

# Blended Products in the GOES-R Satellite Proving Ground

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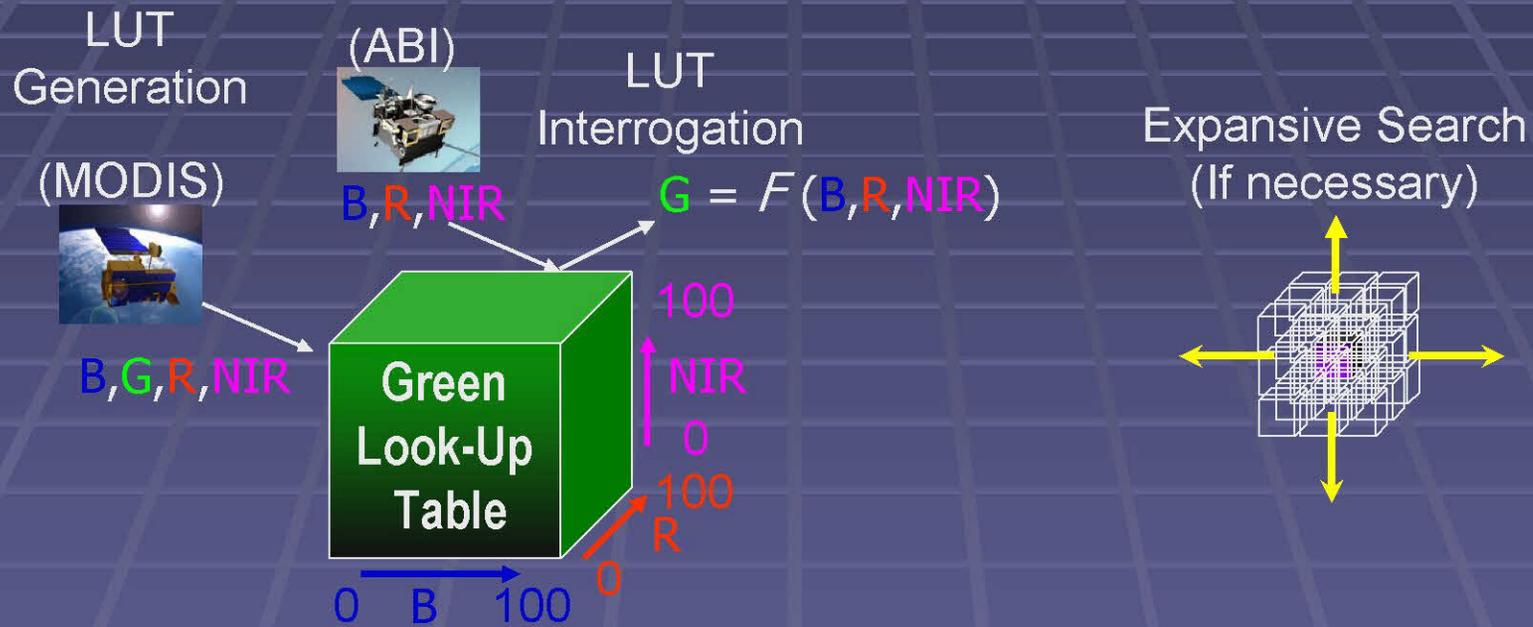


# What are Blended Satellite Products?

- Augment the information available from any single source of satellite data, including:
  - Incorporating *multiple sensors*
  - Coupled to *model information*
  - Use of *current* or *statistical* information, or hybrids
  - *Synthesis, composite*, or hybrids
- Break down the single-sensor / single-product ‘stovepipe’ philosophy to application development
- Require a broader infrastructure providing access to myriad datasets and tools
  - STAR’s “Satellite Algorithm Testbed”
  - Coordination among multi-agency/international resources

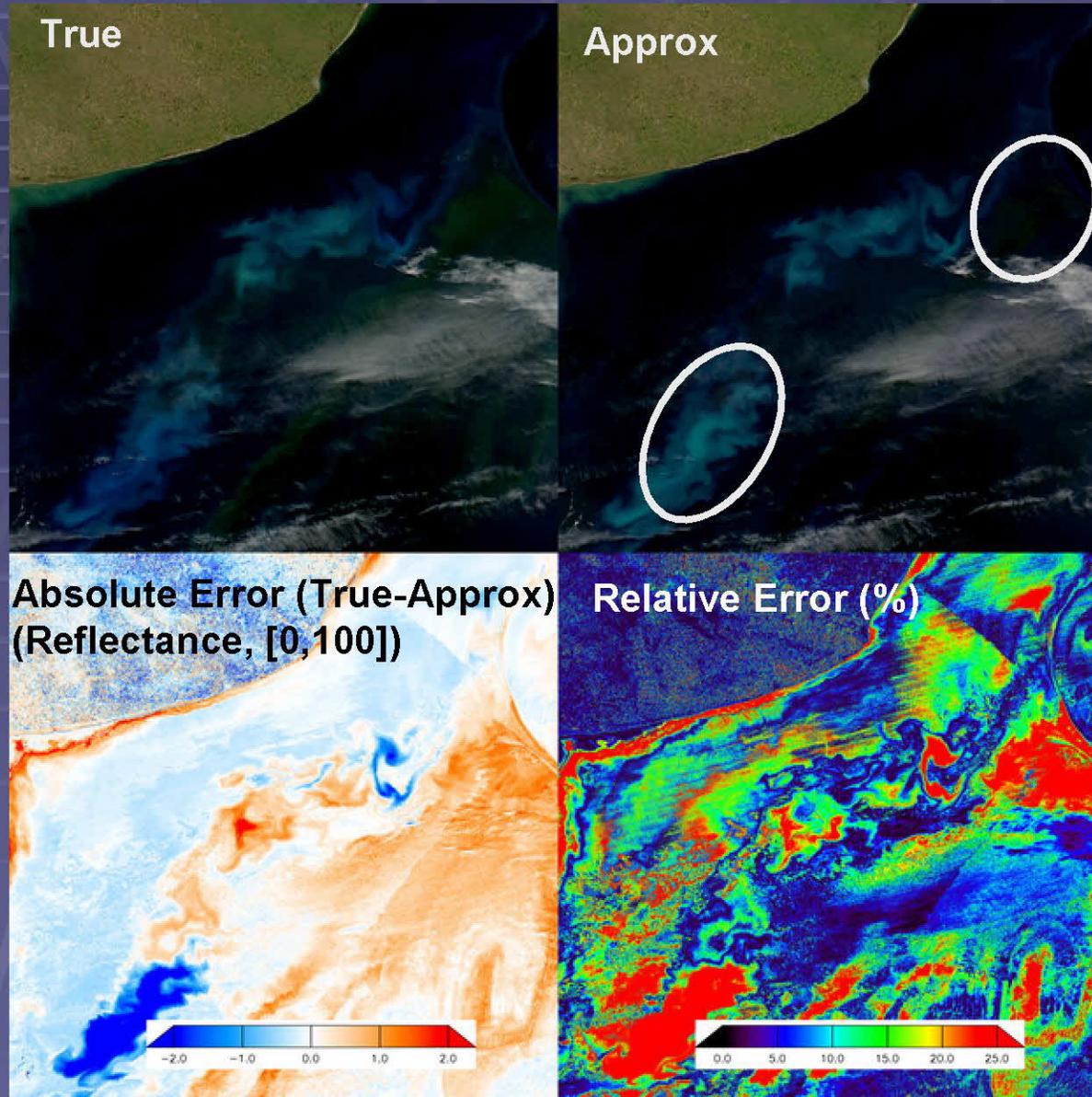
# 1. True Color from the ABI

*(Multi-Sensor, Current+Statistical, Synthesis)*



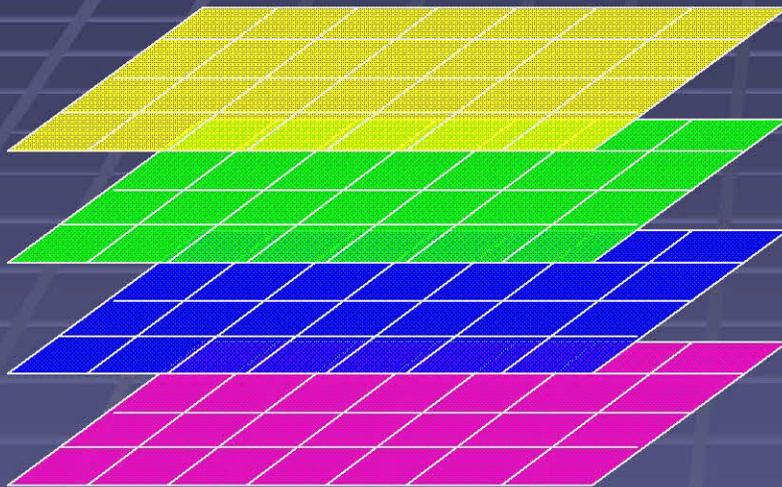
→ Blending provides a way to create missing data in order to approximate true color imagery from the ABI

# 'Synthetic' True Color Examples

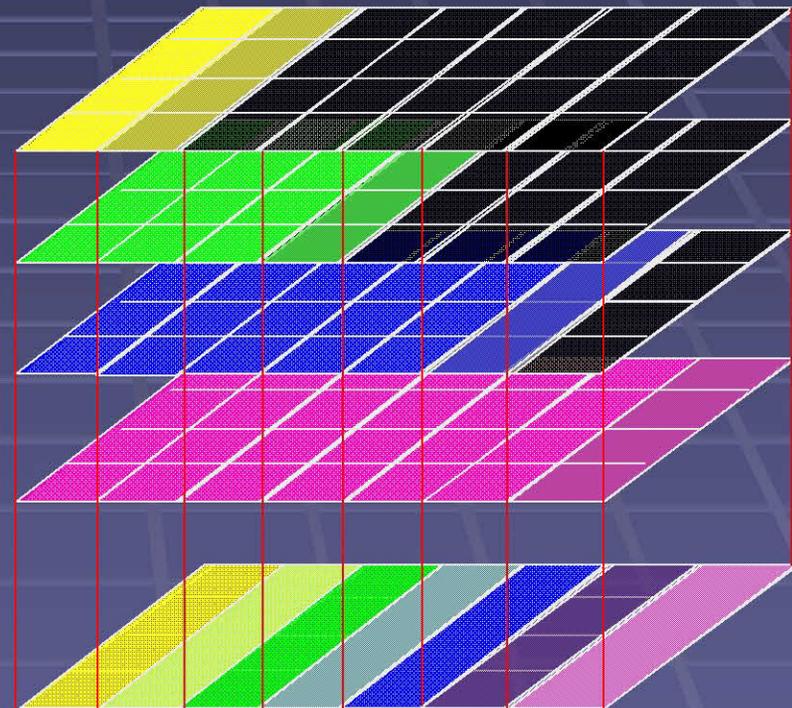


## 2. GeoColor Blended Imagery (*Multi-Sensor, Synthesis/Composite*)

Layers of Information



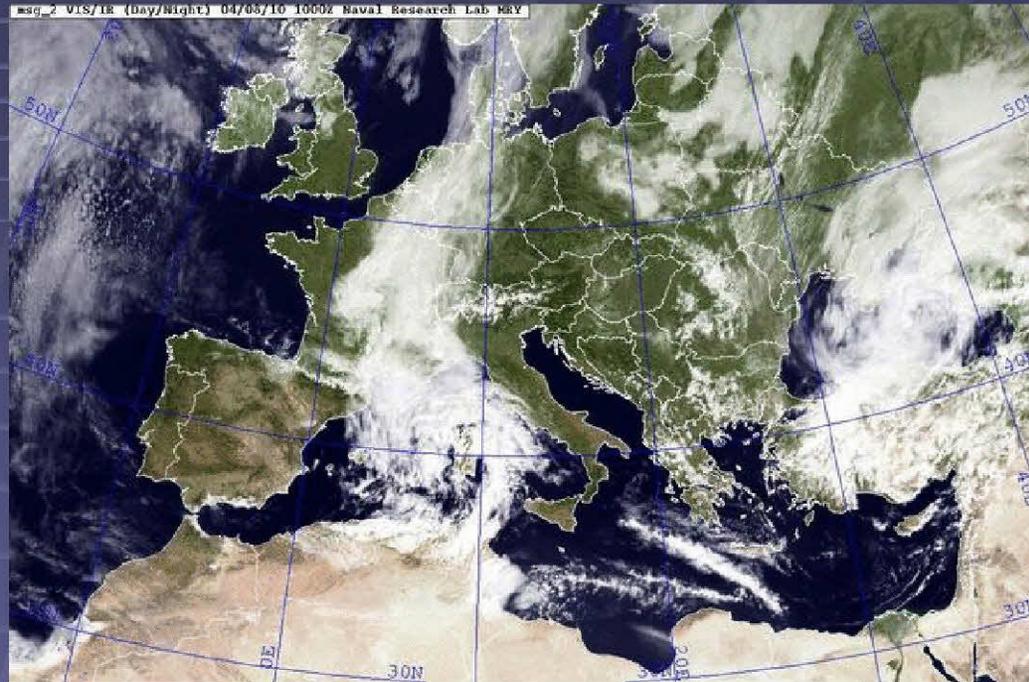
Spatial Opacity Rules



Blending is accomplished both in the vertical and horizontal dimensions

“*N-dimensional blending*” allows for simultaneous display of multiple GOES-R AWG products, day & night, with dynamic transparency factors defined at the pixel level.

# GeoColor Example over Europe



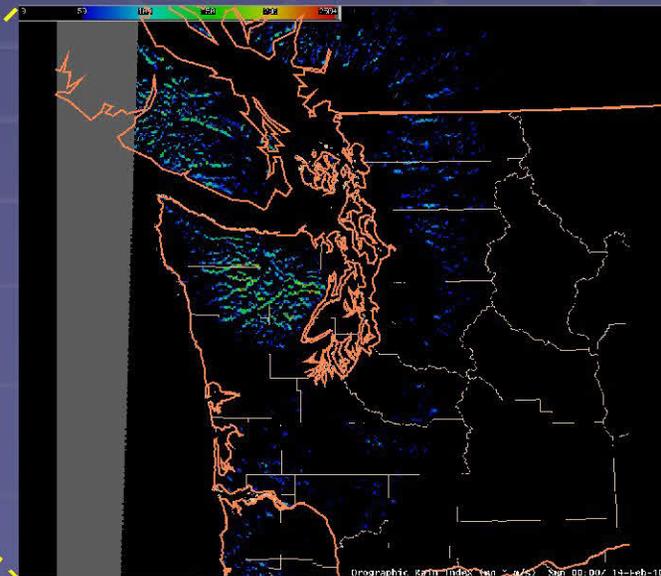
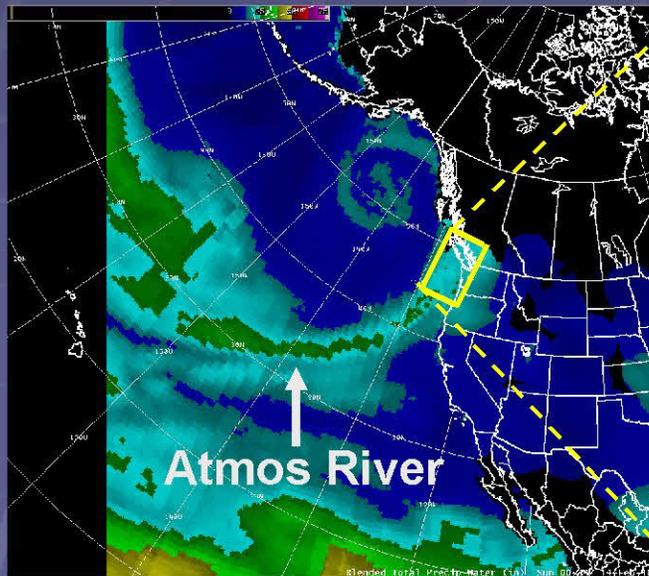
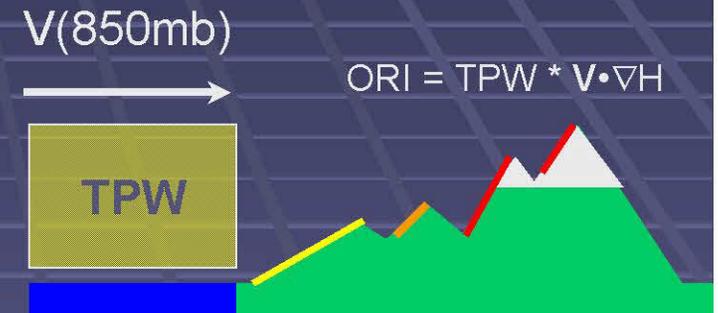
- By combining with MODIS backgrounds, the GeoColor application of N-Dimensional Blending anticipates geostationary true color imagery.

# 3. Orographic Rain Index (ORI) (*Multi-Sensor, Model-Coupled, Composite*)

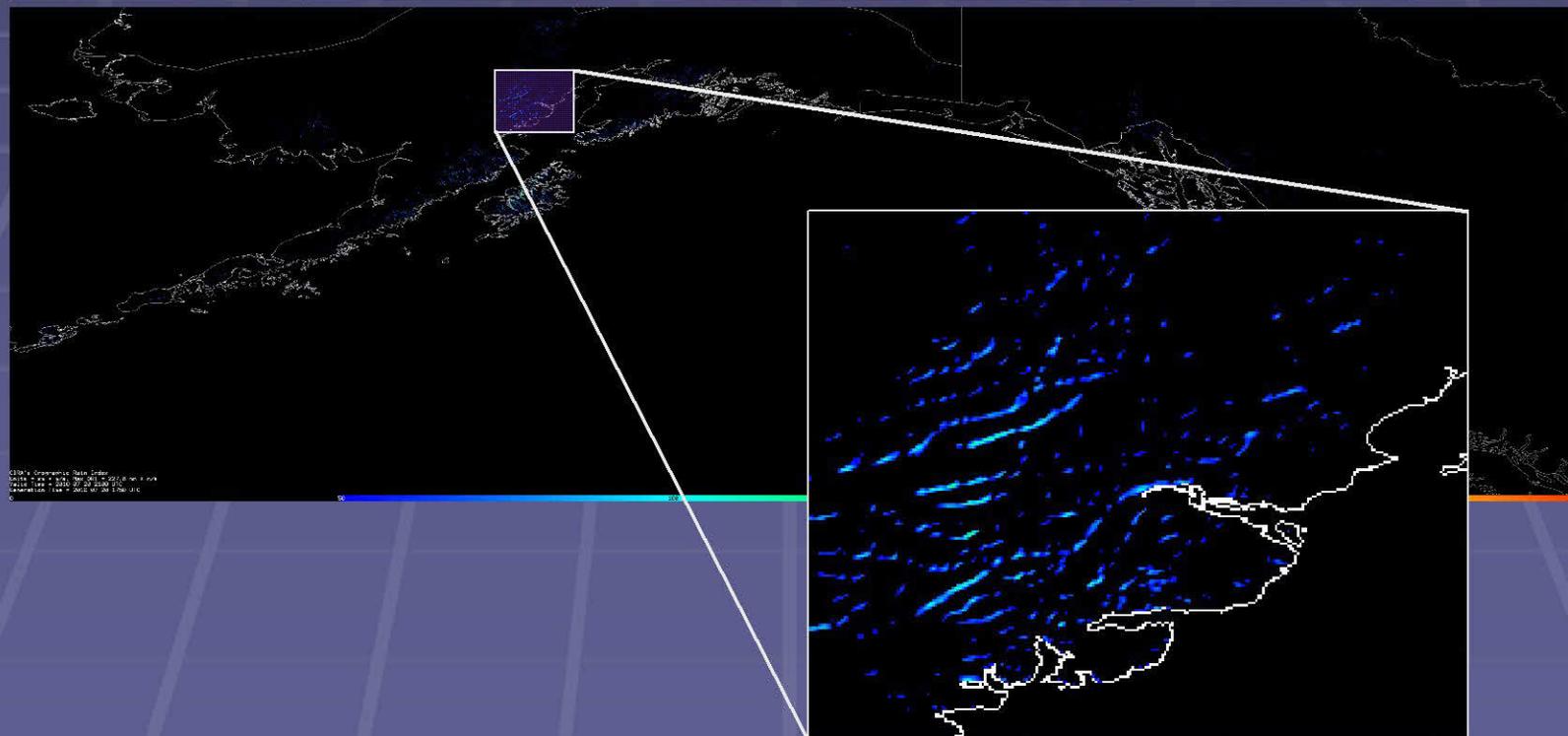
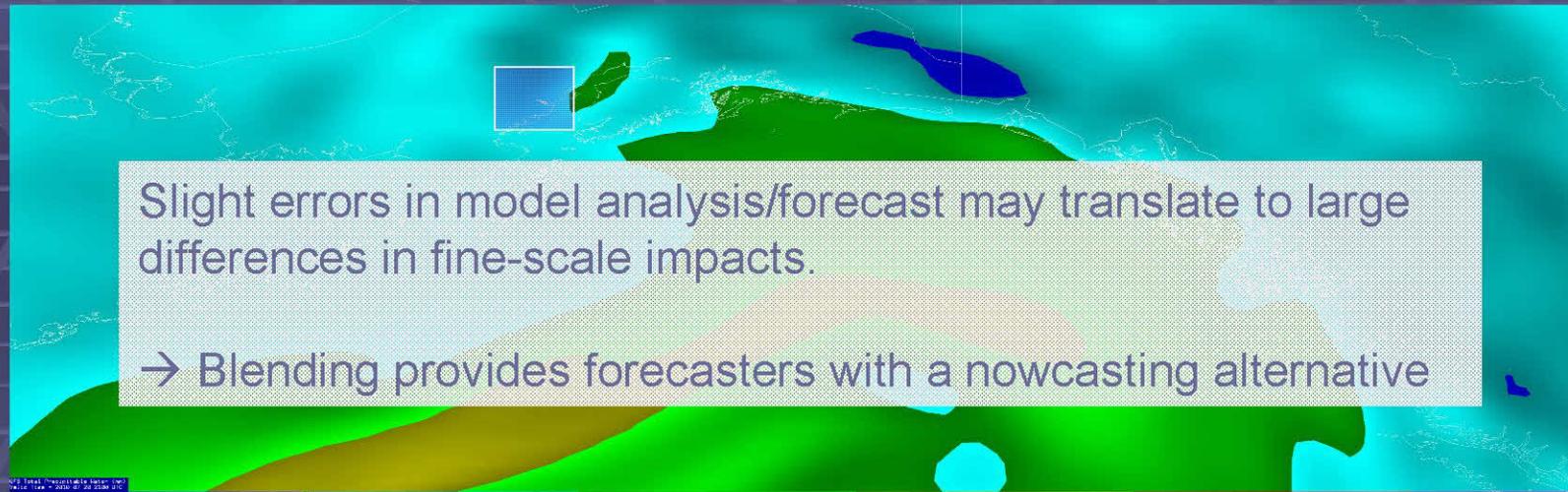
Incorporates:

1. TPW retrievals from GOES/AMSU/GPS
2. Model wind fields from GFS
3. High resolution (30 s) terrain database

Predicts where land-falling moisture plumes impact strong terrain gradients.



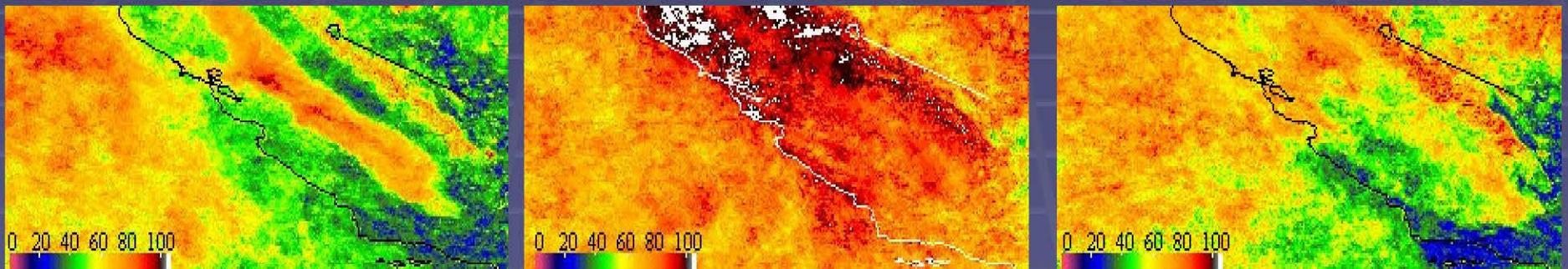
# Alaska Domain Example



# 4. Conditional Cloud Climatology (*Statistical, Model-Coupled*)

- Cloud cover statistics compiled for specific conditions, e.g.,
  - Prevailing wind direction / speed
  - Sea level pressure differences at reference points
  - Geometric thickness of stratus deck at particular location & time

**San Francisco, CA January 1998-2002 1900 UTC**



Calm wind (< 5 m/s)  
31 Cases

Southwest wind  
24 cases  
Cloud Cover (%)

Northwest wind  
25 cases

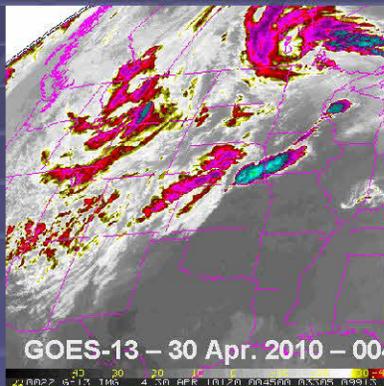


→ Climatologies provide an outlook for cloud coverage time series under the assumptions of forecasted conditions.

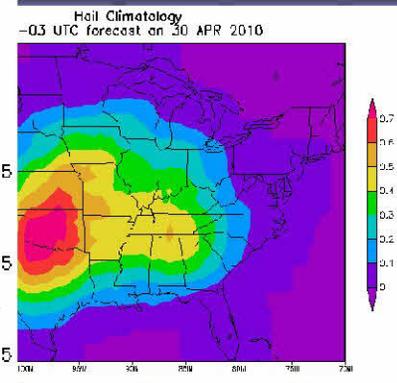
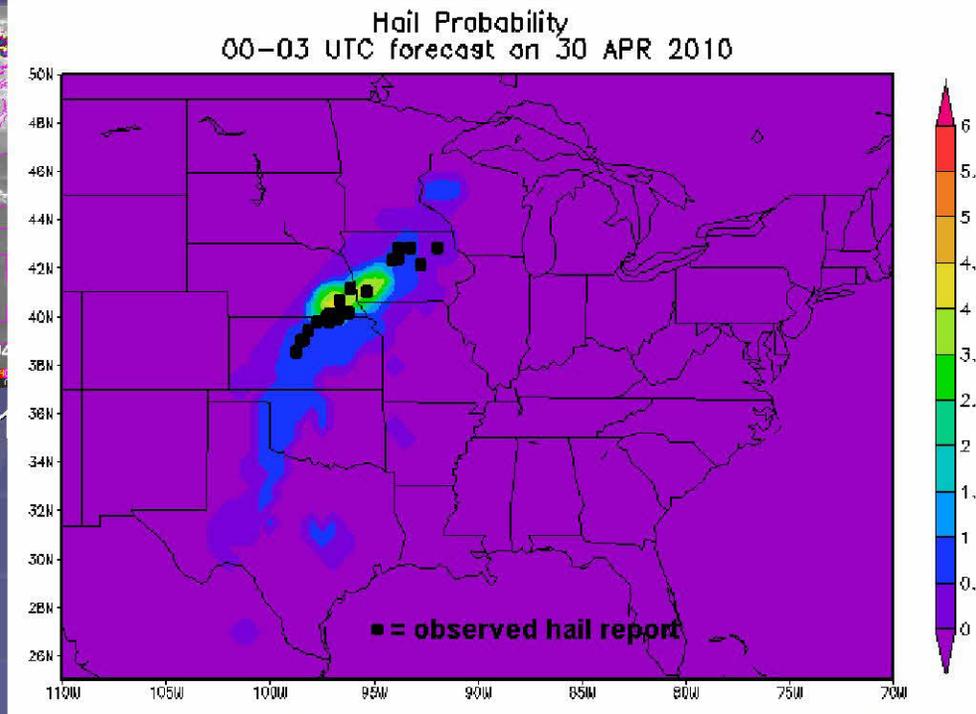
# 5. Hail Probability

*(Current+Statistical, Model-Coupled, Synthesis)*

- Short-term (0-3 hr) prediction of 1-inch (or greater) diameter hail, based on several inputs:



Current GOES



Regional hail climatology

→ Synthesizes current satellite data, model data, and surface observation statistics to provide a targeted decision aid.

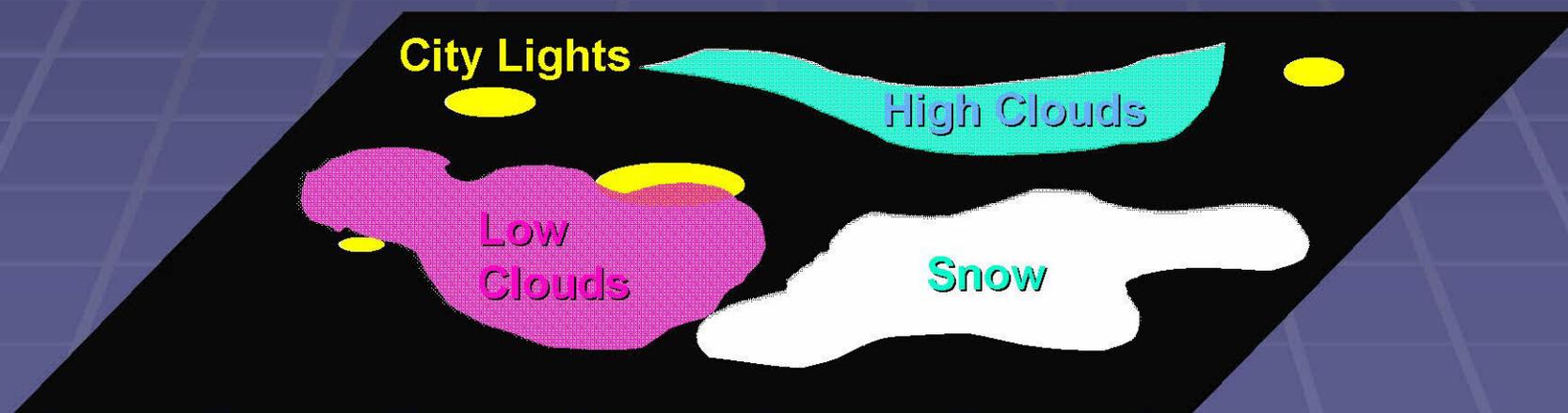
## 6. Snow Cover at Night (*Multi-Sensor, Composite*)



Nighttime Visible Band Only (DMSP/OLS)

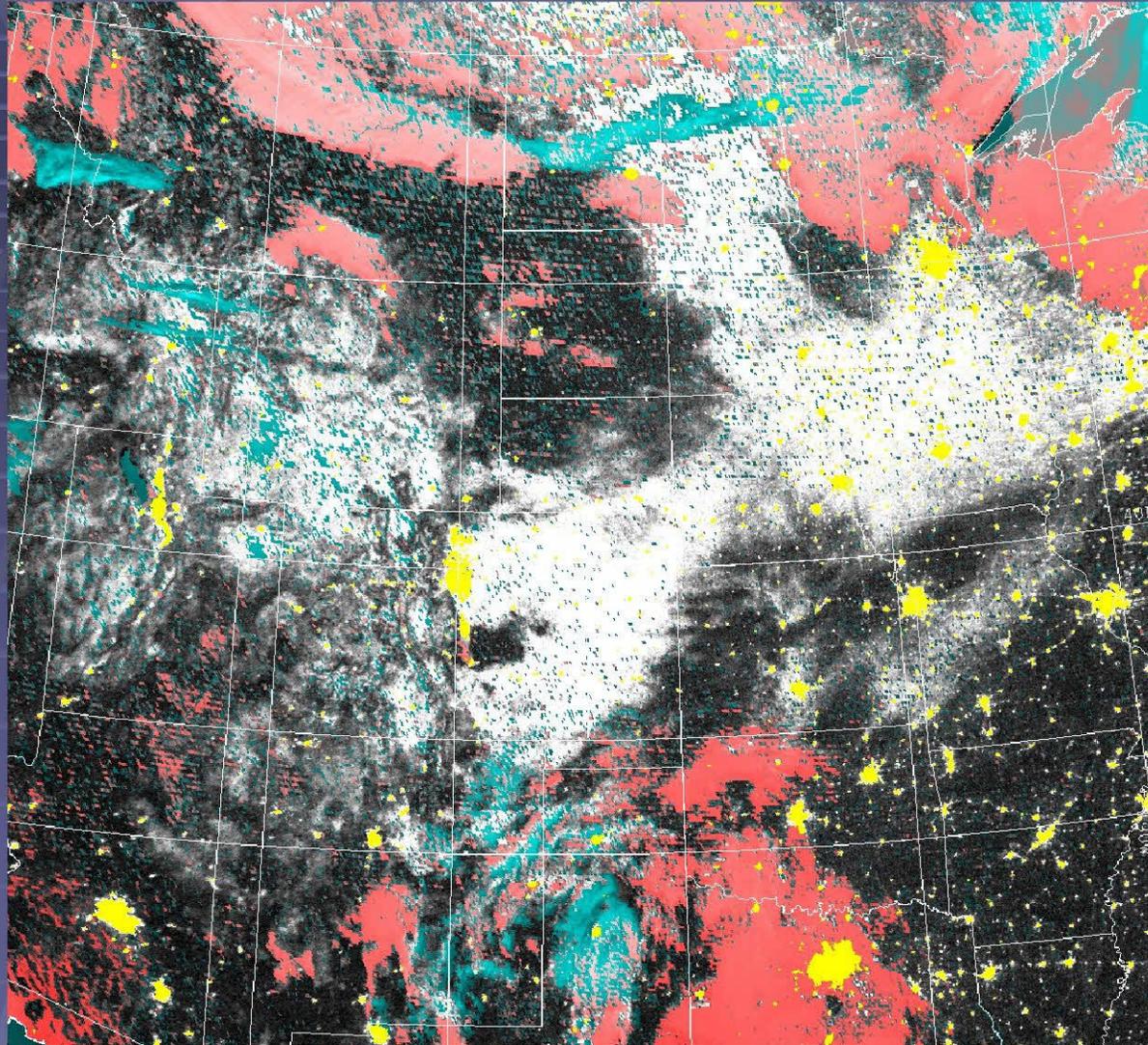
Add Stable Night Lights Mask

Add High/Low Cloud Detection (GOES)



→ Combine LEO and time-matched GEO to provide augmented channel suite for improved discrimination. <sup>11</sup>

# Central U.S. Example



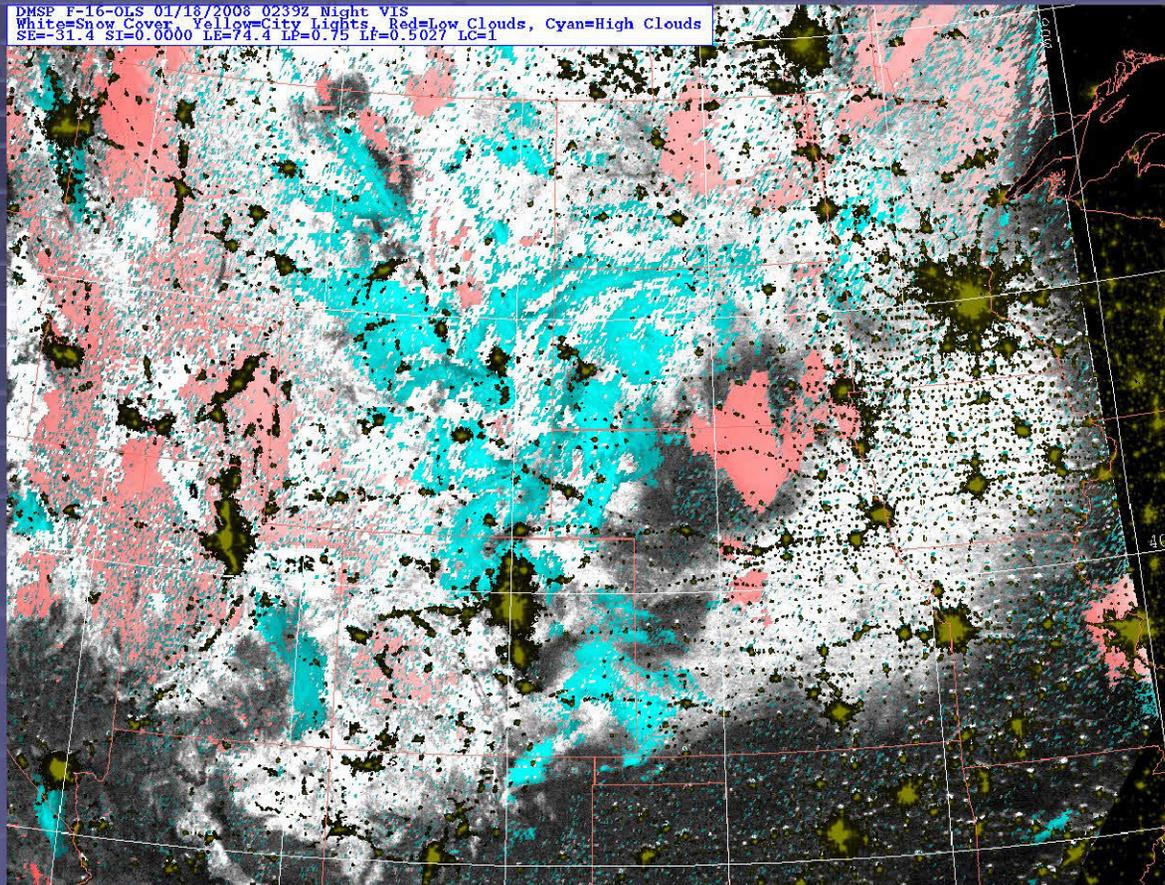
Low  
Cloud

High  
Cloud

City  
Lights

Snow  
Cover

# Quasi-Loop



Low  
Cloud

High  
Cloud

City  
Lights

Snow  
Cover

→ Potential for further blending via N-dimensional technique (coupling VIIRS/OLS with ABI).

# Summary

- Blended products enable applications that are unavailable from single sensors/platforms. Get toward real user needs.
- The Proving Ground is a natural test bed for the vetting of blended products in the operational user community.
- Research and development centers (CIMSS, SPoRT, CIRA) are logical partners for the development of blended products.