Panel and Open Discussion: Improved Air Traffic Management When Congestion Impacts Congested Airspace (e.g., Northeast Corridor and Atlanta)

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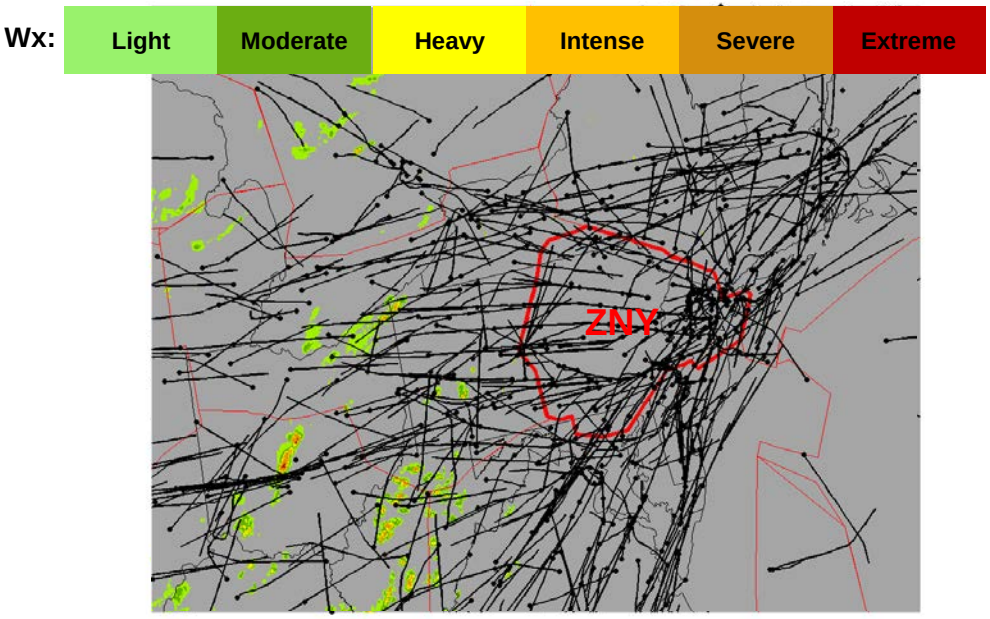
Outline

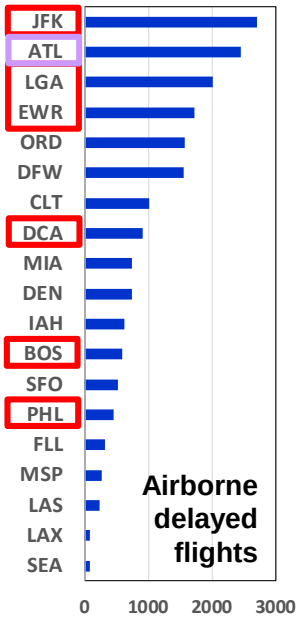
- **Challenge of convection plus congestion**
- **Discussion topics**
  1. **Which forecasts are used operationally today to support key decisions as a convection impact event proceeds**

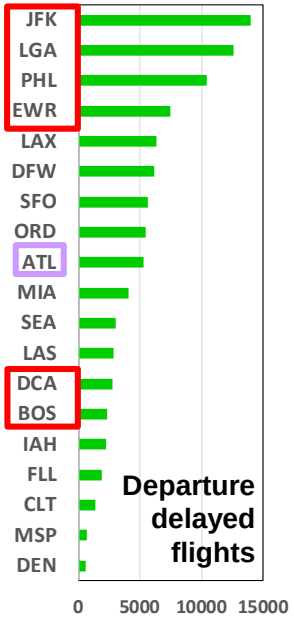
     Events from 2018 in the Northeast Corridor and at Atlanta
  2. **What should be considered to further improve the overall decision support for management of convection in highly congested airspace in the context of current work by PERTI, NEC and FAA weather/ATM R & D**
     - **Improving choice of TMIs to address anticipated congestion**
     - **Convective forecast usability enhancements (e.g., forecast confidence metrics, focused meteorologist support at ARTCCs and some TRACONs)**
     - **Explicit translation of weather forecasts into enroute and terminal capacity impact forecasts**
     - **Post-event analysis to identify best practices and missed opportunities**
     - **Improved training for key decision-makers (e.g., TMU, area managers)**
     - **Decision support for convection + other adverse weather (winds, low C & V)**
  3. **Panel members**

Adverse Weather & Air Traffic Management Challenges

- **Northeast Corridor (NEC) and Atlanta are frequently impacted by adverse weather including convection**







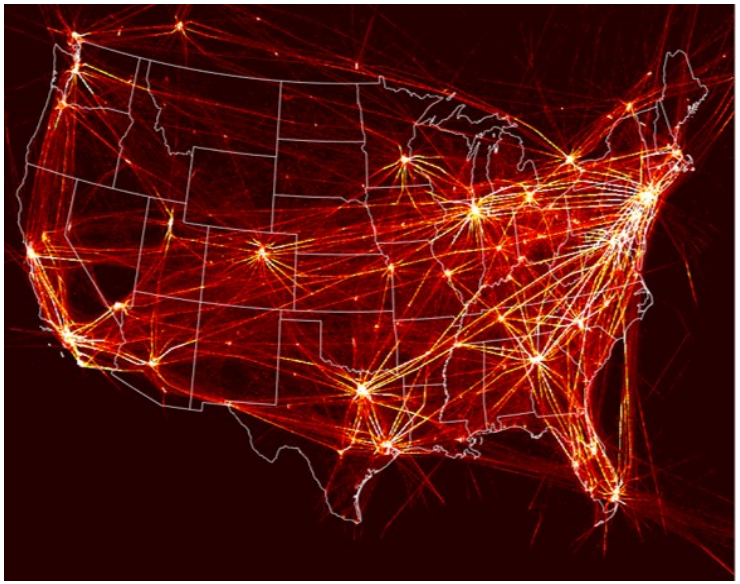
North East Corridor (NEC) airports

Atlanta airport

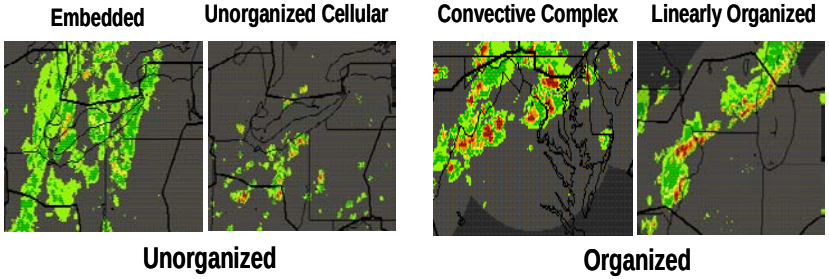
Data for 2017. Source: FAA OPSNET

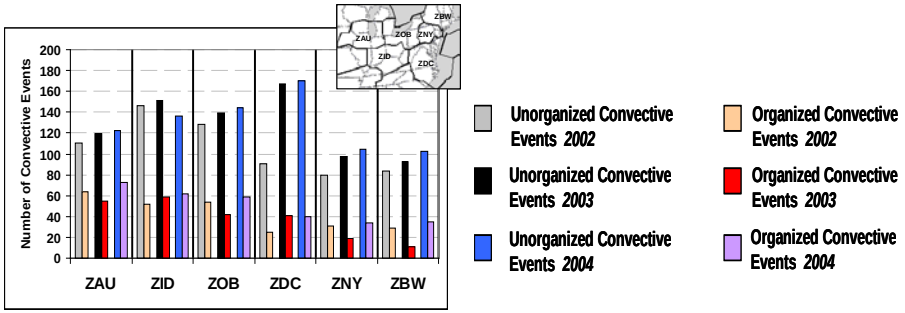
Examine current ATM challenges & identify opportunities for to enable full use of available capacity in the Northeast Corridor down to Atlantal when adverse weather occurs

Challenge of Congestion Plus Convection



Density of IFR aircraft in the US aviation system on a fair weather day in October 2015.





Frequency of various types of convective weather patterns observed in CIWS domain in 2002-2004.

Note that unorganized convective weather-which is hardest to predict in detail hours in advance- is much more frequent near the east coast

Implications of Congestion + Convection

Loss of capacity due to congestion causes a queue to develop when demand>capacity. Planes must be held somewhere (e.g., holding pattern, origin or diversion airport)

Delay ≈ (loss in capacity) x (square of the time over which the capacity was not used) / Fair weather excess capacity

This simple relationship has two significant consequences for air traffic management at outset, during and at the end of the convective impact event:

1. **Very important to keep duration over which capacity is not used as small as possible**
   - **Do not restrict traffic too early**
   - **Resume use of airspace quickly when constraint ends**
2. **Need to especially reduce the loss of capacity during convection at airports that have very little fair weather excess capacity**

Convection Forecasts Observed in Use

Convective Forecast to Support ATM	lead times (hrs)	Update rate	Forecast Depiction		resolution (km)	Uncertainty information
			Precip	Storm echo tops		
Forecasts generally available at FAA traffic management (TM) positions and on the WWW						
TFM Convective Forecast (TCF)	4,6,8	2 hrs	Regions of sparse (25%-40%) and medium (40-76%) coverage by 40dBZ. Squall lines (75-100%	Peak tops in region		Yes-forecaster confidence of 50% that coverage is at least 25%
CIWS forecast (on TFMS) and ITWS forecast (on situation displays)	0-2	5 min	Deterministic updated every 5 minutes	Deterministic updated every 5 minutes	1	Yes-recent past performance
Forecasts available on WWW, but not generally available at FAA TM positions						
CoSPA (precursor to NextGen Weather Processor (NWP) strategic forecast on Aviation	2-8	15 min	Deterministic updated every 5 minutes	Deterministic updated every 5 minutes	3	
SREF 3-hour Calibrated Thunderstorm	3-87	6 hrs	Probability of convection at grid	No	32	No
High Resolution Rapid Refresh (HRRR) forecast	1-36	1 hr	Deterministic used in CoSPA (see above) and will be used in NWP	Deterministic used in CoSPA (see above) and will be	3	No
Weather Research and Forecasting Model (WRF) (e.g., Rapid Refresh	1-24	1 hr	Deterministic	No	13	No
Localized Aviation MOS Program	1-24	1 hr	Probabilistic	No	2.5	No
Human Advice						
National Aviation Meteorologists (NAM) at ATCSCC						
Center Weather Service Unit						
Private forecasting services (e.g., airline, The Weather Company, etc). May include proprietary numerical forecast models as well						

Comments:

1. Many longer lead time forecast display concepts include the ability to compare the forecasts issued at various times for a fixed forecast valid ti
   Consistency of the various forecasts is viewed as a confidence indication.

Panel Members

ATM Decision-Makers

- **Mark Hopkins (Delta Airlines) –** Major operator at Atlanta and Northeast Corridor (especially New York)
- **John Kosak and Ernie Stellings (NBAA)** (TET airport is a major focus)
- **Darin Tietjen (Southwest dispatch)** (# 2 operator at ATL, major operator at BWI)
- **Rocky Stone (United Airlines)** – Cockpit decision support. United is the major operator at IAD and EWR.

Convective Weather DST Developers

- **Jim Evans / MIT-LL**

Atmospheric Scientists/Forecasters

- **Warren Qualley (Southwest Airlines) (Previously American Airlines)**
- **David Bieger (NOAA)-ATCSCC**
- **Pat Murphy (FAA weather R & D)**