NWS NAM
Weather Impacts

FPAW

Frank Brody
Meteorologist in Charge
National Weather Service
National Aviation Meteorologists
FAA/ATCSCC, Warrenton, VA
August, 2016
FPAW/NBAA
Overview

• Situations:
  – April 29, 2016
  – June 30 - July 1, 2016

• Conceptual Model - Delays vs Met Inputs

• Summary
“Weather is intertwined with nearly every decision we make.”

- Bryan Beck, FAA / ATCSCC National Operations Manager (NOM)
April 29, 2016
April 29, 2016: DFW

- NAM / CWSU briefings and CAWS 11Z – 14Z focused on TS line development in east TX after 19Z

- FAA GDP issued at 1530Z ... for period 19Z – 02Z

- GDP Issued several hours before TS started

- GS in place 19Z – 01Z
CAWS 002: 4/29/16

Issued 1322z -- valid 17z - 21z
CAWS 002: 4/29/16

Issued 1322z -- valid 17z - 21z

BKN Line
Radar / Lightning Data 4/29/16

2100Z

2300Z
DFW ASPM Data: 4/29/16

- Departure Delays: 249
- Airborne Holding Minutes: 792
- Diversions: 7

- 7 Diversions relatively small for DFW with TS
- GS probable factor in low number of Diversions
# FAA NAS Aero Data

**NAS Daily Report For Friday, April 29, 2016**

**Daily NAS Totals:**
- IFR Ops: 46805 (2.87%)
- AC Ops: 28952 (0.27%)
- Delays: 955
- Holding Minutes: 2551
- Diversions: 55

NAS Daily data is not for public or media release and is for official FAA use only. NAS Daily data is preliminary and subject to change.

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Summary – April 29, 2016

- Well forecast TS event for east TX
- CAWS and Met briefings focused on high confidence TS development
- Thus -- GDP for DFW issued with ~4 hours lead time before TS formed near and east of DFW
- DFW delays (249) and airborne holding (792 mins) high
- DFW diversions relatively low (7) – probably due to long GS
- Meteorological inputs resulted in proactive TMI
- Mitigation of impacts?
June 30 – July 1, 2016
June 30 – July 1, 2016

• PERTI approach initiated on-the-fly by ATCSCC
  
  *PERTI = Plan, Execute, Review, Train, Improve*

• Detailed special NAM weather briefing evening of June 30 – for Northeast TS on July 1

• ATCSCC and NAM day shifts had a “running start” for July 1

• Significant coordination / collaboration by NWS mets on June 30 and July 1: AWC, NAMs, CWSUs – for briefings and TAFs.

• AFPs and GDPs were issued early on July 1
HIGHLIGHTS: Significant impacts to NY/BOS/PHL routes and terminals tomorrow afternoon and evening as a cold front moves through the region.

- Route/Gate impacts across NY/PA after 18-19Z...through 02Z
- NY/PHL terminal impacts possible after 20Z...likely after 22Z
- BOS Terminal impacts possible aft 21Z...more likely aft 00Z

Higher uncertainty in coverage across ZDC airspace.
Internal Day 2 TS Outlook for July 1, 2016

Briefed to ATCSCC 20Z June 30, 2016
Internal **Day 1** TS Outlook for July 1, 2016

*Briefed to ATCSCC  12Z  July 1, 2016*

ISSUED: 11Z 07/01/2016
VALID 07/01/2016

NAM EXPERIMENTAL THUNDERSTORM OUTLOOK
CAWS 001 – CAWS 004 7/1/16

Collaborative Aviation Weather Statement 001
NWS Aviation Weather Center Kansas City MO
1332 UTC Fri 01 Jul 2016

Collaborative Aviation Weather Statement 002
NWS Aviation Weather Center Kansas City MO
1521 UTC Fri 01 Jul 2016

Collaborative Aviation Weather Statement 003
NWS Aviation Weather Center Kansas City MO
1748 UTC Fri 01 Jul 2016

Collaborative Aviation Weather Statement 004
NWS Aviation Weather Center Kansas City MO
2119 UTC Fri 01 Jul 2016
## July 1, 2016

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NAS AERO Data July 1, 2016

NAS Daily Report For Friday, July 01, 2016

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Summary -- July 1

- Well-forecast and highly briefed TS event - up to 3 days out
- PERTI-style weather and ATFM briefing on June 30 (D-1) during evening FAA Planning Webinar
- CAWS and briefings on July 1 focused on Northeast TS
- Still – a high number of departure delays and Diversions at Northeast terminals
Key Questions / Challenges

What is relationship of dedicated meteorological inputs & Ops Bridging to NAS impacts?

How to *systematically* quantify the value of integrated weather decision support?
- Importance of lead times?
- Impacts avoided via improving – or avoiding -- a TMI?
- Fuel / cost savings?
Met Inputs & Ops Bridging vs. Delays

*Strawman*
Met Inputs & Ops Bridging vs. Delays

Conceptual Model *

Met Inputs and Ops Bridging

* Strawman

NWS/NCEP/AWC/NAM
Summary

• **Convection** - intensive focus / coordination / collaboration

• Ops Bridging occurs via NWS and airline mets

• *In general, focused met inputs appear to mitigate delays and improve TMI issuances.* Hard to quantify.

• Some weather situations – regardless of how well-forecast and briefed – will still result in significant NAS impacts
The Critical 6 C’s:

- Coordination
- Collaboration
- Consistency
- Customization
- Confidence
- Consultation
Questions / Discussion / Debate ?
BACKUP CHARTS
Other Issues

• Multiple convective-allowing models (CAMs) and convective forecast products available to mets and decision-makers

• Met collaboration is labor intensive
  – Sometimes results in a better product
  – Sometimes does not result in a better product
What is PERTI?

- NAS–wide ATO initiative
- Next phase of the SysOps Continuous Improvement Strategy
- Involves resources, processes, and analytics
- Enables SysOps to become more strategic and proactive to reduce current trends
Program Overview

What does PERTI involve?

PLAN
- Expand and align the planning horizon to better prepare for predictable events mitigating impacts

EXECUTE
- Execute the pre-tactical plan to serve as the basis of daily operations

REVIEW
- Develop operational insights using data, metrics, and tools to expand the institutional knowledge

TRAIN
- Use the information gained through the Review process to specifically customize appropriate training on process and systems

IMPROVE
- Measure new capabilities and system performance with key metrics and integrate lessons learned into the operation to continuously refine and improve processes
Program Overview

How will PERTI help?

– Provide required resources to enhance strategic planning
– Expand the planning horizon and align strategic processes
– Provide timely collaboration to solve operational challenges
– Provide a mechanism to evaluate new operational capabilities and procedures
– Deliver a review, feedback process to integrate operational insights into training for continuous improvement
– Mitigate impacts of disruptive events (such as severe weather, planned outages, NOTAMs, capacity changes/impacts)
– Better optimize daily available capacity
June 16, 2016
June 16, 2016

• Major delays in NY / PHL markets
• Complex weather scenario
• TS coverage / confidence / tops did not meet CCFP or CAWS criteria
• FAA “Deep Dive” review conducted
• One outcome: More flexibility needed in weather products (i.e. CAWS).
• Minimally accounted for in review: real-time Ops Bridging verbal briefings
CCFP vs 13Z Radar Images  June 16, 2016

09Z CCFP F004
AND RADAR
VALID 1300Z

11Z CCFP F002
AND RADAR
VALID 1300Z
CCFP vs 15Z Radar Images June 16, 2016

11Z CCFP F004 AND RADAR VALID 1500Z

CAWS ISSUED AT 1308Z/13Z CCFP F002 AND RADAR VALID 1500Z
Summary – June 16, 2016

• Combination events was major factor:
  – Isold TS Delmarva
  – Short narrow line TS OH/Wrn PA
  – Poorly forecast by models / auto-CCFP
• Delmarva / ZDC TS did not meet CAWS or CCFP criteria: less than 25 pct “sparse” coverage”
• CAWS issued for western PA TS
• Intensive real-time briefings by Mets on both areas in 0-3 hour timeframe
Summary – June 16, 2016

Significant delays / diversions due to combination of locations of TS areas

If areas had not occurred simultaneously, likely much fewer impacts (per ATCSCC ops personnel)
High number of Departure Delays

### NAS Daily Report For Thursday, June 16, 2016

#### Daily NAS Totals:
- **IFR Ops:** 50449 (0.23%)
- **AC Ops:** 30480 (5.28%)
- **Delays:** 2334
- **Holding Minutes:** 3306
- **Diversions:** 80

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<td>AFP</td>
<td>1900-2142</td>
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NWS/NCEP/AWC/NAM
Coordination / Collaboration

- CWSU
- OTHER FAA
- NWS WFO
- WPC/SPC
- NHC/SPWC
- A4A/NBAA/IATA
- AWC - CAWS

NAM ↔ ATCSCC

NWS/NCEP/AWC/NAM
Summary

• National Weather Service NAMs provide key weather decision support to ATCSCC and the National Air Space

• Meteorological expertise is fully integrated with ATFM decision makers
NWS/NCEP/AWC/NAM

Contact Info:

awc.nam@noaa.gov
frank.brody@noaa.gov

540-422-4511
Accuracy and Consistency

- Accurate & Consistent
- Not Accurate but Consistent
- Accurate but Not Consistent
- Not Accurate & Not Consistent
“Show Me The Money... $$”
Accurate Forecast Saves $$

A Case Study

- Thunderstorms southwest of Chicago
- WILL IT REACH THE TERMINAL?
- ORD TRACON/TOWER ASKS FOR GROUND DELAY PROGRAM
Thunderstorms southwest of Chicago

WILL IT REACH THE TERMINAL?

ORD TRACON/TOWER ASKS FOR GROUND DELAY PROGRAM

Program length = 2 hours

#Flights affected = 154

#Passengers affected = ~15,400

Average Delay (per flight) = 21 min

Total Delay in NAS = 3,200 min or 53.3 hours
Accurate Forecast Saves $$

- NAM briefed NO thunderstorm impacts to ORD/MDW
- $$ Savings -- $4,690 per hour cost of delay
- 53.3 hours X $4,690 per hour =

SAVINGS: $250,000
Typical Day
(all times UTC)

Scheduled:

- TAF Updates - 09, 11, 13, 15, 17, 19, 21, 23 & 01
- 5-Day Terminal Outlook - 0930
- Day 1-8 Impact Graphics - 1030
- NY/PHL TAF Coordination - 1040 & 1640
- Aviation Previous Day Weather Graphic - 1100
- NWS HQ Standup - 1145 local
- ATCSCC Standup - 1200 & 2000
- NAS Day-1 Convective Outlook - 1245
- FAA NAS System Review (Day 2-4+ Outlook) - 1400
- FAA HQ (High Impacts as needed) -1430

As Needed:

- CAWS Collaboration
- SWPC & VAAC
- Ad-hoc ATCSCC Briefings/Telcons/chats – 15+ each day
- Holiday Outlooks, Special Events, Tropical...
Most IDSS is:

- **Terminal (Airport) Impacts**
  - Arrival/Departure Gates
  - Weather at Airport
  - Ground Stop (GS)
  - Ground Delay Program (GDP)

- **Enroute (Cruising) Impacts**
  - Route blockage
Key Aviation Weather Websites
AWC TFM Portal
Key Aviation Weather Websites

NWS Aviation Weather Center:  
www.aviationweather.gov

www.aviationweather.gov/caws

AWC TFM Portal:  
http://testbed.aviationweather.gov/trafficflowmgmt/portal
VERBAL BRIEFINGS

• NAM Day 1 FORECAST INDICATED SCATTERED TS ACROSS WRN PA AT 15Z ... NOT ON 11Z CCFP

• 1126 DCC/WX WX: PLAN - AREA OF SHRA/TS NEAR PHL AND SOUTH WILL MOVE EAST OFF NJ COAST BY 13Z.

• 1238 DCC/WX WX: SV/STMO - TS/SHRA ACROSS SRN NJ/DELMARVA MAY STICK AROUND TIL 18Z ... AGREE WITH ZNY CWSU...GIVEN DEEP MOISTURE AND NO CAP AND THE FACT THAT IT CONTINUES TO FILL IN
CAWS 002: 4/29/16
Issued 1322z -- valid 17z - 21z

Collaborative Aviation Weather Statement 002
NWS Aviation Weather Center Kansas City MO
1322 UTC Fri 29 Apr 2016

Weather: Thunderstorms
Valid: 1700-2100Z

ARTCCs affected: ZFW, ZHU, ZME
Terminals affected: KDFW

CCFP: 13Z Issuance - Coverage too high

SUMMARY: Medium coverage in 17Z and 19Z CCFP forecasts is too broad. Sparse coverage expected over much of the CCFP medium coverage forecast.

DISCUSSION: Best forcing forcing for medium coverage of thunderstorms is forecast along the west and southwest portions of the outflow boundary from complex of thunderstorms moving through AR, to the northeast of DFW.

Operations Note - CCFP areas that are not displayed in the CAWS graphic for the valid times posted are deemed to be accurate unless otherwise stated.
Key Points

• The 09Z CCFP 4 hour forecast (valid 13Z) was too far east with low/low. It missed the activity across PA all morning.
• The 11Z CCFP 2 hour forecast (valid 13Z) was very good over the Delmarva with low/low. Not good across PA.
• CAWS was issued at 1308Z to address CCFP deficiencies across Western PA
• Tops ZDC area were averaging about 25K with isolated tops 30-35K feet.
• The criteria for high confidence/sparse coverage was not met at the 2+ hour decision point.
• CAWS would be triggered with high/low... hence a low/low forecast did not trigger a CAWS.
• **Multiple briefings by AWC/NAM and CWSU Mets for 0-3 hour timeframe**
Initial Summary

• A convective event significantly impacted ZNY/ZBW/ZDC airspace.

• Advanced planning/PERTI was implemented by ATCSCC NAMs, with extensive collaboration from NWS and airline field meteorologists.

• CCFP was slow to catch on to the event, and in general was underdone in terms of depiction of linear features (this is an understood weakness in the auto-CCFP algorithm)

• CAWS issuances focused on delineating timing and location of highest coverage/impact.
 perti webinar 21z june 30, 2016

- Detailed convective outlook provided by AWC NAM
- NAM coordinated Chat/phone collaboration on timing/intensity/impacts prior to the webinar between ZNY/ZBW/ZDC CWSUs
- Used model and Collaborative forecasts to brief the following 4 graphics... (note, the ARW/SFEF was used as the model input. NAM will have to decide on the best model input to use based on each situation).
• Impacts to ZNY were briefed in the NAS 2-4 Day outlook for the 3 days leading up to event.
• NAMs were requested to provide a Day 2 outlook during the afternoon of June 30th.
• Detailed convective outlook was briefed on a national Webinar the evening of June 30th.
• Forecast was well collaborated and accurate, with individual TAF sites carrying TS 18-24 hours in advance, and NAM/CWSU outlooks all in agreement.