Proving Ground Activities at CIRA

Renate Brummer[1], Ed Szoke[1,2], Steve Miller[1], Curtis Seaman[1], Dan Lindsey[3], Galina Chirokova[1], Andrea Schumacher[1], Don Hillger[3] and Deb Molenar[3]

[1]Cooperative Institute for Research in the Atmosphere (CIRA)

[2]NOAA/Earth System Research Laboratory (ESRL)/Global Systems Division (GSD)

[3]NOAA/National Environmental Satellite, Data, and Information Services, Center for Satellite Applications and Research (NESDIS/STAR)

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GOES-R: Next generation of geostationary Earth-observing systems, scheduled for launch on 14 October 2016. www.goes-r.gov
JPSS: Joint Polar Satellite System, the next generation of Polar operating satellites. Suomi NPP launched in October 2011, JPSS-1 scheduled for launch in early 2017. www.jpss.noaa.gov

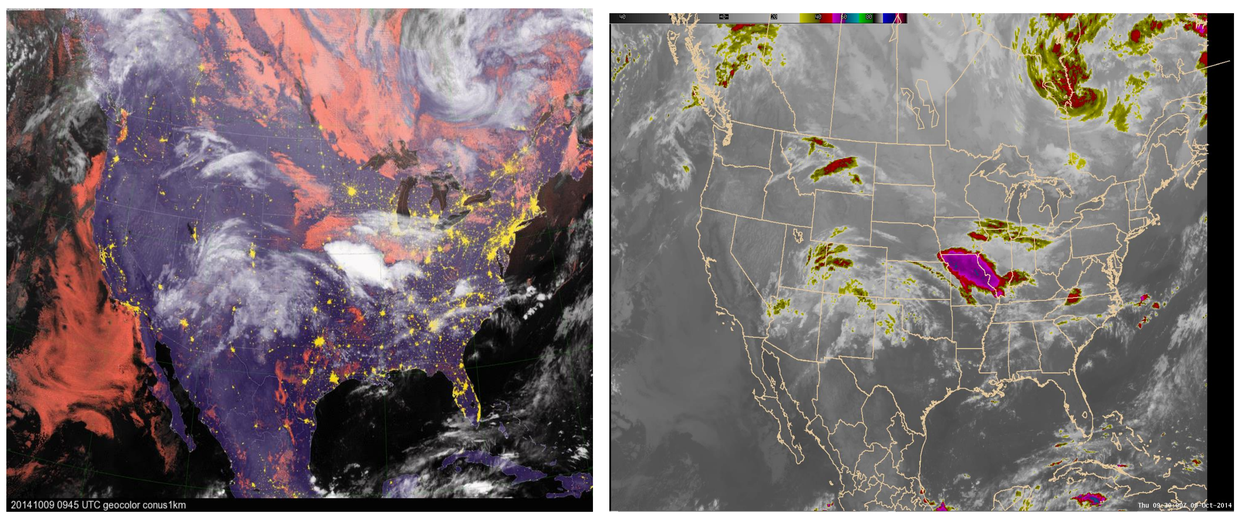
GOES-R and JPSS each have a Proving Ground:
- to help forecasters become familiar with the new bands and products
- to allow for feedback from forecasters that will help produce the most useful products for operations.

CIRA is an active Proving Ground Provider along with the Cooperative Institute for Meteorological Satellite Studies (CIMSS) at the University of Wisconsin-Madison, the Short-term Prediction Research and Transition Center (SPoRT) at NASA/Huntsville/Alabama and NOAA/NCEP National Centers.

How does CIRA create Proving Grounds (PG) products for evaluation?

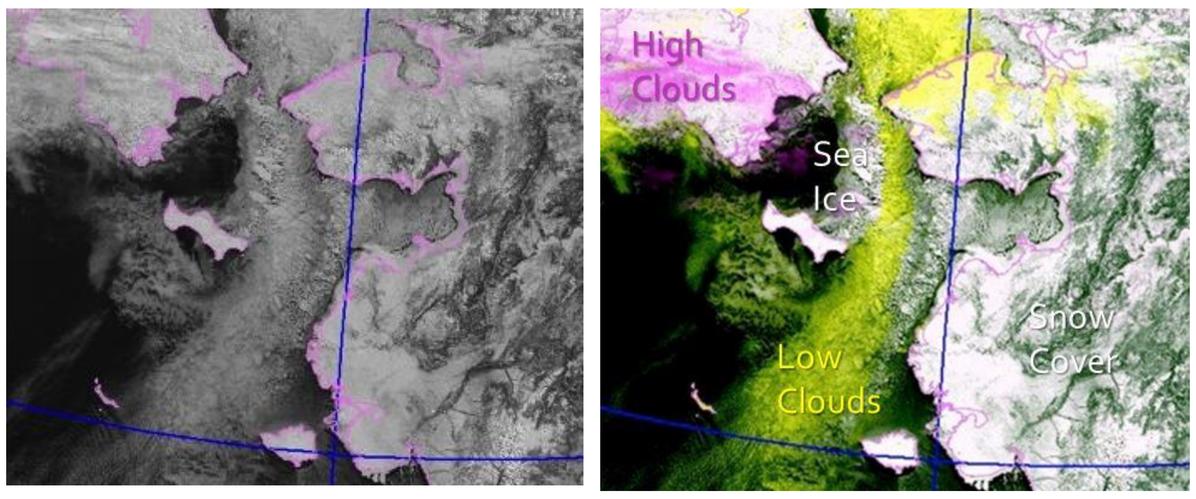
PG-Method 1: Use current **GOES** bands and/or combined info.
PG-Method 2: Use **MODIS**, **Suomi-NPP**, **MSG** and **Himawari-8** as proxy for GOES-R/ABI
PG-Method 3: Generate **"synthetic" imagery** from numerical forecast and radiative transfer models to replicate GOES-R

PG-Method 1: GeoColor Product



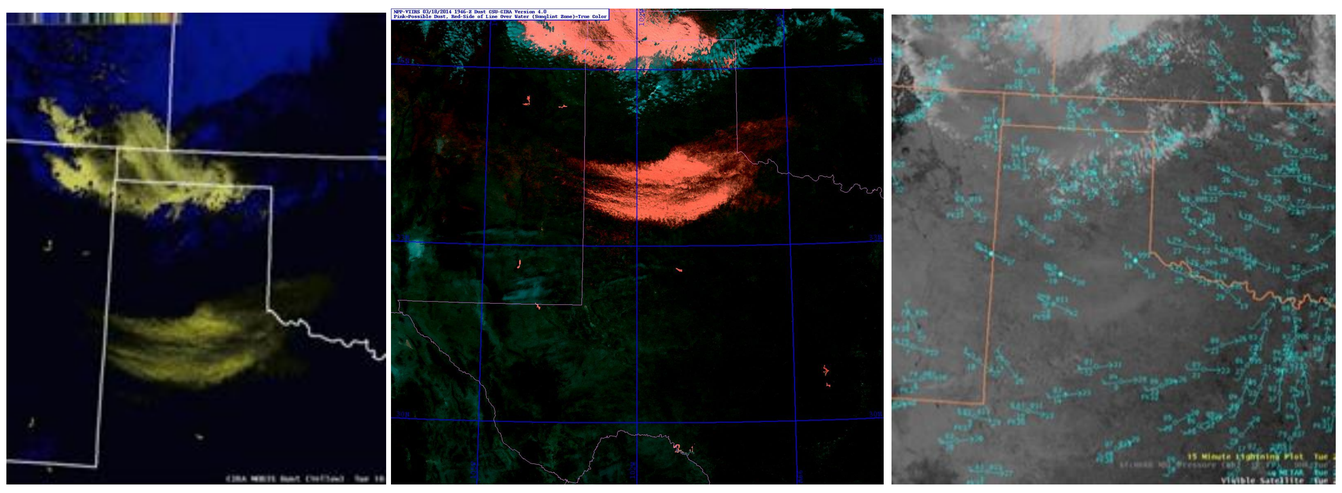
GeoColor imagery provides a seamless transition from daytime (visible) to nighttime (IR) imagery. The background is true color (daytime) or city lights (nighttime). In addition, low clouds and fog are highlighted during the night (pinkish color) while other clouds appear white. Compare to the IR image at the same time (0945 UTC 9 October 2014)

PG-Method 2: VIIRS Snow/Cloud Discrimination Product



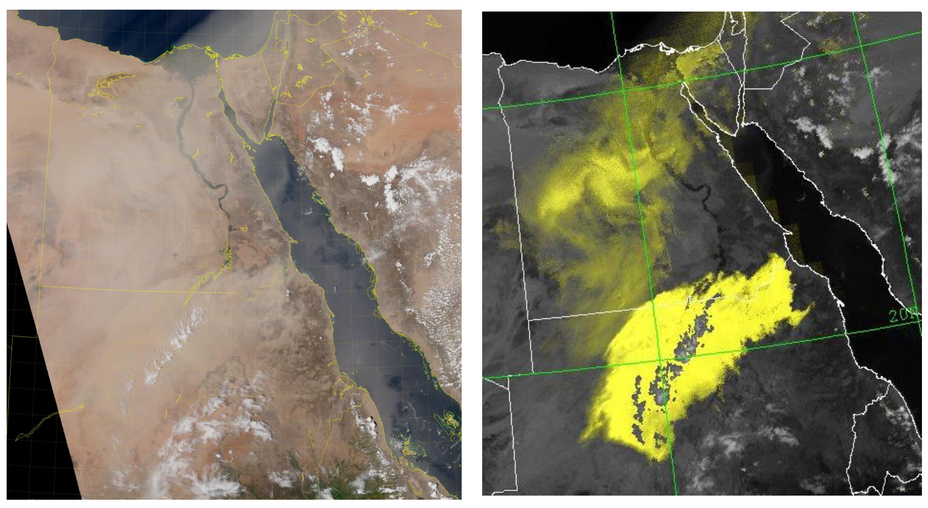
Alaska's Bering Strait: DNB image to the left and snow cloud discrimination product to the right at the same time. Stronger absorption by snow/ice at shortwave infrared wavelengths helps to distinguish snow/ice from liquid-phase clouds.

PG-Method 2 (cont.): Blowing Dust: Blue Light Absorption Technique and DEBRA Product



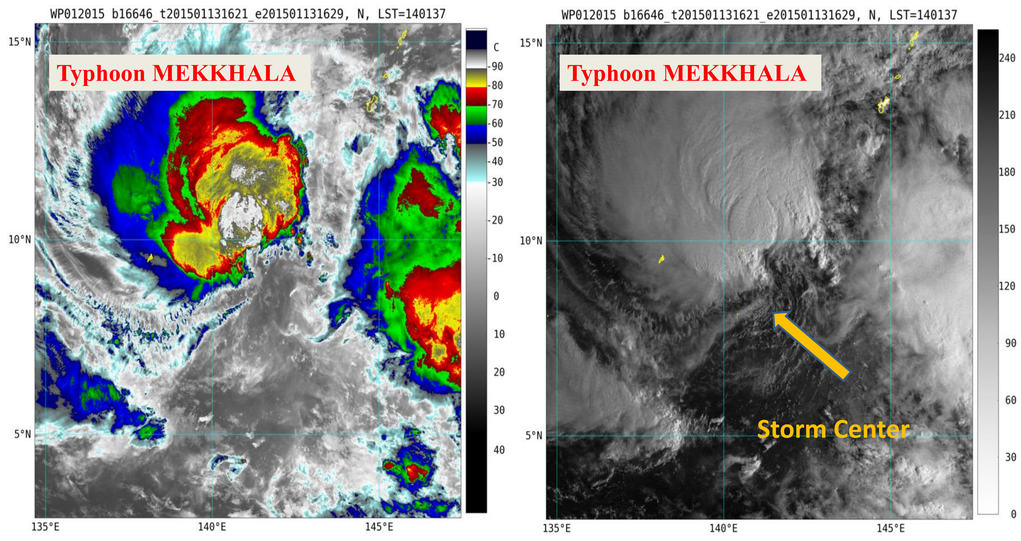
Blue light absorption technique: MODIS-based Yellow Dust Discrimination product (left) and VIIRS-based Pink Dust Discrimination product (right) (1946 UTC 18 Machr 2014)

Corresponding GOES visible image and surface observations valid at 2000 UTC 18 March 2014

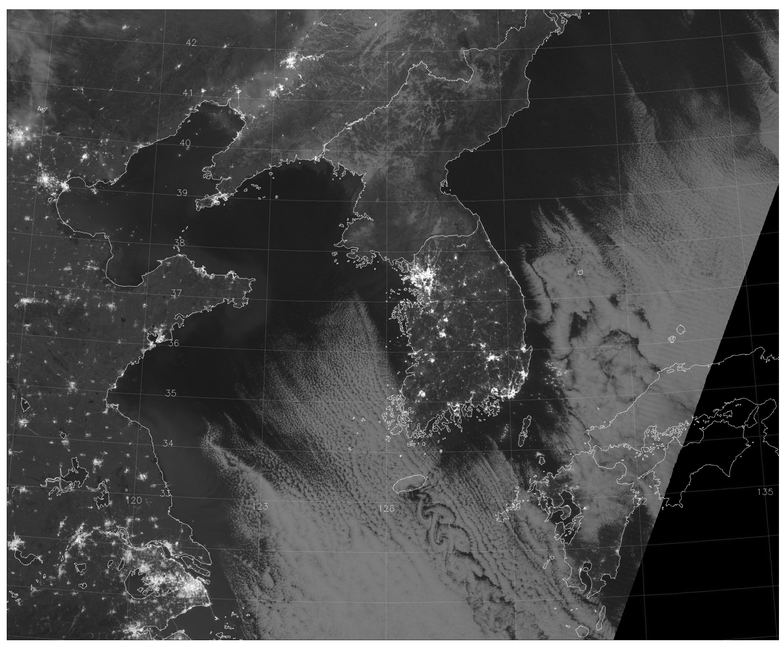


Middle East at 10:32 UTC 10 Sep 2015. VIIRS True Color RGB image (left) showing dust blanketing the area. The DEBRA product (right) over-enhances the dust over low-cloud situations by coupling strong BTD signals with relatively cooler TB (11 µm) values and reducing background effects.

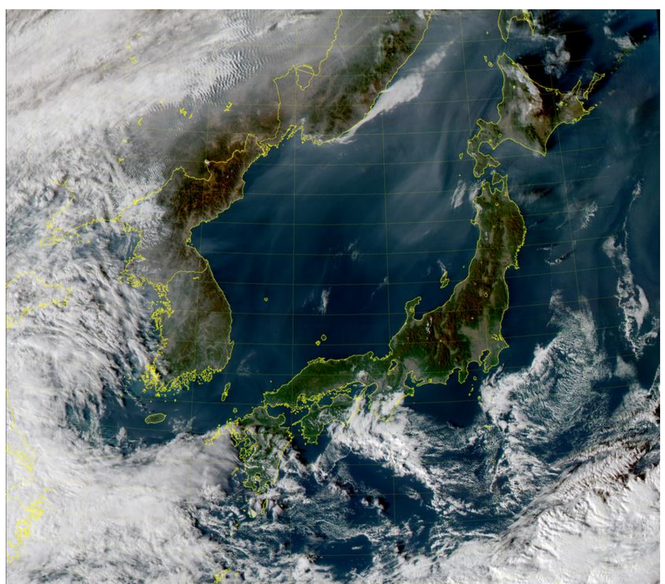
PG-Method 2 (cont.): VIIRS Day/Night Band (DNB) Imagery and HAC True Color AHI RGB



Western Pacific Typhoon MEKKHALA at 1621 UTC 13 Jan 2015: VIIRS IR (I5 11.45µm) (left) and DNB (right). The low level center of typhoon can only be detected in the DNB image.



VIIRS DNB image of the Korean Peninsula and the Yellow Sea as seen under a full moon (18:09 UTC 7 January 2015). Note the von Karman vortices visible in the clouds caused by Jeju Island.



Hybrid Atmospherically Corrected (HAC) true color AHI RGB imagery from 0600 UTC 4 November 2015.

PG-Method 3: Synthetic Imagery

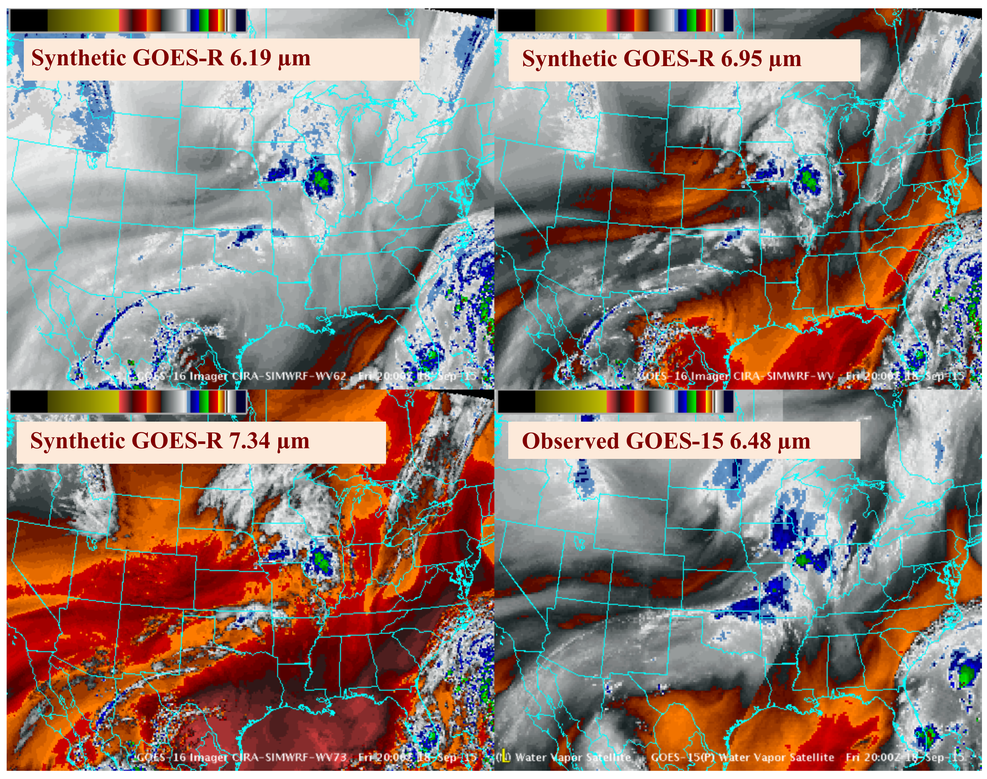


Figure left: The 3 synthetic GOES-R water vapor bands (6.19 µm, 6.95 µm, 7.34 µm) along with the current GOES water vapor band (6.48 µm) for comparison. These synthetic images are all 20-hour forecasts from the 00z/18 September 2015 run of the 4-km resolution NSSL WRF model valid at 20z/18 Sep2015.

Proving Ground Lessons:

1) **Evaluation of potential new products through the GOES-R and JPSS Proving Grounds is very important.**
2) **Feedback from forecasters is critical to help improve products. A variety of methods are used to gather feedback.**
3) **Forecasters do not all agree on the same look to a given product.**
4) **There is much to be learned about how best to use the new water vapor bands that will be available on GOES-R.**
5) **We do not always anticipate the use of products**
   For example: we initially introduced synthetic imagery bands so forecasters could directly compare them to model imagery and gain confidence in the model's ability to produce realistic imagery. This worked so well that forecasters now like synthetic imagery as a new way to look at model output, akin to radar reflectivity from high-resolution models.
6) **Working closely with Satellite Liaisons has proven to be very valuable.**

For more CIRA PG products go to: http://rammb.cira.colostate.edu/

Questions? Send email to Renate.Brummer@colostate.edu