

# HWT Experimental Forecasting Program Plans for 2010 (and beyond)

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# HWT Plans for 2010



- Use proven template of bringing together research scientists, NWP model developers, and forecasters to examine topics of mutual interest
- Needs and requirements of NSSL and SPC will modulate design and execution
  - NSSL primary focus on VORTEX2 field program
    - All hands on deck!
  - SPC increasingly focused on thunderstorm impacts on aviation
    - NWS and UCAR review panel directives
    - Partner with Aviation Weather Center utilizing multi-NCEP Center resources to improve thunderstorm forecasts for aviation

The short-term convective forecast needs of the aviation community are consistent with those of the overall user community

- Higher temporal/spatial resolution thunderstorm and severe thunderstorm forecasts are needed at more frequent time intervals (especially 0-12 hrs)

# HWT Plans for 2010

- **Some changes will likely occur**
  - Aviation weather component requires later timetable than typical Spring Experiments
    - Maximum thunderstorm frequency in northeast corridor starts in June
    - But, summer vacation of SPC staff also increases in June!
    - Experiment from mid/late May into mid/late June (4 week period)
  - More visiting scientists and forecasters will come from aviation community
    - AWC, WFOs in northeast states, CWSUs, and FAA
  - A much more focused experiment compared to 2009
    - Emphasis on blending smaller number of 00z model runs with a few short-term “update” model runs
    - Less model data to ingest, utilize, evaluate, and archive
    - 2008 Model data: 30 GB/Day 2009 Model data: 100 GB/day!

# HWT Plans for 2010

- **Some things will likely stay the same:**
  - Daily activities include real-time experimental forecasts and model evaluation
    - Continue probabilistic severe storm forecasts (Team 1)
    - Add thunderstorm aviation impact forecasts (Team 2)
    - Explore complementary use of deterministic WRF models and SSEF in forecast decision-making
    - Examine impact of radar assimilation in short-term model forecasts (especially “update” runs)
    - Renew emphasis on “why” WRF models produce storms where they do
      - Examination of model pre-convective environment and impact of “parent” model ICs
  - Again, the need to balance workload with available resources will require focusing on fewer models than in 2009

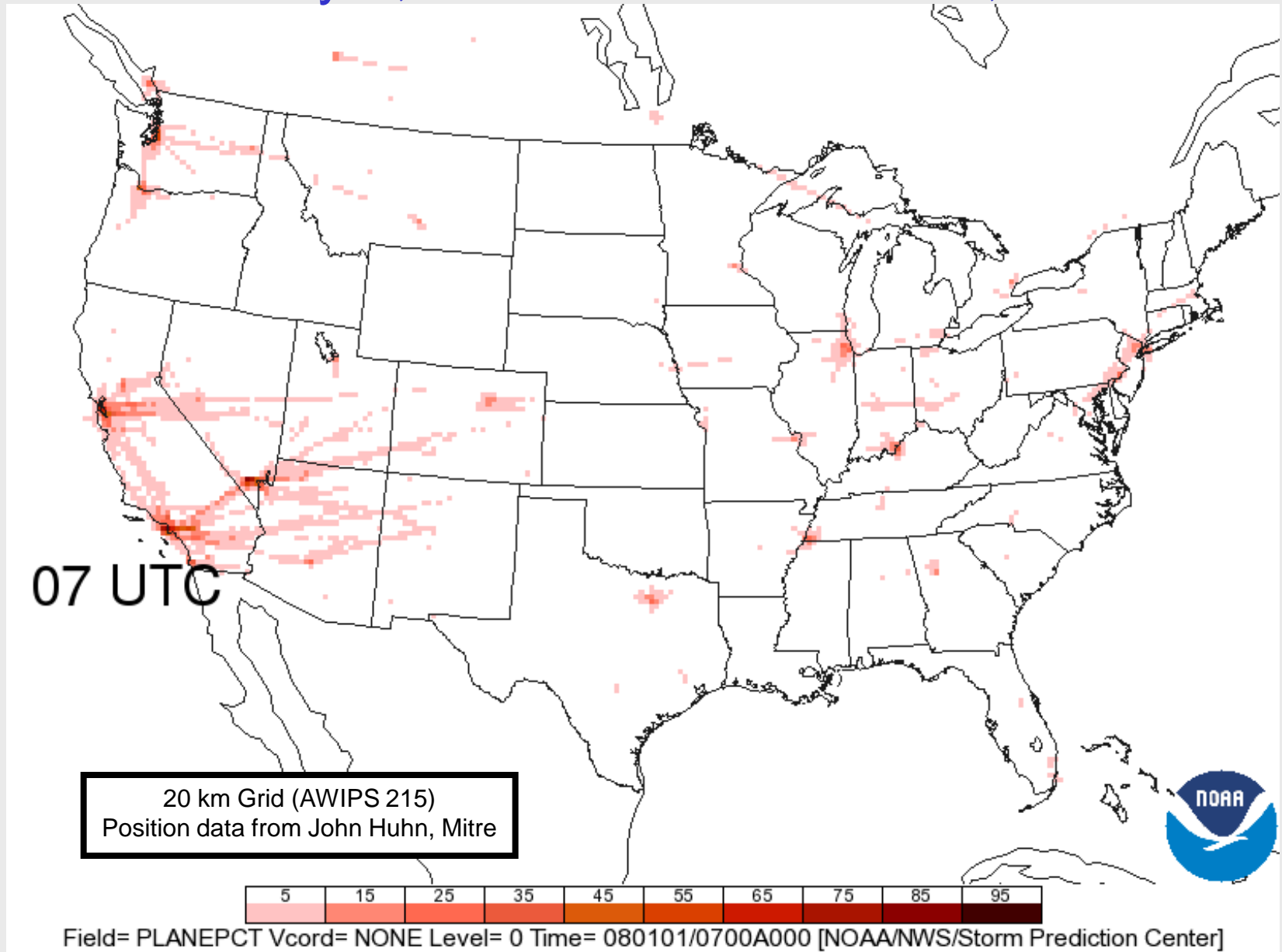
# Initial HWT NWP Plans for 2010

- 00z “Next-day” model runs
  - EMC 4 km NMM and NSSL 4 km ARW (year-round)
  - CAPS 20 member 4 km SSEF and 1 km ARW
  - Used for initial morning experimental forecasts
- Short-term update model forecasts
  - Hourly 3 km HRRR
  - CAPS 4 km WRF V2 support runs at 12, 15, and 18z (09z?)
  - Used in short-term forecast support (0-12h) for periodic updating of experimental forecasts
- Radar assimilation sensitivity testing
  - DTC objective verification of HRRR and CAPS Cn and C0 runs

# Examples of Possible Aviation Applications of Ensemble Output

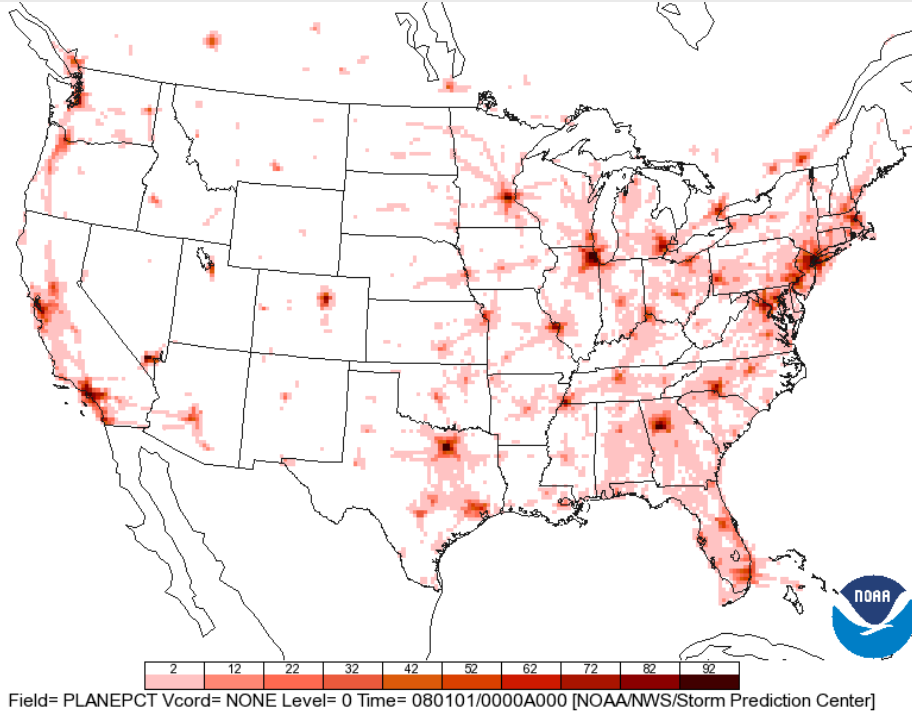
# All Levels Gridded Flight Composite (20 km Grid)

January 1, 2004 to December 31, 2008

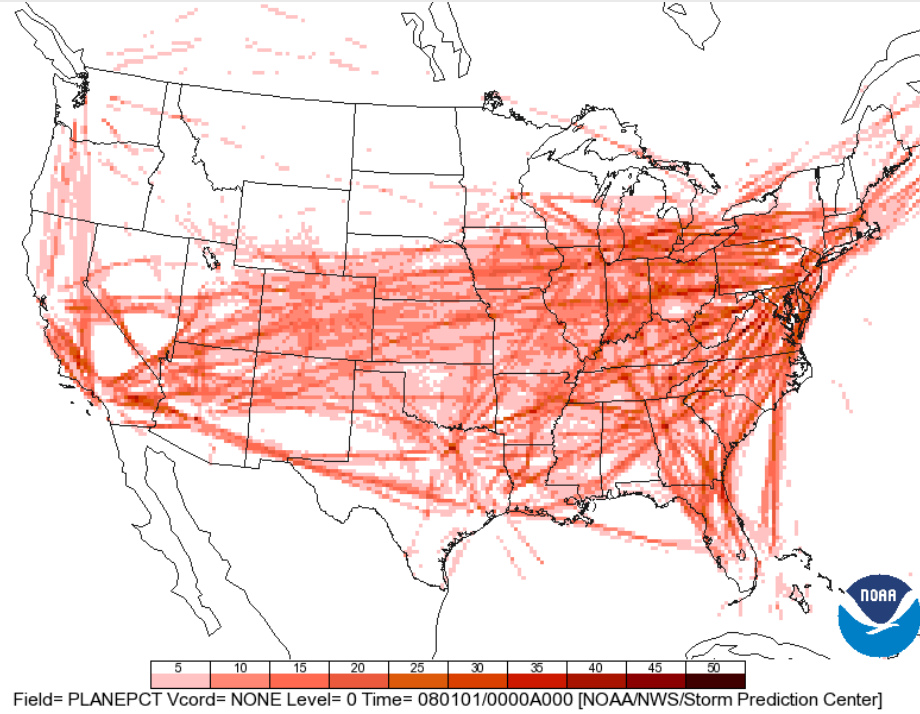


# Gridded Flight Composites (20 km Grid) at 00 UTC January 1, 2004 to December 31, 2008

## All Flights $\leq$ 10,000 Feet



## All Flights $\geq$ 25,000 Feet



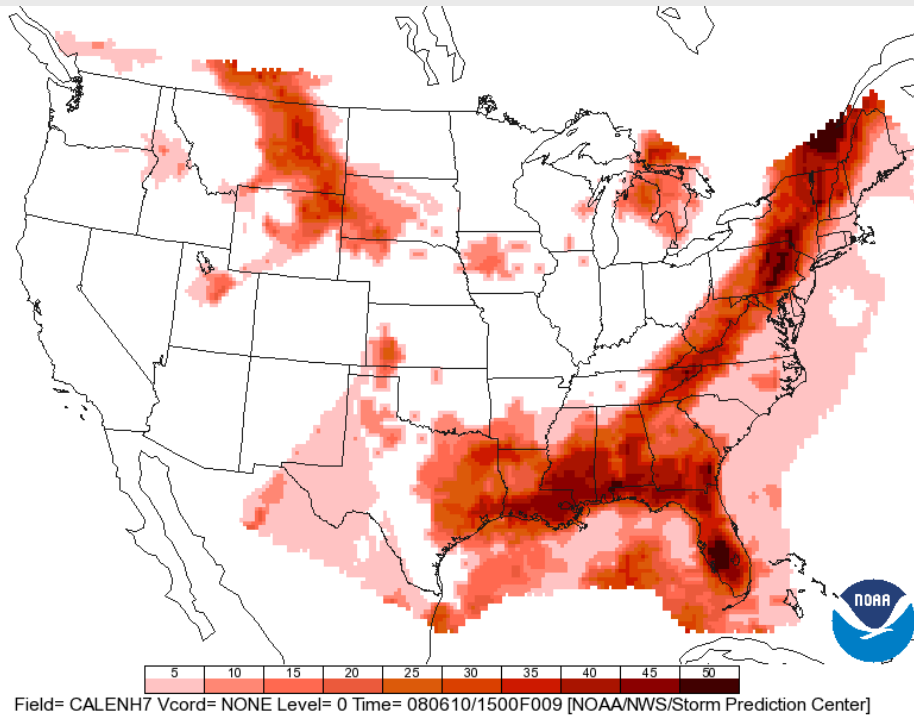
**Snapshot probability of an aircraft inside the 20 km (AWIPS 215) grid box**



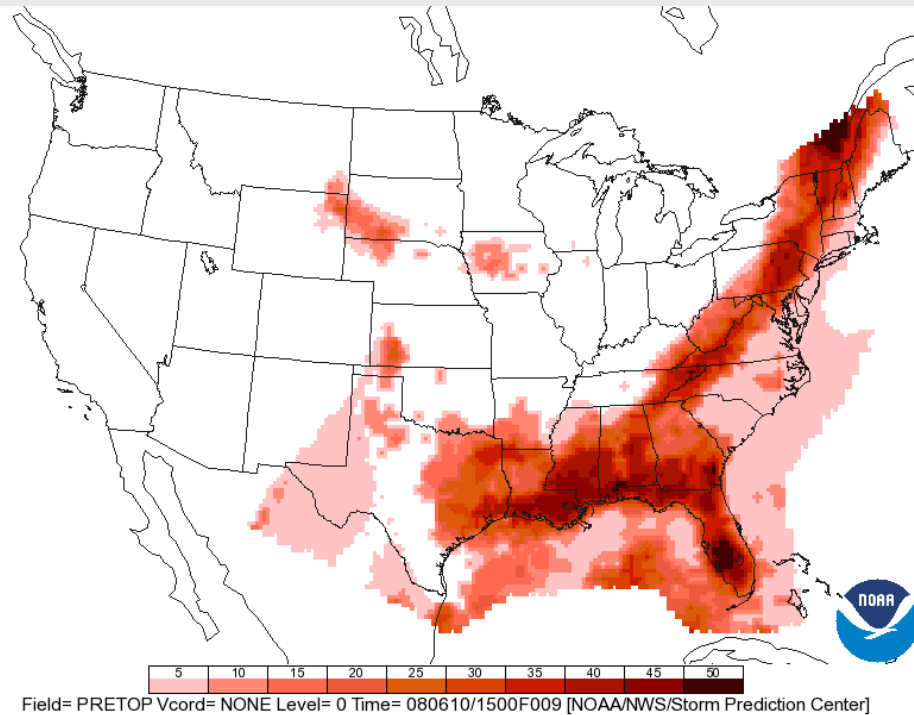
# SREF Guidance 15 UTC 10 June 2008

F009 valid at 00 UTC 11 June 2008

## Calibrated Probability of a T-Storm



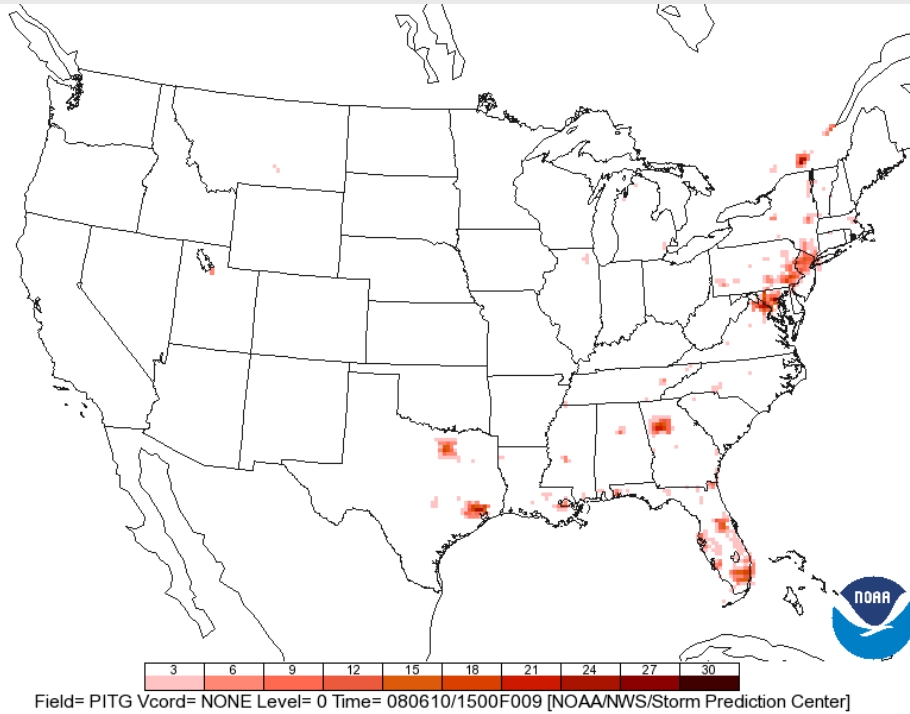
## Probability of Tops $\geq$ 37,000 Feet



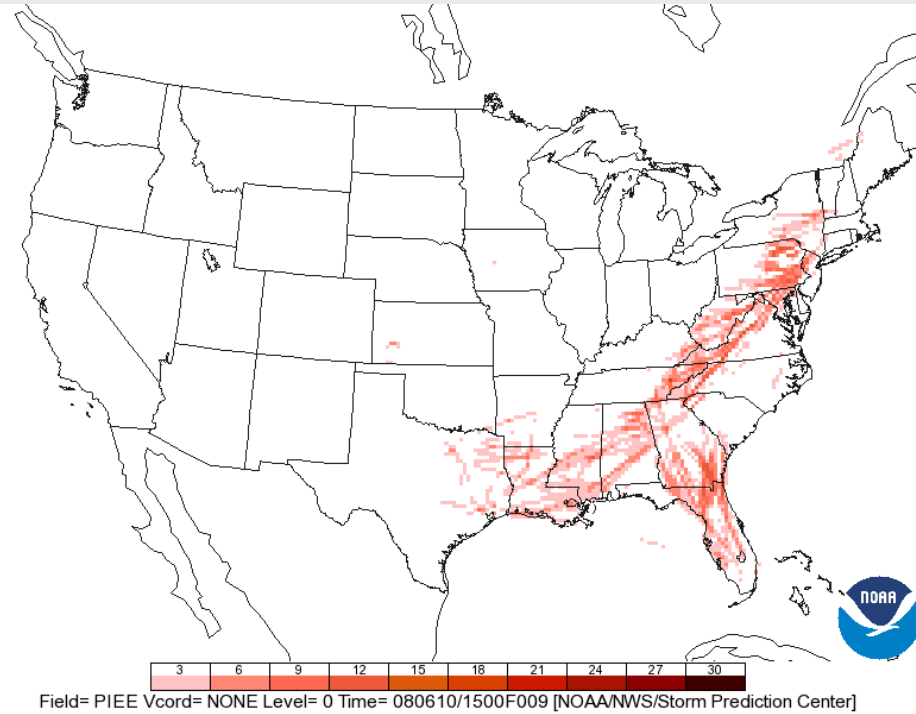
# SREF Impact Guidance 15 UTC 10 June 2008

F009 valid at 00 UTC 11 June 2008

Impact of Thunderstorms:  $\leq 10$  kft



Impact of Tops: En Route  $\geq 25$  kft



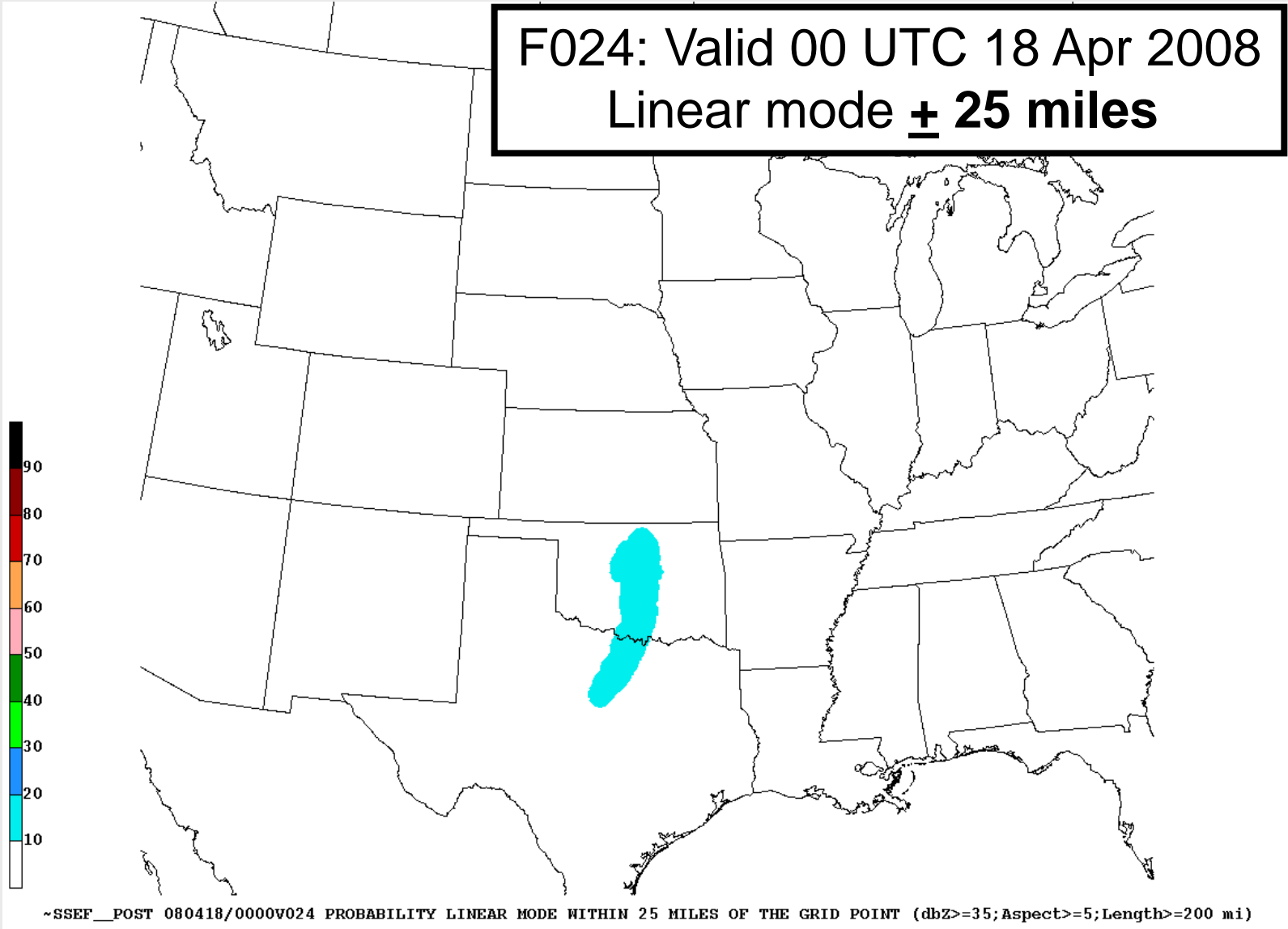
**Joint probabilities - calibrated thunderstorm and aircraft position**

# SSEF Convective Mode Linear Detection

- Determine contiguous simulated reflectivity areas exceeding 35 dbZ
- Estimate mean length-to-width ratio of the contiguous area; search for ratios  $\geq 5:1$
- Flag grid point if the length exceeds:
  - 50 miles
  - 100 miles
  - 200 miles

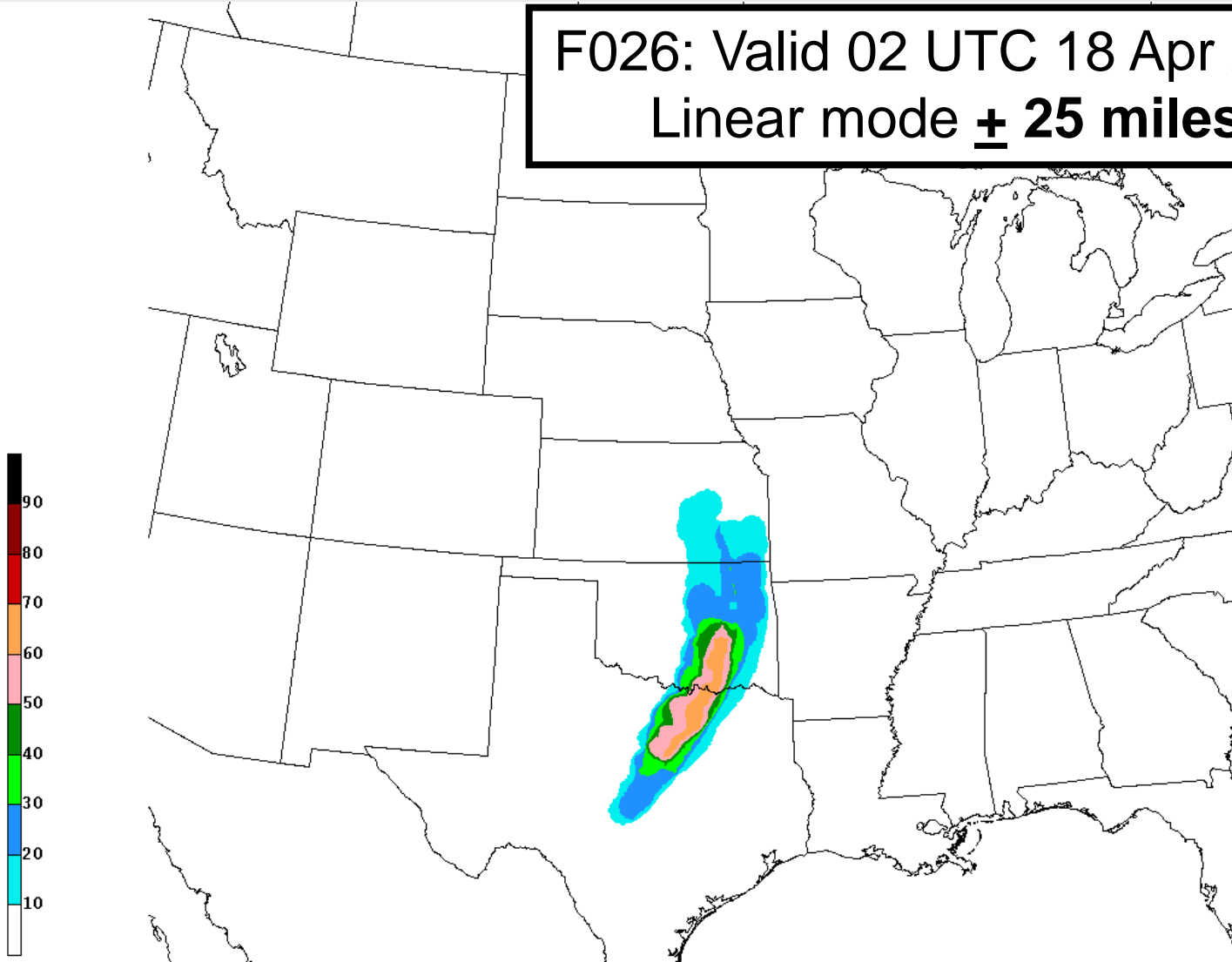


# Probability Linear Mode Exceeding 200 miles (Squall Line Detection)



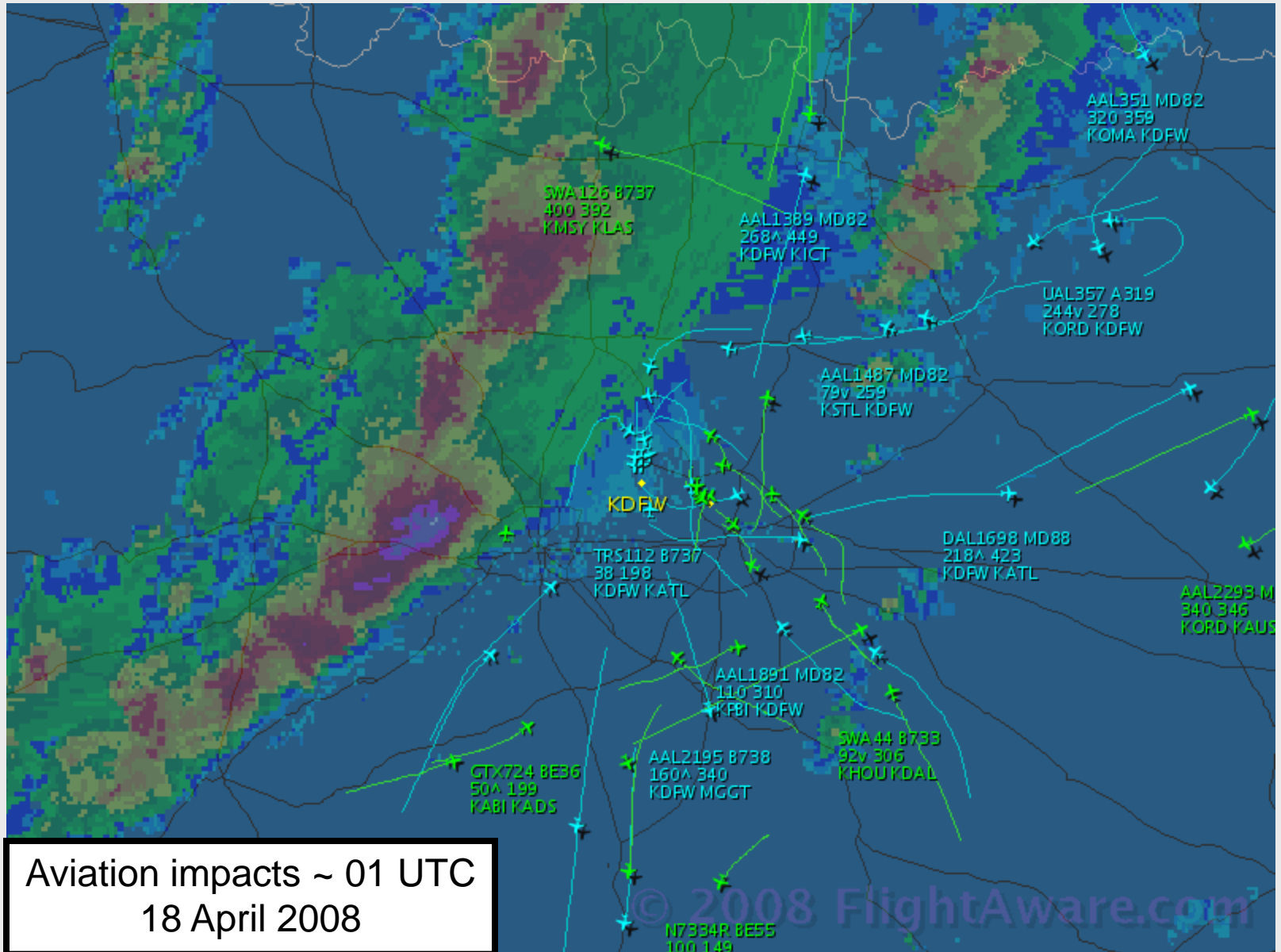
# Probability Linear Mode Exceeding 200 miles (Squall Line Detection)

F026: Valid 02 UTC 18 Apr 2008  
Linear mode  $\pm$  25 miles



~SSEF\_POST 080418/0200V026 PROBABILITY LINEAR MODE WITHIN 25 MILES OF THE GRID POINT (dbZ>=35;Aspect>=5;Length>=200 mi)

# Linear Convective Mode: Impacts



Aviation impacts ~ 01 UTC  
18 April 2008

Image provided by Jon Racy

# A General Vision for HWT Beyond 2010

- Continue Spring Forecasting Experiment (4 week duration)
- Utilize the HWT as NCEP and NWS Resource
  - Partner with other NCEP Centers to examine a variety of convective weather impacts, such as
    - HPC: convective heavy rain and flash flooding
    - OPC: offshore thunderstorms over the Gulf Stream
    - TPC: tropical cyclone tornadoes
- Explore other thunderstorm analysis & prediction challenges in week-long HWT workshops with science and operational communities
  - Invited presentations, discussions, and collaboration planning
  - Include one day for real-time forecasting exercise or DRT case
  - Sample SPC topic areas (NSSL with have others)
    - Dry lightning/fire weather in west
    - MCS severe storms and heavy rain/flooding (simultaneous or transition)
    - Cool season southeast US severe