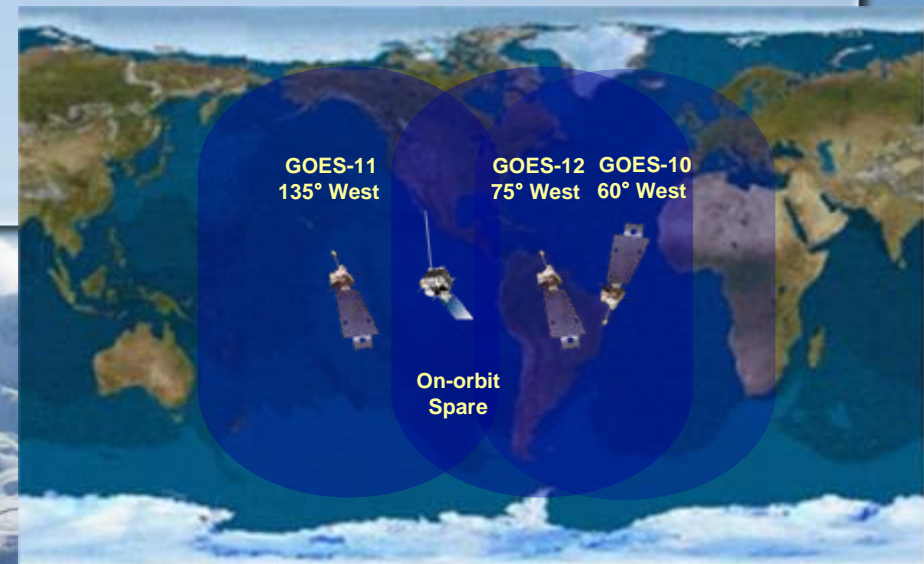
*• GOES mission requires two on-orbit operational satellites and one on-orbit spare*

# NOAA Operational Satellites - GOES

- GOES-12 @ 75°W
  - Operational East with occasional thruster anomaly: most can be recovered through yaw corrections.
  - Imager/Sounder and subsystems green
- GOES-11 @ 135°W
  - Operational West
  - Engineers report better than expected battery recovery from Fall 2008 eclipse season
  - Imager/Sounder and subsystems green

# NOAA Standby Satellites - GOES

- GOES-13 @ 105°W
  - Placed back into storage on April 16, 2009
  - PLT and subsequent analysis yielded need for partial frame cancellation due to sun intrusion
  - Successfully tested and verified as possible replacement for GOES-12 (East) or GOES-11 (West) if needed
  - Thruster anomalies seen on GOES-13 during testing
- GOES-10 @ 60°W
  - Sounder filter wheel anomaly on 2/8/09
  - To be de-orbited in December 2009
  - Currently NOAA has no plans to replace GOES-10 for South American coverage

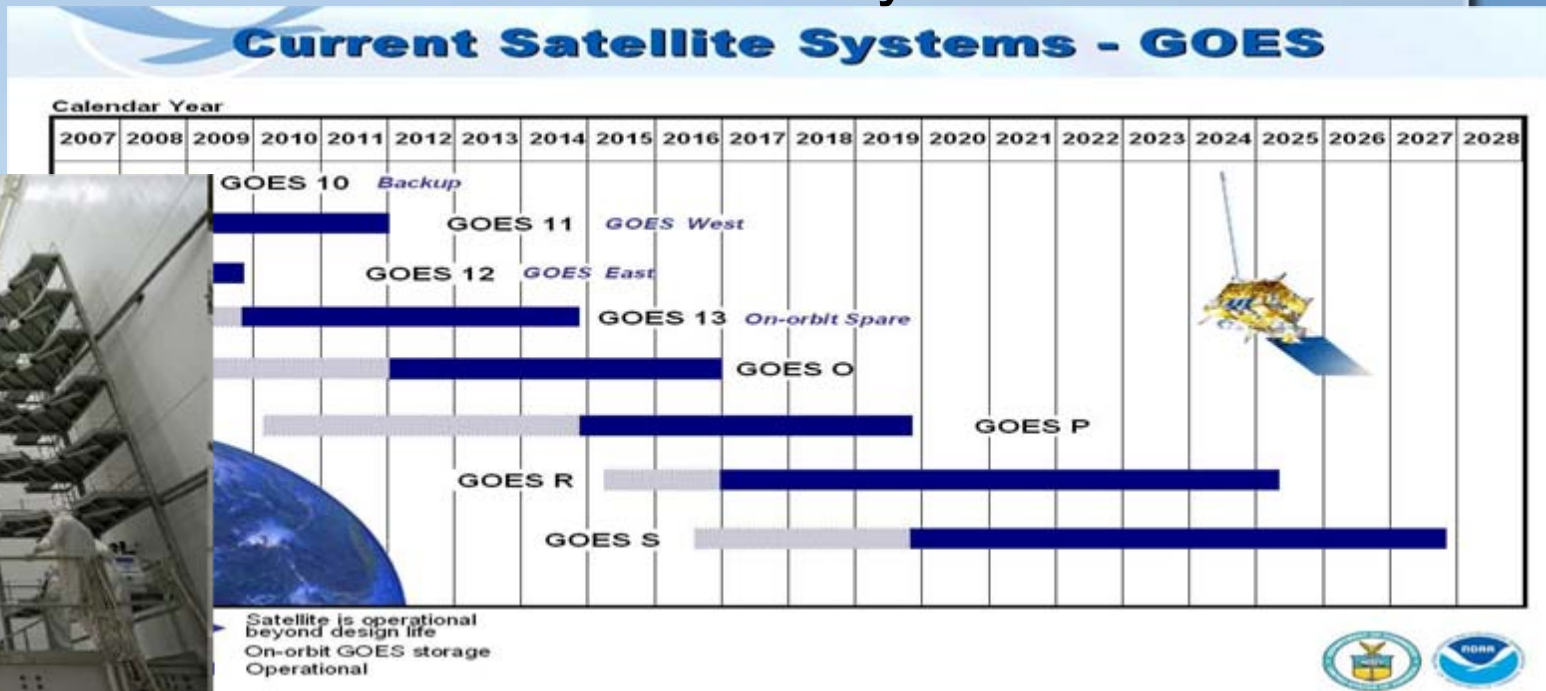


# GOES Performance Status

<b><i>Payload Instrument</i></b>	<b>GOES-10</b>	<b>GOES-11</b>	<b>GOES-12</b>	<b>GOES-13</b>
Imager	G	G	G	G
Sounder	R	G	G	G
Energetic Particle Sensor (EPS)	Y	G	Y	G
Magnetometers	G	G	G	G
High Energy Proton and Alpha Detector	G	G	G	G
X-Ray Sensor (XRS)	G	R	R	R
Solar X-Ray Imager (SXI)	N/A	N/A	R	Y
<b><i>Spacecraft Subsystems</i></b>				
Telemetry, Command & Control	G	G	G	G
Attitude and Orbit Control	G	G	G	G
Inclination Control	R	G	G	G
Propulsion	G	G	G	G
Mechanisms	G	G	G	G
Electrical Power	G	Y	G	G
Thermal Control	G	G	G	G
Communications Payloads	G	G	G	G

# Upcoming Launches - GOES

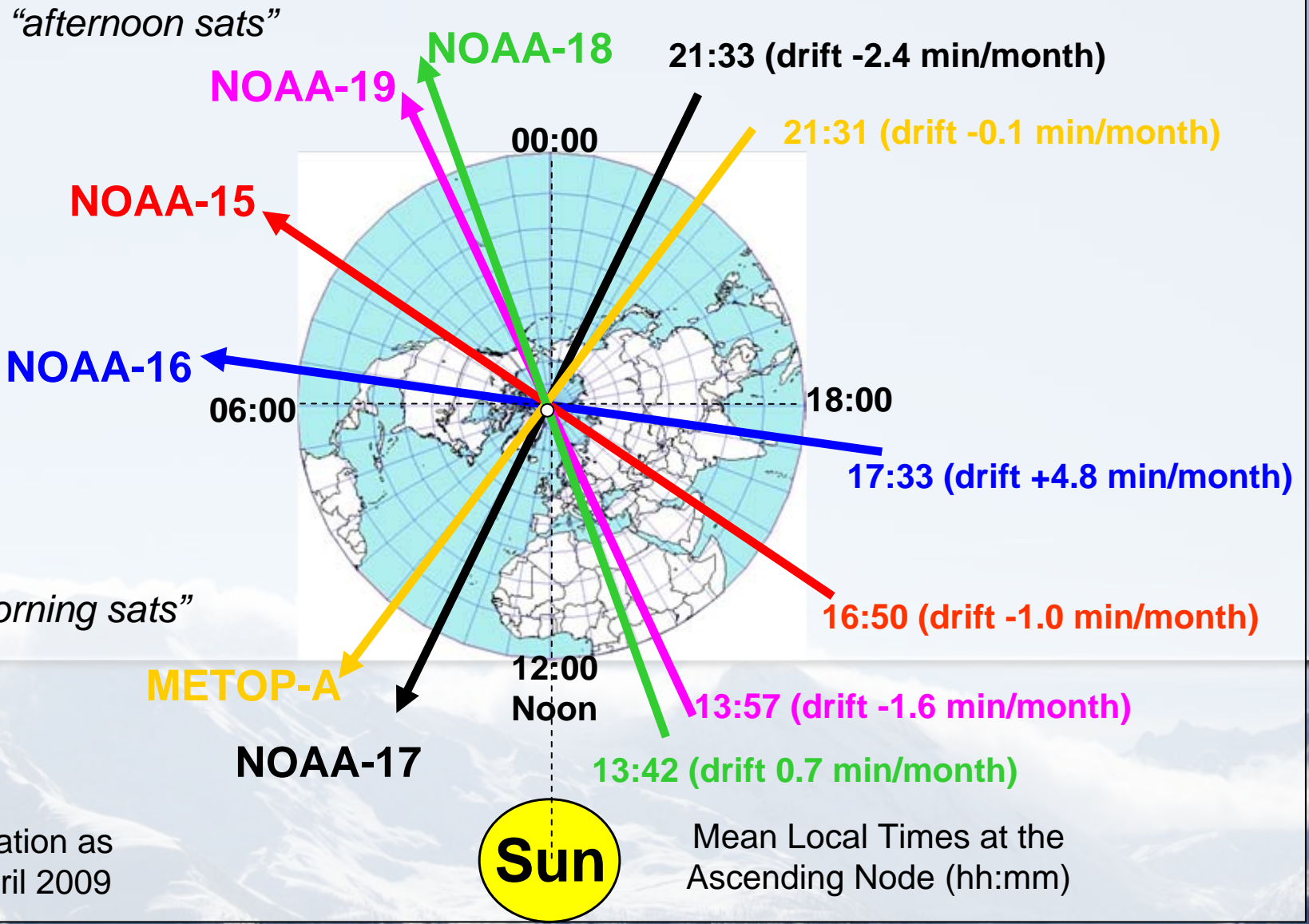
- GOES-O scheduled for launch n.e.t. June 26, 2009: ([http://www.nasa.gov/mission\\_pages/GOES-O/launch/index.html](http://www.nasa.gov/mission_pages/GOES-O/launch/index.html))
  - Band 6 (13.3  $\mu\text{m}$ ) to 4 km
  - PLT to begin November 2009 at 90°W and at 105°W
- GOES-P to be launched within one year of GOES-O launch



# NOAA Operational Satellites - POES

- MetOp-2 Operational AM
  - AMSU-A channel 7 noise continues to exceed specs
    - Operational ATOVS adjusted to use other channels (1/28/09)
  - ESPC still working on ingesting global FRAC (1 km AVHRR) into McIDAS (testing ongoing)
  - ASCAT vector files operationally produced on the DDS for NCEP use
- NOAA-18 Operational PM
  - HIRS noise continues, ATOVS operating in a “No-HIRS” mode
- NOAA-19 ready to be declared Operational PM on June 2, 2009
  - Yaw, pitch and roll corrections being applied and studied

# NOAA Operational Satellites - POES



Constellation as of 02 April 2009

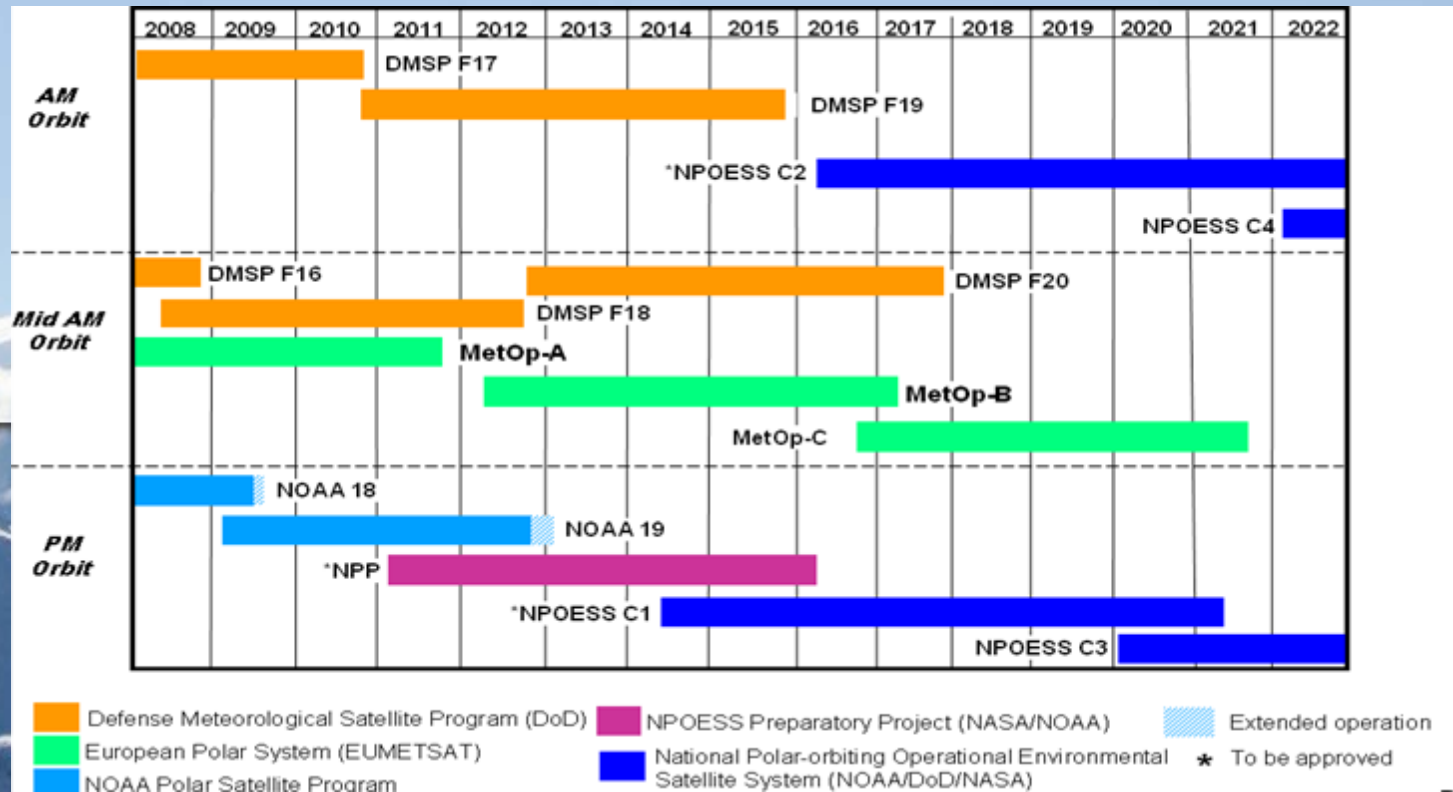


# POES Performance Status

Spacecraft Subsystems	METOP-A	NOAA 19	NOAA 18	NOAA17	NOAA16	NOAA15
Launch Date	Oct 2006	Feb 2009	May 2005	Jun 2002	Sep 2000	May 1998
Operational Date	May 2007	pending	Aug 2005	Oct 2002	Mar 2001	Dec 1998
Mission Data Category	Primary (AM)	Secondary (PM)	Primary (PM)	Secondary (AM)	Secondary (PM)	Secondary (AM)
<b>Payload Instruments</b>						
Adv. Hi Resolution Radiometer (AVHRR)					Y	Y
High Resolution Infrared Sounder (HIRS)			R		Y	Y
Adv Microwave Sounding Unit (AMSU-A1)				R	Y	Y
Adv Microwave Sounding Unit (AMSU-A2)						
Adv Microwave Sounding Unit (AMSU-B)	N/A	N/A	N/A			Y
Microwave Humidity Sounder (MHS)				N/A	N/A	N/A
Space Environment Monitor (SEM)						
Solar Backscatter UV Radiometer (SBUV)	N/A				Y	N/A
<b>Spacecraft Subsystems</b>						
Telemetry, Command and Control						
Attitude Determination and Control					Y	
Electrical Power						
Thermal Control						Y
Communications						Y
- HRPT (Full Resolution Direct Readout)	Y					
- APT/LRPT (Low Resolution Direct Readout)	R				R	
- Data Collection Subsystem (DCS) /Advanced-DCS						
- Search and Rescue Repeater (SARR)					Y	Y
- Search and Rescue Processor (SARP)						
- Data Handling (Recorders)					Y	

# Upcoming Launches - POES

- NOAA-19 represents last of NOAA TIROS Series
- Possible launch slip of NPP into 2011 due to VIIRS delivery issues
- Possible de-manifest of MIS from NPOESS due to cost/schedule overruns



# Non-NOAA Satellite Ingest at ESPC

- NASA EOS (MODIS, AIRS, AMSR-E):
  - Due to recent hardware problems with NASA supplied server (Nanuk), OSDPD is accelerating migration of PG/PD to ESPC
  - NWS working with STAR to study the quality of the AIRS processing
  - MODIS and AMSR-E processing of ESPC level 2 products moved to NSOF
  - McIDAS server available for users (later slide)

# Non-NOAA Satellite Ingest at ESPC

- Jason-2 Ocean Surface Topography Mission (OSTM)
  - ESPC will be the operational PG/PD for Jason-2 for US users
  - OGDRs declared operational March 2009
  - Security issues delayed full handover to NOAA
    - Anticipate full handover in June 2009
  - OGDRs available in BUFR from DDS, CLASS, and NOAAPORT

NOAA Documentation available at:  
<http://www.osdpd.noaa.gov/ml/ocean/ssheight.html>

# Non-NOAA Satellite Ingest at ESPC

- MSG, Meteosat-7, and MTSAT relayed through terrestrial/DOMSAT to ESPC
- Shared Processing (NOAA, DOD) utilized to obtain DMSP data (SSM/I, SSMIS)
- FY-2C, GOES-10, and INSAT non-operational receipt through ADDE from SSEC *thanks!*
- Direct receipt of ERS-2, WindSat, and CHAMP from providers for NCEP Model assimilation and other NCEP offices

# ESPC Overview



## **Office of Satellite Operations (OSO):**

- Manages the launch (w/NASA), operation and maintenance of NOAA's environmental satellites.
- Ensures the lasting operation of NOAA's satellites through engineering, analysis, and maintenance of a 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
- Acquire data from GOES, POES, DSMP, and Jason-2

## **Office of Satellite Data Processing and Distribution (OSDPD):**

- Manages the operational processing system that converts satellite data (GOES, POES, DMSP, Jason-2) into environmental products for users such as NWS, DoD, EPA, FEMA, US Coast Guard, Universities, Public and others.
- Provides analysis and interpretation of satellite data (SAB/NIC)
- 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).
- Operates from Suitland, MD and Camp Springs, MD



# ESPC Overview

## Geostationary Satellites

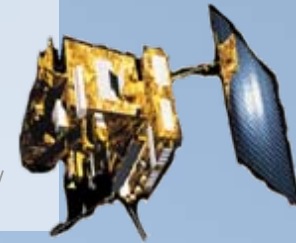
MTSAT-1R (DOMSAT)  
 MSG (landline via Wallops)  
 Meteosat-7 (landline)



## Polar Orbiting Satellites

**GOES-11, 12, 13**

NOAA-15, 16, 17, 18, 19  
 MetOp-A  
 NASA Terra, Aqua  
 DoD DMSP



“Raw” Data  
 Various Ways



Interpretive Products, Product  
 Development, R2O, Product  
 Management

Polar Acquisition Stations for  
 POES, MetOp, EOS

- Wallops, VA
- Fairbanks, AK
- Gilmore Creek, AK
- Svalbard
- Honolulu, HI
- Miami, FL
- Australia
- Monterey, CA
- NASA DAACs

Processed  
 data,  
 products, and  
 services

Partners and Customers

Public



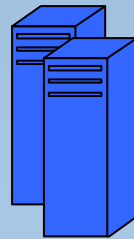
# ESPC Satellite Data PG/PD Overview



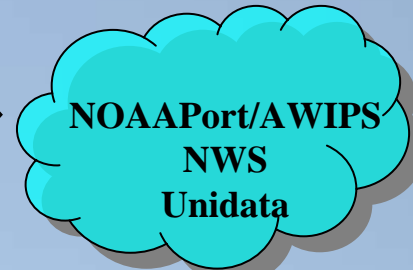
ESPC Processing



SAB Analysis



GOES Ingest and  
NOAAPort Interface  
(GINI)



IBM SATEPSDIST  
Servers



Data Distribution Server  
(DDS)

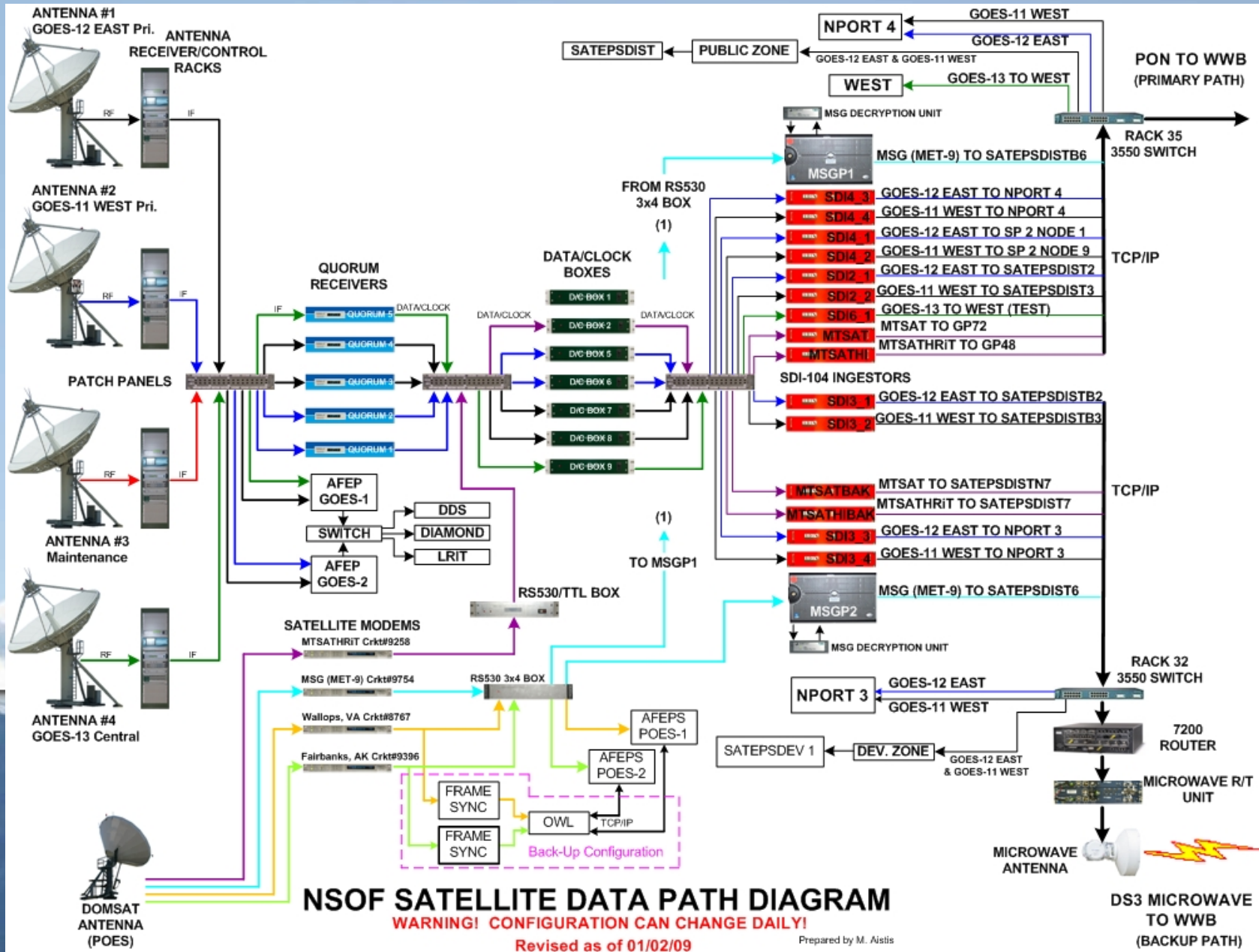


Dell Blade Servers  
(Linux)

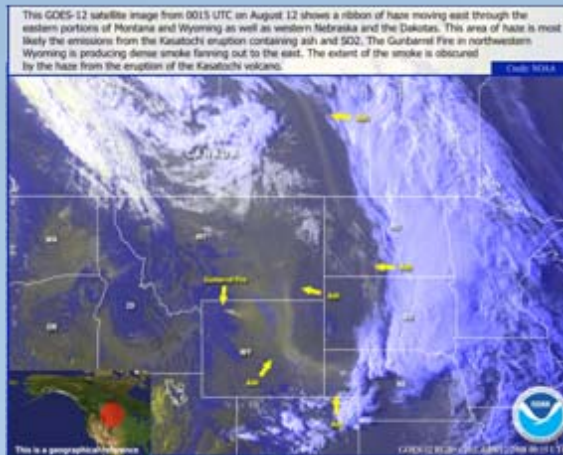




# ESPC Satellite Ingest Infrastructure



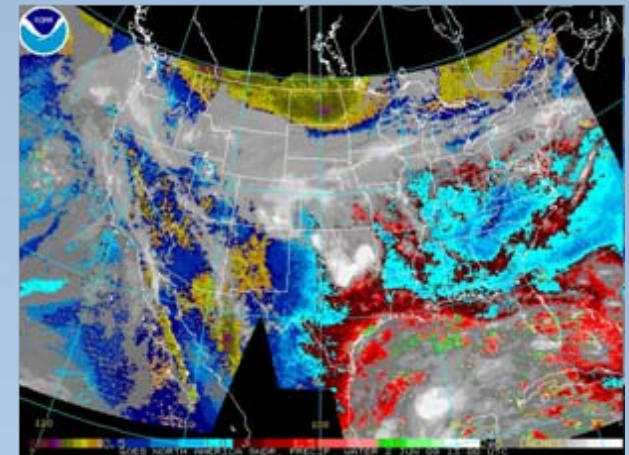
# Sample of Satellite Products from ESPC



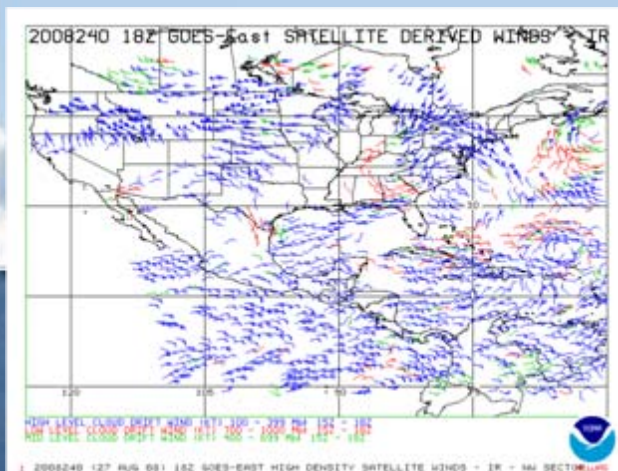
**Volcanic Ash & Fires**



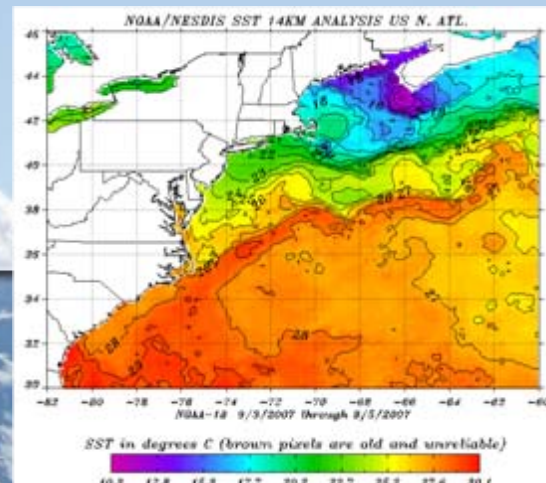
**Tropical Cyclone Analysis**



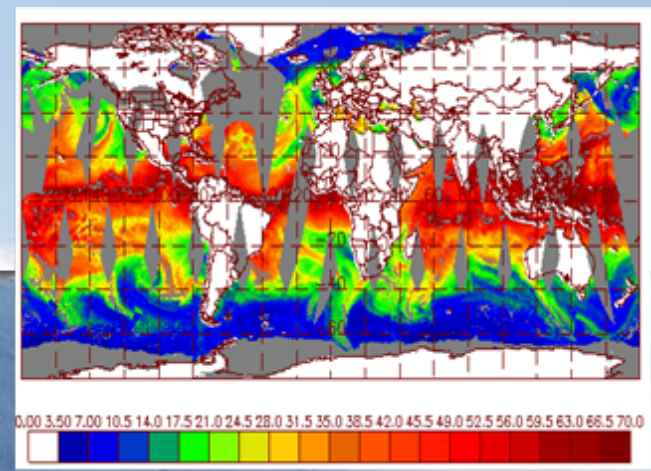
**GOES/POES Sounder Products**



**GOES/POES/MODIS Winds**



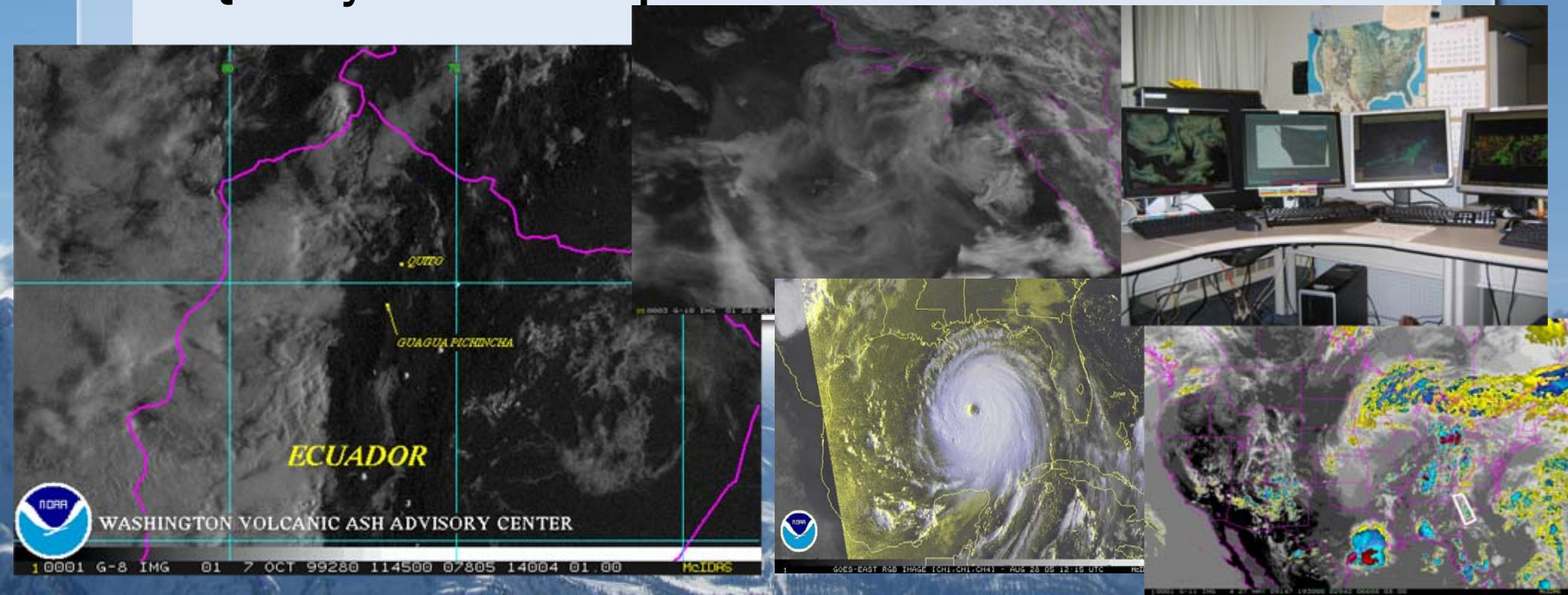
**Ocean Products**



**Land Products**

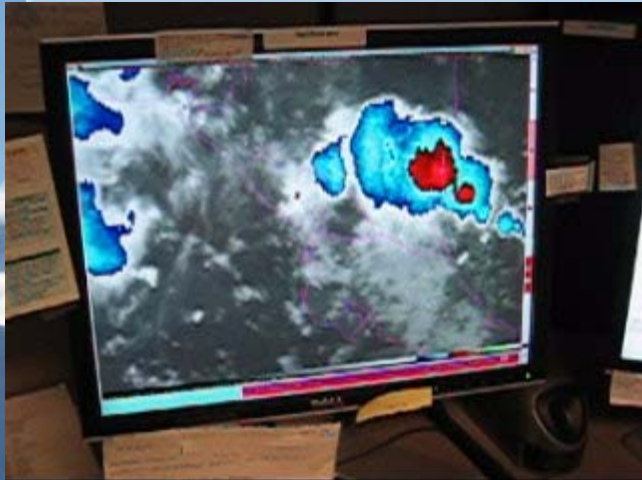
# McIDAS in use at SAB for Hazard Monitoring

- 24 x 7 Operations
- Interactive (man-machine mix) products
- Near realtime hazards-related product generation
- Quality assurance procedures utilized



# McIDAS in use at SAB for Hazard Monitoring

- ~18 Workstations using McIDAS at 640+ frames
- 2 N-AWIPS for NCEP PG, 2 AWIPS for GINI/Text QC
- Custom GUIs using ENVI/IDL
- Development WS for McIDAS-X and McIDAS-V



# Data and Product Distribution from ESPC

- **GINI (GOES Ingest and NOAAPORT Interface)**
  - Remapped satellite data using McIDAS distributed to NWS for display on AWIPS/Unidata
  - Derived products (i.e. GOES/POES Sounding Products) generated external to GINI distributed via GINI
- **SATEPSDISTx (1-7) – McIDAS ADDE Based**
  - Serves real time and remapped imagery from GOES, POES, MTSAT, Meteosat-9/7, MTSAT, NASA/EOS
  - Serves Derived products from GOES, POES, DMSP, QuikSCAT, TRMM
  - Serves Model and InSitu (observations, forecasts) Data
- **DDS**
  - AIX server delivers primarily polar products for use in polar derived product and for assimilation into NWP
- **DAPE (SPP)**
  - Data exchange of Air Force, Navy, NESDIS, NWS
  - Largely derived products such as from SSM/I, GOES Winds
- **ReBroadcast Services**
  - GVAR, LRIT, EMWIN, DCS, SARSAT
  - HRPT, VHF, APT, ARGOS
  - GeoNETCAST, NOAAPORT

# GINI Products on NOAAPORT/Unidata

- Created and distributed through GINI using McIDAS as core processor/remapper
  - Imagery
  - Sounder “images”
- Created outside of GINI, but distributed through GINI
  - 4 (5) satellite composite.
  - Sounder Derived Products (TPW, LI, CTP, ECA, Skin-T)
  - Imager Derived Products (LCB)
  - Polar (POES and DMSP) microwave derived products (TPW, Rain Rate)
  - AutoEstimator for Precipitation
- Created outside of GINI, distributed outside of GINI, but appearing within AWIPS
  - GOES BUFR and POES BUFR Soundings
  - High Density Winds
  - QuikSCAT and ASCAT
  - Text Messages: SPENES, VAA, Tropical Bulletins, Help Desk messages
  - ASOS Satellite Cloud Products

# ESPC Remapper Updates

- Upgrade of operational SATEPSDIST systems to a IBM P6 processor/AIX complete
- SAB and external users have identified issues with data throughput from the NSOF systems
  - Network and system admins identified outdated Intrusion Detection devices, replaced by larger IDPs
  - SAB ops and WWB Centers continue to use WWB servers for ops, but systems are old and lack thorough support
  - Local servers for GOES, POES, MSG, Meteosat, and MTSAT-1R are in pre-ops (latency problem identified, acquiring ingestors to feed these systems)
  - ***Look for information soon on redirection of satellite feed related to SATEPSDISTx vs GSPx vs GPxx based McIDAS ADDE servers***

# GINI and Remapper COOP

- Once ingestors are configured for the backup satellite, images for GINI (AWIPS) and remapper (main use by SAB and NCEP) would start immediately.
  - Due to the curvature of the earth and viewing angle, GINI adjustments will be needed (Puerto Rico, Hawaii, or Alaska sectors).
  - There will be some data sparse areas until the operational satellite is back on line or the backup satellite is moved to the operational location.
- Products that access McIDAS ADDE server for GOES imagery would begin processing and all products should be running within 24 hours
- Depending on which satellite is replaced, there may be band/channel changes, and some products would not be made if replacing GOES-11 with GOES-13



# ESPC User Services

- User Notifications:

Procedures updated to allow for consistent notifications on any outages, anomalies, or other events affecting flow of products to users

New templates generated

*Complete! Set your AWIPS to Alarm if so desired!*

NWSTG/AWIPS using the NESDIS admin messages

NOUS71 KNES or xxxADANES for outage and anomaly messages

NOUS72 KNES or xxxADMNES for other routine (i.e. RSO) messages

- Product Monitoring

Work ongoing to streamline ESPC product monitoring using Java based “stoplight” bars

Similar monitoring tasks are being consolidated

Tools to allow Help Desk to monitor NOAAPort

# ESPC User Services

- Customer Relationship Management (CRM) Tools
  - SOW at DOC procurement office, IT security details being worked out
  - Installation in Summer(?) 09, user/help desk training, existing product list integration
  - Online “Portal” for Centers (and other users) to view ESPC status, calendar of events, operational notices, and to submit trouble reports and view repair status

# ESPC Web Product Delivery

Per request of NWS Western Region, SSD web team have been developing WFO specific web pages with much more detail and options than typical images from [www.goes.noaa.gov](http://www.goes.noaa.gov) pages

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

East and West Coast, Regional, and WFO sectors available

Loops of Visible, 3.9 $\mu$ m, Water Vapor, IR (with multiple enhancements)

Various overlays available (loop dependent)

Hurricane forecast points, radar, surface plots, watch/warnings, roads, counties

Expected to be fully on line with all WFOs in Flash loops by Summer

# ESPC Web Product Delivery

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

Satellite Services Division  
Satellite Imagery


DOC / NOAA / NESDIS / OSDPD / SSD

Our Mission / Disclaimer / Privacy Policy

Search OSDPD  Go

Fire OSEI Precipitation Sat Info Snow/Ice Tropical Volcano Winds GIS

## GOES East Baltimore/Washington WFO Imagery



**CURRENT TIME**  
(based on your computer's time)  
19:29:00 UTC 3:29:00 PM Local

**GOES East Imagery - 15 Minutes**  
xx02,xx152,xx322 and xx452  
Images available about 15 minutes later.  
1 km resolution Contour

Single Image		Java Loops (Toggle Lat/Lon)				Flash Loops (Toggle Lat/Lon)	
With Lat/Lon	No Lat/Lon	Short	Long	Power User	Regular	Power User	
<a href="#">Visible</a>	<a href="#">Visible</a>	<a href="#">Visible</a>	<a href="#">Visible</a>	<a href="#">Visible</a>	<a href="#">Visible</a>	<a href="#">Visible</a>	
<a href="#">Shortwave (162)</a>	<a href="#">Shortwave (162)</a>	<a href="#">Shortwave (162)</a>	<a href="#">Shortwave (162)</a>	<a href="#">Shortwave (162)</a>	<a href="#">Shortwave (162)</a>	<a href="#">Shortwave (162)</a>	
<a href="#">Fire (162)</a>	<a href="#">Fire (162)</a>	<a href="#">Fire (162)</a>	<a href="#">Fire (162)</a>	<a href="#">Fire (162)</a>	<a href="#">Fire (162)</a>	<a href="#">Fire (162)</a>	
Infrared Channel 4 Enhancements							
<a href="#">None</a>	<a href="#">None</a>	<a href="#">None</a>	<a href="#">None</a>	<a href="#">None</a>	<a href="#">None</a>	<a href="#">None</a>	
<a href="#">AID</a>	<a href="#">AID</a>	<a href="#">AID</a>	<a href="#">AID</a>	<a href="#">AID</a>	<a href="#">AID</a>	<a href="#">AID</a>	
<a href="#">Rucrak</a>	<a href="#">Rucrak</a>	<a href="#">Rucrak</a>	<a href="#">Rucrak</a>	<a href="#">Rucrak</a>	<a href="#">Rucrak</a>	<a href="#">Rucrak</a>	
<a href="#">JJA</a>	<a href="#">JJA</a>	<a href="#">JJA</a>	<a href="#">JJA</a>	<a href="#">JJA</a>	<a href="#">JJA</a>	<a href="#">JJA</a>	
<a href="#">SGB</a>	<a href="#">SGB</a>	<a href="#">SGB</a>	<a href="#">SGB</a>	<a href="#">SGB</a>	<a href="#">SGB</a>	<a href="#">SGB</a>	
<a href="#">Sunstop</a>	<a href="#">Sunstop</a>	<a href="#">Sunstop</a>	<a href="#">Sunstop</a>	<a href="#">Sunstop</a>	<a href="#">Sunstop</a>	<a href="#">Sunstop</a>	
<a href="#">Rainbow</a>	<a href="#">Rainbow</a>	<a href="#">Rainbow</a>	<a href="#">Rainbow</a>	<a href="#">Rainbow</a>	<a href="#">Rainbow</a>	<a href="#">Rainbow</a>	

**Loop/Flash Note:**  
Short - usually 8 images/limited static overlays

Information Service  
Data and Information Service (NESDIS)

Search OSDPD

Special Imagery Geostationary Polar Satellite Services Original SSD Links

## Baltimore/Washington WFO - False Color RGB Loop

Cnty  CWA  Rd  L/L  Wat/Wam  Radar  Fronts  MSLP  T  TD  CHS  Heat  Trop Pts  
 Bth PR  Wind  Gzt  HDW-L  HDW-M  HDW-H  3PCPN  6PCPN  Snow  RH  PW  LI



1 NWS/PELMOREX MEDIA INCLUNIDATA 1 KM BREF RADNR MAY 27 09 17 03 UTC R2106

Start Print Back < > Set Animation Speed Zoom Refresh



# ESPC Web Product Delivery

Katrina AVN Image Loop - Satellite Services Division - Mozilla Firefox

File Edit View Go Bookmarks Tools Help

http://www.ssd.noaa.gov/GOES/2005/Katrina/avn-loop.html

SSD Hotlist Index COD Sterling Radar My Calendar SSD Home Page NOAA Webmail Google Home Gmail - Inbox NCEP Home NWS Home

Katrina AVN Image Loop - Satellite Se...

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

Satellite Services Division  
Real Time GOES Imagery

DOC / NOAA / NESDIS / OSDPD / SSD

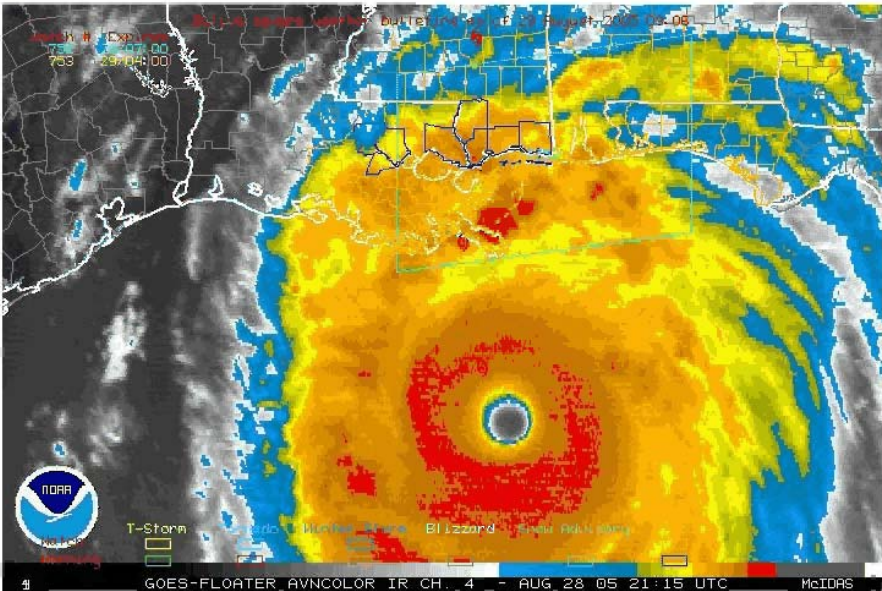
Disclaimer / Privacy Policy

Fire OSEI Precipitation Sat Info Snow & Ice Tropical Volcano Winds GIS

Mission Statement

### Katrina - AVN Color Infrared Loop

County  Roads  LatLon  Wind  Severe WatchWarn  MSLP  Radar  NWS Fronts  Trop Fcst Pts



GOES-FLOATER AVN-COLOR IR CH. 4 - AUG 28 05 21:15 UTC MeIDAS

Start Rock < > Set Animation Speed Zoom <| > Refresh

Left click - toggle on/off; Right click - show frame

Applet Ani5 started

start Hughes, Brian - Jul... Inbox for Brian.Hug... C:\Documents and S... Microsoft PowerPoin... Katrina AVN Image L... 8:08 AM

# Data Access at ESPC

McIDAS Access to realtime and remapped GOES imager and sounder images:

- GOES-East: **SATEPSDIST2e.nesdis.noaa.gov**
  - Group: **GER**
- GOES-West: **SATEPSDIST3e.nesdis.noaa.gov**
  - Group: **GWR**
- These servers will replace GSP1 and GSP2
- Access controlled, please e-mail or call Brian H. or Tom R. for access

# Data Access at ESPC

McIDAS Access to derived GOES imager and sounder products:

- **SATEPSDIST1e.nesdis.noaa.gov**
  - **Group: DPD**
- Products include:
  - Operational SFOV Area and Point (14 stability params)
  - Operational GOES volcanic ash products
  - Hydroestimator
  - Radar mosaic from NOAAPORT
  - GOES High Density Winds in Point

# Data Access at ESPC

McIDAS Access to POES, DMSP, and other polar data and products:

- **SATEPSDIST4e.nesdis.noaa.gov**
  - **Group: PLR**
- Products include:
  - Operational AM and PM AVHRR GAC/LAC/HRPT
  - Composited AMSU-A/B
  - Composited and Single Pass Derived Microwave Products
  - Blended TPW and TPW anomaly
  - Quikscat and ASCAT Point
  - MetOp-A Global FRAC (1 km) – still under testing
  - NOAA-19 *soon*



# Data Access at ESPC

Other McIDAS data of interest:

- Operational NCEP Model grids in McIDAS grid format:
  - **SATEPSDIST5e.nesdis.noaa.gov**
  - **Group: MOD**
  - RUC, NAM, GFS, UKMET, and ECMWF
- MTSAT-1R HRIT (5 channel imager):
  - **SATEPSDIST7e.nesdis.noaa.gov**
  - **Group: MTS**
  - Hourly Full Disk and offsetting NHemi data

# Data Access at ESPC

Other McIDAS data of interest:

- MSG and Meteosat-7 full resolution:
  - Users must be a “.gov” or contracted to U.S. Gov’t supporting a program
  - Data can not be posted to web except on synoptic times 00Z, 06Z, 12Z, and 18Z until 72 hours
  - **SATEPSDIST6e.nesdis.noaa.gov**
  - **Groups: MSG, MET, IND**

# Data Access at ESPC

- ESPC's "Public" McIDAS Server:
  - **SATEPSANONE.nesdis.noaa.gov, Group "PUB"**
  - Replaces "GP16"
  - GOES-East and West 4 km imager
  - MSG on synoptic time
  - No need for registration, ADDE access open

## Other ESPC Data/Products:

- GOES and POES products in NCEP "flavor" BUFR format available via FTP from:
  - **SATEPSDIST1e.nesdis.noaa.gov**
    - CSBT, Imager/Sounder Radiances, Winds

# Data Access at ESPC

## Other ESPC Data/Products cont'd:

- POES Level 1b and Level 2 products in BUFR format available from:
  - **DDS.nesdis.noaa.gov** (FTP and sFTP)
  - Access through Cathy Nichols, ESPC
- POES L1b also available through CLASS
  - McIDAS can read CLASS files through the use of a local ADDE server.
  - For NOAA-19, obtain the May 09 release