

# **NWS Research to Operations Success**

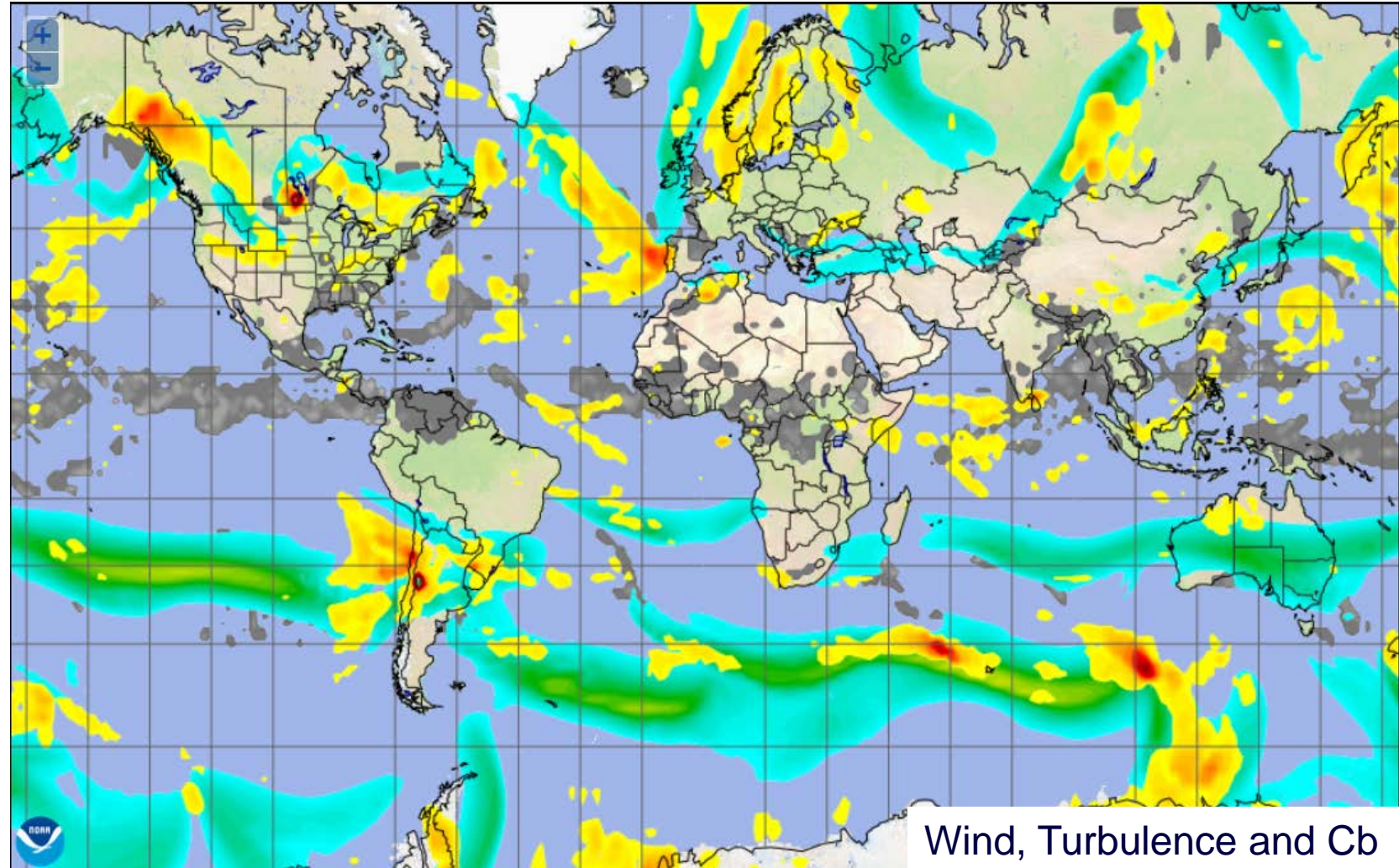
**August 2015 FPAW**

# WAFS Global Hazard Grids



[WWW.AVIATIONWEATHER.GOV/WAFS](http://WWW.AVIATIONWEATHER.GOV/WAFS)

- Blend of UKMET and GFS
- 3hr increments F06 to F36
- 1.25 degree downloadable grid available on WIFS



Wind, Turbulence and Cb

# Graphical Turbulence Guidance 3



## New Products:

- All diagnostics mapped to Eddy Dissipation Rate (EDR;  $m^{2/3}s^{-1}$ )
  - ADDS to now display EDR values
- CAT diagnostic extended down to the surface and forecast hours 15 and 18
- New Mtn Wave diagnostic
  - CAT diagnostics combined with low level winds and terrain characteristics

## New Platform

- Hosted on NCEP Central Operation's (NCO) Weather and Climate Operational Supercomputing System (WCROSS)
  - Robust 24/7 support and reduced latency from direct model access

## Operational Schedule

- Currently running in parallel on WCROSS in 30-day evaluation phase.
- Operational early October 2015

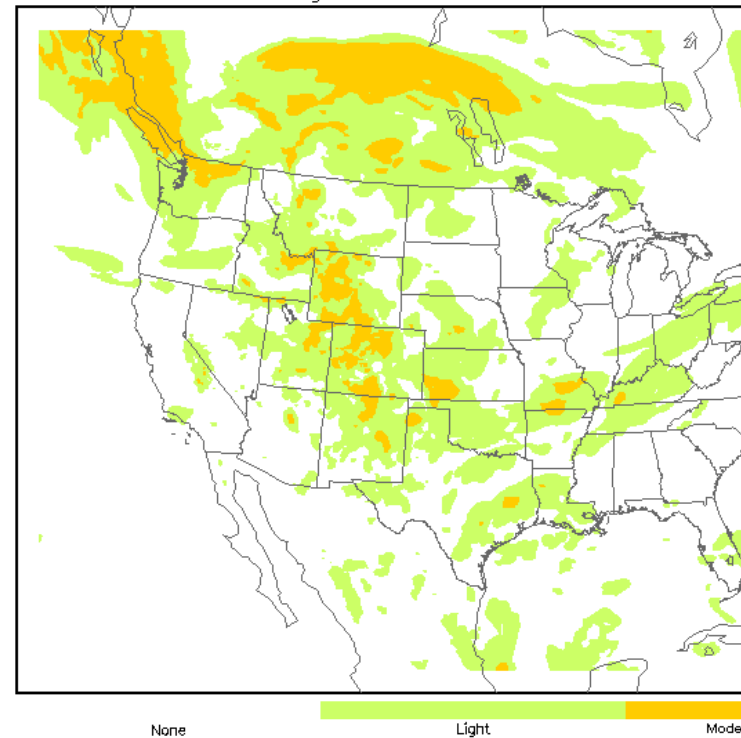
# GTG Version 3



## GTG2 - Maximum turbulence intensity (10000 ft. MSL to FL450)

Valid 1800 UTC Fri 21 Aug 2015

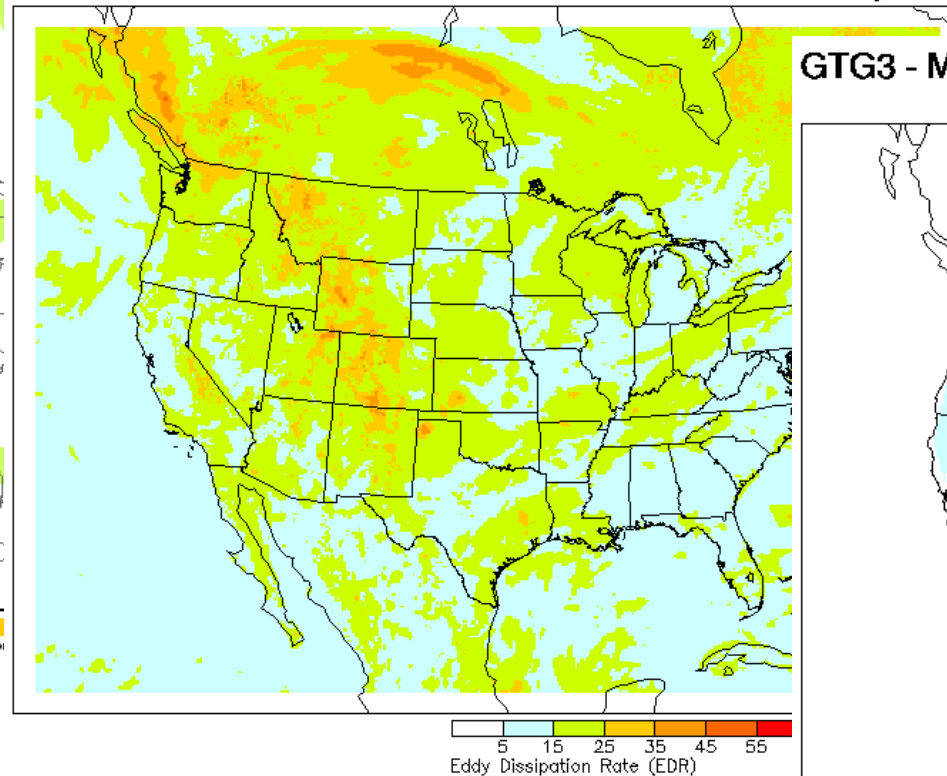
02-hr forecast from 1600 UTC 21 Aug



GTG v2.5: 2-hr forecast valid 1800 UTC Fri 21 Aug 2015. Categorical display based on thresholds.

## GTG3 - Maximum combined intensity (100 ft. MSL to FL500)

02 hr forecast valid 1800 UTC Fri 21 Aug 2015

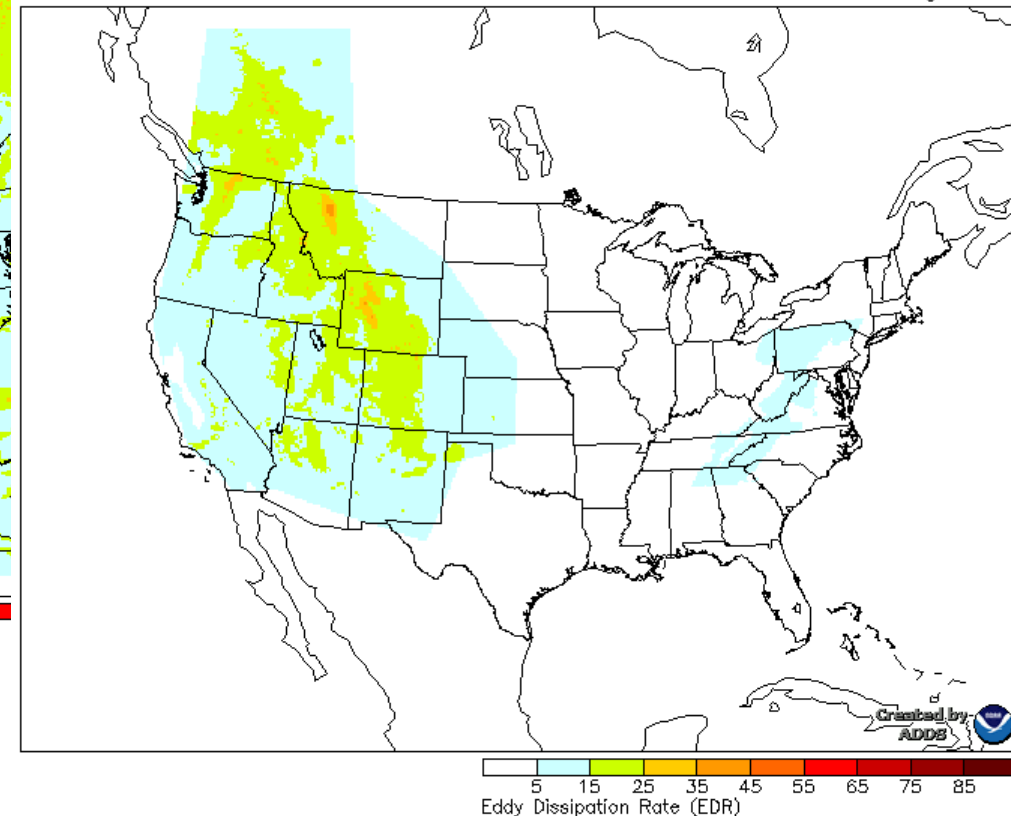


GTG v3.0: 2-hr forecast valid 1800 UTC Fri 21 Aug 2015. Combined (Max of CAT, MTW) in units of EDR.

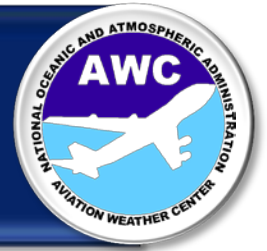
GTG v3.0: 2-hr forecast valid 1800 UTC Fri 21 Aug 2015. MTW forecast domains in units of EDR.

## GTG3 - Maximum mountain wave (100 ft. MSL to FL500)

02 hr forecast valid 1800 UTC Fri 21 Aug 2015



# **Collaborative Aviation Weather Statement**



***National Guidance from AWC coupled with the evolution  
of CCFP into a Consistent Collaborative  
All Hazards Impact-based Decision Support Service,  
positions the NWS Aviation Program as a  
Weather Ready Nation Leader***

# **WWRN**

# FAA Statement of Need for a Collaborative Aviation Weather Statement



Allow decision makers to more effectively manage Traffic Flow Management (TFM) initiatives

Scheduled convective forecast planning guidance to support Strategic Planning Call

Timely delivery of high-confidence, high-relevance aviation weather constraint forecasts

Enable more efficient use of available airspace



July 24, 2014

Ms. Cynthia Abelman, Chief  
Aviation Services Branch  
National Weather Service  
SSMC-2 RM 13308  
1325 East West Highway  
Silver Spring, MD 20910

Dear Ms. Abelman:

**Objective:** This memorandum constitutes the *Statement of Need for the Aviation Weather Statement to Support Collaborative Decision Making (CDM)*. This new collaborative product will provide Air Traffic Management (ATM) decision makers with the timely delivery of high confidence, high relevance aviation weather constraint forecasts, including those which predict that an anticipated constraint will not materialize or an active constraint will terminate sooner than expected. This will allow ATM decision makers to more effectively adjust, initiate, amend or terminate planned or active Traffic Flow Management (TFM) initiatives, resulting in more efficient use of available airspace.

**Background:** Pursuant to Title 49 United States Code Section 44720, the Federal Aviation Administration (FAA) establishes requirements for the weather information and services necessary for the safe and efficient conduct of operations in the National Airspace System (NAS). The National Oceanic and Atmospheric Administration (NOAA) National Weather Service (NWS) may be tasked to provide the weather information and services necessary to meet the requirements established by the FAA.

The Collaborative Convective Forecast Product (CCFP), manually generated by NOAA/NWS in collaboration with industry stakeholders, is the currently established scheduled CDM product. It is valid for convective weather only and is only produced from March to October. However, the science of forecasting, including automated convective forecasts, and the use of available technologies have greatly evolved in the 14 years since the CCFP was implemented. The FAA desires to take full advantage of these capabilities to improve CDM services.

**Overview:** Through the use of limited proof-of-concepts and demonstrations with the CDM community, the FAA has identified the operational need to supplement the CCFP with an event-driven collaborative forecast product. This product, the *Aviation Weather Statement (AWS)*, has a focus on all weather (i.e., not just convection) that can potentially impact strategic NAS planning. The AWS will be the new collaborative product between the Government and industry meteorologists. A new process, Operational Bridging (OB), will

Page 1 of 2

define the set of processes, Meteorologist/TFM engagement protocols, and communication tools to generate the new product. The AWS, will be issued when:

- Operationally significant weather activity is expected to develop or move into the area of concern within the next 4 hours,

- There are conflicting event forecasts of operationally significant weather,
- Operationally significant weather activity is no longer expected within the next four hours in the area of concern, and/or
- Operationally significant weather activity is expected to cease one or more hours earlier than previously forecasted within the area of concern

Focus will be given to key traffic flow and special use areas affecting the Core 29 terminals in the CONUS. The AWS will include additional attributes beyond those from the CCFP such as event timing, potential impact, and orientation. The AWS will be generated, revised, corrected and cancelled as conditions warrant.

The FAA still requires a scheduled convective forecast product to support the Strategic Planning Call (SPC) every two hours. The FAA seeks to evolve the current CCFP to be an objectively generated convective forecast to support the scheduled SPC. Both the scheduled and event-driven products will be considered the primary source of weather for Traffic Flow Management (TFM) decisions with the event-driven product taking precedence over the scheduled product if there are differences.

**Next Steps:** The FAA is in the process of defining performance requirements associated with OB and AWS, using appropriate requirements validation processes/methodologies. Upon completion of the validation phase, FAA will transmit the performance requirements for the *Aviation Weather Statement to Support Collaborative Decision Making* to NWS.

Sincerely,

Richard J. Heuwinkel, Manager  
NextGen Aviation Weather Division, ANG-C6

Cc: Mr. Robert Hunt, FAA, AJV-73  
Mr. Kevin Johnston, FAA, AJR-12

Page 2 of 2

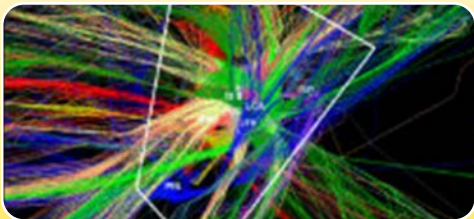
# Need for Change



**New TFM tools require more flexibility than CCFP provides  
e.g., Air Flow Programs, Ground Delay Programs,  
Collaborative Trajectory Options Program (CTOP)**



**Need more specificity about onset and cessation of weather  
events in high impact airspace**



**Focus limited resources in highest impact areas**



**Continuous collaboration captures dynamically changing  
NAS**

**e.g., Runway Closures, Restricted Air Space, Playbook**

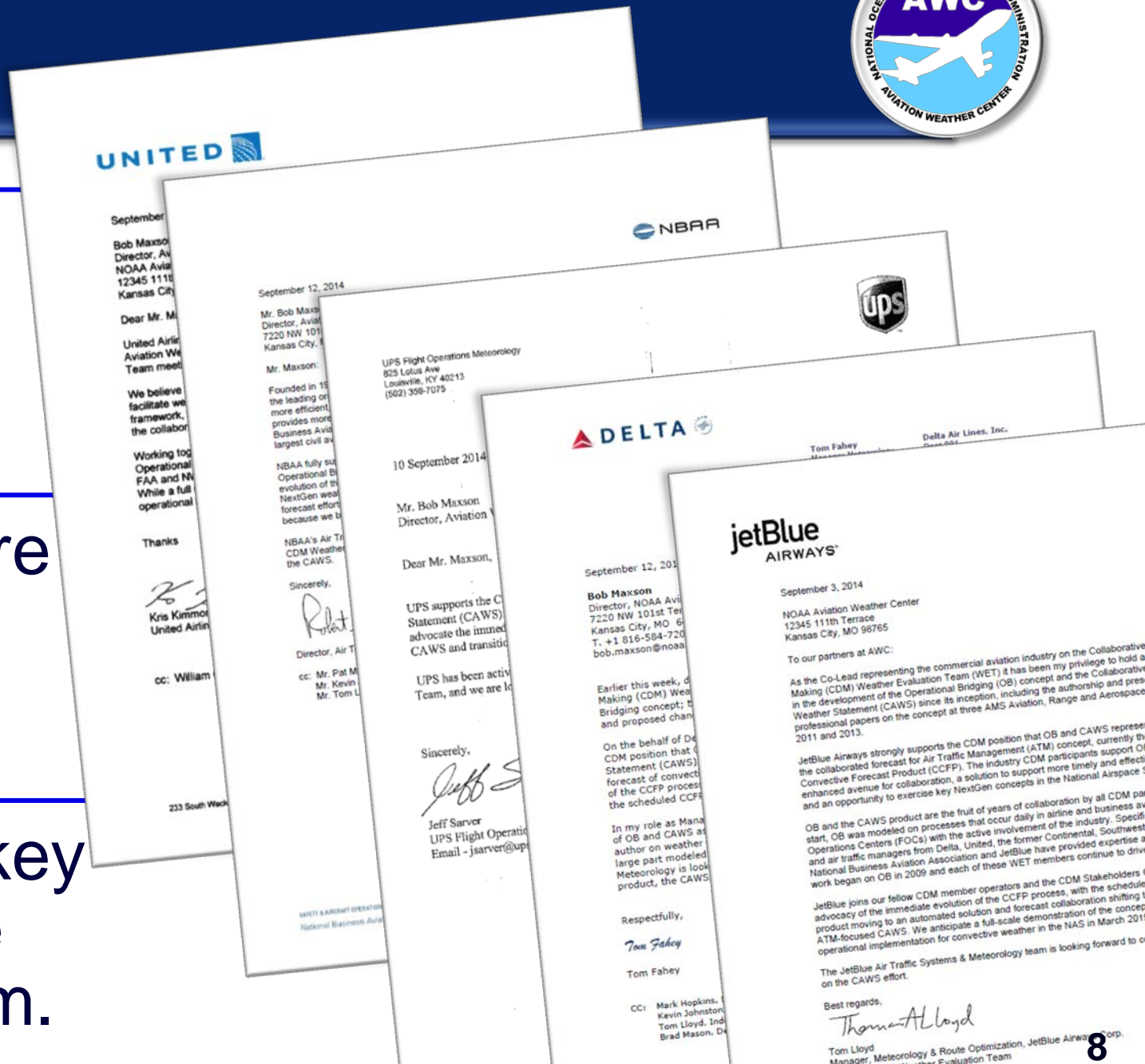
# User Advocacy



Enhanced avenue for collaboration

A solution to support more timely and effective ATM decisions,

Opportunity to exercise key NextGen concepts in the National Airspace System.





# Transition from CCFP to CCFP Guidance and CAWS

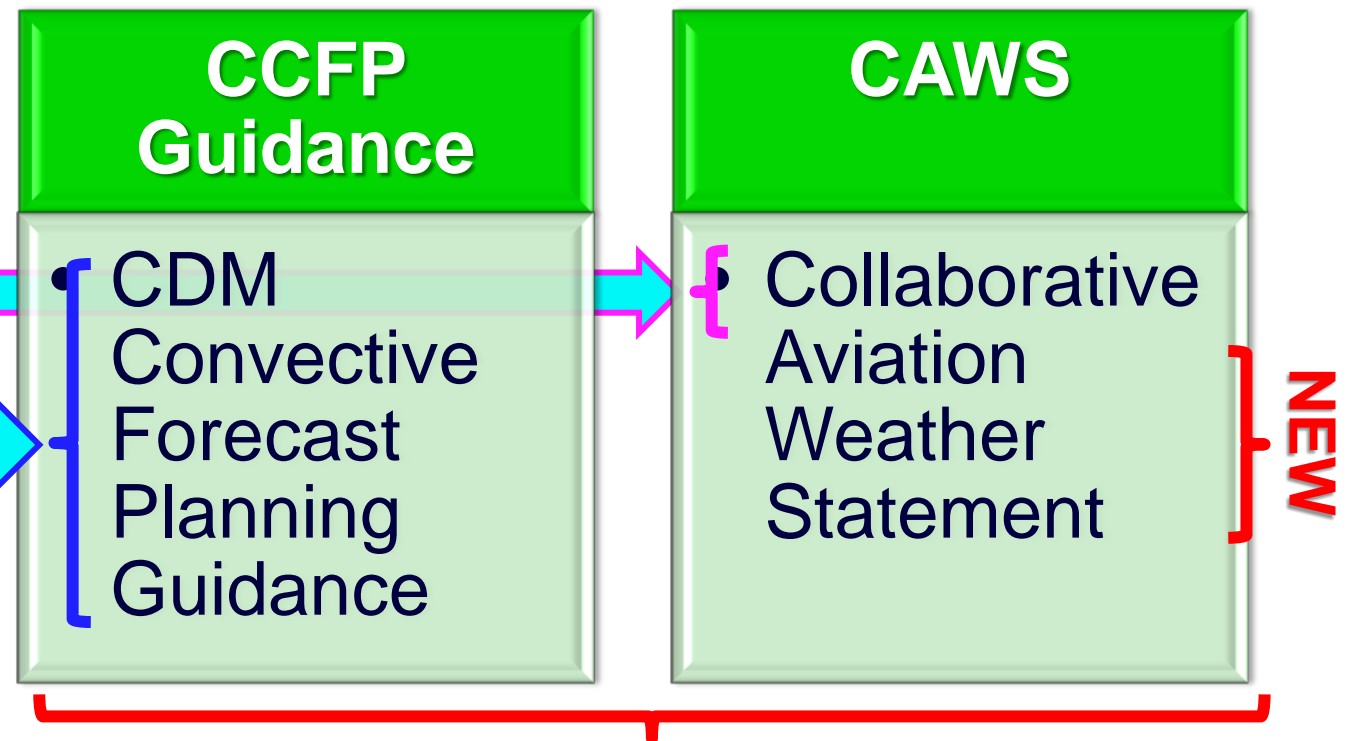


## PREVIOUS



**Meteorologist  
In the Loop**

## DEMONSTRATION



**Meteorologists  
Over the Loop**

# CAWS and CCFP Guidance



## CAWS

- Event-driven collaborative forecast product
- Focus on weather events that can potentially impact strategic NAS planning
- Continual collaboration between the Government and Industry meteorologists
- Focus on key traffic flow and special use areas affecting the Core 29 terminals

## CAWS improves upon CCFP

- Specific event timing (both onset and cessation)
- Description of Potential impact
- Orientation/Mode of Convection
- Eventual focus on all weather
  - Not just convection

## CCFP Guidance

- Objectively generated convective forecast
  - High resolution meso- and storm-scale probabilistic guidance
- Support the every 2-hour scheduled Strategic Planning Call
- CAWS takes precedence when differences between CCFP, CoSPA, etc.

# Collaborative Aviation Weather Statement (CAWS)

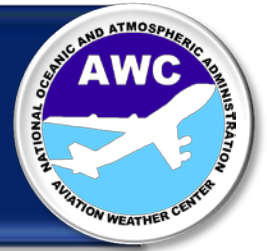


## Initial Aviation Weather Statement Needs for an TFM Area of Concern\*

- Onset: Thunderstorm activity is expected within 4 hours
- Cessation: Thunderstorm activity expected to end within 4 hours
- Consistency: Conflicting thunderstorm forecasts
- New Information: Thunderstorm activity is expected to cease earlier

*\*An area of concern includes en route traffic flows, Core 30 terminal operations and special event airspace.*

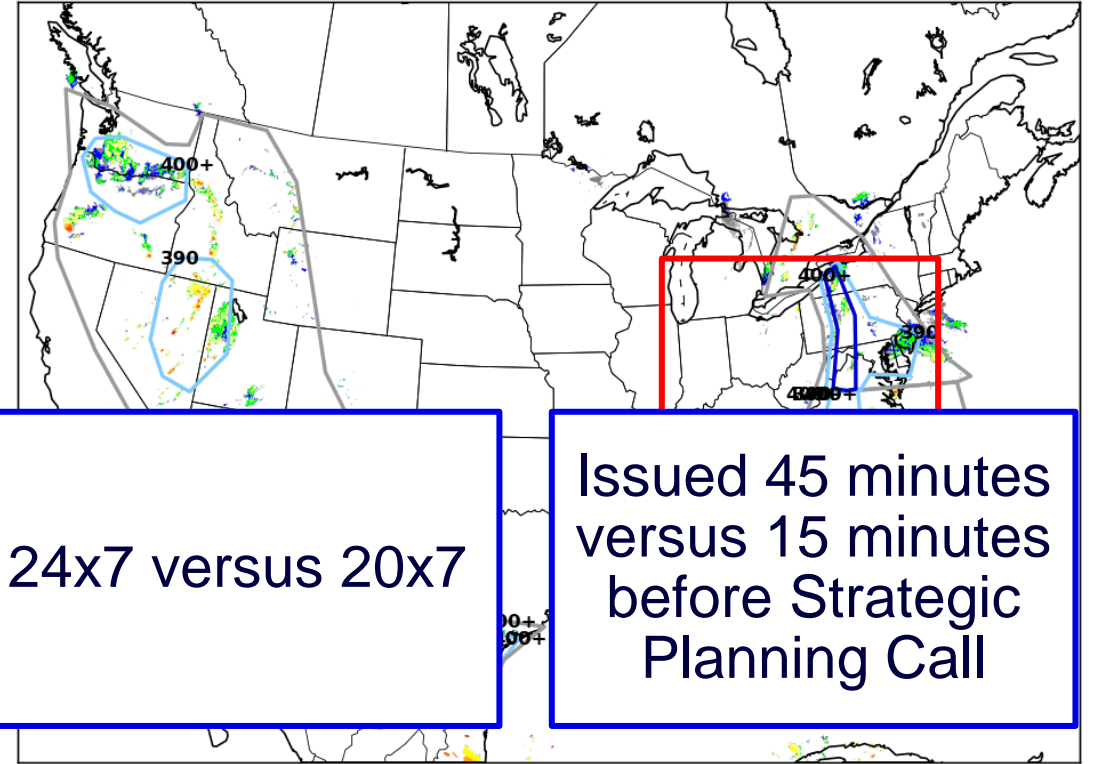
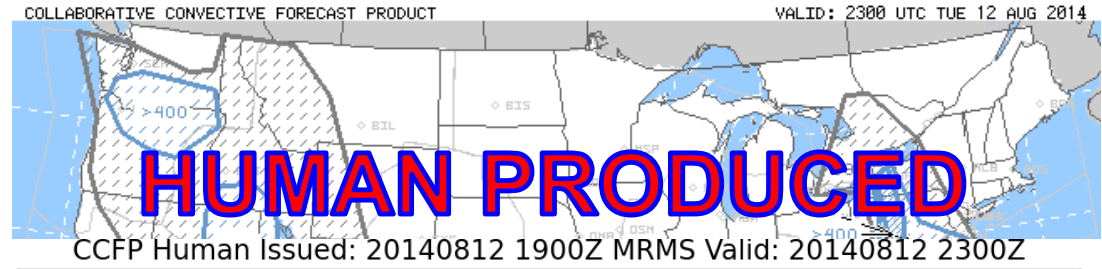
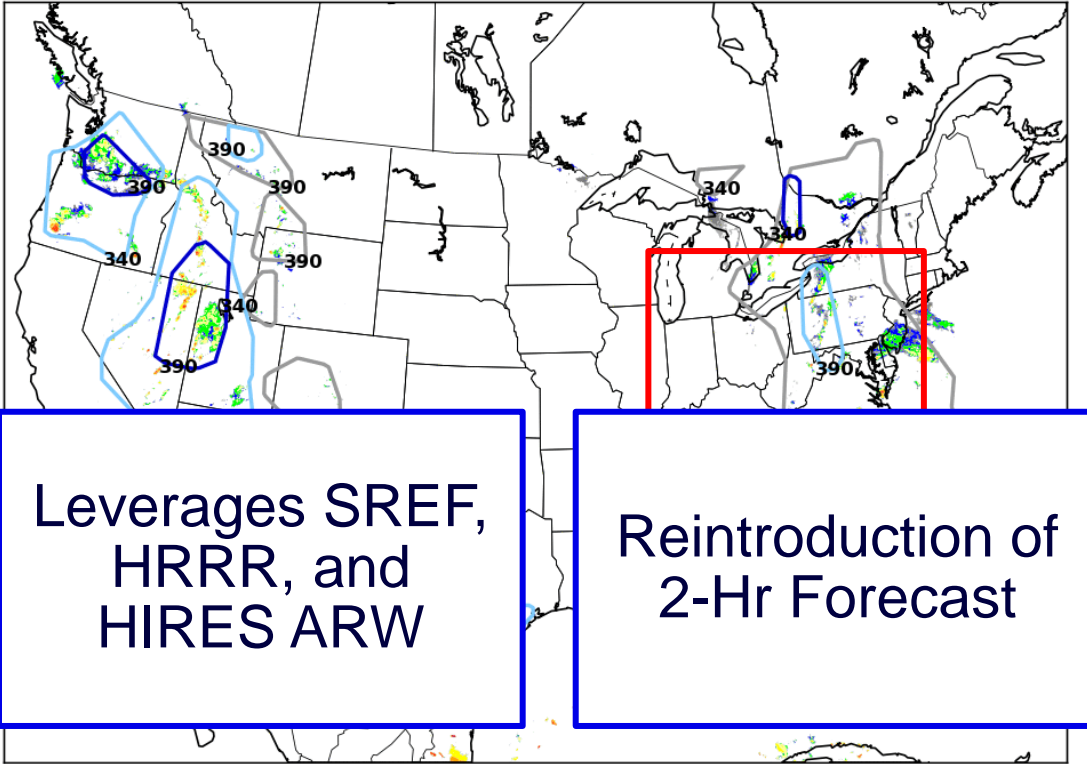
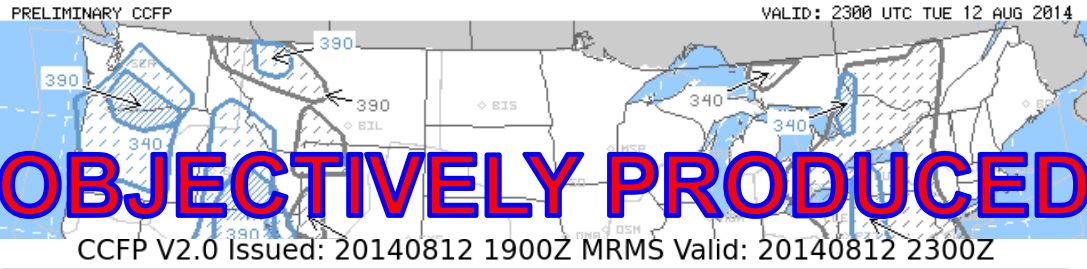
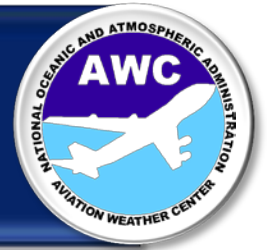
# CCFP Ingredient List



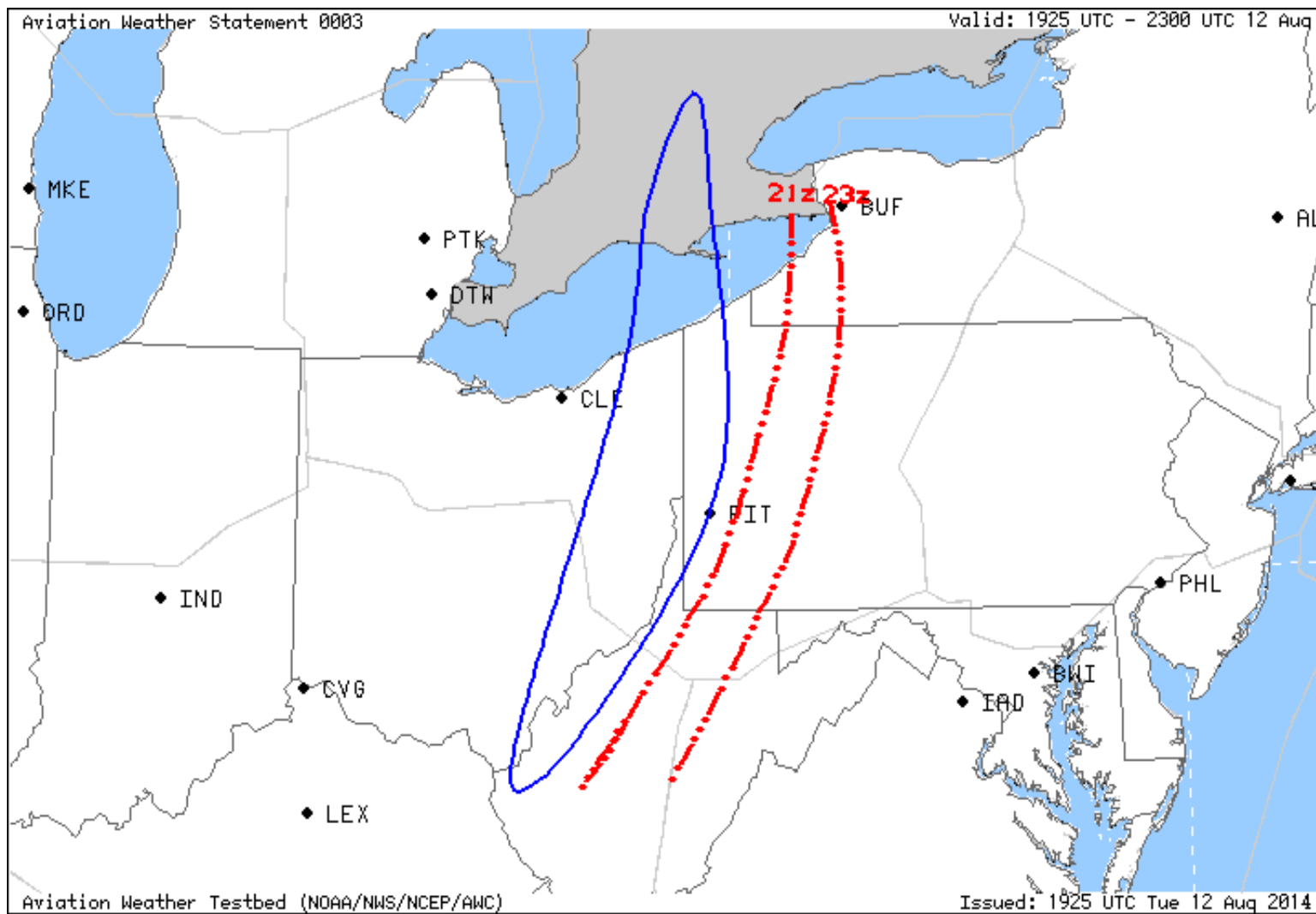
## Convective Allowing Models

- **SREF**
- **Hi Resolution ARW**
- **3 Time Lagged Versions of HRRR**

# CCFP Guidance Example



# CAWS Example



Aviation Weather Statement 0003  
NWS Aviation Weather Center Kansas City MO  
1925 UTC Tue 12 Aug 2014

Valid Period...1925 UTC - 2300 UTC 12 Aug

AWS for Convection...

NAS Elements Affected...

ARTCCs...ZDC ZID ZOB

TRACONs...

Terminals...

Jet Routes...J64, J60, J80

Constraints...

A broken line of convection with tops FL300-450 continues moving through OH/PA. Convective threat will likely continue past 23z.

# Verification of Experimental CCFP Guidance



## 3<sup>rd</sup> Party Independent Verification

- Funded by FAA Aviation Weather Research Program
- Performed by NOAA ESRL/GSD
  - Same group that verified CCFP for a decade
  - Using proven methodologies



**RTVS**  
Convective Verification

## Data: March 2014 throughout Experimental period

- 1 full convective season, plus additional validation through the Winter

## Direct comparisons with 2014 CCFP

# Development History

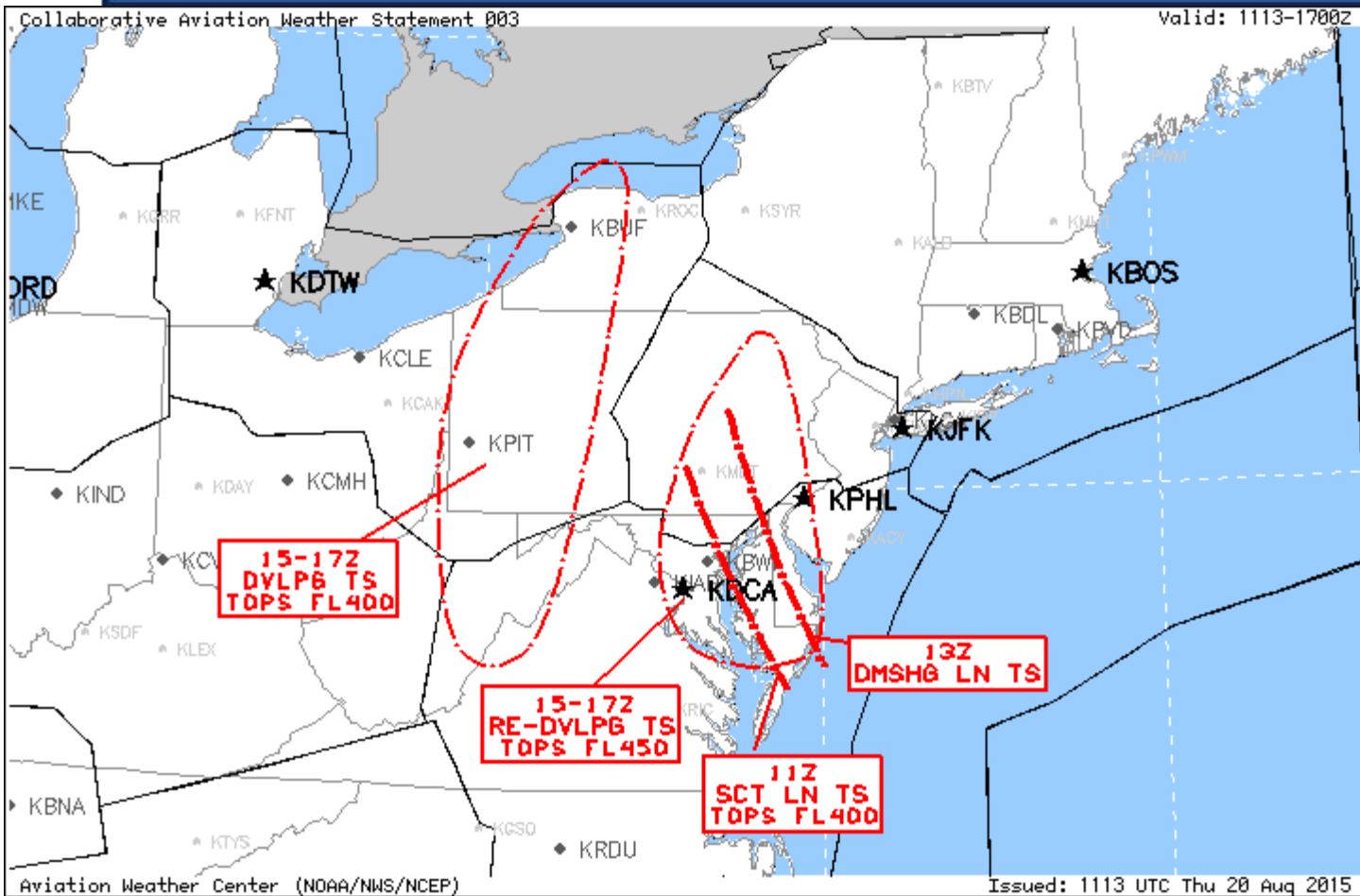


- **Both the FAA (especially AJV-73, ANG-C6, and AJR-12) and airlines have made significant investments into the AWS since 2009**
- **Demonstrations of the AWS have occurred since 2011 at the Aviation Weather Textbed**
- **FAA and Airlines have endorsed the AWS and developed a phased implementation strategy**

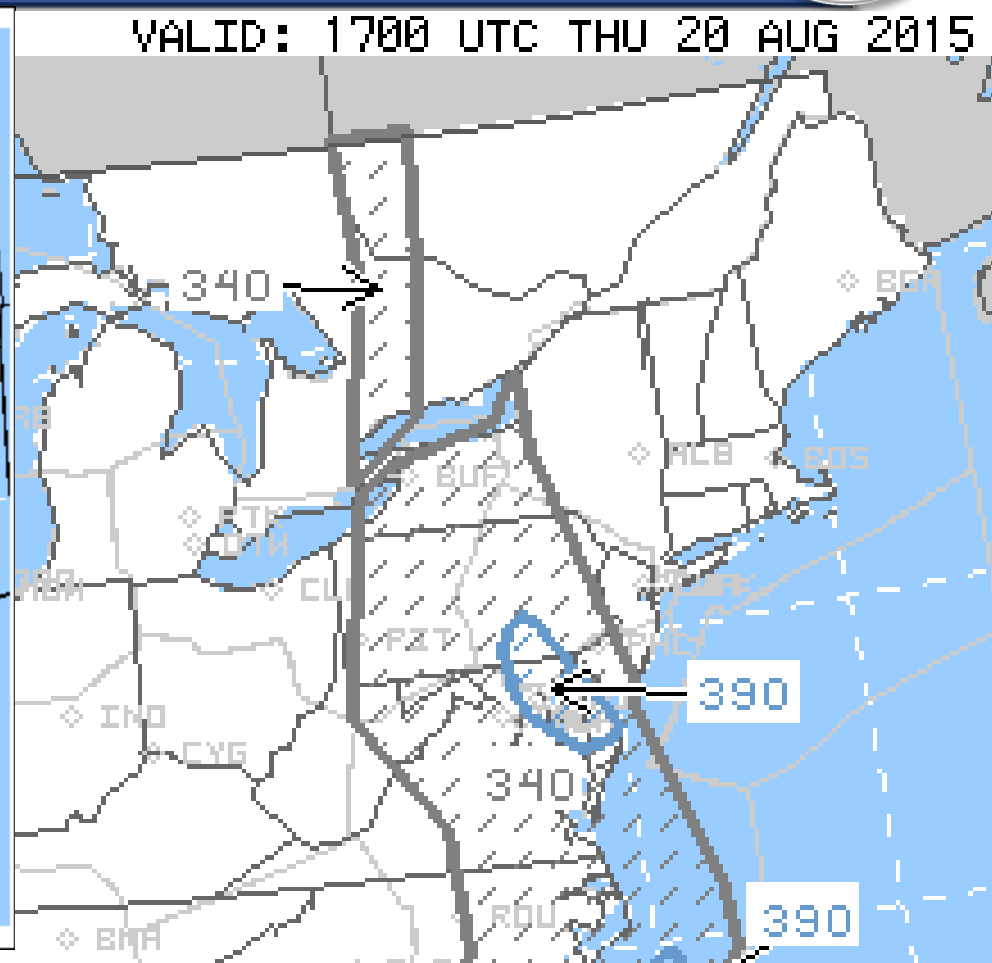




# CAWS/CCFP Example 1 08/20/2015



**1113Z CAWS Valid Through 17Z**



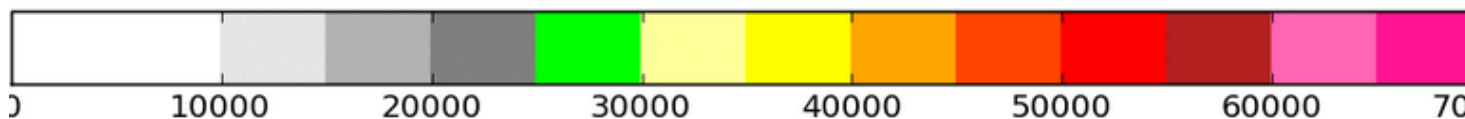
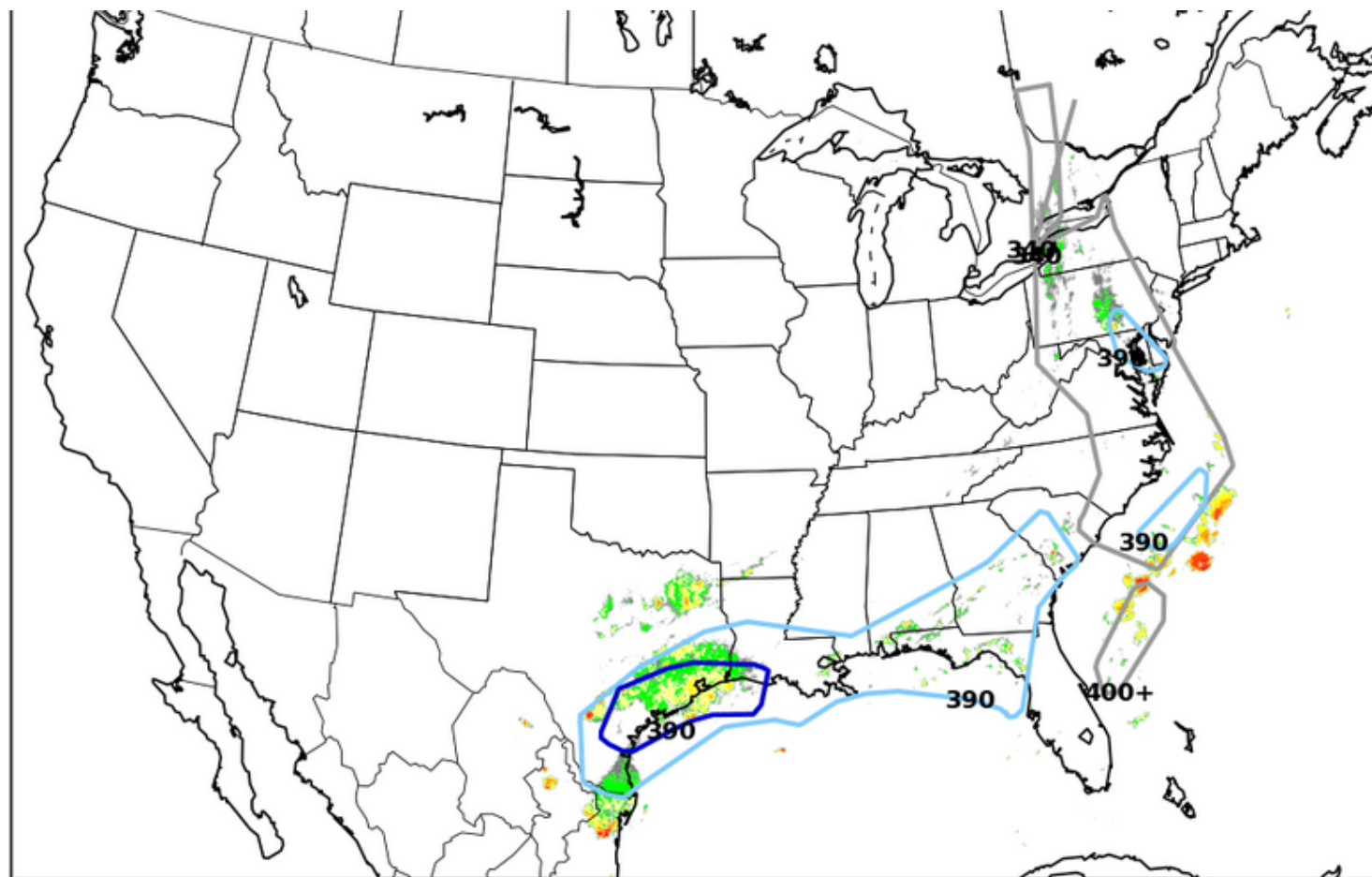
**11Z CCFP Valid 17Z**

# CCFP Verification Example 1

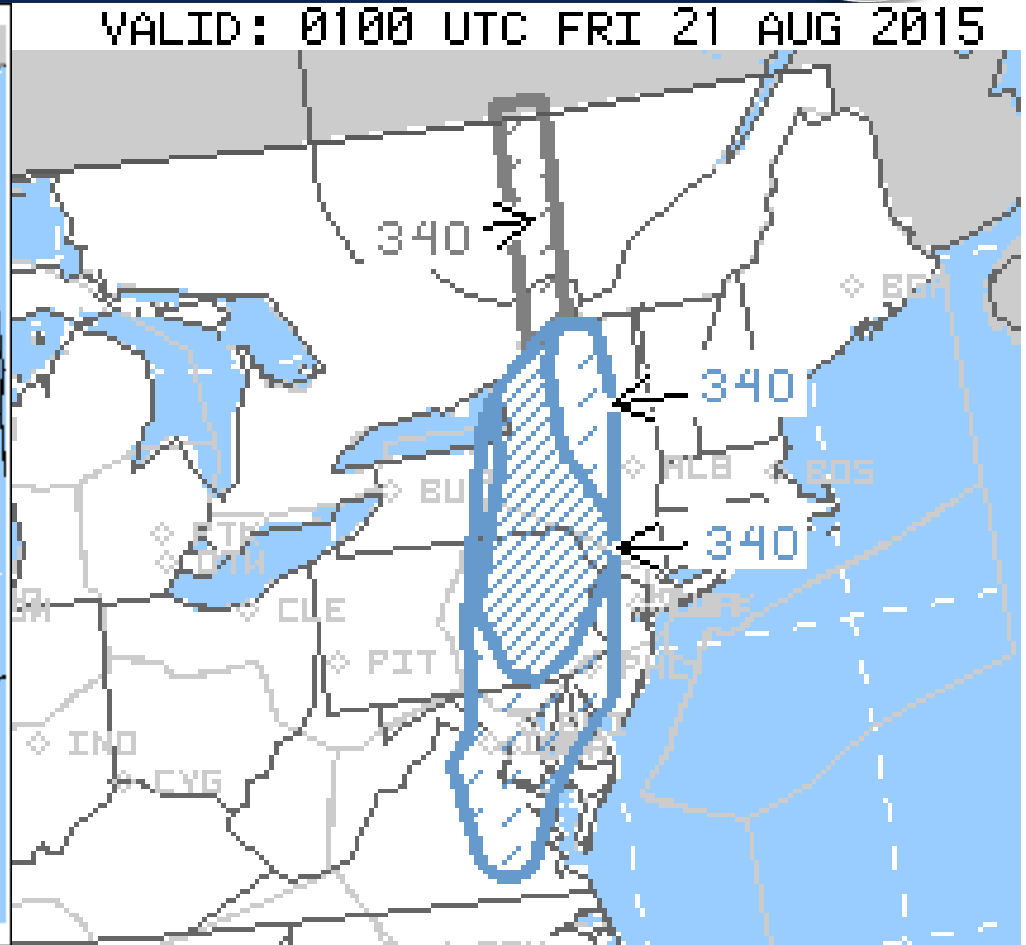
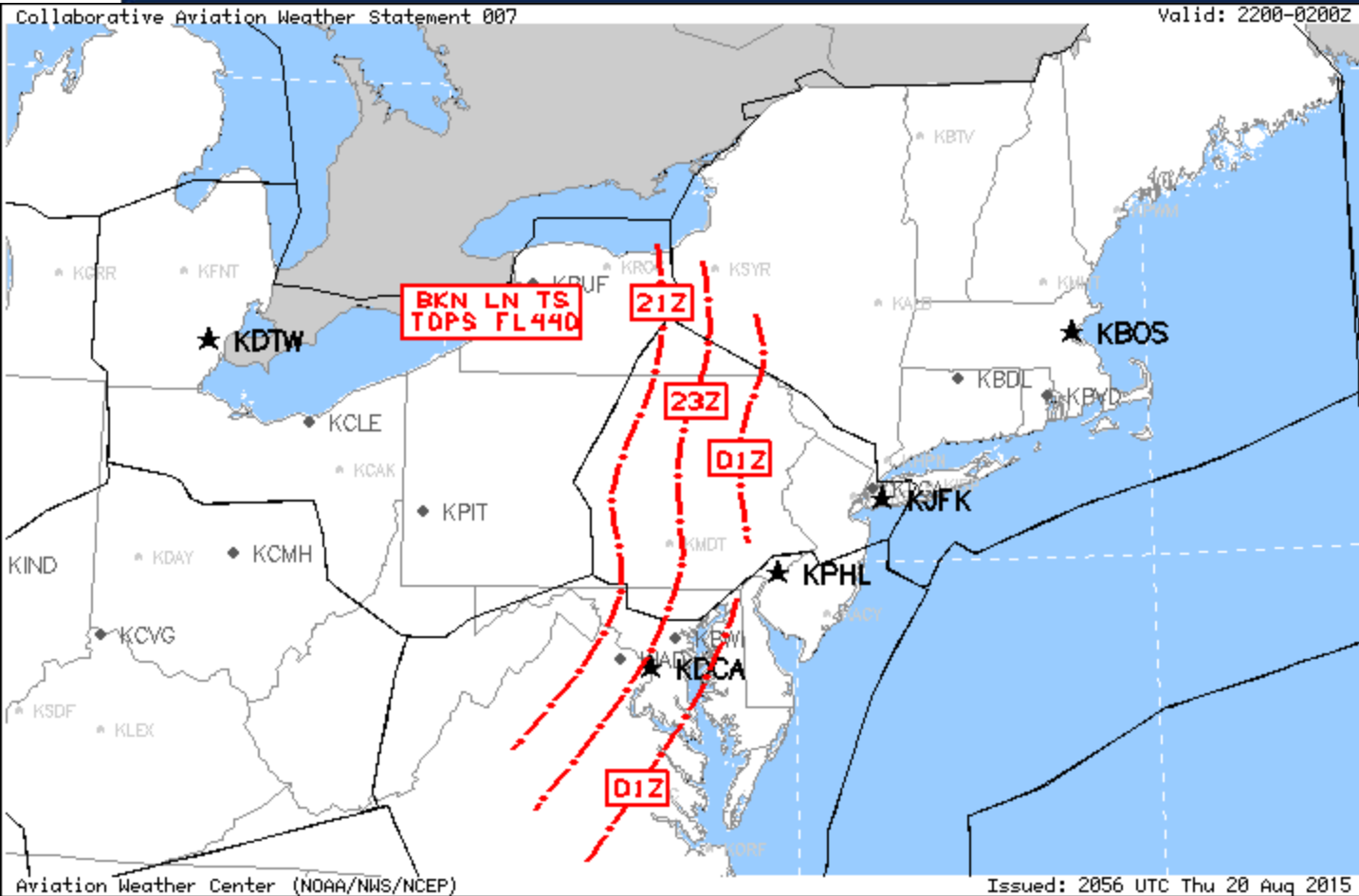


**11Z CCFP, Valid 17Z vs  
Observed Echo Tops**

**General Areas Right  
Timing and Character Off**



# CAWS/CCFP Example 2 08/20/2015



**2056Z CAWS Valid Through 01Z**

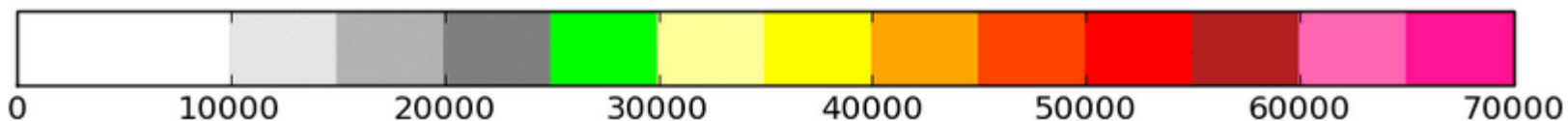
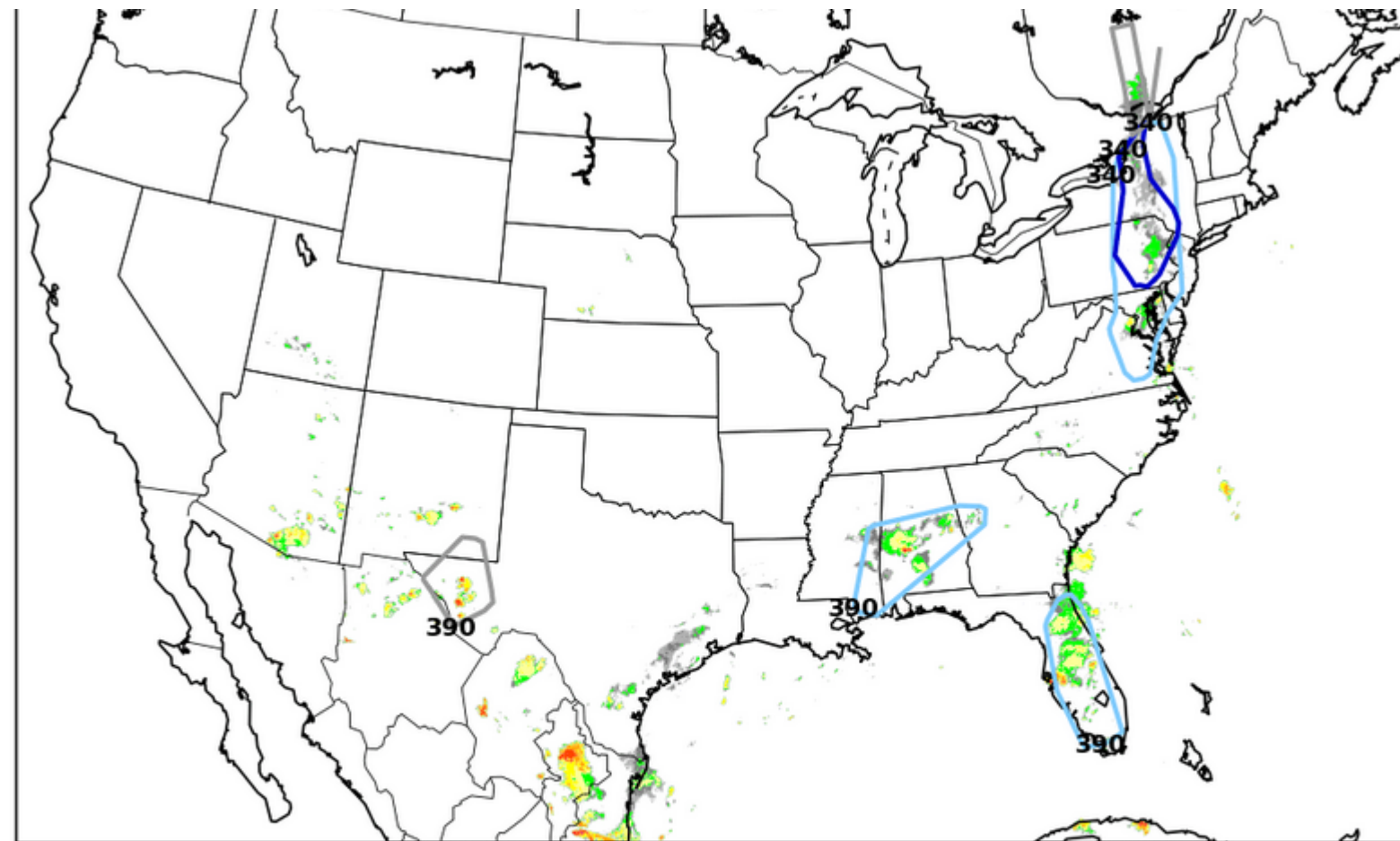
**21Z CCFP Valid 01Z**

# CCFP Verification Example 2



**21Z CCFP, Valid 01Z vs  
Observed Echo Tops**

**General Areas Right  
Timing and Character Off**



# CAWS/CCFP Outcome 08/20/2015



**Poorly Forecast WX = High Number of Diversions**

**Well Forecast WX = High Number of Delays**

- **Over 10,300 delays**
- **Top 10 Day This Year for Delays**
- **Only 138 Diversions**