

Use of VIIRS DNB Data to Monitor Power Outages and Restoration for Significant Weather Events

Gary Jedlovec and Andrew Molthan

Earth Science Office
NASA / Marshall Space Flight Center
Huntsville, Alabama



transitioning research data to the operational weather community



Short-term Prediction Research and Transition (SPoRT)

SPoRT is focused on transitioning unique NASA and NOAA observations and research capabilities to the operational weather community to improve short-term weather forecasts on a regional and local scale.

- close collaboration with numerous WFOs across the country
- SPoRT activities began in 2002, first products to AWIPS in 2003
- co-funded by NOAA since 2009 through “proving ground” activities

Proven paradigm for transition of research and experimental data to “operations”



Benefit

- demonstrate capability of NASA and NOAA experimental products to weather applications and societal benefit
- prepares forecasters for use of data from next generation of operational satellites (JPSS, GOES-R)

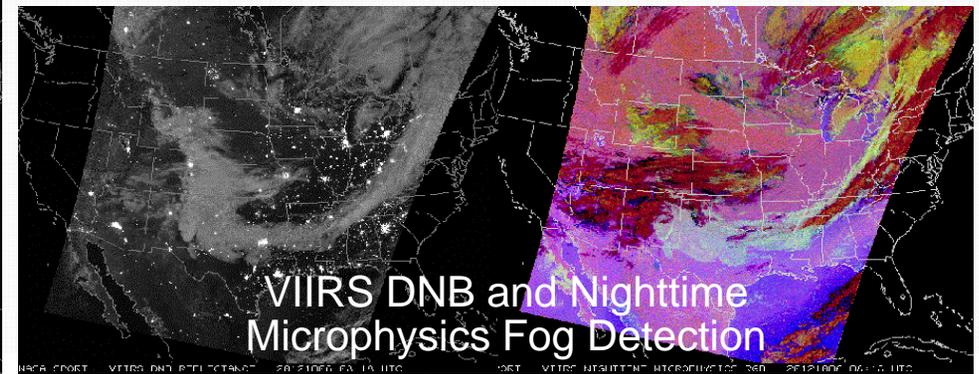
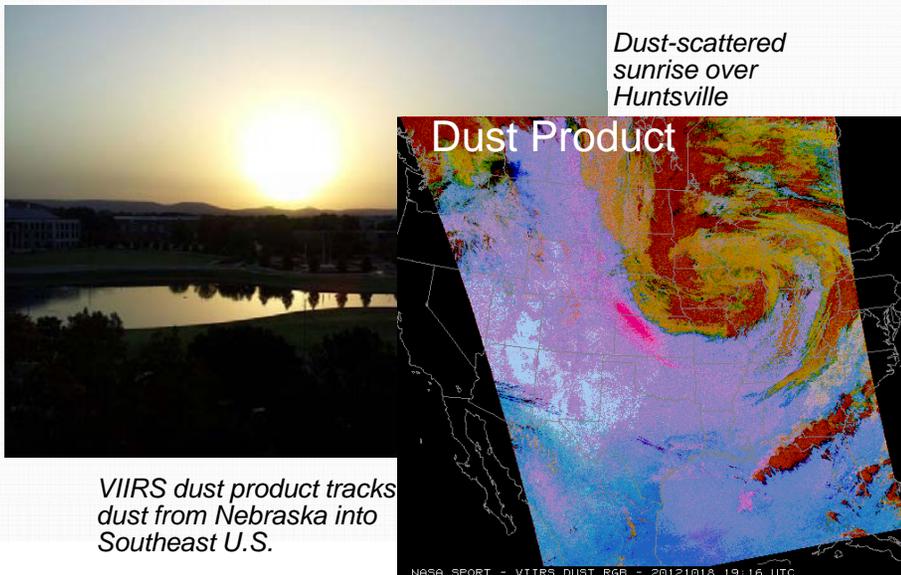


transitioning research data to the operational weather community



Impact of VIIRS on Forecast Activities

- **Increased swath** width provides greater spatial coverage for improved situational awareness
- **Resolution preserved on end of scan** – better feature detection
- **Unprecedented night-time detection** with low light sensor (day-night band, or DNB) helps with detection of low clouds and fog, and atmospheric features missed with infrared alone
- **Multispectral capabilities** for enhanced products
 - enhanced red-green-blue (RGB) composite products
 - use CrIS channels for missing water vapor and ozone channels



transitioning research data to the operational weather community



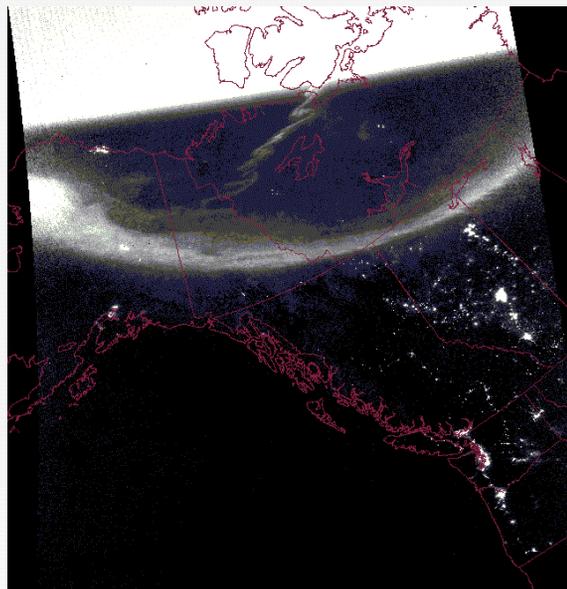
VIIRS (Low light level) DNB

VIIRS day-night band (DNB) senses moonlight (and city light) reflected from clouds, fog, and surface features (snow, etc.) and emitted light from cities, fires and other sources.

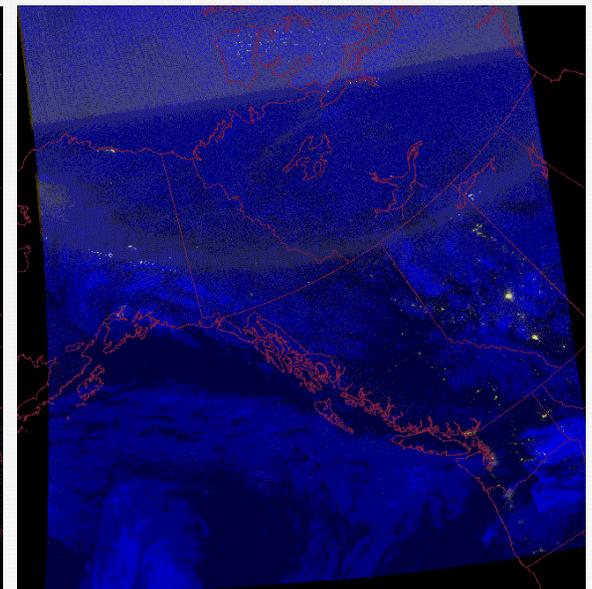
- Very little moonlight is need for a useful product
 - radiance, reflectance (collaboration with CIRA on lunar model)
 - RGB (DNB, DNB, IR)



radiance



reflectance



RGB composite (rad)

VIIRS “Blackout” Product

VIIRS day-night band (DNB) was used to produce a red-green-blue composite product to monitor changes in emitted light from cities

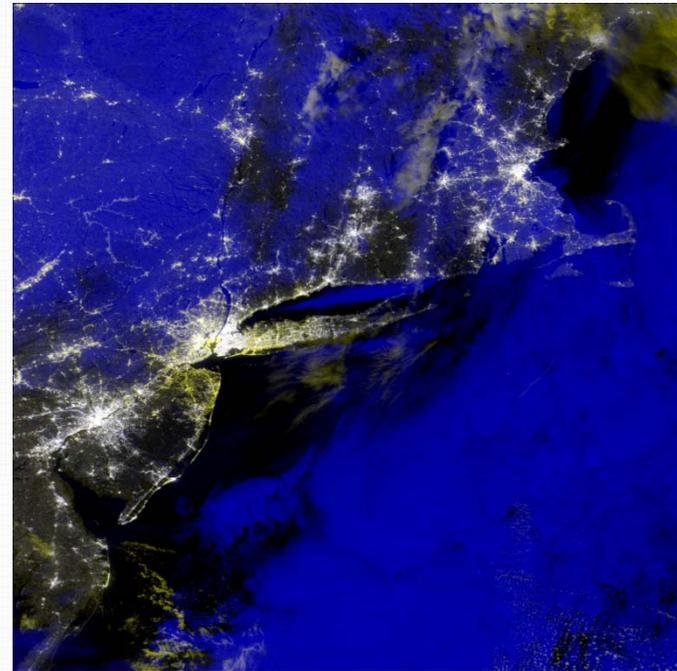
Preliminary work with Hurricane Isaac (New Orleans)

Application to power outages from Superstorm Sandy

- pre-storm data from August 31 combined with post-storm data in a color composite image
- pre-storm “reflectance” data used in red and green channels, post-storm in blue channels
- “bright” sources in pre-storm data but not in post-storm data show up as yellow

City Lights – 8-31-2012

City Lights – 11-04-2012



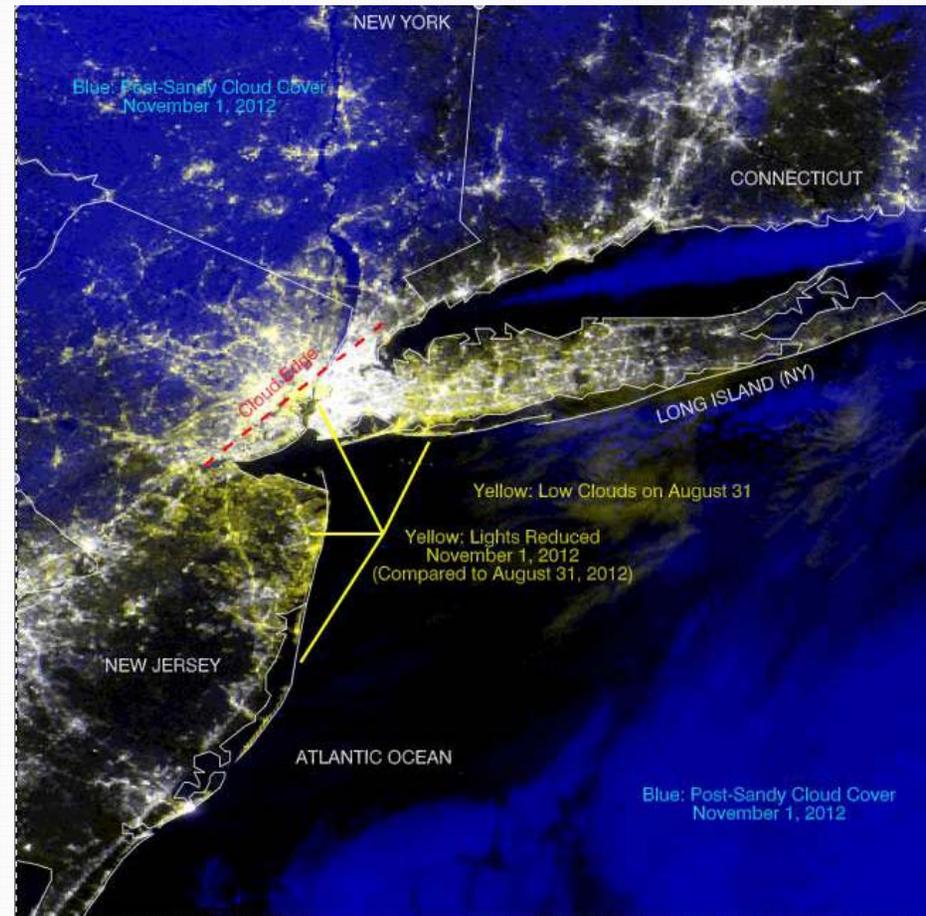
RGB composite image indicating extent of area affected by power outage (yellow)

Blackout Product – Impact and Use

Hurricane Sandy

- Produced a daily (Nov. 1-10) blackout product in near real-time
- Product provided to USGS data portal for use by relief agencies, including the Joint Coordination Element (JCE) mobilized for the disaster
 - FEMA
 - Army Corp of Engineers
 - U.S. Army Northern Command

Post Sandy development work with some of these agencies.



Web Services to Support Disaster Applications

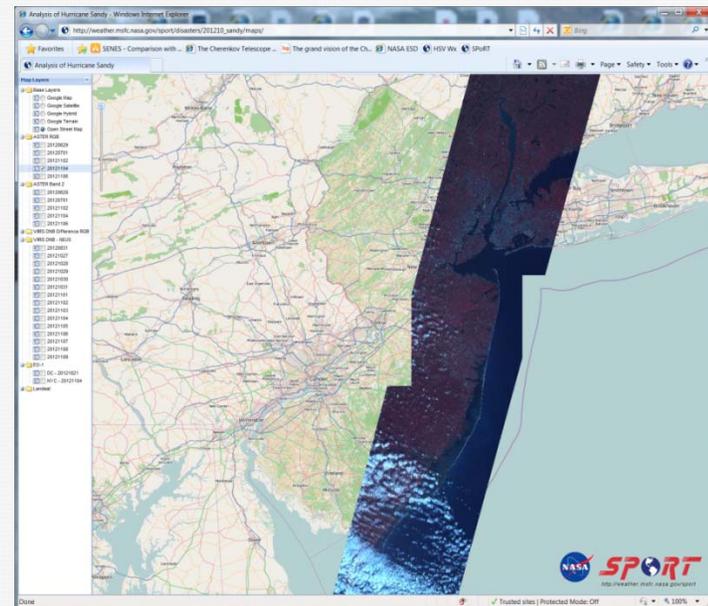
Need for access to data and products supporting disaster applications “anytime and from any place”

SPoRT Web Services

- tiled imagery for a “Google Earth” roam and zoom
- web-based applications - [tiled web service link](http://weather.msfc.nasa.gov/sport/disasters/201210_sandy/maps/)

http://weather.msfc.nasa.gov/sport/disasters/201210_sandy/maps/

- Android and iPhone “apps”



Tiled web service for Hurricane Sandy



transitioning research data to the operational weather community



Conclusion

- Advanced imaging capabilities of VIIRS on Suomi NPP and JPSS has created many unique applications
- Day Night Band (DNB) has the ability to sense relatively small amounts of emitted / reflected visible light at night for monitoring low clouds and fog, smoke, and even surface features
- Products derived from the DNB can be used to detect lights from cities and has particular utility to monitor power loss and restoration from significant weather events
- While the Hurricane Sandy example is atypical, DNB products are being developed (by NASA and the broader community) to monitor power loss for more regional and local applications



transitioning research data to the operational weather community

