



Severe Weather/Lightning: Operational Perspective

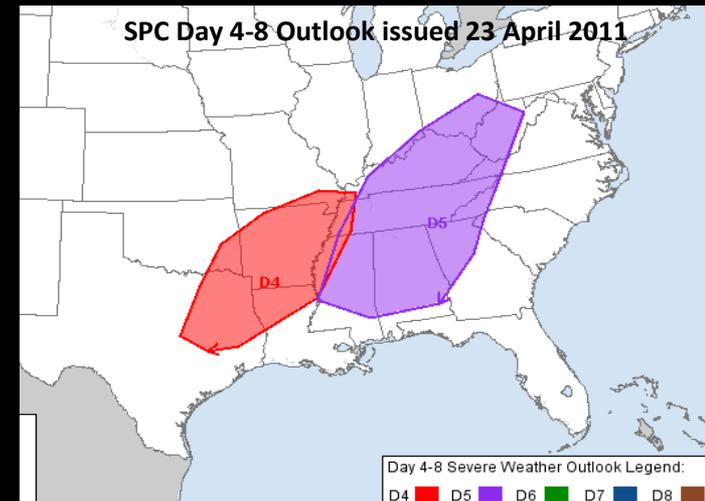
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Introduction

- Through improved modeling, research, etc., short/medium-range prediction of ingredients for severe convective storms has improved greatly
 - Severe weather: ≥ 1 " hail, ≥ 58 MPH wind gusts, or tornadoes
- Bigger challenges persist in the “near” term (0-6 hr)



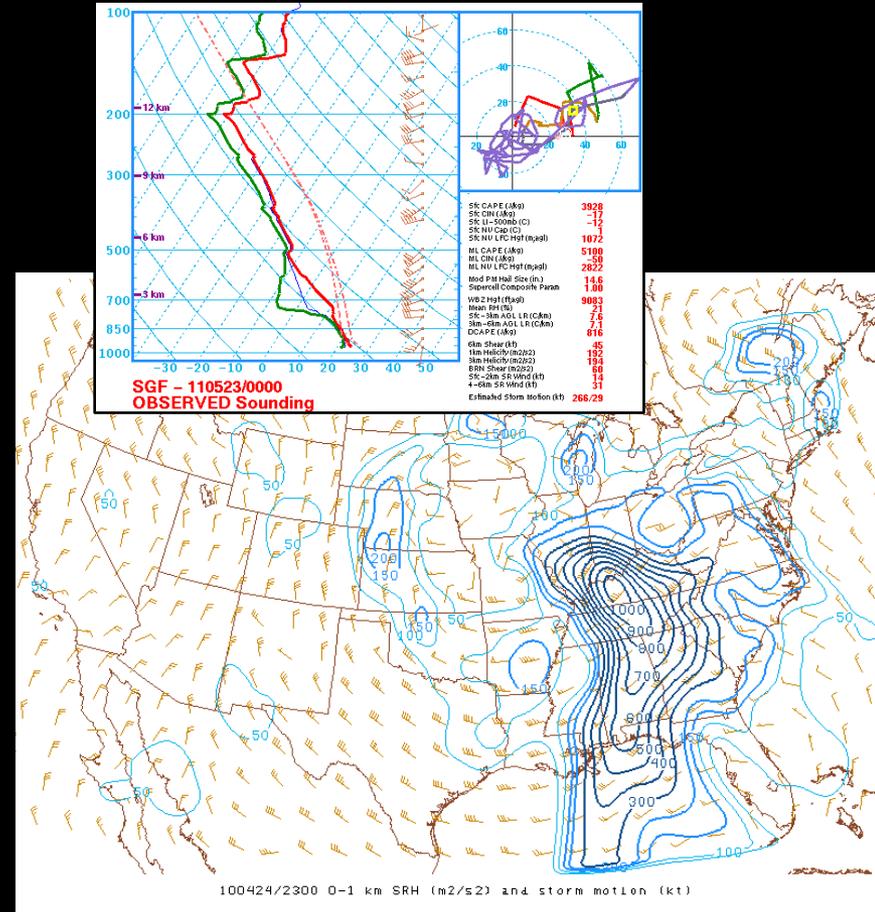
Near-Term Overview

- Local severe weather operations boil down to **anticipation** and **validation**
 - Anticipation: how will things evolve/change?
 - Validation: are expected/current conditions valid/reasonable?
- Main questions during severe weather:
 - Where & when will storms develop?
 - How will storm impacts evolve, or how is environment evolving?
 - Which storms have the greatest chance of threatening life and property?



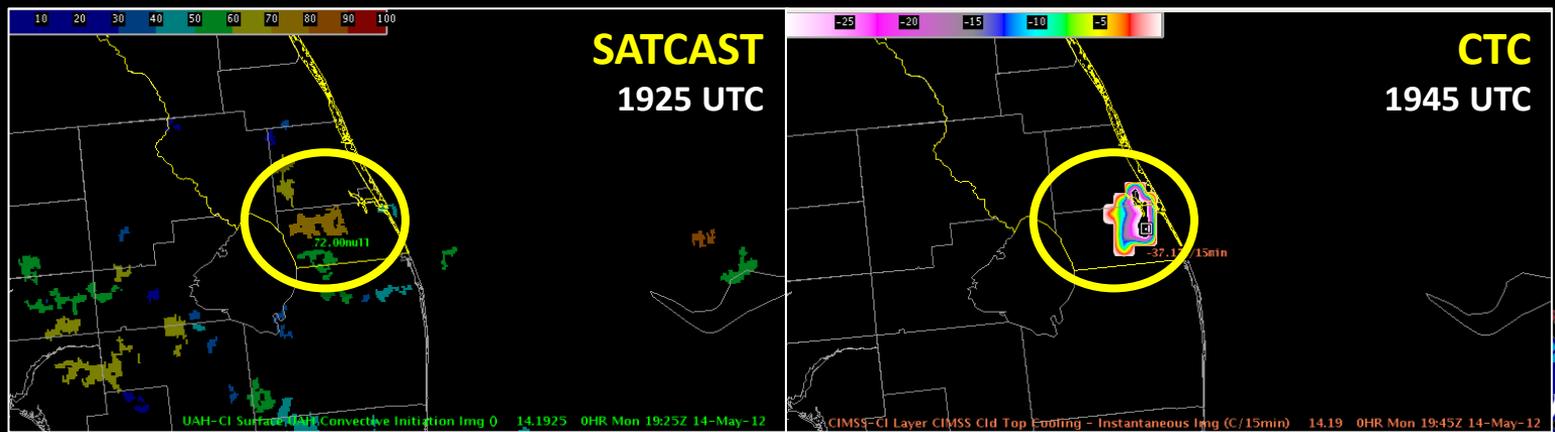
Near-Term Overview

- Models/analyses like the SPC Mesoanalysis site or HRRR/RAP are increasingly reliable and useful, but there are limitations (and always will be)
 - *Anticipation*, not validation
- Forecasters often seek a “sanity check” of environmental data, often looking at direct observations (balloon data, surface obs, etc.)
 - *Validation*, not anticipation



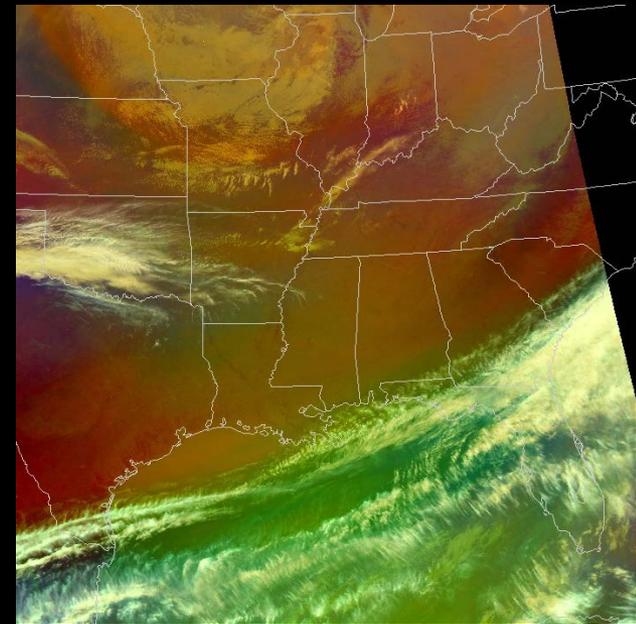
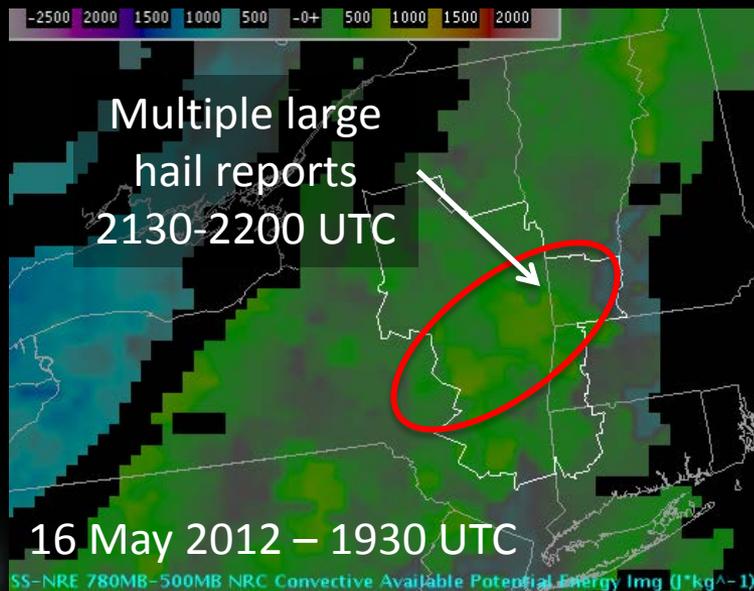
Where & when will storms develop?

- Indirect:
 - CIMSS NearCast
- Direct:
 - University of Alabama in Huntsville SATCAST
 - CIMSS Cloud Top Cooling



How will storm impacts evolve?

- CIMSS NearCast
- MODIS/VIIRS Air Mass RGB
- Assimilation of ABI data into NWP/analyses

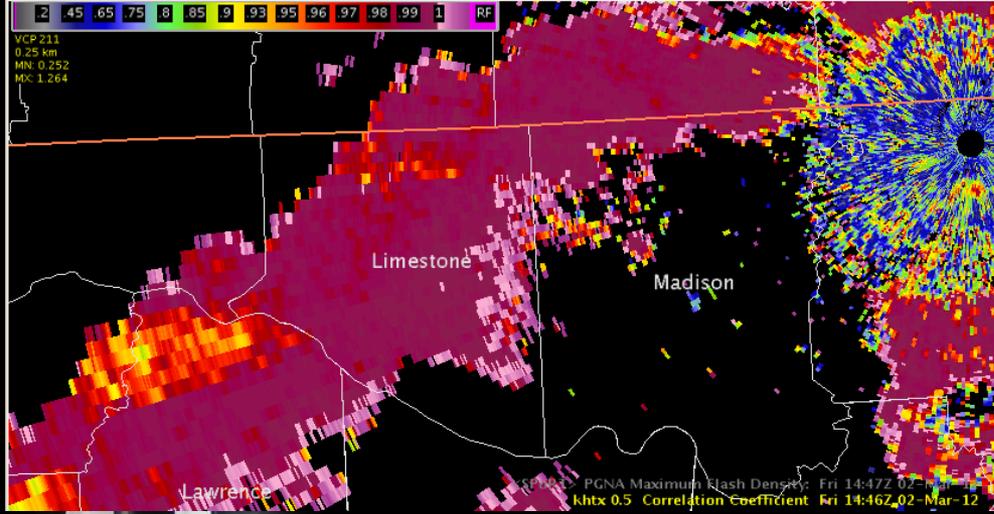
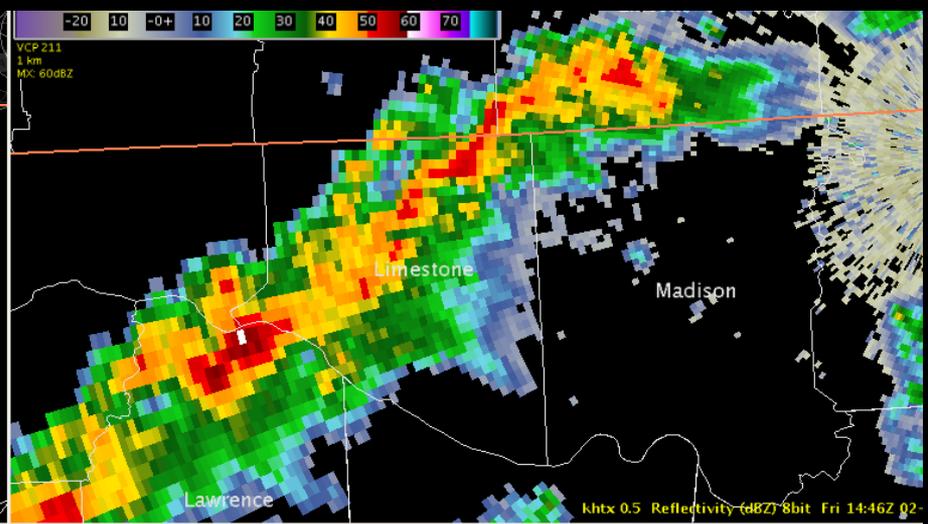
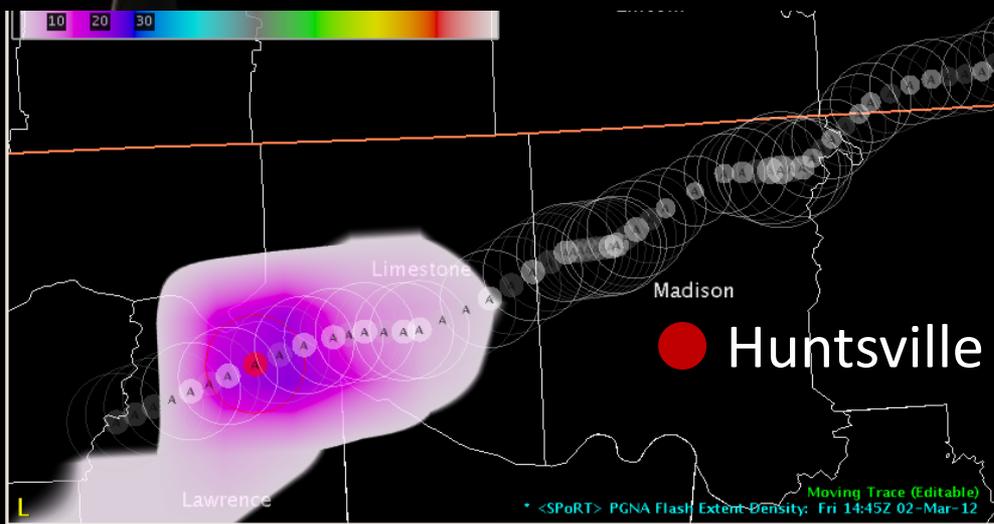


Which storms have the greatest chance of threatening life/property?

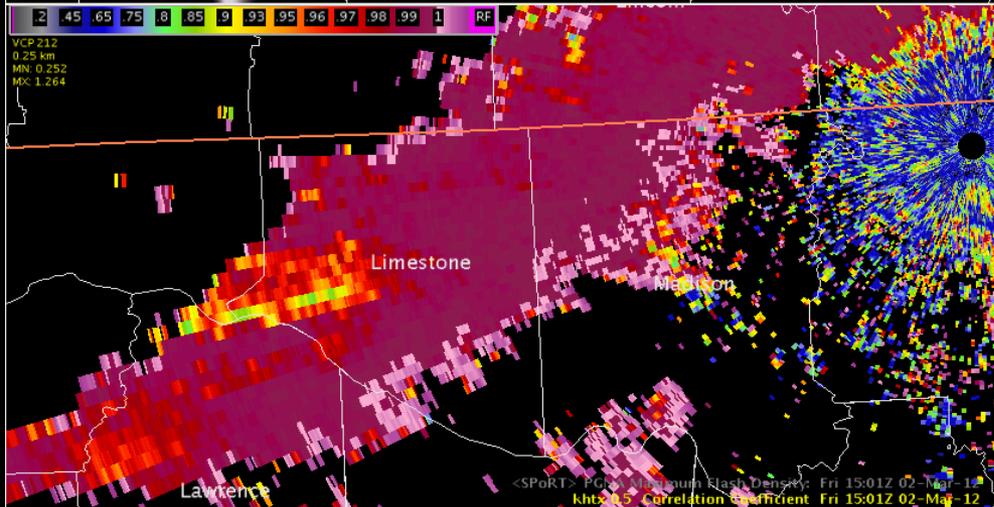
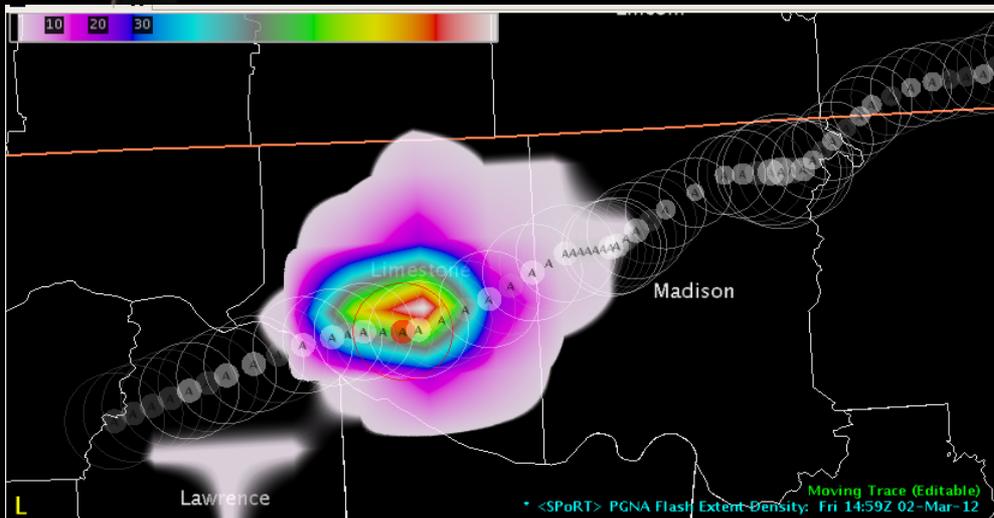
- CIMSS Cloud Top Cooling
- Total Lightning Information
 - Pseudo-Geostationary Lightning Mapper
 - Earth Networks Total Lightning Network



PGLM - 2 March 2012 (1445 UTC)

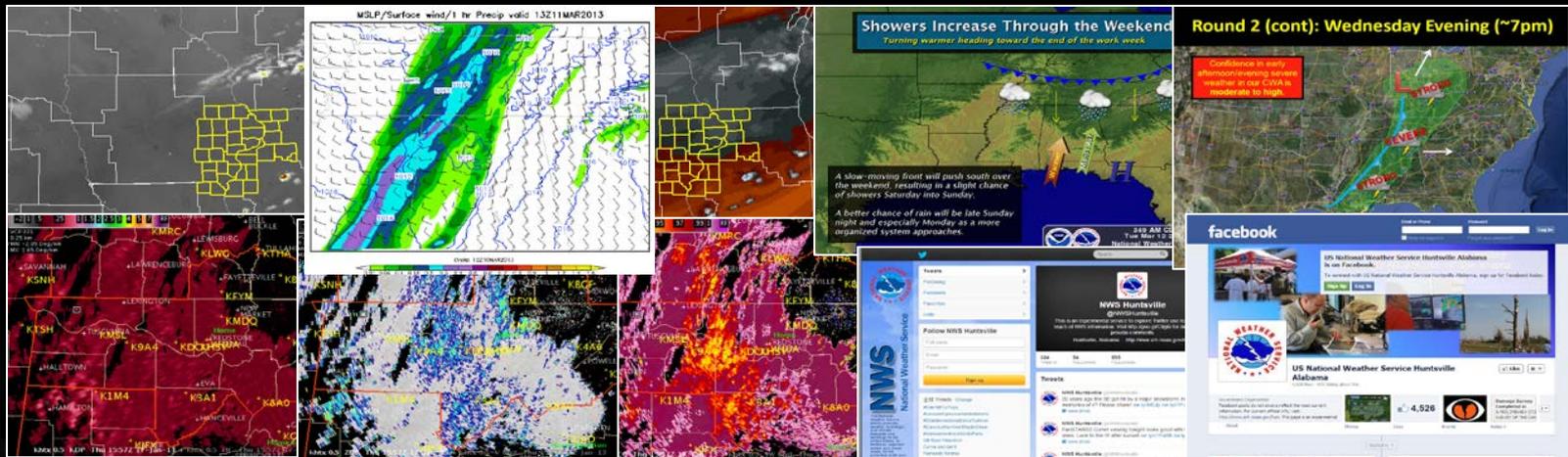


PGLM - 2 March 2012 (1459 UTC)



Future Challenges

- Operational meteorologists must cope with increasing “firehose” of data, while providing more services
 - New models with increasing resolution, Dual-Pol Radars (2-3x the base data), GOES-R/JPSS
 - Decision Support, Social Media, etc.



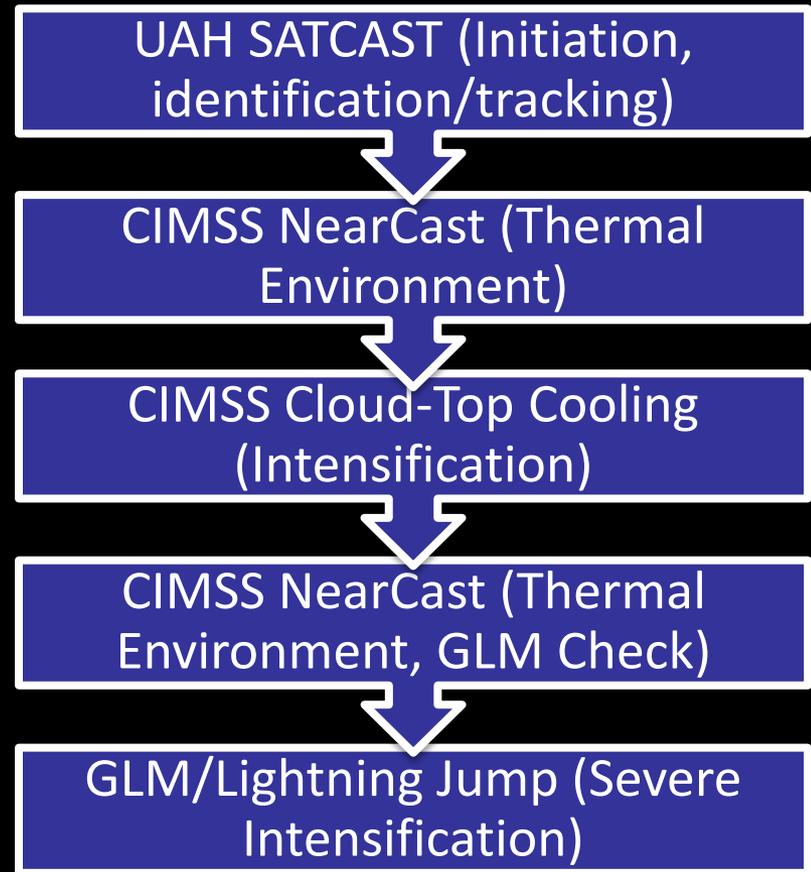
Algorithms & Applications

- Lightning jump algorithm for GLM/ENTLN/LMAs has tremendous potential (albeit with some caveats)
- Other brainstorm:
 - Thermal boundary detection
 - Wind/wind shear calculations
 - Varied lightning safety applications
 - Assimilation into Warn-On-Forecast



Unified Algorithm Concept

- What if we put many of the existing concepts together?
 - Intermediate step between Warn-On-Detection (current) and Warn-On-Forecast (future)
 - Possibly less expensive computationally than high-res, high-refresh NWP? Available at local WFO?
 - Forecaster interactivity: manually start the algorithm on a cell, or interrupt if not feasible



Closing Thoughts

- Next-gen satellite data has great potential to help with severe weather operations, both anticipation and validation, bridging an important gap between NWP and radar
 - Algorithms/data need to answer at least one of the “key questions” mentioned earlier
- Research & operations communities must continue to engage one another to answer the right questions, in the right ways





Thank you! Any questions?

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Acknowledgements:

Geoffrey Stano (SPoRT), Kris White and Chris Darden (NWS)



HUNTSVILLE, ALABAMA