Satellite Training

(From Satellite PG/User Readiness Meeting)

NWS OCWWS Training Division
NESDIS GOES-R & JPSS
COMET
Satellite Liaisons
VISIT (CIRA/CIMSS)
NWS Regions

August 18 2014

Satellite Training Outline

- Training Review – NWS Training Div
- Introduction to COMET's Satellite Education Resources
- Satellite Liaisons & Training

Training Performance Goals

- Improved NWS short-term forecast and warning operations by optimally using new Digital Satellite data.
- Increased use of Digital Satellite data into operations to support Decision Support Services (DSS) for Weather Ready Nation.

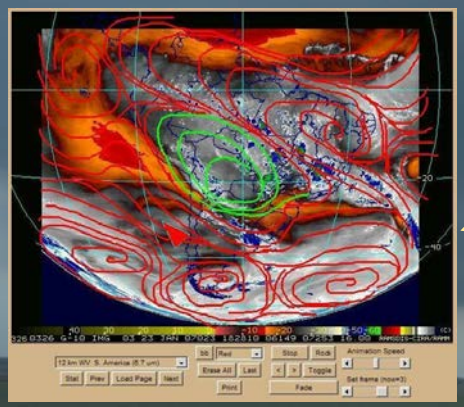
Working Together for Satellite Training

VISIT (CIRA/CIMSS)

EUMETSAT, NASA/SPoRT, Canada, DOD…

UCAR/COMET

Satellite Liaisons & Proving Grounds



WMO Virtual Lab

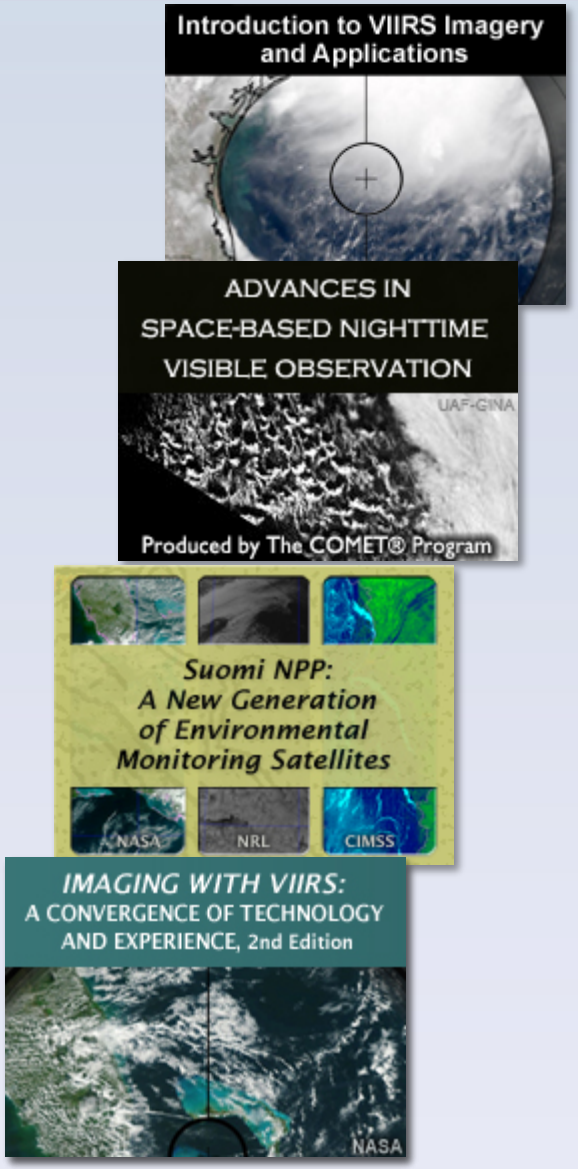
NWS Training Division & SOOs

Users & Developers

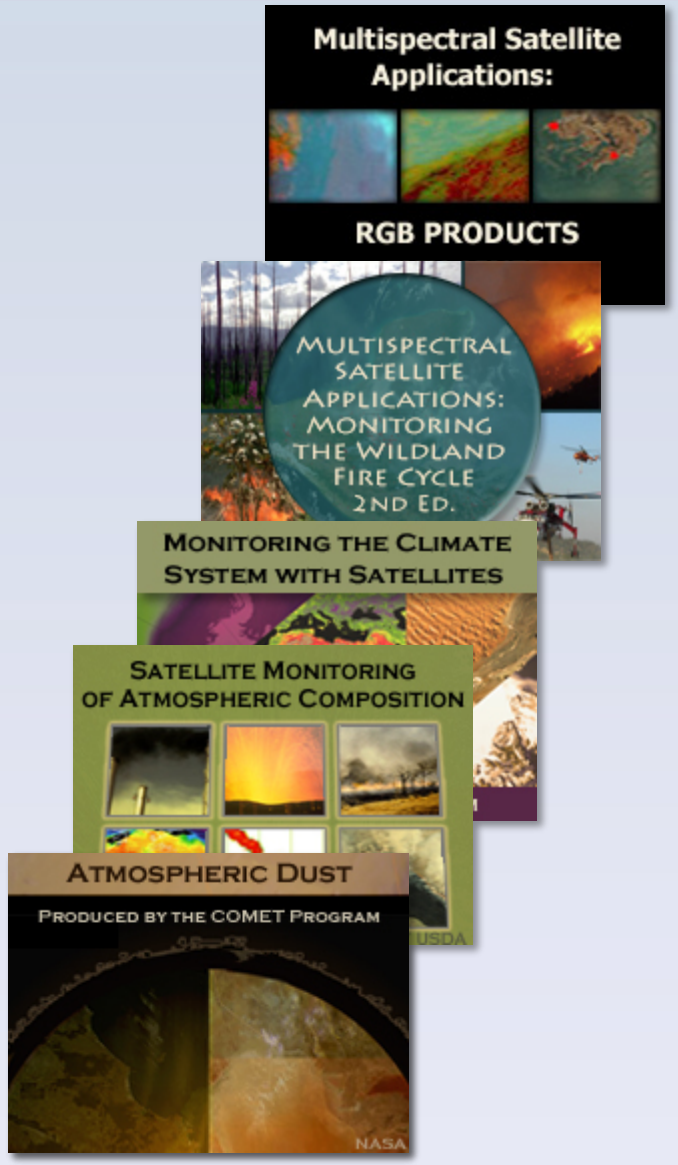
Topic Groupings

GOES

S-NPP & JPSS

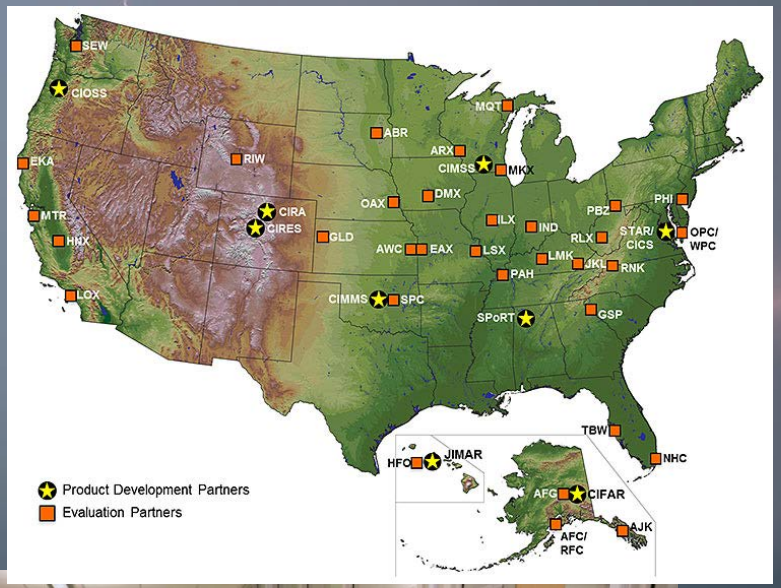


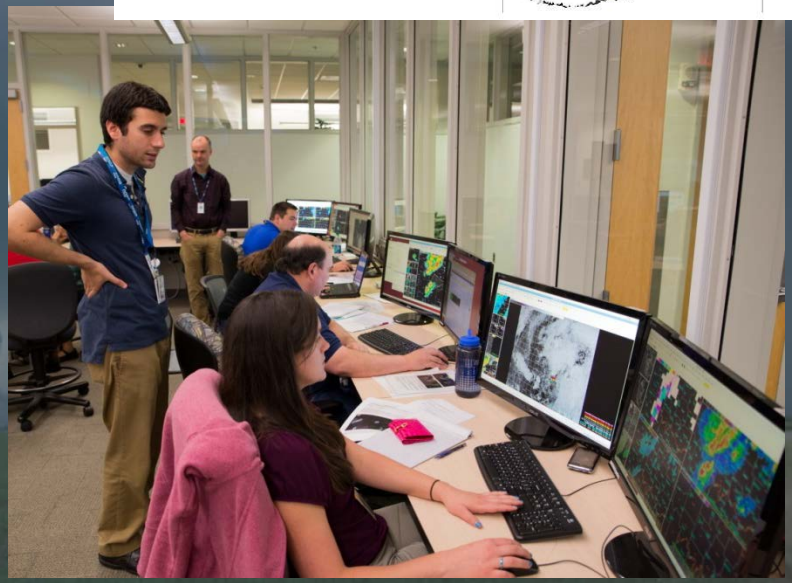
Multispectral Apps



Inputs to Develop Content

- COMET Modules
- Satellite Liaisons
- SNPP & Himawari Data Sets
- Test Bed Experiments
- OPG Operational Readiness Evaluations
- CIRA/CIMSS/SPoRT
- WMO Virtual Lab
- Satellite Proving Ground/ User Readiness Meetings





Training Plans Overview

Plans in development through NWS Regions, Centers and SOO/DOH Satellite Training Team

- Pre-launch Information Short Training
- Baseline Training
- SOO/DOH – Science Infusion Week
- Ongoing Just-in-Time Training & Resources
- Integration into Forecast & Warning Operations

Pre-Launch Information

- Start 6 months before launch
- 1-2 min information “teasers”
- Intro examples to set baseline understanding
- Youtube type examples on Applications
- Build upon existing Youtube satellite videos

Science Infusion Week

- SOOs/DOHs 1 week residence workshop
- Focus on integrating new data & emerging science to improve science of WRN message
- Focus on evolving forecast & warning process as satellite data are used in high resolution rapid refresh models
- Monthly Follow up sessions on science sharing and operational cases by SOOs/DOHs
- Management support from NWS Regions, HQ, Chief Learning Office & NESDIS

Just-In-Time Training

- Start once GOES-R data available on AWIPS II.
- Training Partners serve as GOES-R Help Desk function via email/chat/FAQs - Real-time access to an expert – daily (24x7)
- Partners host "Storm of the Month" webinars in-depth review of recent cases
- Host collaborative environments involving end users and developers (e.g., consolidated blog)
- Develop searchable on-line library of training modules, blogs, FAQs, and resources (ESRC)

Next Talks

Introduction to COMET's Satellite Education Resources –
Wendy Abshire

Satellite Liaisons & Training –
Chad Gravelle

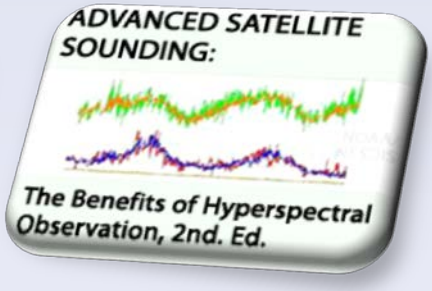
MetEd

COMET

Introduction to COMET's Satellite Education MetEd Resources

Wendy Schreiber-Abshire
UCAR's COMET® Program

Joint JPSS/GOES-R Science Seminar
Introduction to Satellite Training Initiatives and Opportunities
18 August 2014



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https://www.meted.ucar.edu/index.php

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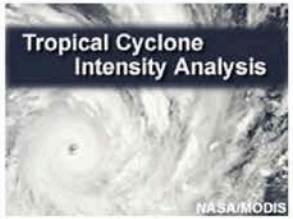


Tropical Cyclone Intensity Analysis

This lesson provides guidance for operational forecasters needing to combine different intensity methods to determine the intensity of a tropical cyclone. Each of the intensity methods is summarized, focusing on both strengths and weaknesses. These methods...

More Information »

1 2 3 4 5 6 7 8 9 10 See All

News and Updates

COMET is a Weather-Ready Nation Ambassador

Posted on: 2014-06-05

Earlier this year, COMET was approached by NOAA to help connect the public with the Weather-Ready Nation

What is MetEd?

MetEd is a free collection of learning resources for the geoscience community. Whether you're an experienced meteorologist honing existing skills or a student looking for new topics of interest, we have something for you. Learn more about MetEd in this short video.

AMBASSADOR™ WRN WEATHER-READY NATION

The COMET® Program is a Weather-Ready Nation

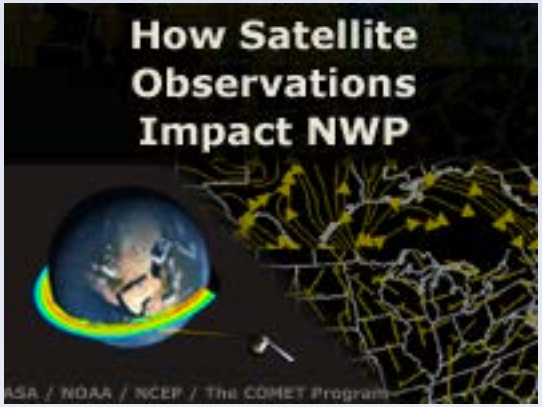
Fast Facts

- **Over 100 Satellite-specific modules on MetEd (69 English, 23 Spanish, 16 French)**

- **Over 20,000 meaningful English Satellite Module User Sessions per year**

NESDIS satellite training activities with the COMET Program attract additional funding and training development specifically in the satellite topic area from both EUMETSAT and the Meteorological Service of Canada

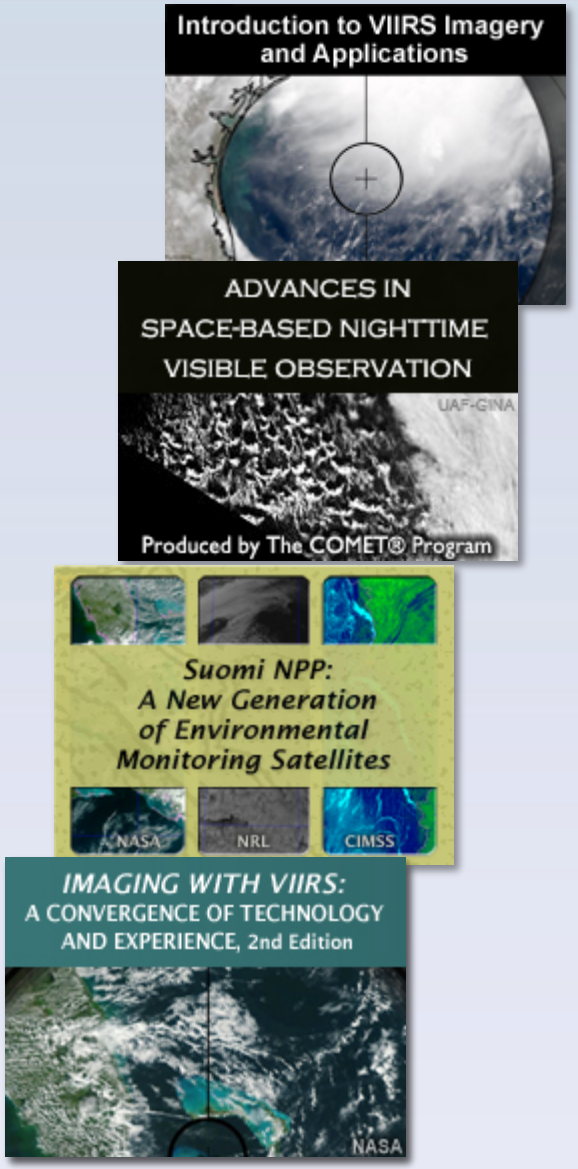
- **Newest publications: *How Satellite Data Impact NWP* and *GOES-R: GLM***



Topic Groupings

GOES

S-NPP & JPSS



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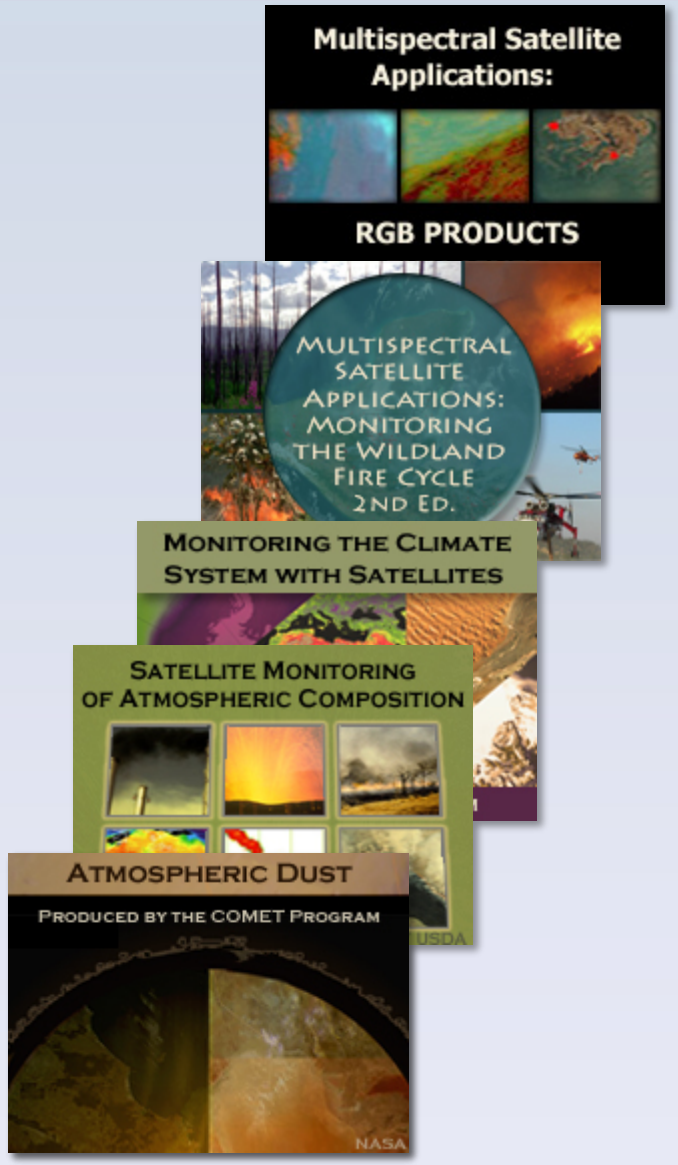
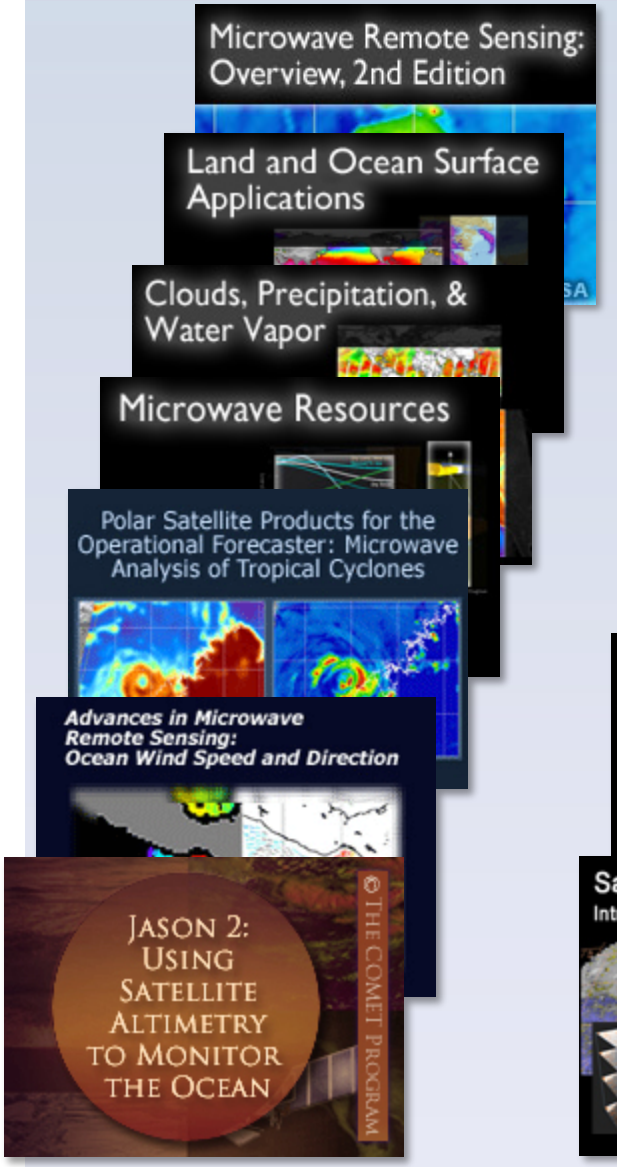


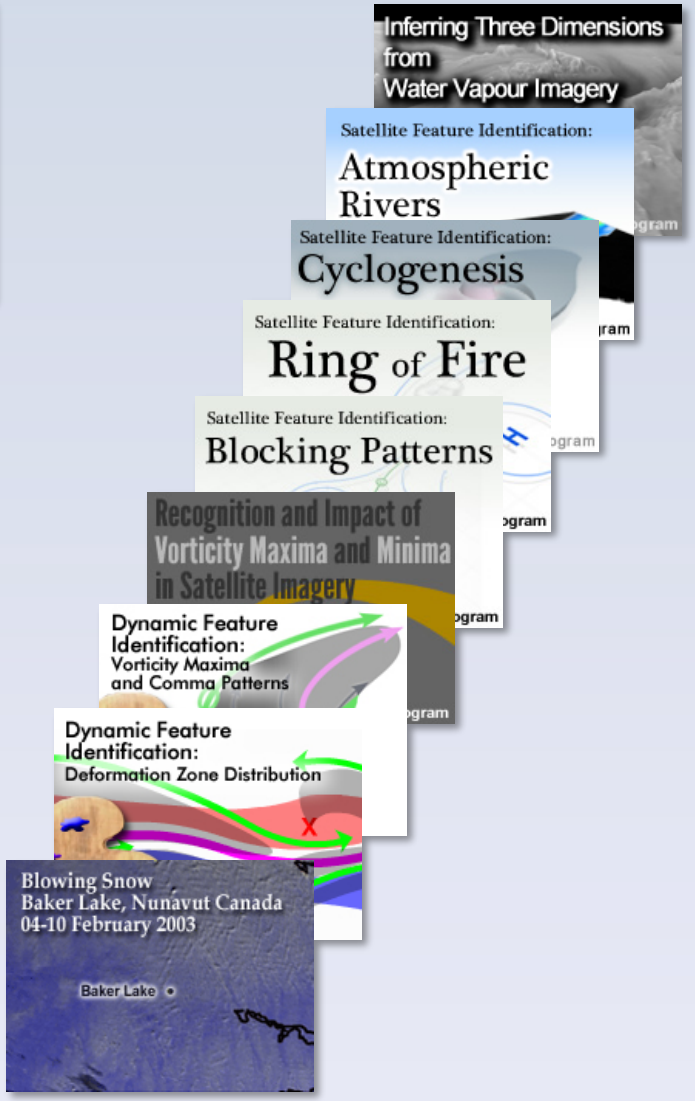
Topic Groupings

MW Remote Sensing



Atmospheric Sounding

MSC – Water Vapour Interpretations



ASMET-7: Aviation Case Studies

ASMET-6: Precipitation

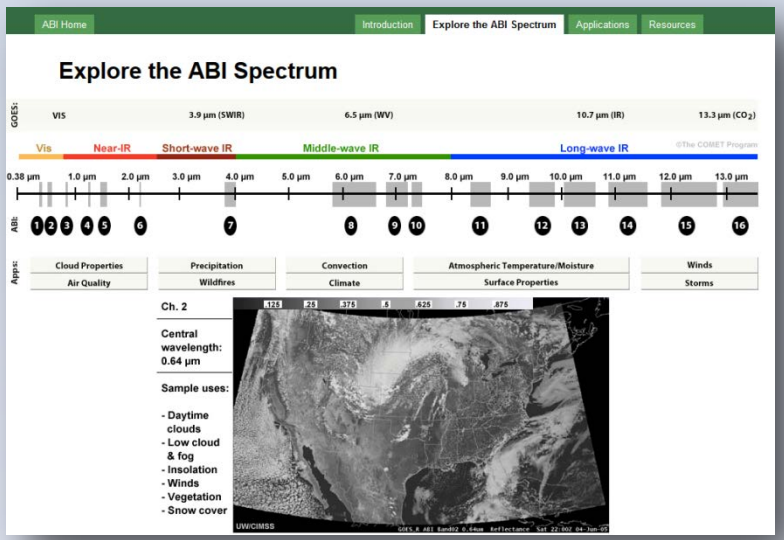
ASMET-5: Case Studies (2004-2006)

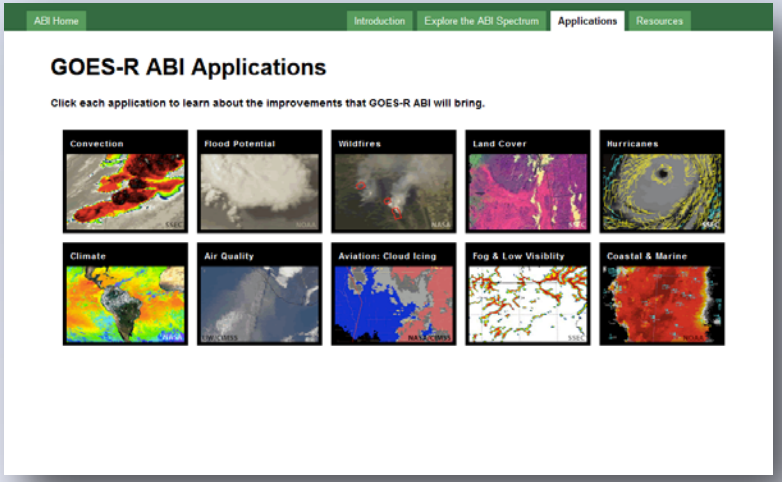
- Secondary Lows Behind Frontal Systems
- Dust storms
- Cloud Clusters

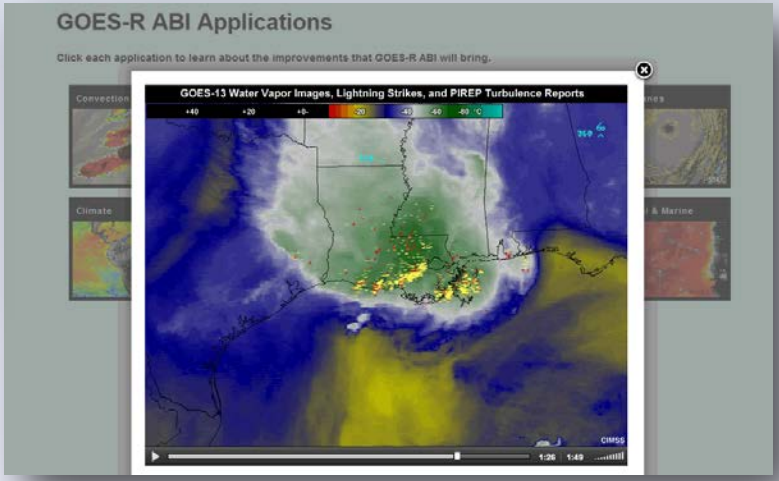
- **ASMET-4: Tropical Cyclones over the SW Indian Ocean**
- **ASMET-3: Combining Satellite Imagery and Model Output in Weather Forecasting**
- **ASMET-2: Integrating Satellite Imagery of the ITCZ into Analyses**
- **ASMET-1: Basics of Visible and Infrared Remote Sensing (2014 update of 1997 module)**

GOES-R ABI: Next Generation Satellite Imaging *(Feb 2013)*

- Interactive exploration of ABI's 16 bands, linking bands to observable phenomena
- Movies describing advancements in ten application areas (e.g. analysis, forecasting, NWP, climate and environmental monitoring)

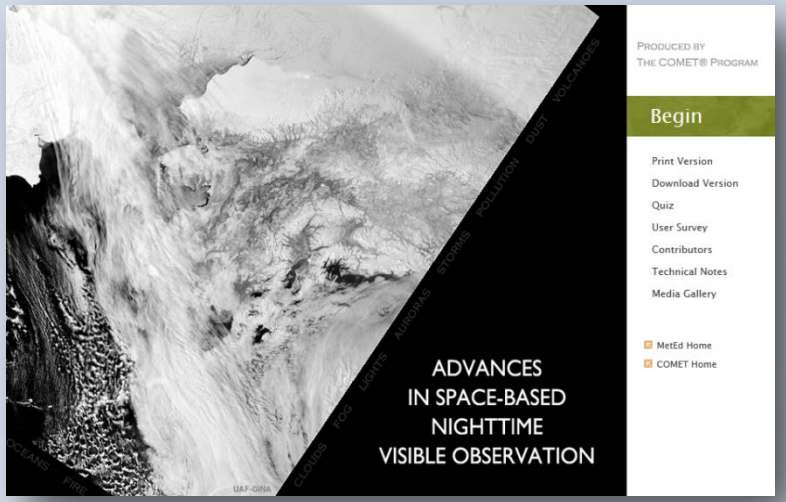


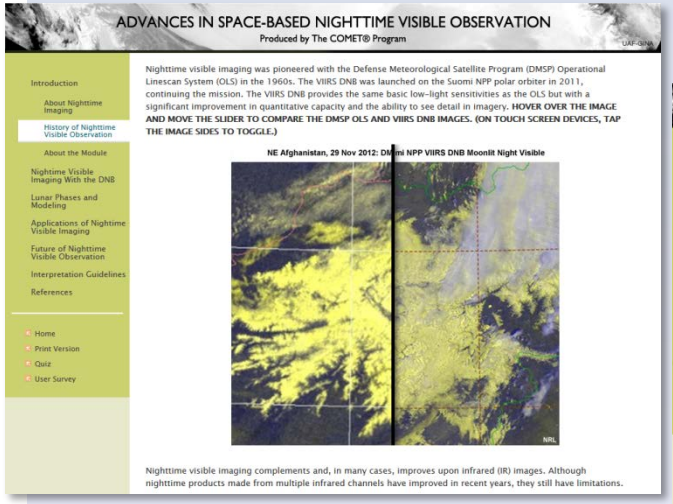


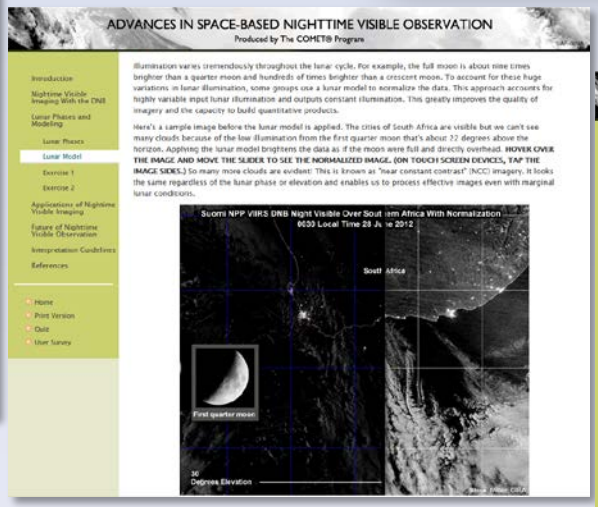


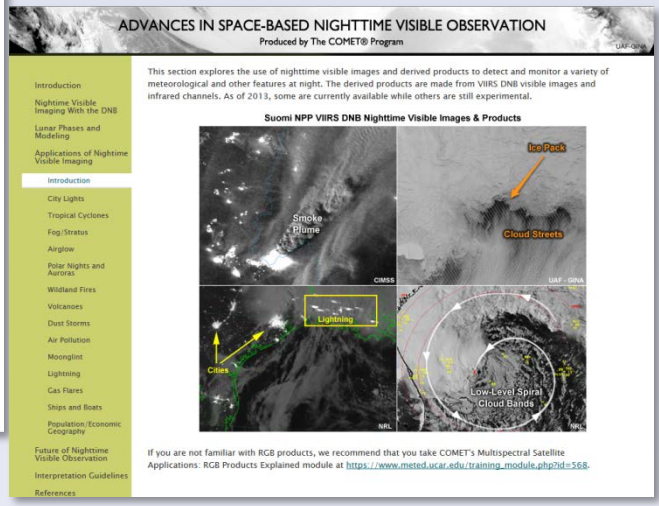
Advances in Space-Based Nighttime Visible Observation *(Apr 2013)*

- Technical Improvements with Suomi NPP VIIRS Day-Night Band
- Lunar cycle & modeling, constant contrast techniques for normalized imagery
- Meteorological and other applications
- Future improvements in NT Vis imaging



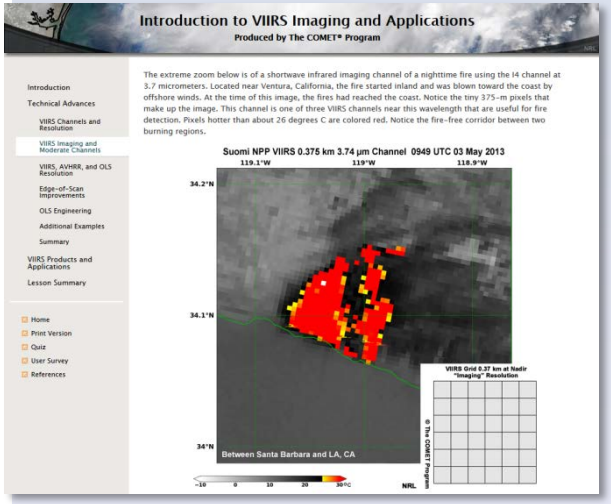


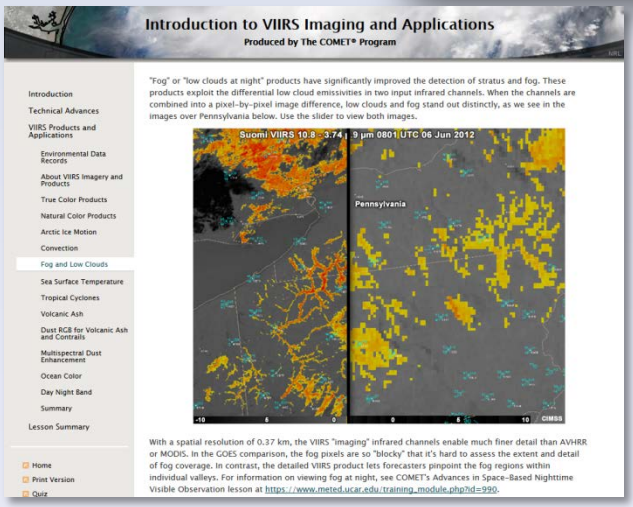


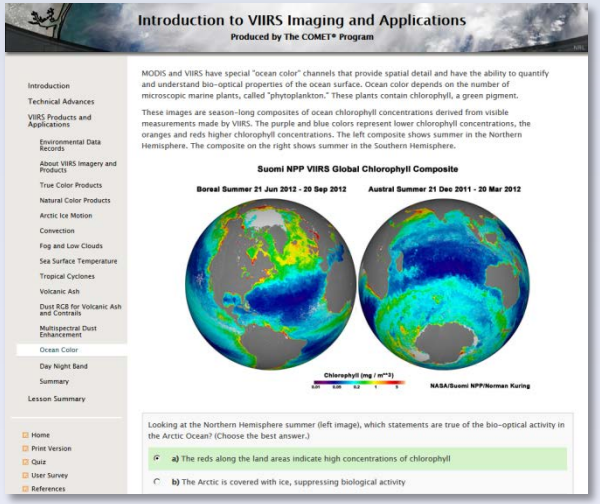


Introduction to VIIRS Imaging and Applications *(Sep 2013)*

- VIIRS capabilities vs. earlier imagers
- Imaging strategy, 22 bands, resolution
- Key applications
- Introduction to the Day-Night Band







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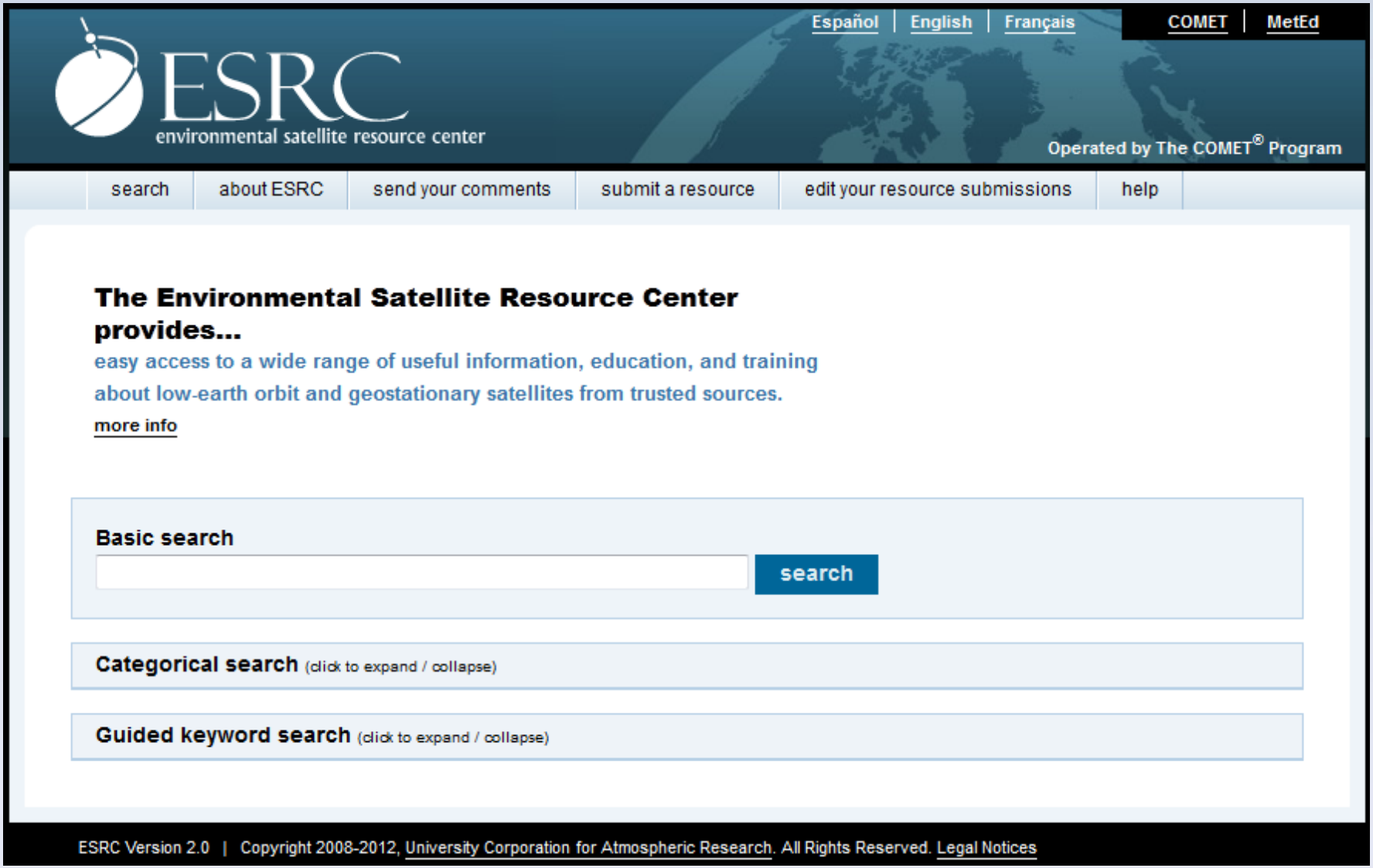
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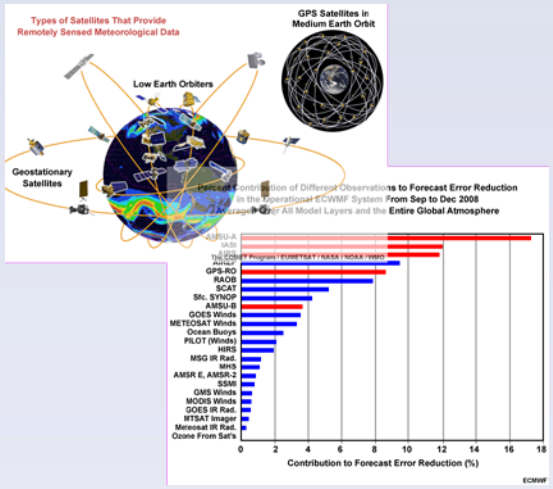
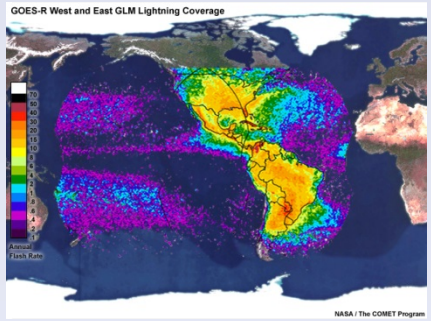
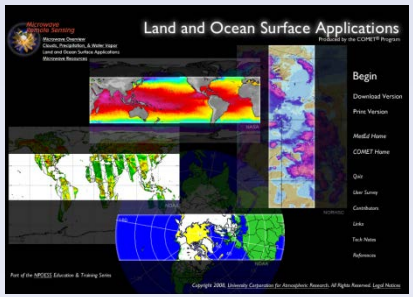
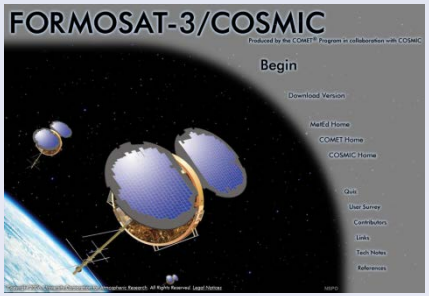
In Progress and Next Steps:

- Microwave Remote Sensing: Land and Ocean Surface Applications, 2nd Ed.
- COSMIC-2
- Marine Forecasting using Scatterometer and Altimeter Data
- SNPP applications for River and Lake Ice
- Short features on High Impact Events highlighting JPSS capabilities
- Himawari-8 AHI differences from ABI on GOES-R
- Input from SOO Satellite Team
- Spanish versions of ABI and GLM lessons









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Module Listing »

Search

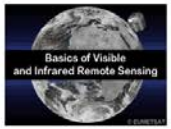
Topics: Satellite Meteorology Languages: English

In this topic area, find out how current and future satellites and their sensors work, how to interpret what they tell us, and how to make forecasts and other weather products from their data.

Modules | Courses

Sort by: Date (Newest to Oldest)

1 - 40 out of 68 results



Basics of Visible and Infrared Remote Sensing

Languages: English
Publish Date: 2014-01-07
Skill Level:
Completion Time: 1.50 - 2.00 h
Topics: Satellite Meteorology
(0 reviews)

This lesson presents the scientific and technical basis for using visible and infrared satellite imagery so forecasters can make optimal use of it for observing and forecasting the behaviour of the atmosphere. The concepts and capabilities presented are common to most ... Read more »

ASMET 7: Convective Weather and Aviation in West and Central Africa

Languages: English
Publish Date: 2013-12-26
Skill Level:
Completion Time: .75 - 1.00 h
Topics: Aviation Weather, Satellite Meteorology
(0 reviews)

The hazards associated with convective systems present some of the most dangerous conditions encountered by aircraft and pose many challenges to aviation operations. When convection is forecast to develop, aviation forecasters are required to issue a series of warning ... Read more »

ASMET 7: Detecting Clear Air Turbulence: South African Case Study

Languages: English
Publish Date: 2013-12-26
Skill Level:
Completion Time: .50 - .75 h
Topics: Aviation Weather, Satellite Meteorology
(0 reviews)

Turbulence is a major concern for the aviation industry. It often goes undetected in cloud-free areas, catching pilots off guard when they fly into it. Turbulence can injure passengers and crew, and cause structural damage to aircraft. This makes it critical for aviation ... Read more »

Tropical Fog: A Look at Fog That Impacts Aviation in Guyana

Languages: English, Spanish
Publish Date: 2013-12-20
Skill Level:
Completion Time: .75 - 1.00 h
Topics: Aviation Weather, Fog and Low Stratus, Satellite Meteorology
(0 reviews)

This module applies concepts covered in the module, Fog: Its Processes and Impacts to Aviation. It examines the fog processes at a tropical location: Guyana. A basic overview of the main fog types is provided, and then a detailed analysis is done for a representative fog ... Read more »

ASMET 7: Forecasting Fog for Aviation: Kenya Case Study

Languages: English
Publish Date: 2013-11-05
Skill Level:
Completion Time: .75 - 1.00 h
Topics: Aviation Weather, Satellite Meteorology
(0 reviews)

This lesson aims to improve aviation forecasts of fog in the African airspace by teaching forecasters to make more accurate forecasts using satellite imagery, numerical weather prediction, and other available data. A process for diagnosing and forecasting fog is presented ... Read more »

Introduction to VIIRS Imaging and Applications

Languages: English
Publish Date: 2013-09-30
Skill Level:
Completion Time: .75 - 1.00 h
Topics: Satellite Meteorology
(1 review)

This lesson introduces the VIIRS imager that operates on the current U.S. Suomi NPP satellite and is planned for future JPSS environmental satellites. VIIRS has many advanced features that improve both spectral and spatial resolution and enable the delivery of consistent, ... Read more »

Special Interest

More on Satellite Meteorology

ESRC

The Environmental Satellite Resource Center (ESRC) provides easy access to a wide range of useful information, education, and training about low-earth orbit and geostationary satellites from trusted sources.

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About Our Training

Our training consists of modules and courses. A **module** is targeted toward one focused subject, whereas a **course** is a collection of modules that pertain to a broader subject area. You can receive certificates of completion for both modules and courses. Courses are entirely self-paced and available for open enrollment.

Virtual Classroom

The COMET® Program's virtual classroom provides access to material in support of our **residence** and **virtual courses**. These courses are generally available by invitation only and are hosted at our UCAR facility in beautiful Boulder, Colorado.

Go

Quick URLs and Contact Info.

abshire@ucar.edu

URLs:

- http://meted.ucar.edu
- http://meted.ucar.edu/esrc

Satellite Liaison Perspective on Forecaster Training for GOES-R

Effective GOES-R Training Practices – National Centers

- All (almost) forecaster training is in person, either individually or in small groups (3-5 analysts/forecasters).
- Products that are identified have immediate benefit to NCEP Center.
- Presentations (20-25 minutes) and quick guides are created that include relevant product examples for each NCEP Center.
- Interactions with forecasters are ongoing after training is complete to…
  - Keep dialogue going between SME and forecasters
  - Show additional real-time examples (2-minute case studies)
- Satellite Liaison has a consistent presence in operations to continuously familiarize forecasters to GOES-R capabilities.

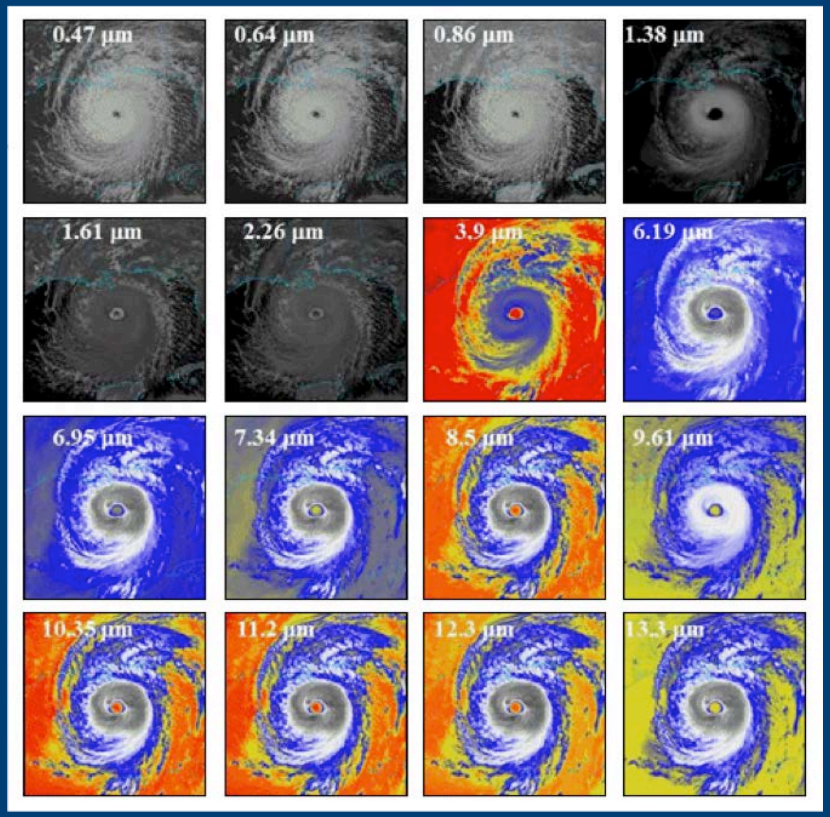
Effective GOES-R Training Practices – Weather Forecast Offices

- All (almost) forecaster training is remote (e.g., live teletraining).
- Live teletraining is offered to the WFO(s) and given by Satellite Liaison or the product developer.
- A recorded version of the live teletraining or prerecorded Articulate/VISIT version is provided to the WFO(s).
- Supplemental resources (e.g., quick guide or blog), if available, are provided to the WFO(s).
- Satellite Liaison is a resource and SME to the WFO(s).

How Should NWS Users Be Trained?

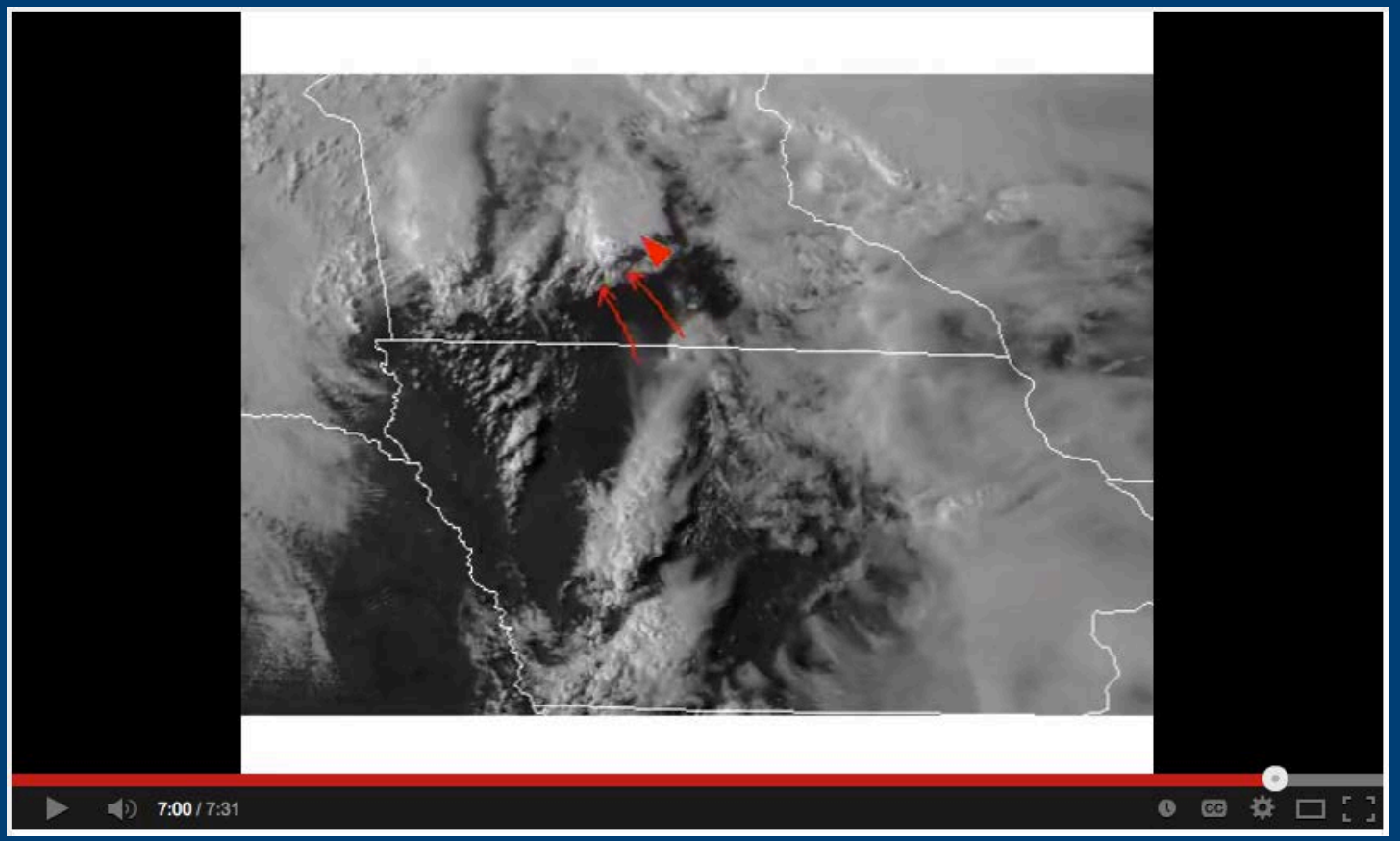
- In-residence Satellite SMEs (i.e., SOO and Satellite FP) for each WFO / NCEP Center
- Dual-Pol Style Course for GOES-R (multi level)

1. Core Set of Articulate Presentations
   - (20-30 minutes each)
   - Advanced Baseline Imager
   - Geostationary Lightning Mapper
   - Application / Track Centric (Convection, Winter Storms, Low Clouds and Fog, Fire Detection)



How Should NWS Users Be Trained?

2. Video Blog Posts of Near Real Time Events – YouTube Channel
   - Just-In-Time Training…4-6 minutes or even less



h/t Dan Bikos (CIRA)

How Should NWS Users Be Trained?

3. Supplemental In-Office and within AWIPS2 Resources

- Quick Guides
- Product Verification Statistics

Front

RGB Air Mass Quick Guide by NASA / SPoRT

Why is the Air Mass RGB imagery important?

There are numerous single channel imagery that provide information to assist the diagnosis and monitoring of synoptic and mesoscale features. The RGB Air Mass product is able to identify temperature and moisture characteristics of the air mass surrounding these features, allowing the user to infer some of the physical processes taking place.
Application: Comparison of the Air Mass RGB to NWP model short-term forecasts, allows forecasters to evaluate how well the model is forecasting the event, especially in rapid cyclogenesis cases.

RGB Air Mass Product - What is used in the combine and what does each color represent?

Color	Band / Band Diff.	Physically Relates to....	Little contribution to composite indicates.....	Large contribution to composite indicates .....
Red	6.7 – 7.3	Vertical water vapor difference	Moist conditions high levels	Dry conditions at high levels
Green	9.7- 10.7	Estimate of tropopause height based on ozone. Polar (tropical) air has higher (lower) ozone concentrations	Tropopause height is low. Typically indicates a polar air mass, where 9.7 has very cold brightness temperature compared to 10.7	Tropopause height is high. Likely a tropical air mass where the two channels will have similar brightness temperature values
Blue	6.7	Water Vapor in layer from ~200 – 500 mb	Dry at upper levels Warm brightness temperatures have little blue	Moist at upper levels Cold brightness temperatures result in lots of blue

What should I be looking for in the imagery?

The Air Mass RGB identifies jet streaks and areas of high potential vorticity with red colors.

Vorticity / Jet Streak

The stratospheric intrusions associated with these features have dry, ozone rich air resulting in mostly red and little to no green or blue. Red colors result from very dry upper levels compared to mid-levels. Little green in this area occurs because the 9.7 channel brightness temperature is much colder than the 10.7 channel due to the increased ozone concentration and lowering (warming) of the tropopause height from the stratospheric intrusion. The blue scale is inverted so that warm brightness temperatures result in less blue (i.e. dry at ~400mb)

Warm air with moisture at upper levels tend to have green coloring while this same air with moisture at mid-levels tends to have an olive color (nearly equal red and green contributions). Cold air with higher concentrations of ozone is more blue and purple.

Warm, mid moisture | Warm, high moisture

Thick, high-level clouds have high intensity values of each color and therefore appear white while other mid-level clouds have light pink colors depending on their characteristics.

What are the things to watch out for?

The edges of the MODIS swath tend to have less green due to limb cooling of the 9.7 ozone channel, resulting in false influence of the red and blue colors near the edge.

When is it available?

A hybrid style with the GOES water vapor channel is used to provide context every 15 minutes. The MODIS swath showing the actual Air Mass RGB is inserted as available ~4-6 times per day.

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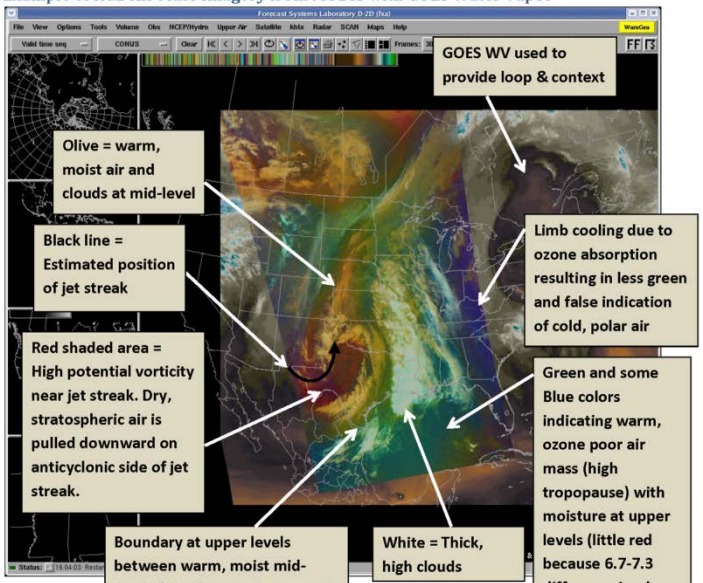
Example of RGB Air Mass Imagery from MODIS with GOES Water Vapor



Resources:

This guide provides a highlight of the Air Mass RGB product as quick reference. Operational applications of RGB imagery can be seen on SPoRT's blog site (http://nasasport.wordpress.com/). A primer of the RGB imagery concept can be found at the UCAR/COMET MetEd website (https://www.meted.ucar.edu).More in depth information can be found at EUMETRAIN's website (http://eumetrain.org/).

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h/t NASA SPoRT

Training Resources Need to…

- …be multi leveled and include training in person by the Satellite FP.
  - "Dual-Pol Style" Course
  - Real-time One-On-One Training…SME/forecaster interactions
  - Inter-Office Mentoring…forecasters teach each other (i.e., situational training)
- …include product background information with strengths/weaknesses.
- …have relevant (i.e., regional) examples and product verification.
- …show how GOES-R incorporates with tools forecasters currently use…data fusion.
- …show how GOES-R makes forecaster decision making easier.
- …incorporate Decision Support Service examples.
- …be incorporated into AWIPS-2.

Questions

- Weather.gov/training
- http://meted.ucar.edu