



GOES-R / JPSS Proving Ground User Readiness Meeting

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Proving Ground Involvement

- **WFO Huntsville**
 - Satellite Proving Ground participant - since 2003
 - Partnership with NASA SPoRT
 - Advent of AWIPS II era resulted in periodic interruptions
- **GOES-R / JPSS Products Evaluated:**
 - Total Lightning (conceptual proxy for GLM) - since spring 2003
 - North Alabama Lightning Mapping Array – 1km resolution/2-min
 - Source Density, and recently Flash Extent Density
 - MODIS imagery – since spring 2003
 - “Fog” product , “True” Color, Snow Cloud, NT Microphysics
 - Convective Initiation – since summer 2006
 - VIIRS imagery – since summer 2012
 - “Fog” product, NT Microphysics, Day-Night Band



Proving Ground Training Experiences

- **Training Modules**
 - NASA SPoRT and COMET
 - MODIS Fog Product
 - GOES-R CI
 - Total Lightning (NALMA)
 - RGBs
- **Quick Guides**
 - NASA SPoRT
 - GOES-R CI
 - RGBs
 - Total Lightning
- **Verbal Training**
 - SPoRT Team, AIM and SOO
- **AWIPS Procedures**
 - Helped forecasters understand new products in context of familiar products

RGB Night-Time Microphysics Quick Guide by NASA / SpoRT

Why is the Night-time Microphysics RGB Imagery Important?
The distinction between low clouds and fog is often a challenge. While the difference in the 10.8 and 3.9 channels has

Example RGB Night-Time Microphysics Imagery from MODIS - 2011, November 11
Fog and low cloud patterns in similar due to use of 10.8 & 3.9 spectral difference, but the spatial thickness and thermal information provide even greater contrast in the new and old blue colors compared to the standard spectral difference alone.

Low blue indicates colder mid-level clouds in low clouds indicated in the 10.8-3.9 difference.

Example RGB Night-Time Microphysics Imagery from MODIS - 2012, March 25
A full view to give training users (increase in green contributions) compared to "Low Clouds" (with low ceiling and visibility, but IR cooling criteria).

High blue contributions from all colors, but more blue overall indicates areas of low clouds with most observations having low visibility, but IR cooling criteria.

This image is an example submitted by the Corpus Christi, TX WFO. The RGB shows fog in a full view to give training offering the Gulf Coast near Victoria and Port Lavaca, extending to the far northwest of Houston. Low clouds in Texas are seen surrounding Corpus Christi and to the west.

Reference:
This guide provides a highlight of the Night-time Microphysics RGB product at each mission. Operational applications of RGB imagery can be seen on SPoRT's blog site (<http://blogs.noaa.gov/spoort/>). A printed version of the RGB imagery manual can be found at the COMET server (http://www.comet.noaa.gov/SPoRT/RGB_Manual_in_Short_Formation.pdf).

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Total Lightning Quick Guide by NASA SPoRT

What is Total Lightning?
Total lightning observes both cloud-to-ground strikes and intra-cloud flashes. On average, the majority of all lightning flashes in a given thunderstorm are intra-cloud flashes. A much more lightning sensitive for more information from National Lightning Detection Network data alone. Furthermore, the amount of total lightning is related to a storm's overall updraft strength in the mixed phase region. Total lightning is currently available from ground-based lightning mapping arrays (LMAs) in the CONUS area. Total lightning will be available from the Geostationary Lightning Mapper (GLM) that will provide observed full-day coverage.

Product Categories
NASA SPoRT provides two total lightning product sets. These include the ground-based LMA observations at a 2.5 km resolution and SPoRT's satellite geostationary lightning mapper (Polar) product suite with 8 km resolution. The Polar demonstrates future GLM capabilities. The operational uses below are valid for either product set.

Advantages of Total Lightning

- More observations than National Lightning Detection Network data alone.
- Spatial extent of a lightning flash (i.e. 10, not a point observation).
- Subminute update rate (updates of 3.2 minutes).
- Total lightning is most heavily related to a storm's updraft strength in the mixed phase region.
- More total lightning equals a much stronger storm updraft and vice versa.
- Special case: **Lightning Juggo**, one often produces severe weather.
- Can generate severe weather by 10-20 minutes.

Operational Uses

First Cloud-to-Ground Lightning Strike Lead Time

- On average, the majority of all lightning flashes are intra-cloud.
- Approximately 90% of thunderstorms include with an intra-cloud flash.
- Often, the first intra-cloud flash will precede the first cloud-to-ground strike by 5 minutes.
- Can enhance Airport Weather Warnings, Terminal Area/Arrival Forecasts, and improve lightning safety.

Anomalous high probability of CI assigned to missed cirrus

Last Modified July 2013

4. Cloud-to-Ground
5. What is Meant by
6. What is Meant by
7. What Does Intra-C
8. What is the Sound
9. Viewing in AWIPS
10. Four Panel Anis
11. What are the Pri
12. Lightning Guide
13. Forecaster Quick
14. Forecaster Quick
15. Summary

For fog and low clouds the thickness may vary, therefore the RGB green and red contributions also vary. Thick cloud or fog that extends above the surface may have nearly equal amounts of red and blue contributions with large amounts of green in the RGB. This combination produces the aqua color as we might expect for low clouds or fog in warm climates.

The 3.9 channel is subject to noise at very cold temperatures. Fog at high latitudes in winter may have noise in the pixels representing fog. Similarly, the depiction of very high, cold clouds (i.e. cumulonimbus tops) will have yellow pixels mixed in areas of dark red for this RGB due to the 3.9 channel noise at such temperatures.



Proving Ground Training Experiences

- **With all of the training just mentioned...**
 - Was the forecast staff prepared to use the products in operational context (forecast process and/or warning process or both) after the training?
 - **Yes...and no.**
 - Yes – They were prepared as a **beginning user** of the product. They had relevant background information and most questions about suggested use of the product were answered.
 - No – They were not prepared as an **expert user** of the product. Forecasters have demonstrated a necessary familiarization period with new, experimental products...**at least 4 weeks in most cases.**
 - Forecaster, “How much of an increase is enough for a lightning jump?”



Proving Ground Training Experiences

- **Strengths and Weaknesses**
 - Strengths of modules and quick guides
 - Serve as good introductions to a new product
 - Can be accessed at any time by forecasters
 - Contain useful examples
 - Weaknesses of modules and quick guides
 - Forecasters can't ask questions
 - No real-time examples
 - Don't typically contain enough examples detailing exactly how a product can be used

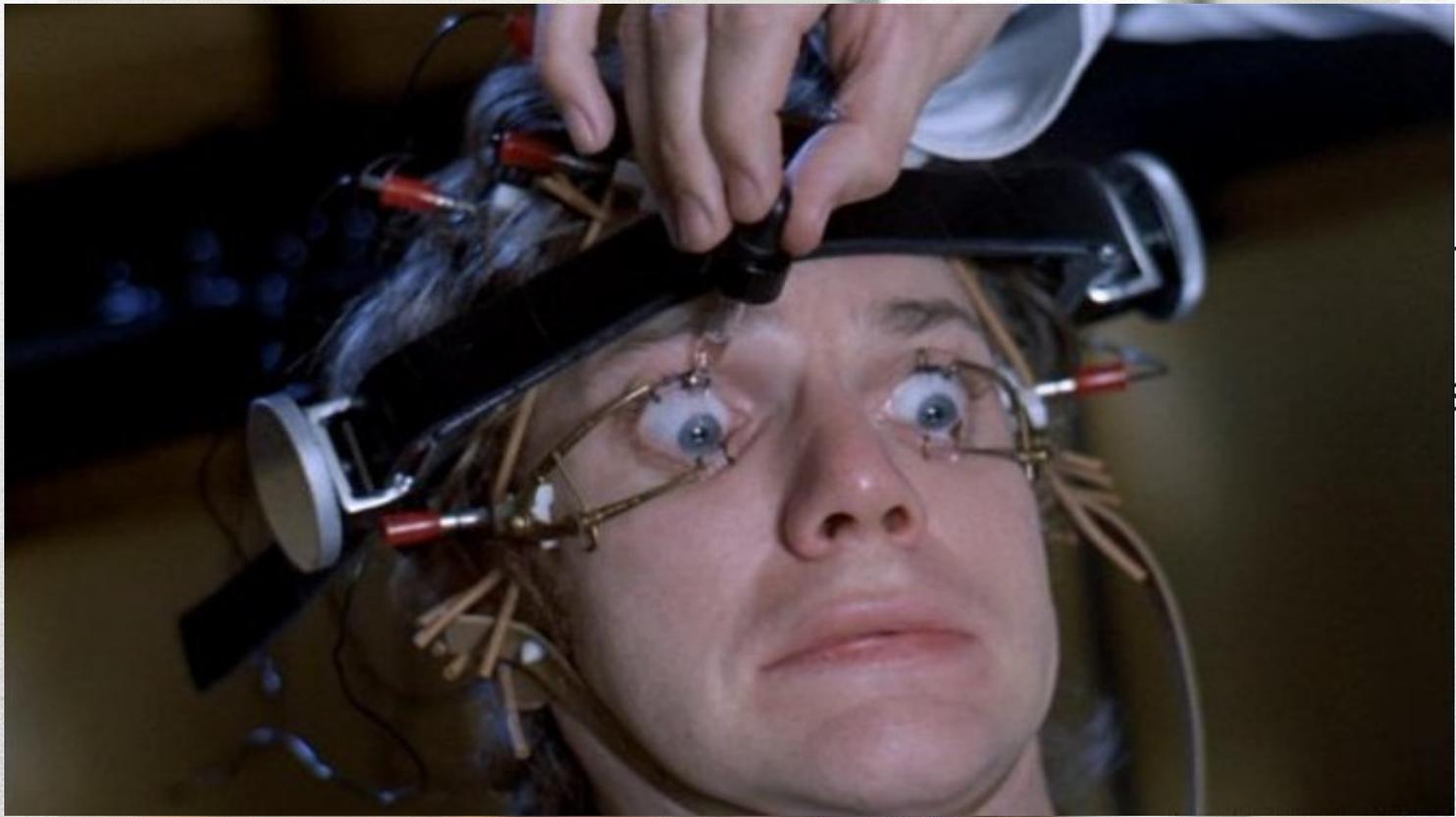


Proving Ground Training Experiences

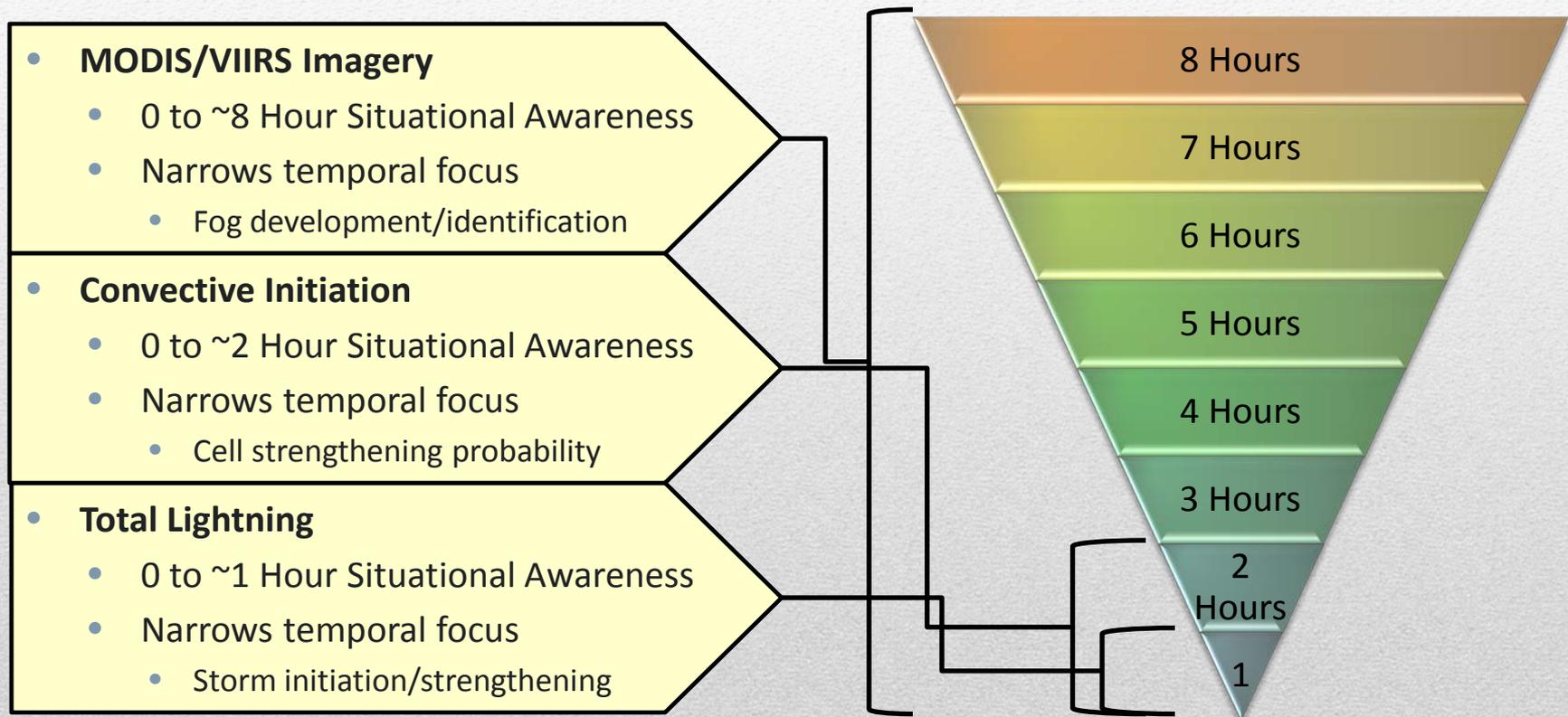
- **Strengths and Weaknesses**
 - Strengths of verbal training
 - Serve as good introductions to a new product
 - Forecasters CAN ask questions
 - Can contain archived or real-time examples
 - Weaknesses of verbal training
 - Product experts are not always available
 - May have limited time to interact with forecasters due to operational demands



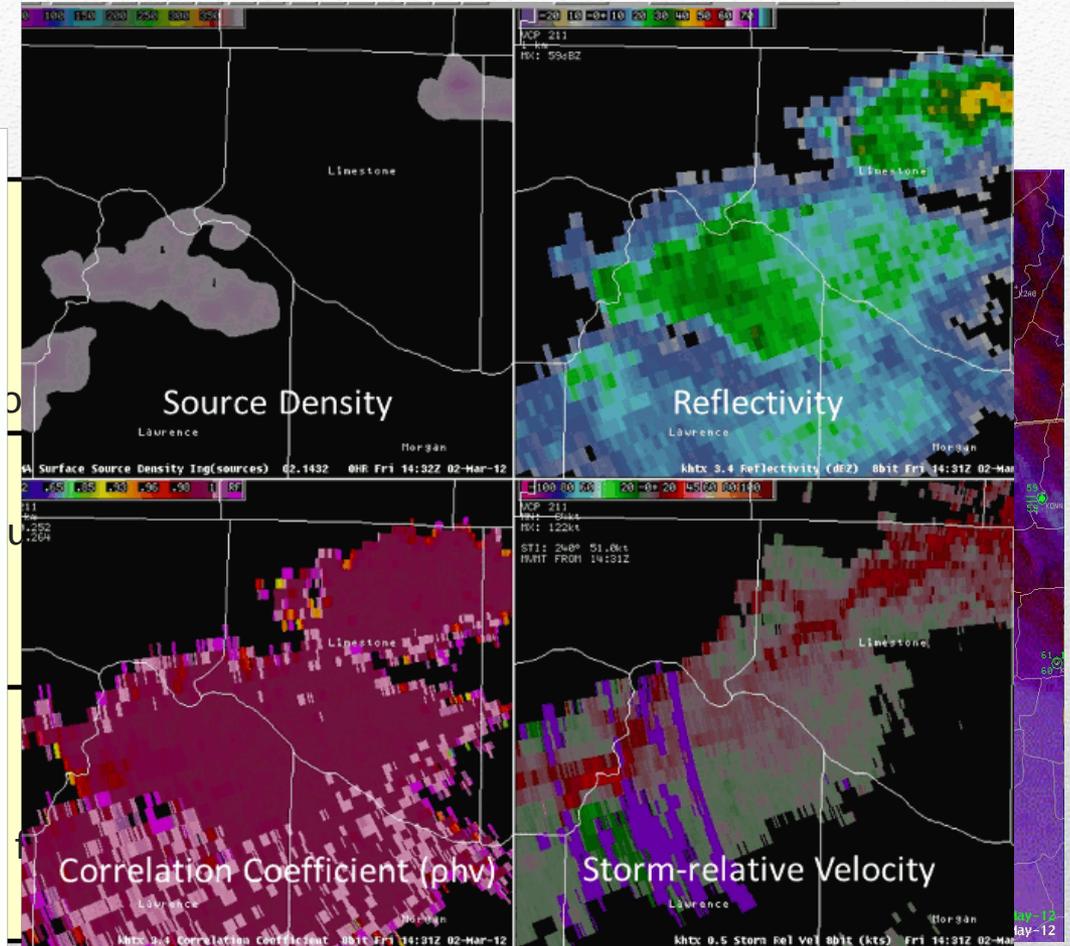
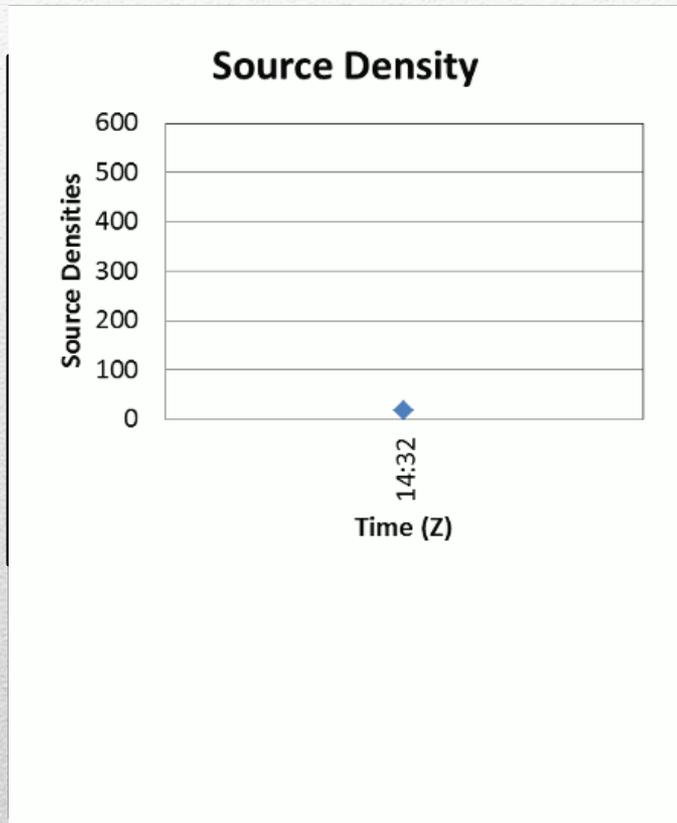
Proving Ground Training Experiences

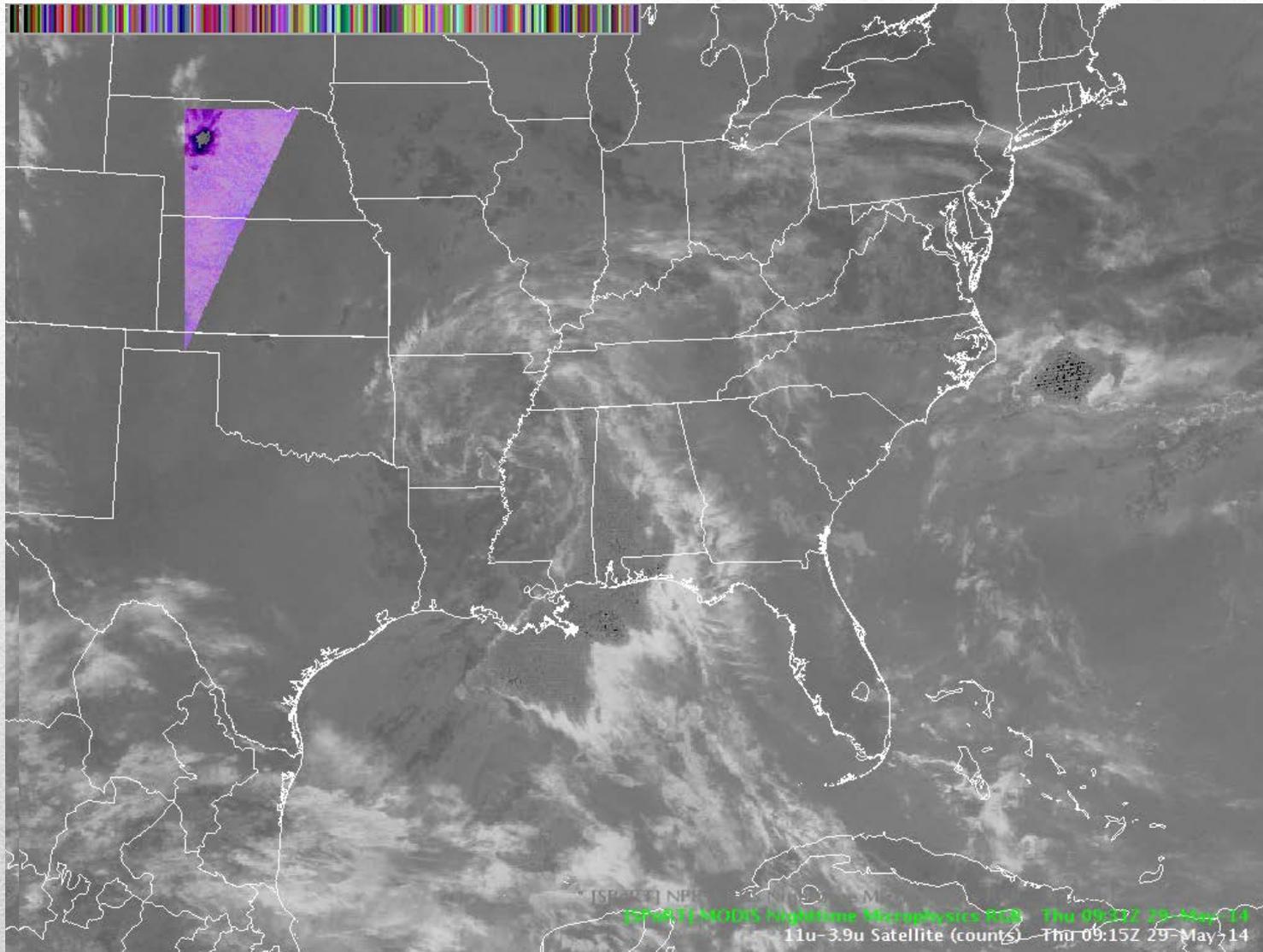


Product Evaluations and Operational Relevance...



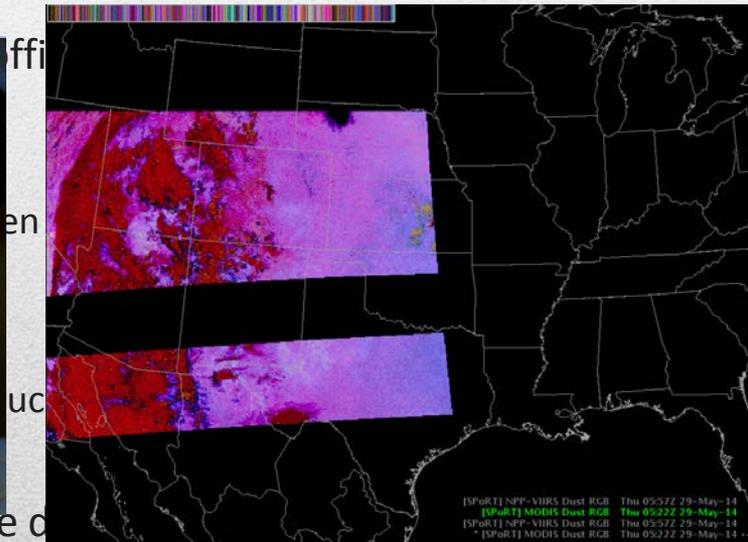
Product Evaluations and Operational Relevance...





Product Evaluations and Operational Relevance...

- **Product Weaknesses**
 - Overarching problems



- Too much other data to incorporate
- Not readily apparent what constitutes a lightning “jump”
- Degradation with range from center of network

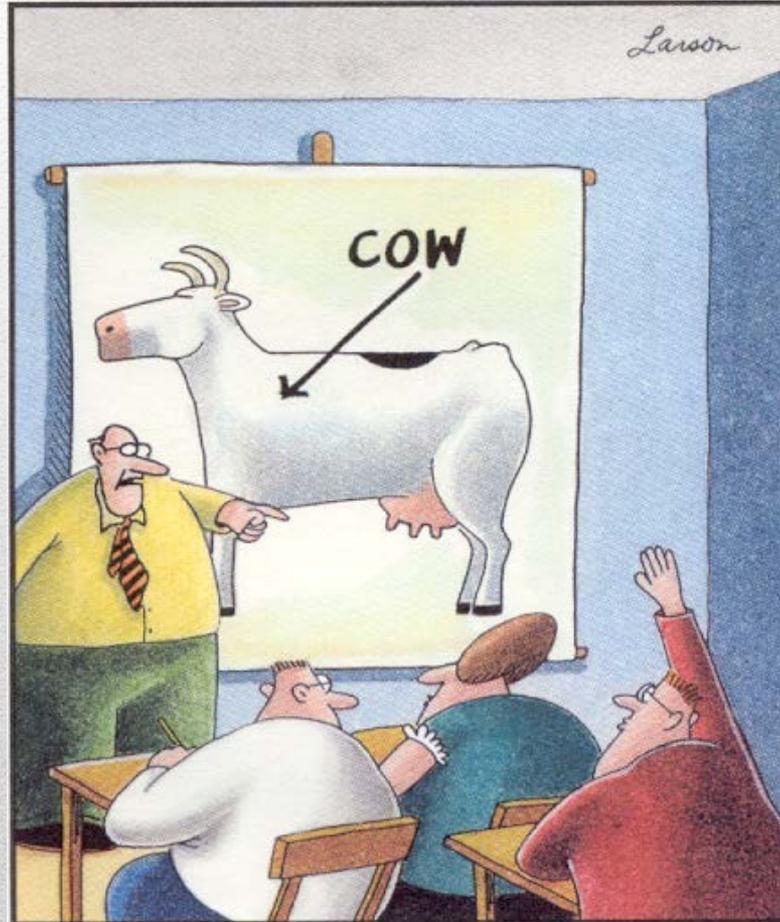


User Readiness

- **Change status of some PG products to “operational” before GOES-R and JPSS launches approach?**
 - Less data lag and drop-outs
- **Work to broaden reach and scope of PG training**
 - Buy-in from regional SSD chiefs?
 - Establish PG or satellite focal points (forecasters or SOOs)
 - Help ensure proper use of products, training completed
 - Create AWIPS procedures providing context for proper usage
- **RGBs**
 - Decrease lag in data ingest (if possible)
 - Fusion with other familiar legacy satellite imagery (i.e., hybrid imagery)
 - It’s polar orbiting...ok. Don’t intend imagery to address forecast challenges most of the time, they won’t. Stress it’s a training aid for future imagery.
- **Total Lightning**
 - Need tools or other data visualization to signify lightning “jumps”
 - Moving Trace Tool or color visualizations to data



Questions?



"Yes ... I believe there's a question in the back."

