THE SATELLITE PROVING GROUND FOR MARINE, PRECIPITATION, AND SATELLITE ANALYSIS
2014 DEMONSTRATIONS

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6th NOAA Testbeds & Proving Grounds Workshop
04/15/15
Introduce the National Centers that make up the “Satellite Proving Ground for Marine, Precipitation, and Hazardous Weather Applications”

- Weather Prediction Center (WPC)
- Ocean Prediction Center (OPC)
- Tropical Analysis and Forecast Branch (TAFB)
- NESDIS Satellite Analysis Branch (SAB)

GOES-R/JPSS Demonstrated Proxy Products

- RGB Products
- GOES-14 Super Rapid Scan Operations for GOES-R (SRSOR)
- WRF/NAM Simulated Imagery
- Overshooting Top Detection
- Convective Initiation
- GOES-R Lightning Detection Product
- Nearcast Model
- ATMS Microwave Products
- Day Night Band (VIIRS)
NOAA National Weather Service

OPC and TAFB

As of April 2015: OPC – 19 forecasters, TAFB – 17 forecasters

- Atlantic and Pacific High Seas
- Atlantic, Pacific, Gulf of Mexico, and Caribbean Offshore Zones
- Outlook (Medium Range)
- Special Project Support
  - Antarctica NMFS
  - USCG Arctic (with AR)
  - Japan
- Tropical Cyclone Classifications (TAFB only)
The Smoke, Fire and Air Quality Program

The Precipitation Program

The Volcanic Ash Program

The Tropical Program

As of April 2015: 15 analysts
All training to this point has been conducted in person, either individually or in small groups (3-5 forecasters/analysts at a time)

Use PowerPoint presentations, then a Quick Guide is made available for the forecasters to get quick answers to analysis questions. COMET modules and blogs are also shared.

The Liaison interacts with forecasters post training to discuss the products and points out significant uses when necessary.

Training for TAFB and NASA HS3 has also been conducted in person, with additional information for HS3 available via a CIRA website. Training materials can be shared with NWS WFOs.
These methods have proven to work well with this PG, but there was some trial and error:

- The difference between introducing products and providing application-based examples is significant.
- Determining whether a product is useful for a particular situation, rather than just blindly introducing products (just because it's on the list).
- Learning when it's best to find products that complement each other, including integrated displays.
RGB Products
Overshooting Top Detection
GOES-R Lightning Detection
GOES-14 SRSOR
ATMS 88 GHz
Ozone Products
MODIS Air Mass RGB (GOES-R/JPSS)
Start of Hurricane Arthur’s Extratropical Transition on 07/05/14
AIRS Ozone Products (JPSS):
Start of Hurricane Arthur’s Extratropical Transition on 07/05/14

AIRS TOTAL COLUMN OZONE

AIRS OZONE ANOMALY
SEVIRI Air Mass RGB (GOES-R)  
March 2015 Hurricane-Force Storm Events

Animation courtesy of James Kells (OPC)
SEVIRI Air Mass RGB (GOES-R) ASCAT overlay
NAM Nested 4km Simulations
Low-End Derecho on 06/12/13

INFRARED (10.7 µM)  WATER VAPOR (6.5 µM)
GOES-R Overshooting Top Detection/Magnitude

GOES-13 Infrared and Proxy OTM for strong nor’easter on 11/06/12
SHORT TERM OUTLOOK VALID 1750-2250Z...HIGH CONFIDENCE FACTOR IN SHORT TERM OUTLOOK...ALREADY CONVECTION HAS DEVELOPED ACROSS PORTIONS OF SE TX/SW LA THIS AFTERNOON WITH SOME LOCATIONS RECEIVING A QUICK 2-3" IN AN HR. INCREASING CONCERN OF ADDITIONAL CONVECTION DEVELOPING/EXPANDING N FROM GULF OF MEXICO AHEAD OF SHORTWAVE TROF THAT IS GRADUALLY LIFTING NEWD ACROSS ERN TX/WRN GULF OF MEXICO. WITHIN THE LAST HR AN OUTFLOW BOUNDARY HAS BEGUN TO PROPAGATE NWD TOWARDS TO COASTLINES OF SE TX/SW LA WITH NEW CONVECTION ALREADY BEGINNING TO INITIATE. GOES CI ALGORITHM DOES SUGGEST POSSIBLE TO LIKELY ADDITIONAL CONVECTIVE TO DEVELOP AHEAD(ALONG OUTFLOW BOUNDARY IN THE NEXT COUPLE OF HRS. ATTM OBJECTIVE SFC MOISTURE CONVERGENCE MOISTURE HAS A STRONG MAX LOCATED ALONG THE SW LA COAST. GIVEN THE STRONG SRLY 85H MOISTURE TRANSPORT OF 2.0"+ PWS AND SLOW-MOVING NATURE OF THE SHORTWAVE...THINKING THIS STRONG MOISTURE FLUX SHOULD ONLY GRADUALLY SHIFT NWD OVER THE NEXT 2-4 HRS...FAVORING REPEAT CELL ACTIVITY. ~Warren
ADDITIONALLY A MORE EXPANSIVE AXIS OF CONVECTION HAS DEVELOPED ALONG A WEST-EAST LINE WITH THE UPDRAFTS GROWING RAPIDLY PER THE EXPERIMENTAL 1 MINUTE RAPID SCAN VISIBLE IMAGERY. THE MEAN STEERING FLOW REMAINS WEST TO EAST WHICH SUGGESTS THE ACTIVITY WILL SLIDE EASTWARD INTO CENTRAL TN DURING THE NEXT COUPLE OF HOURS. ~Rubin-Oster

SUPER RAPID SCAN IMAGERY CONTINUES TO SHOW THAT MOST OF THE MOST ACTIVE UPDRAFTS WERE LOCATED FROM SOUTH CENTRAL TN INTO NORTHERN AL...A REGION WHERE THE MEAN MID LEVEL FLOW WAS ROUGHLY THE SAME AS LOW LEVEL INFLOW. ~Bann
THE 00Z NAM-CONEST AND 00Z NSSL-WRF INDICATE A FORMIDABLE W/E OR WSW/ENE AXIS OF STRONG CONVECTION SETTING UP THROUGH 06Z AND TWD THE PREDAWN HOURS INVOLVING SERN NEB AND CNTRL AND SWRN IA. ADDITIONALLY...THE EXPERIMENTAL NEARCAST PRODUCT INDICATES AN AXIS OF DIFFERENTIAL THETA-E THAT SUPPORTS AN INSTABILITY AXIS ACROSS SERN NEB AND THROUGH A LARGE PART OF CNTRL AND SRN IA. THIS IS ALREADY WITHIN THE INSTABILITY GRADIENT AS SEEN BY THE LATEST RAP ANALYSIS...BUT THE NEARCAST PRODUCT INDICATES THIS PERSISTING THROUGH 12Z. THEREFORE...CONFIDENCE IS RATHER HIGH THAT CONVECTION WILL CONTINUE TO ORGANIZE AND EXPAND IN A GENERAL WSW/ENE FASHION OVERNIGHT AND ADVANCE INTO OR DEVELOP ACROSS CNTRL/SWRN IA IN PARTICULAR. ~Orrison
GOES-R Mesoscale Mode with GOES-R Lightning Detection
Proxy using GOES-14 SRSOR and GLD-360/NLDN Lightning Density
GOES-R Mesoscale Mode with the DC Lightning Mapping Array (Proxy GLM)
Read more on the “It’s Severe” blog

Courtesy of Scott Rudlosky (NESDIS/STAR) and Pat Meyers (CICS)
June 13, 2013 “Derecho” Ocean Perspective
ATMS 88GHz “V” (JPSS)
Super Typhoon Vongfong near maximum intensity
155 kts (175 mph)

Courtesy of NASA SPoRT and NRL
GOESRCI, SAB: For our operations and from my perspective, it did give advance notice of convective development on a couple of occasions, but generally had somewhat limited use given the agitation in the CU field was already seen.

RGB Air Mass, WPC: I think the RGB Air Mass product provides advantages to water vapor imagery on occasion if the disturbance is large enough to show up, and obscured in traditional satellite imagery. It is also helpful to see stratospheric air clearly on the RGB product and compare directly to model PV or vorticity fields.

OTD/OTM, OPC: Used the magnitude product more frequently than the detection. On a few occasions, when used in conjunction with lightning density and IR imagery, it was useful in determining severe potential of individual offshore supercells.

RGB Products, TAFB: Both imagery complemented the suite of imagery aforementioned. The imagery also complemented the convection enhancement in satellite imagery (i.e. low, moderate, high). For example, the RGB Air mass imagery showed middle to upper level dry air in regions of tropical wave environment devoid of convection. The same was true for the Dust imagery; in regions were dust were present, convection wasn't.
More examples of applications of these products in real-world examples that demonstrate advantages over traditional model/satellite views would help to prove the utility of these experimental satellite products.

Perhaps once per month a center could submit a case study on how they used a proving ground product and why they found it useful (or not useful). The centers could each take turns doing this and anyone from the chosen center could submit the case study. Sharing this case with the group via the satellite blog would help to show how a product is being used differently by various groups and would also encourage more use of the products overall.

Handouts with general rules of thumb on how to use or not use the products either via email or even old fashioned paper copies are always appreciated since knowledge learned in the demonstrations may not all be retained.
2015 Demonstrations

- 01/15/15 – 04/15/15
  - Products
    - Fog and Low Stratus
      - FLS Product
      - GeoColor
      - RGB Nighttime Microphysics
    - RGB Air Mass and Ozone Products
      - Refresher training and comparisons with water vapor
- 06/01/15 – 11/30/15
  - Products
    - Convection and Heavy Rainfall/Flash Flooding
      - GOES-R Lightning Detection Product
      - Overshooting Top Detection
      - GOES-R Convective Initiation
      - Cloud Top Cooling (New)
      - Layered Precipitable Water (New)
      - GOES-14 SRSOR
      - Nearcast
      - New JPSS Products (TBD)
      - RGBs
      - Atmospheric Motion Vectors (New)

- Himawari Training to start in coordination with COMET, Pacific Region, and Alaska Region readiness (Summer)
The WPC, OPC, and SAB have progressed from using basic satellite channels to new satellite techniques with help from the Satellite Proving Ground.

The main uses of satellite imagery at these centers is to compare current conditions with NWP initialization and current conditions.

New GOES-R and JPSS satellite products are assisting current operations, well ahead of launch time.

Future direction: Continue to explore new satellite techniques that will enhance operations and lessen forecast errors.
A Wild Week in the Tropical Pacific (follow-up to 3/11/2015 post)

Last week I posted on the very active tropical Pacific Ocean with four storms occurring simultaneously. Tropical Cyclone Pam (17P) made a devastating visit to the island nation of Vanuatu as a Category 5 (145 kts or 165 mph) cyclone and has since joined the westernlies after passing near New Zealand as a much weaker system. Currently, the majority of the region has quieted down some, but Tropical Cyclone Nathan (east of Queensland) and Tropical Storm Bavi (West Pacific) are still active, while Tropical Cyclone Olwyn dissipated after making landfall in Western Australia. Jim Kelts (OPC) compiled a few animations that show the evolution of all four tropical cyclones starting on 03/08/15. The imagery is courtesy of the MTSAT-2 satellite and we are eagerly anticipating the new Himawari-8 satellite data over the next few months.
Super Typhoon Vongfong (2014)