

CIRA GOES-R Proving Ground Products

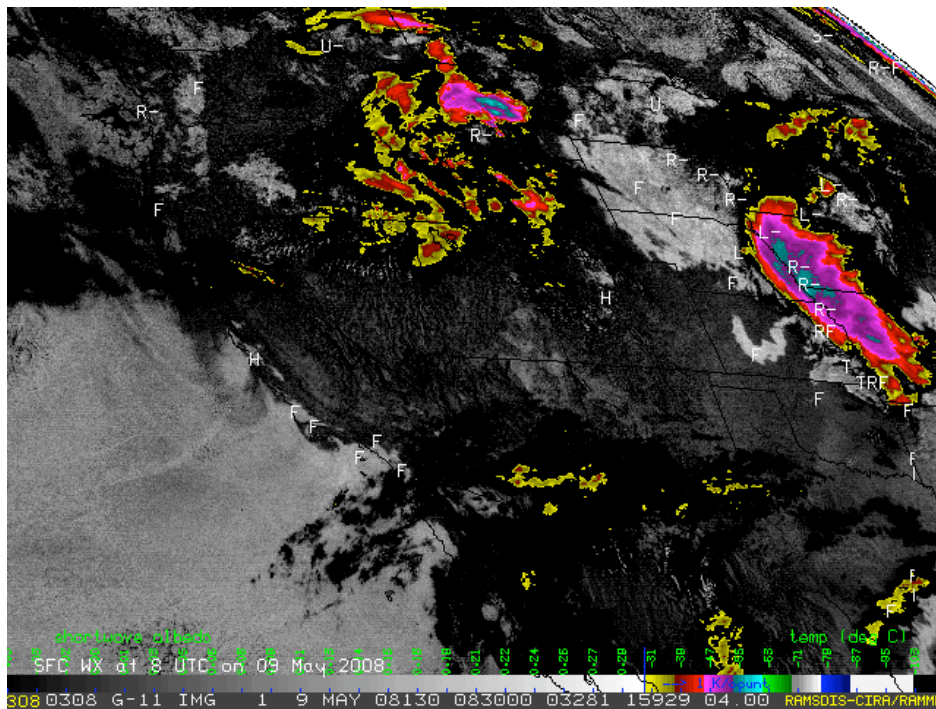
CIRA's Plans for FY08:

- Establishment of the Proving Ground at CIRA
 - Staffing and equipment to ensure robust production
 - Work began on moving RAMSDIS products into AWIPS and creating menu lists with assistance from CIMSS and NOAA/ESRL
 - *NexSat* imagery ingest to require a novel approach
- Develop initial set of ABI prototype products
 - Selected RAMSDIS On-Line products
 - *NexSat* products where applicable
 - CIMSS/SPoRT products where applicable
 - Training materials for all demonstration products
- Foster interactions with neighboring offices
 - Initial contact and site visits to Boulder, Cheyenne, and Miami offices have been established
 - Establish protocols for product ingest & usage
 - Include additional NWS forecast offices (Monterey)

Initial Suite of Proving Ground Products produced by CIRA:

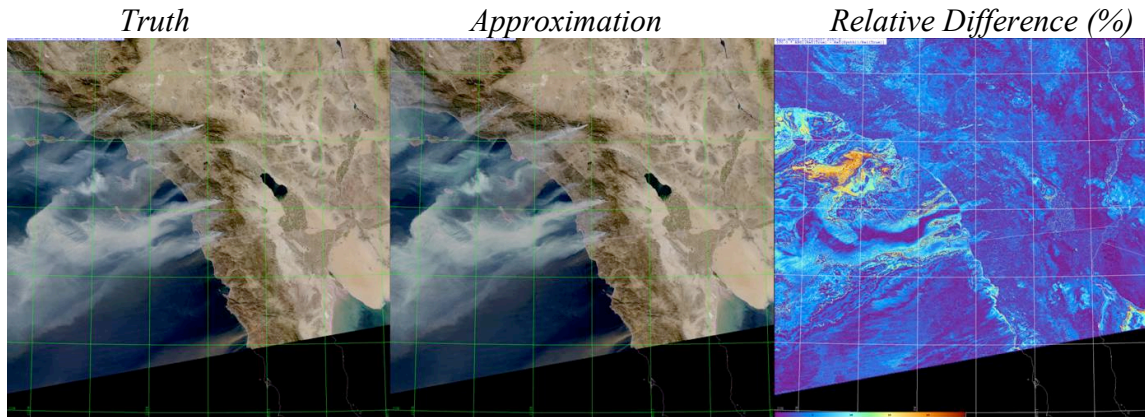
1. Shortwave Albedo Product

Day/night technique with low cloud/fog in light gray to white. High clouds are color-enhanced based on cloud-top temperature. Product is computed from GOES shortwave and longwave spectral bands, to retrieve the reflected component in the shortwave by subtracting the spectrally-equivalent emitted component using the longwave band. Water-drop/fog/stratus show up because of their high reflectance/albedo in the shortwave.



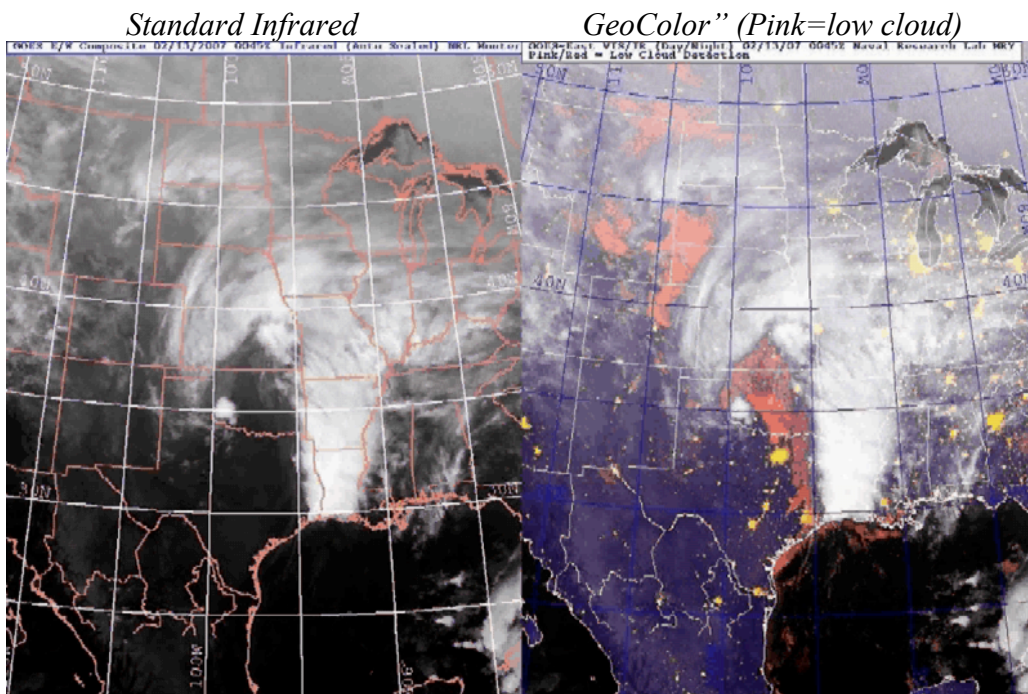
2. Natural color imagery

‘Natural’ or ‘True’ color satellite imagery is preferred by analysts over panchromatic visible because it is visually intuitive, less ambiguous, and has higher information content (feature recognition). It is being produced by synthesizing the missing green band.



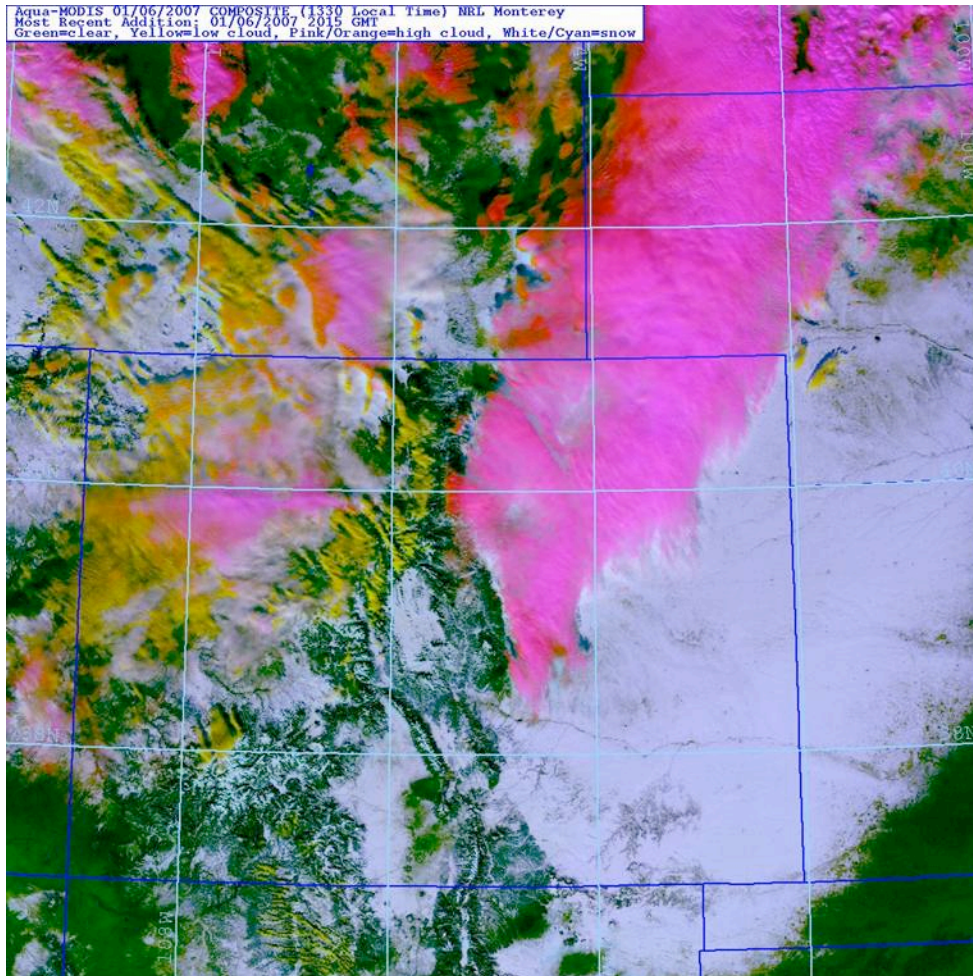
3. “GeoColor” multi-layer blending

The GeoColor technique was originally designed to illustrate the concept of natural color imagery from geostationary orbit (e.g., GOES-R ABI + NPOESS-VIIRS). The technique blends VIS/IR satellite imagery with MODIS blue marble and OLS backgrounds. It soon became apparent that this dynamic blending approach held far more potential for multi-parameter visualization. This dynamic blending approach allows consolidating multiple enhancement techniques into a single value-added image.



4. Snow/cloud discrimination

High spatial resolution snow cover imagery is improved via cirrus filtering using the 1.38 μm band

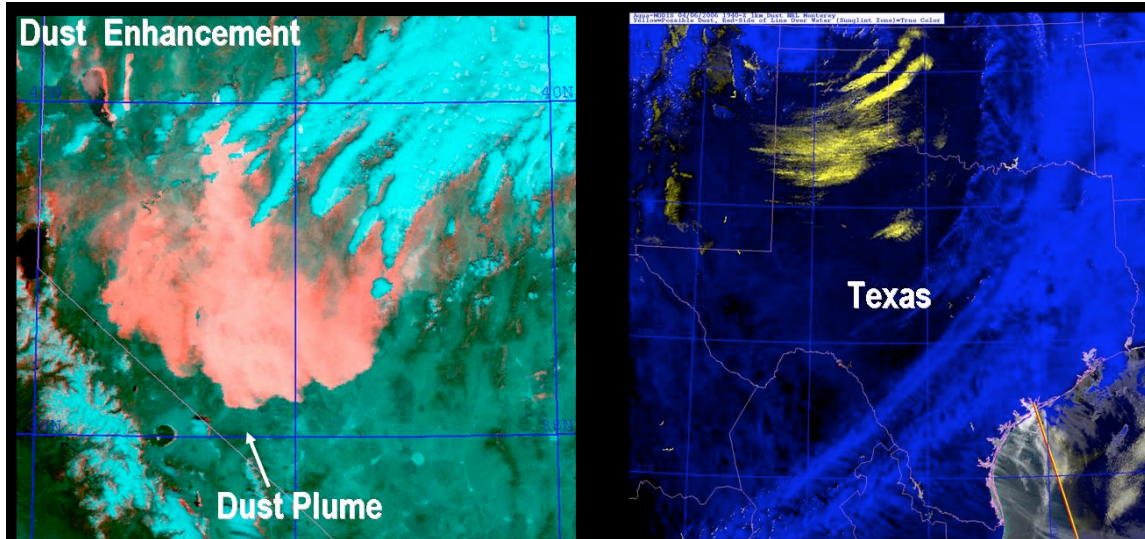


**5. Advanced dust / ash detection:
Blue Light Absorption Technique for Mineral Dust Enhancement**

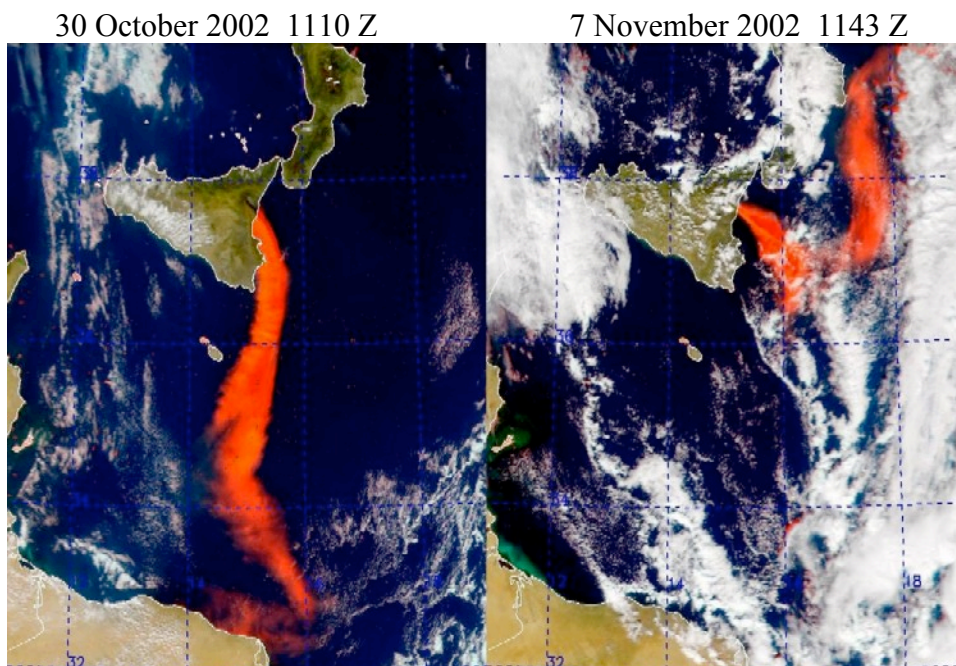
A “normalized difference dust index” (NDDI) is defined as the difference between the reflectance of the red and blue channel normalized by the sum of the reflectance

$$NDDI = (R853 - R469) / (R853 + R469)$$

The “Blue Light Absorption Technique for Mineral Dust Enhancement” techniques uses the NDDI in place of the red channel of a natural color composite to enhance the dusty portion of the scene in pink/red tonality for rapid identification by analysts.



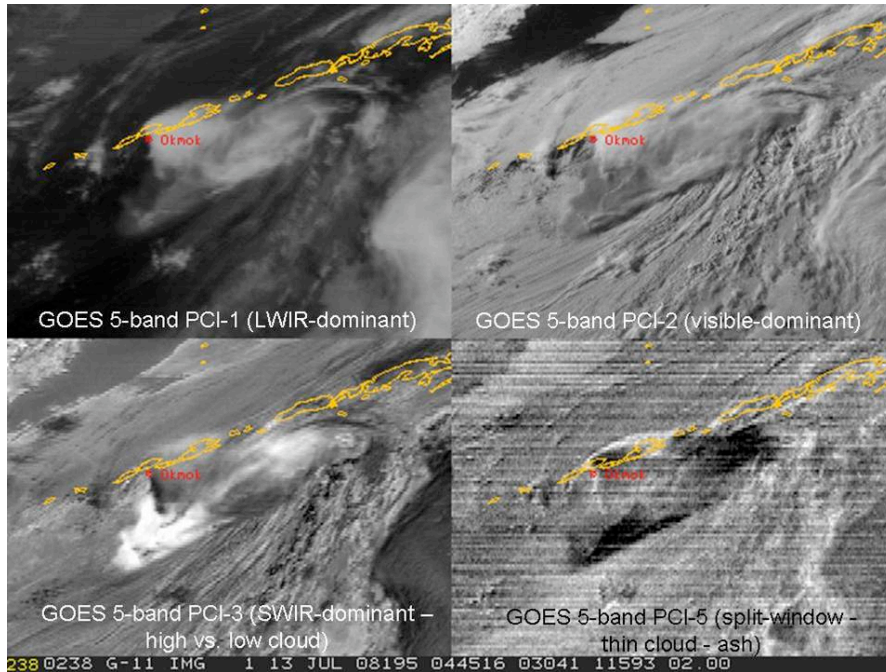
The “Blue Light Absorption Technique” has also been used successfully for volcanic ash enhancement. The figure below depicts the enhancement of the volcanic ash of Etna volcano, Italy, 2002.



6. Advanced ash detection: Principal Component Image (PCI) Analysis

PCIs extract dominant image combinations from the available GOES bands.

In the figure below the PCI technique has been used to conduct an analysis of the initial Okmok volcano eruption from 12/13 July 2008.



PCIs can also be combined using RGB (3-color) analysis (see image below). The colors chosen to enhance the ash cloud, with PCI-2, 3, and 5 as Red, Green, and Blue, respectively. Clear areas in the image are deep purple, high clouds are mainly green, lower clouds are yellow, and heavily-ash-dominated cloud is orange. Note the higher concentration of ash in the plume south of the volcano vs. the plume east of the volcano.

