# Impact-Based Decision Support Services for the National Airspace System

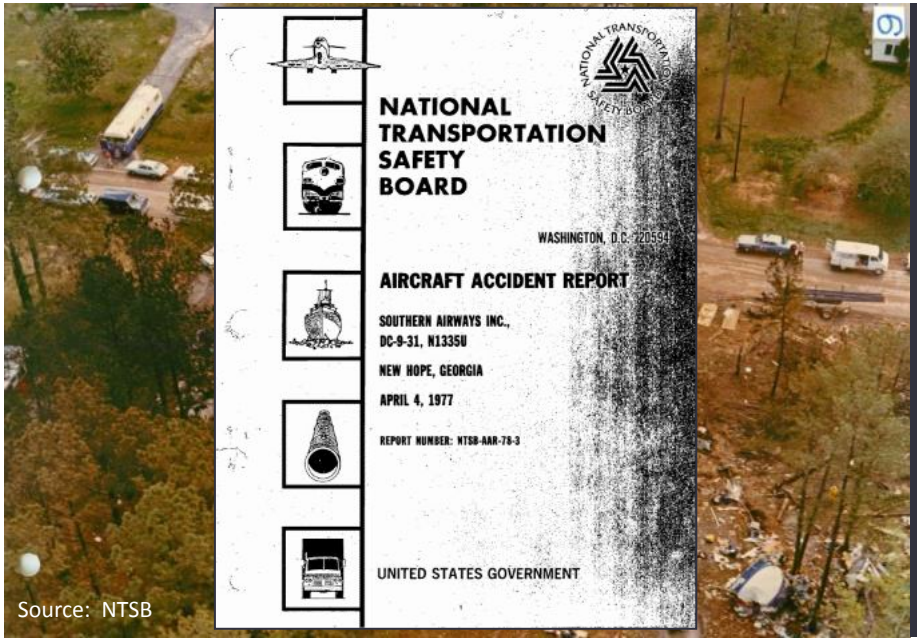
## June 10, 2022

**David G. Bieger**
**Meteorologist-in-Charge**
**National Aviation Meteorologists**

# 49 U.S.C. § 44720, Sec. (a) Meteorological Services

***"The Administrator of the Federal Aviation Administration shall make recommendations to the Secretary of Commerce on providing meteorological services necessary for the safe and efficient movement of aircraft in air commerce. In providing the services, the Secretary shall cooperate with the Administrator and give complete consideration to those recommendations."***

# Why We Are Here




Southern Airways Flight 242 crash in New Hope, GA on April 4, 1977…72 souls lost (22 on-board survived)

Total loss of thrust from both engines due to damage from ingest of water/hail while penetrating an area of severe thunderstorms

NTSB recommendation A-77-068 to formulate procedures for the timely dissemination of all available severe weather information by controllers

**One year later FAA had 3x NWS meteorologists in 13 ARTCCs…by August 1981, FAA had 4x NWS meteorologists in all 21 ARTCCs…that partnership continues to this day!**

# NOAA/NWS Aviation Program

***122*** Weather Forecast Offices

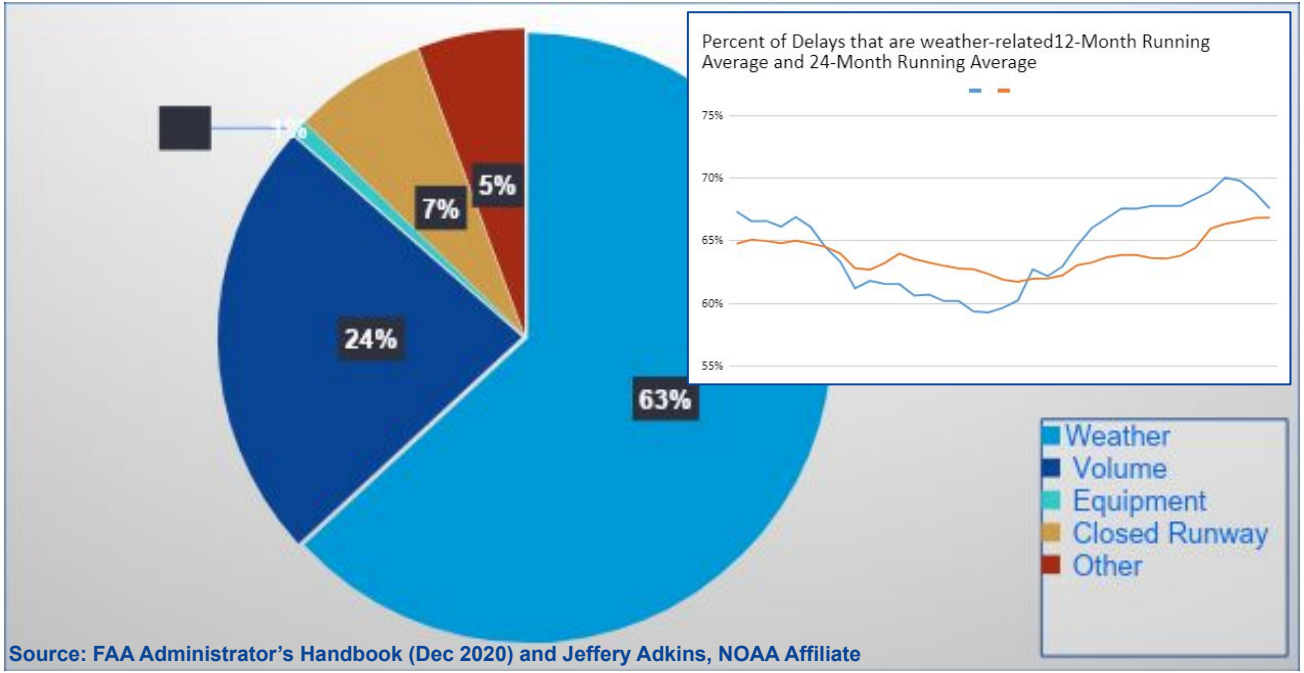

***21*** Center Weather Service Units

***3*** Meteorological Watch Offices

***2*** Volcanic Ash Advisory Centers

**NWS Meteorologists provide embedded Impact-Based Decision Support Services at the ATCSCC as well as the 21 ARTCCs**

# Causes of National Airspace System Delays




**As much as 67% of the delay in the NAS can be attributed to weather, resulting in US economic losses of roughly 23,000,000,000 USD annually.**

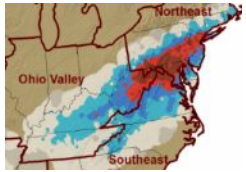
# Multi-Million Dollar Losses to Aviation

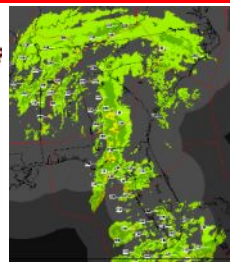
## 18,411 Cancellations

1/22-1/25 2016 – Winter Storm/Thunderstorms

**~$8K Loss / Flight (variable per flight/aircraft type)**

**~$150M Losses**



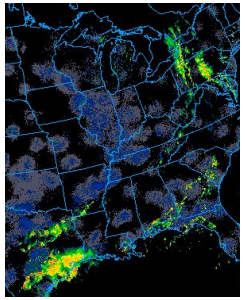
Cancellations ✈ Mostly due to Snow/Ice
Diverts ✈ Mostly due to TS/CIGs/VSBY
Delays ✈ Mostly due to TS/CIGs/VSBY

Cancel/Divert/Delay Data Provided by: MITRE

## 211,226 Min of Delay

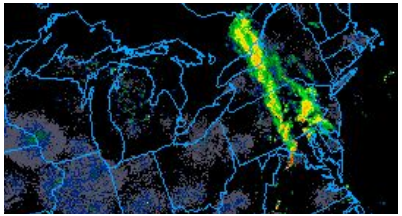
8/20/15 - Thunderstorms

**~$74 Loss / Minute**



**AM & PM TS EWR, LGA, JFK & PHL (Routes Blocked)**

**AM TS IAH ↔ DFW (Routes Blocked & TS at Terminal)**



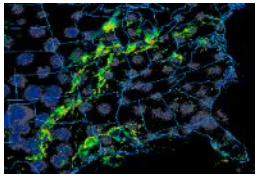
**~$16M Losses**

Cost Data provided by: Airlines for America — We Connect the World

## 322 Diversions

6/15/15 Thunderstorms

**~$8K Loss / Flight (variable per flight/aircraft type)**



**TS Impacting:**
**ORD – NY/PHL/DC**
**ORD – DFW**
**DFW – IAH**

**~$2.6M Losses**

Types of Losses

Airline Crew (timeout)
Missed connection
Missed meeting/vacation
Hotel (airline/passengers)
Reimbursing Tickets
Food
Taxis
Rental Cars
Fuel (airlines & passengers)
Maintenance (airlines)
Lost demand (passenger uses other means)
GDP reduced
Tarmac rule ( > 3 hours)
$27,500 per passenger (paid to Trans Dept)

**Some airlines build divert costs into budgets*

**Source: Eckert, 2017**

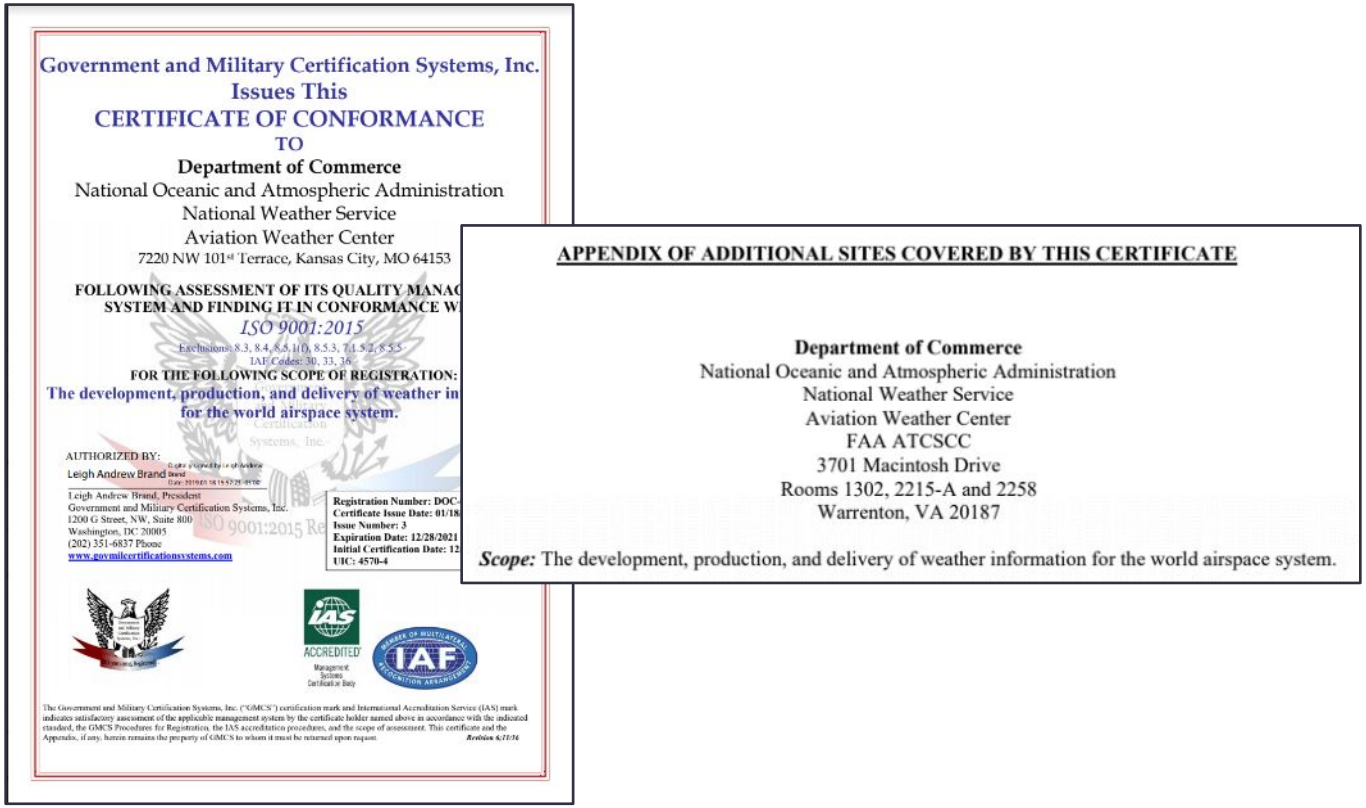
# Brief History of the NAMs

- Pre-1995
  - NWS Meteorologists at ATCSCC
- Post-1995
  - FAA Weather Specialists at ATCSCC
- May 2012
  - NWS Returned to ATCSCC (2x Meteorologists)
- August 2014
  - 1x Meteorologist & 1x Manager Added
- July 2016
  - 2x Meteorologists Added
- January 2019
  - Last FAA Specialist Retires
- NOW
  - 1x Manager, 5x NWS Mets

# Aviation Weather Center


The Aviation Weather Center, located in Kansas City, MO, shares a facility with National Weather Service Central Region Headquarters, as well as the NWS Training Center.

# Quality Management System



Government and Military Certification Systems, Inc.
Issues This
CERTIFICATE OF CONFORMANCE
TO
**Department of Commerce**
National Oceanic and Atmospheric Administration
National Weather Service
Aviation Weather Center
7220 NW 101st Terrace, Kansas City, MO 64153

**FOLLOWING ASSESSMENT OF ITS QUALITY MANAG**
**SYSTEM AND FINDING IT IN CONFORMANCE W**

*ISO 9001:2015*

Exclusions: 8.3, 8.4, 8.5.1(f), 8.5.3, 7.1.5.2, 8.5.5
IAF Codes: 30, 33, 36

**FOR THE FOLLOWING SCOPE OF REGISTRATION:**
**The development, production, and delivery of weather in**
**for the world airspace system.**

AUTHORIZED BY:
Leigh Andrew Brand
Leigh Andrew Brand, President
Government and Military Certification Systems, Inc.
1200 G Street, NW, Suite 800
Washington, DC 20005
(202) 351-6837 Phone
www.govmilcertificationsystems.com

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**Expiration Date: 12/28/2021**
**Initial Certification Date: 12**
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**APPENDIX OF ADDITIONAL SITES COVERED BY THIS CERTIFICATE**

**Department of Commerce**
National Oceanic and Atmospheric Administration
National Weather Service
Aviation Weather Center
FAA ATCSCC
3701 Macintosh Drive
Rooms 1302, 2215-A and 2258
Warrenton, VA 20187

***Scope:*** The development, production, and delivery of weather information for the world airspace system.

# This is Our Mission

AWC Mission

The Aviation Weather Center's highly skilled people deliver global operational aviation weather products and services essential to safe and efficient flight, and economic well-being.

NAM Mission

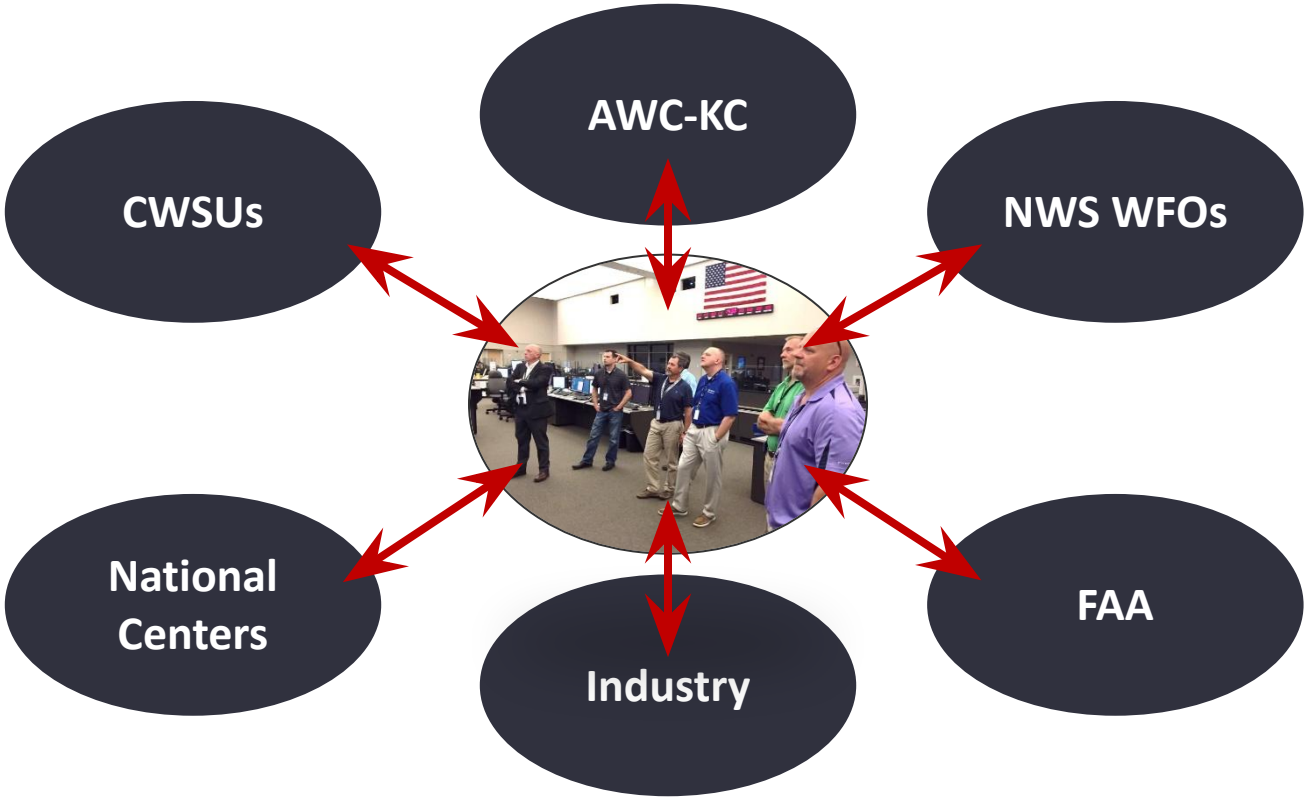
Ensure the safe and efficient operation of the National Airspace System through the provision of timely, relevant, accurate and consistent environmental information to decision makers.

# Key Aviation Stakeholders

- Federal Aviation Administration (FAA)
- National Transportation Safety Board (NTSB)
- Airlines For America (A4A)
- International Air Transportation Association (IATA)
- National Business Aviation Association (NBAA)
- General Aviation Community

- Aircraft Owner and Pilot Association (AOPA)
- International Meteorological Service Providers
- International Civil Aviation Organization (ICAO)

# Coordination and Collaboration

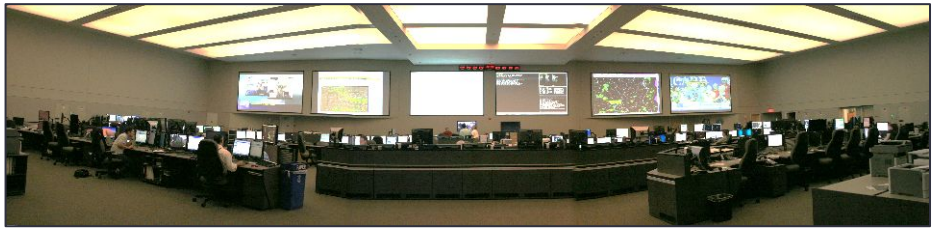


# NWS Support to ATCSCC

**Improve safety, efficiency, and decision making for the National Airspace System**

**Support Collaborative Decision Making**

**Balance air traffic demand with system capacity**



**Fully Integrated and Embedded IDSS**

**Collaborative Forecast Process (NWS and Industry)**

**Focus on weather with potential system impact**

**Our goal is to paint a cohesive national weather picture to the Command Center to improve safety, efficiency, and decision making.**

# Impact-Based Decision Support Services

***"Information is cheap. Meaning is expensive."***

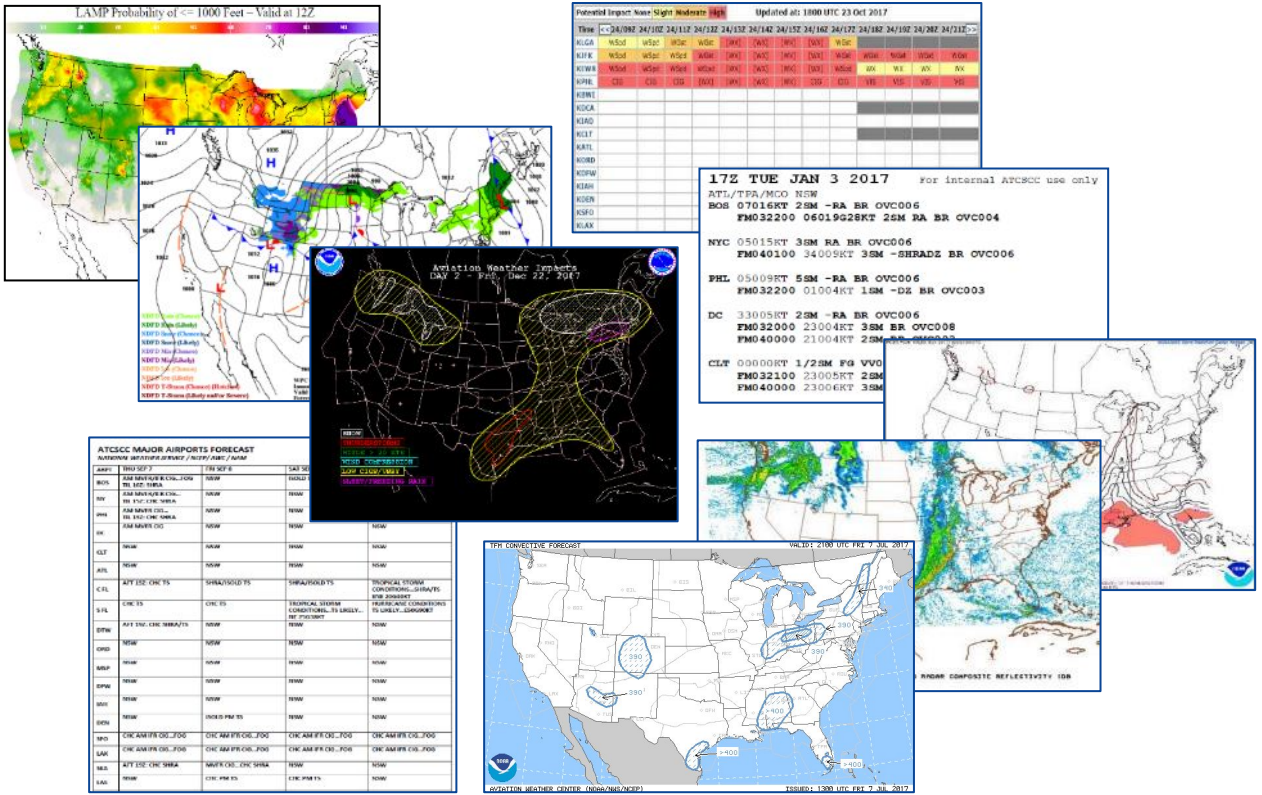
**- George Dyson, Science/Technology Historian**

*Weather information is voluminous.*
*This can lead to "paralysis by analysis."*

***Experience, training, interpretation** and **insight***

*= keys to aiding in smart, safe, & effective decision making!*

# Daily Products and Briefings



# Aviation Weather Impacts Catalog

| | WINDS (wind speed or gusts triggers category) [(>= WDIR1 & <= WDIR2) AND ((> WSPDmin & <= WSPDmax) OR (> WGSTmin & <= WGSTmax))] | | | | | | | | CIG (If coupled with wind, then both are needed to meet CAT), otherwise needs to meet CAT on its own. & [(>= CIGmin & < CIGmax)] | | | | VSBY - (If coupled with wind, then both are needed to meet CAT), otherwise needs to meet CAT on its own & [(>= VISmin & < VISmax)] | | | | WEATHER (Independent of Wind) | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Airport | >= WDIR1 | <= WDIR2 | > WSPDmin | <= WSPDmax | > WGSTmin | <= WGSTmax | CAT | Wind Notes | >= CIGmin | < CIGmax | CAT | CIG Notes | >= VISmin | < VISmax | CAT | VIS NOTES | WX | CAT | WX NOTES |
| ANY | 000 | 360 | 0 | 999 | 0 | 999 | 0 | | 000 | 999 | 0 | | 0 | 0.55 | 3 | Generic; see airport criteria | SN | 3 | |
| ANY | 000 | 360 | 0 | 999 | 0 | 999 | 0 | | 000 | 002 | 3 | Generic; see airport criteria | 0 | 999 | 0 | | FZRA | 3 | |
| ANY | 000 | 360 | 0 | 999 | 0 | 999 | 0 | | 000 | 999 | 0 | | 0.55 | 0.8 | 2 | Generic; see airport criteria | FZDZ | 3 | |
| ANY | 000 | 360 | 0 | 999 | 0 | 999 | 0 | | 000 | 999 | 0 | | 0.8 | 1.55 | 1 | Generic; see airport criteria | IP | 3 | |
| ANY | 000 | 360 | 0 | 999 | 0 | 999 | 0 | | 002 | 005 | 2 | Generic; see airport criteria | 0 | 999 | 0 | | TS | 3 | |
| ANY | 000 | 360 | 0 | 999 | 0 | 999 | 0 | | 005 | 008 | 1 | Generic; see airport criteria | 0 | 999 | 0 | | | | |
| ANY | 000 | 360 | 29 | 999 | 34 | 999 | 3 | Generic; see airport criteria | 000 | 999 | 0 | | 0 | 999 | 0 | | | | |
| KBOS | 20 | 170 | 20 | 999 | 25 | 999 | 3 | | 000 | 999 | 0 | | 000 | 999 | 0 | | RA | 1 | |
| KBOS | 20 | 170 | 0 | 20 | 0 | 25 | 0 | | 000 | 999 | 0 | | 0 | 1 | 3 | ? | SHRA | 1 | |
| KBOS | 20 | 170 | 0 | 20 | 0 | 25 | 0 | | 000 | 999 | 0 | | 1 | 5 | 2 | ? | DZ | 1 | |
| KBOS | 20 | 170 | 0 | 20 | 0 | 25 | 0 | | 000 | 005 | 3 | AAR=28 | 000 | 999 | 0 | | FU | 1 | |
| KBOS | 20 | 170 | 0 | 20 | 0 | 25 | 0 | | 005 | 015 | 2 | AAR=32 | 000 | 999 | 0 | | BLDU | 1 | |
| KBOS | 20 | 170 | 0 | 20 | 0 | 25 | 0 | | 015 | 035 | 1 | AAR=38 | 000 | 999 | 0 | | VCFG | 1 | |
| KBOS | 180 | 10 | 0 | 17 | 22 | 25 | 0 | | 000 | 005 | 3 | | 0 | 999 | 0 | | BCFG | 1 | |
| KBOS | 180 | 10 | 0 | 17 | 22 | 25 | 0 | | 005 | 009 | 2 | | 0 | 999 | 0 | | | | |
| KBOS | 180 | 10 | 0 | 17 | 22 | 25 | 0 | | 009 | 031 | 1 | AAR=38 | 0 | 999 | 0 | ? | | | |
| KBOS | 180 | 10 | 0 | 17 | 22 | 25 | 0 | | 000 | 999 | 0 | | 3 | 4 | 1 | | | | |
| KBOS | 180 | 10 | 0 | 17 | 22 | 25 | 0 | | 000 | 999 | 0 | | 1 | 3 | 2 | | | | |
| KBOS | 180 | 10 | 0 | 17 | 22 | 25 | 0 | | 000 | 999 | 0 | | 0 | 1 | 3 | | | | |
| KBOS | 180 | 10 | 17 | 999 | 25 | 999 | 3 | AAR=30-32 | 000 | 999 | 0 | | 0 | 999 | 0 | | | | |
| KLGA | 280 | 350 | 11 | 17 | 17 | 23 | 1 | 04/22 X-WIND | 000 | 999 | 0 | | 0 | 999 | 0 | | RA | 1 | |
| KLGA | 280 | 350 | 17 | 20 | 23 | 30 | 2 | 04/22 X-WIND | 000 | 999 | 0 | | 0 | 999 | 0 | | SHRA | 1 | |
| KLGA | 280 | 350 | 20 | 999 | 30 | 999 | 3 | 04/22 NOT USED; AAR=28-30 | 000 | 999 | 0 | | 0 | 999 | 0 | | DZ | 1 | |
| KLGA | 360 | 90 | 6 | 12 | 16 | 20 | 2 | | 000 | 999 | 0 | | 0 | 999 | 0 | | FU | 1 | |
| KLGA | 360 | 90 | 12 | 999 | 20 | 999 | 3 | | 000 | 999 | 0 | | 0 | 999 | 0 | | BLDU | 1 | |
| KLGA | 100 | 160 | 11 | 17 | 17 | 23 | 1 | 04/22 X-WIND; | 000 | 999 | 0 | | 0 | 999 | 0 | | VCFG | 1 | |
| KLGA | 100 | 160 | 17 | 20 | 23 | 30 | 2 | 04/22 X-WIND; | 000 | 999 | 0 | | 0 | 999 | 0 | | BCFG | 1 | |
| KLGA | 100 | 160 | 20 | 999 | 30 | 999 | 3 | 04/22 NOT USED;AAR=28-30 | 000 | 999 | 0 | | 0 | 999 | 0 | | | | |
| KLGA | 170 | 270 | 6 | 12 | 16 | 20 | 2 | | 000 | 999 | 0 | | 0 | 999 | 0 | | | | |
| KLGA | 170 | 270 | 12 | 999 | 20 | 999 | 3 | | 000 | 999 | 0 | | 0 | 999 | 0 | | | | |
| KLGA | 10 | 360 | 0 | 999 | 0 | 999 | 0 | | 000 | 999 | 0 | | 3 | 5 | 2 | | | | |
| KLGA | 10 | 360 | 0 | 999 | 0 | 999 | 0 | | 000 | 999 | 0 | | 0 | 3 | 3 | | | | |
| KLGA | 10 | 360 | 0 | 999 | 0 | 999 | 0 | | 010 | 032 | 1 | | 0 | 999 | 0 | | | | |
| KLGA | 10 | 360 | 0 | 999 | 0 | 999 | 0 | | 000 | 003 | 3 | AAR=32 | 0 | 999 | 0 | | | | |
| KLGA | 10 | 360 | 0 | 999 | 0 | 999 | 0 | | 003 | 005 | 2 | AAR=34 | 0 | 999 | 0 | | | | |
| KEWR | 110 | 160 | 11 | 15 | 16 | 20 | 2 | 04/22 CROSSWIND | 000 | 999 | 0 | | 0 | 999 | 0 | | RA | 1 | |
| KEWR | 110 | 160 | 15 | 999 | 20 | 999 | 3 | 04/22 CROSSWIND | | | | | | | | | SHRA | 1 | |
| KEWR | 170 | 260 | 11 | 15 | 15 | 20 | 1 | 11 NOT USED | 000 | 999 | 0 | | 0 | 999 | 0 | | DZ | 1 | |
| KEWR | 170 | 260 | 15 | 29 | 20 | 34 | 2 | | | | | | | | | | | | |
| KEWR | 270 | 330 | 11 | 15 | 15 | 20 | 1 | | | | | | | | | | | | |

# TAF Impacts Board

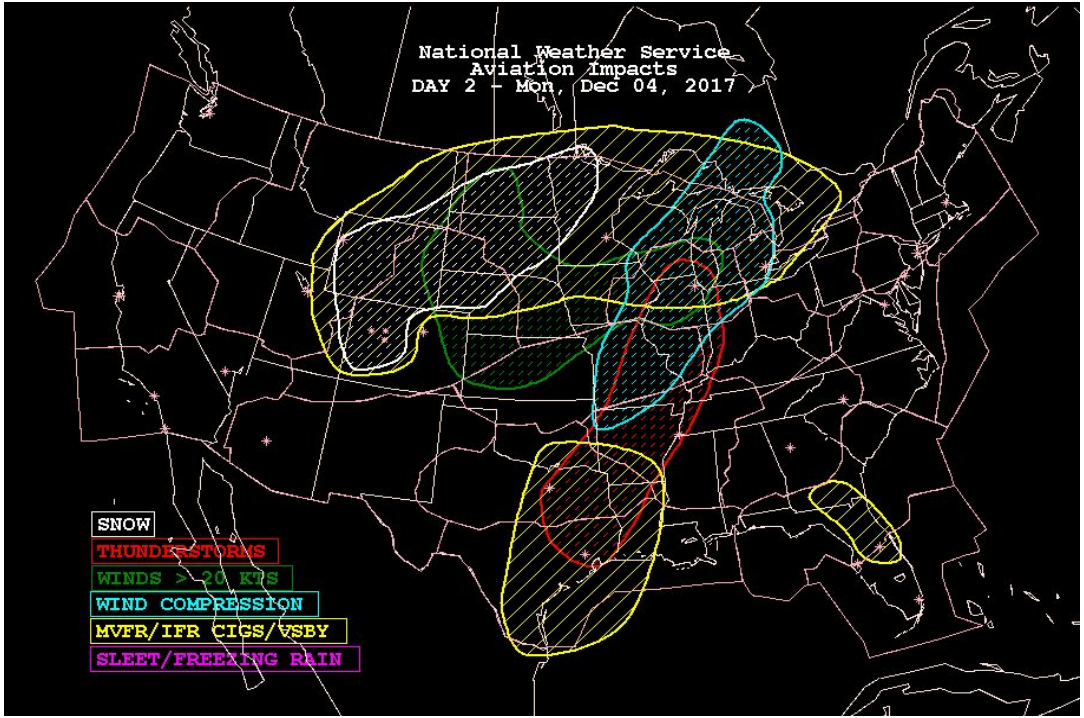
Potential Impact: None | Slight | Moderate | High

Valid at: 1000 UTC 07 Feb 2020

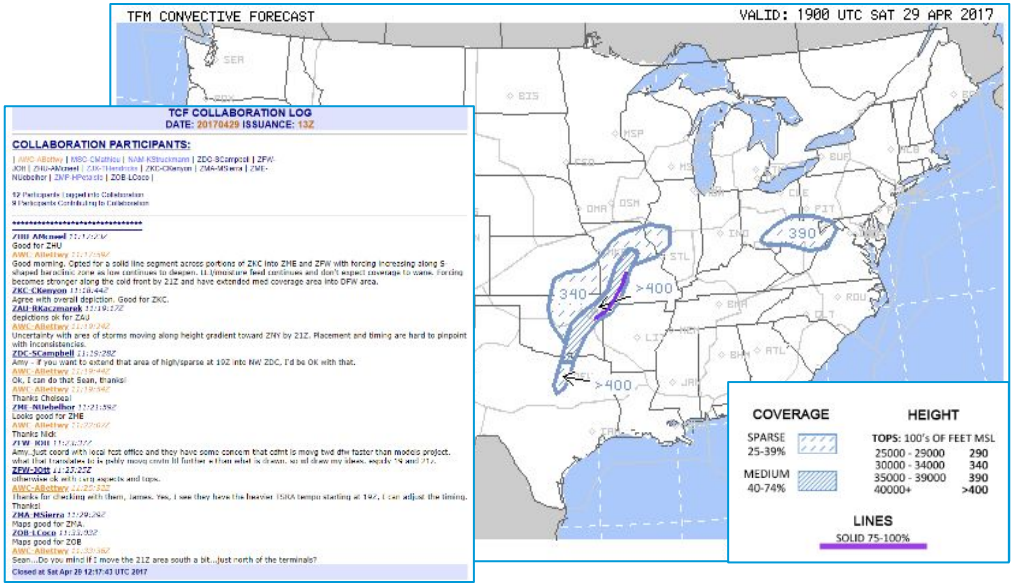
| Time | OBS | 07/10Z | 07/11Z | 07/12Z | 07/13Z | 07/14Z | 07/15Z | 07/16Z | 07/17Z | 07/18Z | 07/19Z | 07/20Z | 07/21Z | 07/22Z >> |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| @TOPE | | | | | | | | | | | | | | |
| KBOS | CIG | CIG | CIG | CIG | CIG | CIG | CIG | CIG | CIG | WSpd | WSpd | WSpd | WSpd | WSpd |
| KCLE | WX | WX | WX | WX | WX | WX | WX | WX | WX | WX | WX | WX | WX | WX |
| KLGA | VIS | VIS | VIS | VIS | VIS | WX | WGst | WSpd | WSpd | WSpd | WSpd | WSpd | WSpd | WSpd |
| KEWR | CIG | VIS | VIS | VIS | VIS | WX | WSpd | WGst | WGst | WGst | WGst | WSpd | WSpd | WSpd |
| KJFK | VIS | VIS | VIS | VIS | VIS | CIG | CIG | WX | WGst | WGst | WGst | WGst | WGst | WGst |
| KPIT | WX | WX | WX | WX | WX | WX | WX | WX | WX | | | | | |
| KPHL | VIS | VIS | VIS | VIS | VIS | CIG | CIG | WGst | WGst | WGst | WGst | WGst | WGst | WGst |
| KBWI | VIS | [VIS] | | | WGst | WGst | WGst | WGst | WGst | WGst | WGst | WGst | WGst | |
| KIAD | VIS | VIS | | | WGst | WGst | WGst | WGst | WGst | WGst | WGst | WGst | WGst | |
| KDCA | CIG | CIG | CIG | CIG | CIG | WGst | WGst | WGst | WGst | | | | | |
| KCLT | WGst | WGst | WGst | WGst | WGst | WGst | WGst | WGst | WGst | WGst | WGst | WGst | WGst | |
| KATL | | | | | | | | | | | | | | |
| KMCO | | | | | | | | | | | | | | |
| KTPA | | | | | | | | | | | | | | |
| KFLL | | WX | [WX] | | | | | | | | | | | |
| KMIA | | WX | [WX] | WX | | | | | | | | | | |
| @TOPC | | | | | | | | | | | | | | |
| KMSP | WX | WX | WX | WX | WX | WX | WX | | | | | | | |
| KDTW | WX | WX | WX | WX | WX | | | | | | | | | |
| KORD | WX | WX | | | | | | | | | | | | |
| KMDW | WX | WX | WX | | | | | | | | | | | |
| KCVG | WX | WX | WX | WX | WX | WX | WGst | WGst | WGst | WGst | WGst | WGst | WGst | |
| KSTL | WX | WX | WX | | | | | | | | | | | |
| KMEM | WX | | | | | | | | | | | | | |
| KDFW | | | | | | | | | | | | | | |
| KIAH | | | | | | | | | | | | | | |
| @TOPW | | | | | | | | | | | | | | |
| KSEA | VIS | VIS | CIG | CIG | CIG | CIG | CIG | CIG | CIG | CIG | CIG | CIG | CIG | CIG |
| KPDX | WSpd | WSpd | WSpd | | | | | | | | | | | |
| KSLC | | | | | | | | | | | | | | |
| KDEN | VIS | [WX] | WX | WX | WX | WX | WX | WX | WX | WX | WX | WX | WX | WX |
| KSFO | | | | VIS | VIS | [CIG] | [CIG] | [CIG] | [CIG] | | | | | |
| KLAS | | | | | | | | | | | | | | |
| KLAX | | | | | CIG | CIG | CIG | CIG | CIG | | | | | |
| KPHX | | | | | | | | | | | | | | |
| KSAN | | | | | | | | | | | | | | |
| Time | OBS | 07/10Z | 07/11Z | 07/12Z | 07/13Z | 07/14Z | 07/15Z | 07/16Z | 07/17Z | 07/18Z | 07/19Z | 07/20Z | 07/21Z | 07/22Z |

***Potential impacts noted are airport-specific, based on Aviation Wx Impacts Catalog***

# NAS Daily Weather Outlook



# Traffic Flow Management Convective Forecast (TCF)




**Collaboration is vital!** **TCF is the primary convective guidance for the FAA to determine Traffic Management Initiatives.**

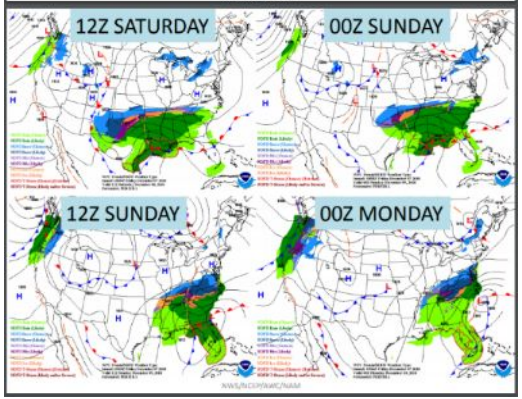
# Significant Event Updates

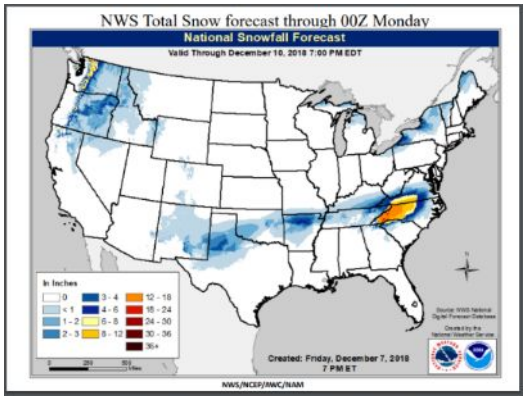
Southern U.S. Winter Storm
12/8/18 - 12/10/18
Issued 00Z SAT 12/8/18

**Summary:**

- Low pressure will develop tonight over southeast Texas and move east-northeast off the North Carolina coast by 00Z Monday. Winter precipitation will spread east from Texas/Oklahoma tonight across portions of Arkansas, Missouri, Kentucky on Saturday and across North Carolina and southern Virginia on Sunday.
- Significant accumulations of snow and sleet are likely across portions of northern Texas, northern Arkansas, Tennessee, Kentucky, North Carolina and Southern Virginia. Significant icing (freezing rain) is possible across upstate South Carolina, northeast Georgia and portions of North Carolina.
- The only major terminal with potential significant impacts at this time is Charlotte North Carolina.

NWS/NCEP/AWC/NAM




NWS Snow Amount Forecasts - Terminals

| AIRPORT | SAT | SAT NGT | SUN | SUN NGT |
|---|---|---|---|---|
| OKC | Sleet/Snow, 1-2" | Flurries | NSW | NSW |
| TUL | Sleet/Snow, <1" | Flurries | NSW | NSW |
| ROA | NSW | Snow after midnight, 1" | Snow, 3-5" | Snow, 1" |
| LYH | NSW | NSW | Snow, 2-4" | Snow, 1" |
| RIC | NSW | NSW | Snow, <1" | Snow, <1" |
| RDU | NSW | Sleet/Snow, <1" | Sleet/Snow, 2-4" | Rain/Sleet/Snow, <1" |
| CLT | NSW | Snow/Sleet/FRZA, 2-4" | Snow/Sleet/FRZA, 3-5" | Snow/Sleet/FRZA, <1" |

NWS/NCEP/AWC/NAM

# PERTI Program Overview

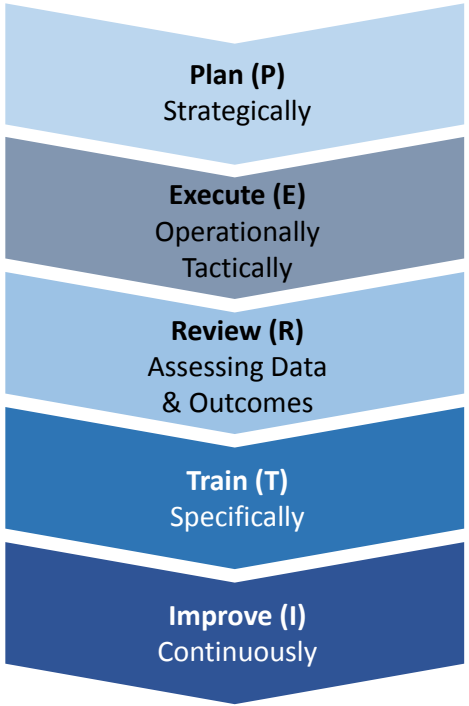
**PLAN** Expand and align the planning horizon to better prepare for predictable events and mitigating impacts.

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

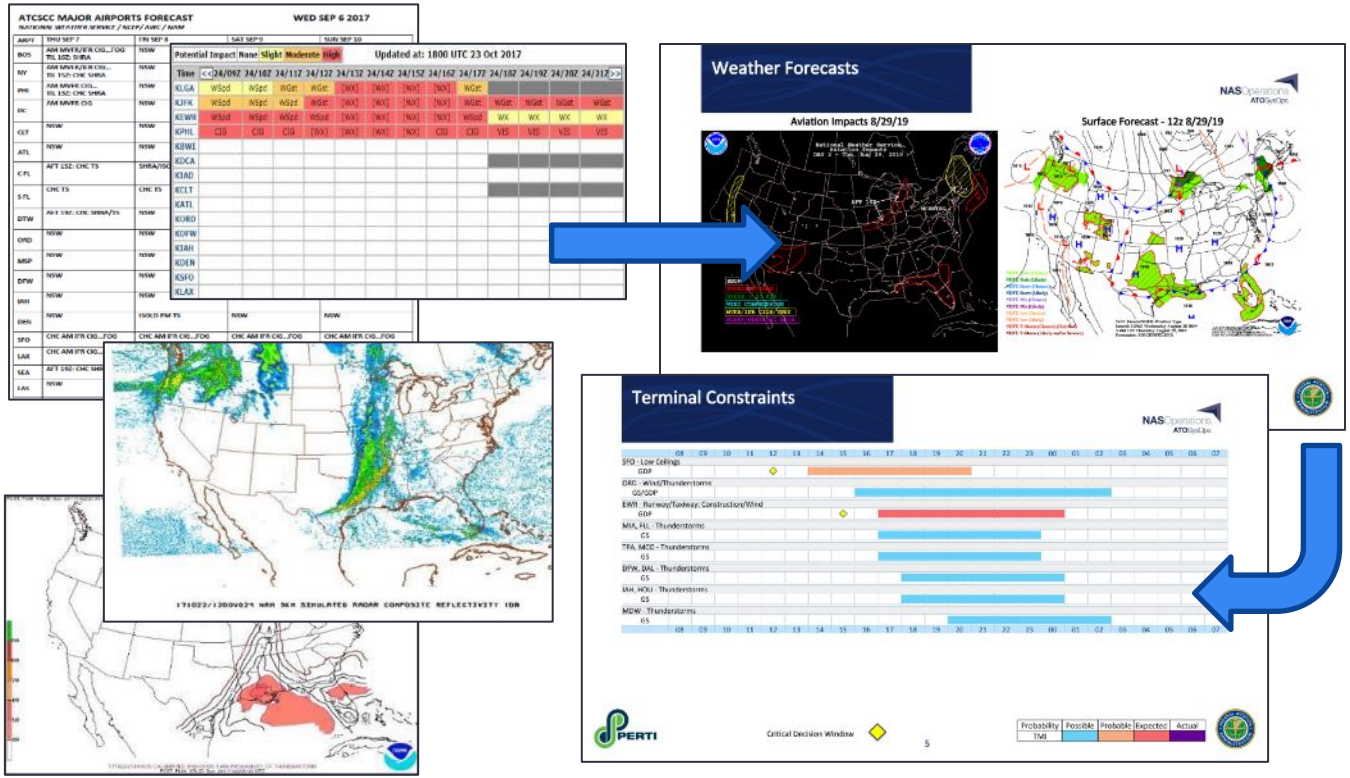
**REVIEW** Develop operational insights using data, metrics and tools to expand the institutional knowledge.

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

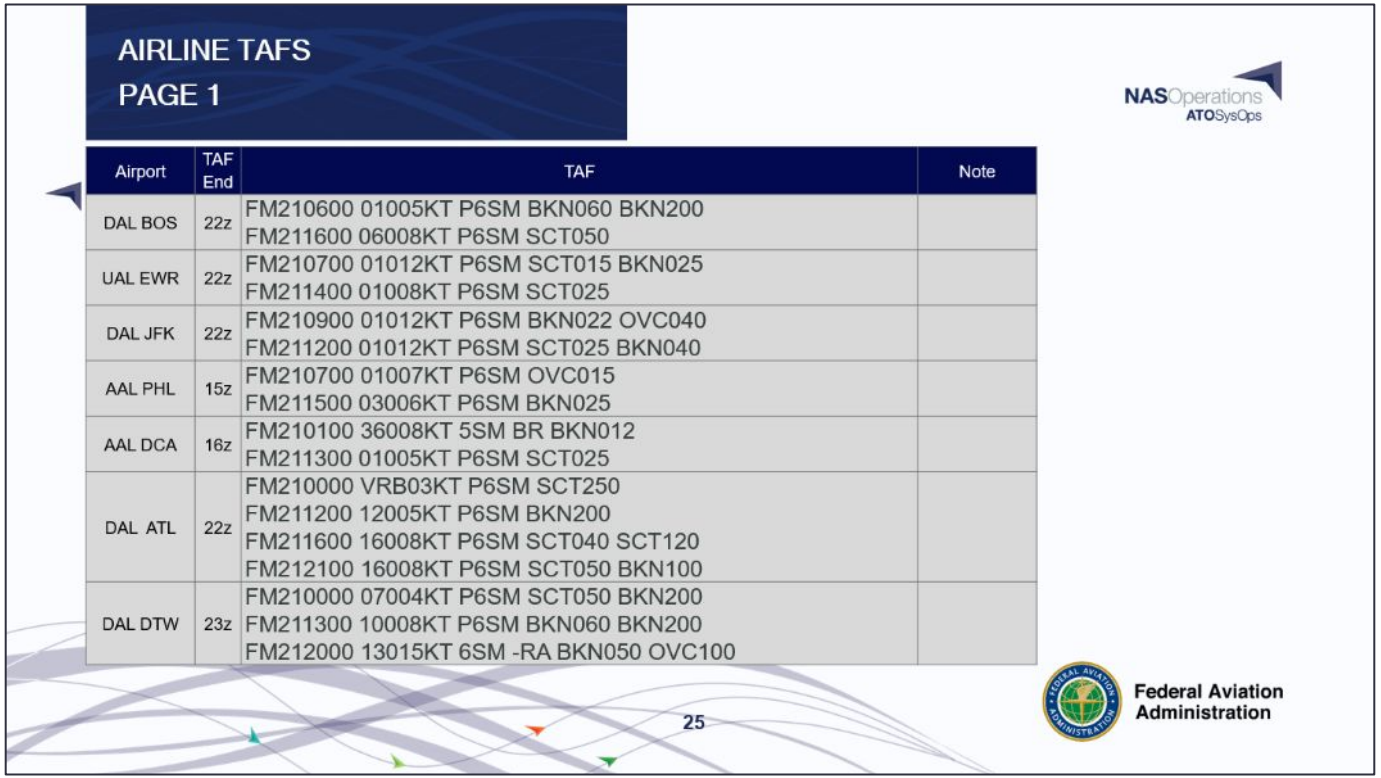
**IMPROVE** Measure new capabilities and system performance with key metrics and integrate lessons learned into the operation to continuously refine and improve processes.



# PERTI Planning



# Industry Collaboration



AIRLINE TAFS
PAGE 1

NASOperations
ATOSysOps

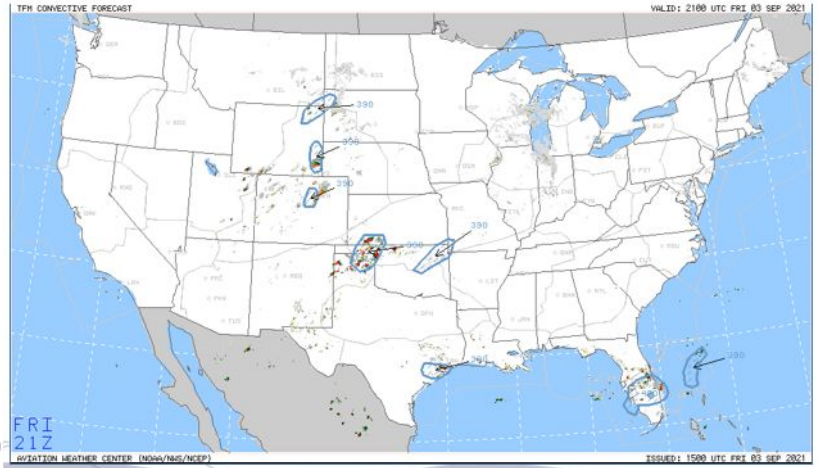
| Airport | TAF End | TAF | Note |
|---|---|---|---|
| DAL BOS | 22z | FM210600 01005KT P6SM BKN060 BKN200<br>FM211600 06008KT P6SM SCT050 | |
| UAL EWR | 22z | FM210700 01012KT P6SM SCT015 BKN025<br>FM211400 01008KT P6SM SCT025 | |
| DAL JFK | 22z | FM210900 01012KT P6SM BKN022 OVC040<br>FM211200 01012KT P6SM SCT025 BKN040 | |
| AAL PHL | 15z | FM210700 01007KT P6SM OVC015<br>FM211500 03006KT P6SM BKN025 | |
| AAL DCA | 16z | FM210100 36008KT 5SM BR BKN012<br>FM211300 01005KT P6SM SCT025 | |
| DAL ATL | 22z | FM210000 VRB03KT P6SM SCT250<br>FM211200 12005KT P6SM BKN200<br>FM211600 16008KT P6SM SCT040 SCT120<br>FM212100 16008KT P6SM SCT050 BKN100 | |
| DAL DTW | 23z | FM210000 07004KT P6SM SCT050 BKN200<br>FM211300 10008KT P6SM BKN060 BKN200<br>FM212000 13015KT 6SM -RA BKN050 OVC100 | |

25

Federal Aviation Administration

# TCF Verification and Daily Review

## Fri Sep 3 2021




https://www.aviationweather.gov/tcf/help

ATOSysOps

- Verified Well
  - ZMA (FL)
  - ZKC (OK/TX Panhandle)
- Verified Close
  - ZHU
  - ZDV
- Over-forecast
  - ZMA (Offshore)
  - ZKC (NE OK)
- Missed

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## West - Traffic & Performance (09/03/2021)

ATOSysOps

ASPM-77 Performance Outcomes: Top 25% compared to baseline; Bottom 25% compared to baseline

| Location | Traffic Cnt | Flight Operator Based Metrics | | | | | | FAA Based Metrics | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Completion | D0* | A0 | Avg Taxi-Out | Taxi-Out s >120* | Avg Taxi-In | Diversions | AH Delays | AH Minutes* | TMI Delays* | TMI Minutes | Departure Delays* |
| West | 16,642 | 97.19% | 56.5% | 56.9% | 16.4 | 1 | 8.3 | 71 | 72 | 2,159 | 203 | 18,738 | 19 |
| ANC | 1,291 | 98.55% | 82.1% | 63.4% | 12.9 | 0 | 6.5 | 0 | 0 | 0 | 0 | 0 | 0 |
| DEN | 1,791 | 90.45% | 35.8% | 37.2% | 21.3 | 0 | 11.4 | 59 | 67 | 2,020 | 196 | 18,609 | 0 |
| LAS | 1,809 | 97.77% | 52.6% | 51.5% | 16.7 | 1 | 8.4 | 2 | 0 | 0 | 2 | 36 | 14 |
| LAX | 1,659 | 97.54% | 59.9% | 67.1% | 16.8 | 0 | 10.6 | 0 | 0 | 0 | 3 | 54 | 0 |
| SAN | 587 | 99.39% | 60.2% | 59.2% | 16.4 | 0 | 5.1 | 0 | 0 | 0 | 1 | 17 | 0 |
| SEA | 1,220 | 98.70% | 65.1% | 67.3% | 17.2 | 0 | 9.8 | 0 | 0 | 0 | 0 | 0 | 0 |
| SFO | 878 | 99.35% | 63.7% | 65.6% | 16.8 | 0 | 8.6 | 0 | 0 | 0 | 1 | 22 | 0 |
| SLC | 1,113 | 98.59% | 65.4% | 65.2% | 17.2 | 0 | 8.6 | 0 | 0 | 0 | 0 | 0 | 0 |
| Other-WE | 6,584 | 98.86% | 59.9% | 54.8% | 13.2 | 0 | 6.1 | 10 | 5 | 139 | 0 | 0 | 5 |

ASPM-77 KPI Trend:


Traffic counts are from OPSNET; other performance data are from ASPM (for the ASPM77 airports)

The KPI (Key Performance Indicator) score is based on the metrics without an asterisk in the data table

If the metric for the given day ranks in the bottom (top) 25% compared to the baseline, then the value is shown in orange (blue)

Federal Aviation Administration

## West - Weather & Initiatives (09/03/2021)

ATOSysOps

Weather:

| Location | # Hours @ Moderate/High | | | |
|---|---|---|---|---|
| | Wind | Ceiling | Viz | Wx |
| West | 1 | 12 | 1 | 1 |
| ANC | 0 | 0 | 0 | 0 |
| DEN | 0 | 0 | 1 | 1 |
| LAS | 0 | 0 | 0 | 0 |
| LAX | 0 | 6 | 0 | 0 |
| SAN | 0 | 0 | 0 | 0 |
| SEA | 1 | 0 | 0 | 0 |
| SFO | 0 | 6 | 0 | 0 |
| SLC | 0 | 0 | 0 | 0 |
| Other-WE | NA | NA | NA | NA |

Initiatives (GS, GDP): Possible | Probable | Expected

| Location | Adv Plan Initiatives | Ground Stops | | | Ground Delay Programs | | | |
|---|---|---|---|---|---|---|---|---|
| | | Proposed Duration | Actual Duration | Actual # | Proposed Duration | Actual Duration | Actual # | Revisions |
| West | | 2h29m | 3h11m | 2 | 7h59m | 2h47m | 1 | 2 |
| ANC | | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| DEN | GDP/GS | 2h29m | 3h11m | 2 | 7h59m | 2h47m | 1 | 2 |
| LAS | | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| LAX | | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| SAN | | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| SEA | | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| SFO | | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| SLC | | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Other-WE | | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

TAF Accuracy:


The weather and TAF accuracy data are based on TAF/METAR potential impact categories from the Aviation Weather Center

The Advanced Planning TAF is from 18Z the day before; the Day of Operation TAF is from 12Z the morning of

Federal Aviation Administration

# QC Assessments

## Seattle Low IMC Fog Event - 11/20/18

**Overview**: A period of low instrument meteorological conditions occurred at Sea-Tac International Airport from approximately 1050Z to 1830Z on Tuesday, November 20, 2018. During this period, ceilings lowered to 100ft AGL with an indefinite ceiling reported for up to an hour at times. Visibility was reduced to less than 1/16 mile with periods of Runway Visual Range as low as 300ft. A brief period of improvement occurred between 1348-1435Z, with visibility 4SM and no ceiling, however, LIMC conditions returned and persisted until the end of the period.

**Forecast:** Discussion Monday emphasized continued high pressure in place across the region, with patchy fog likely overnight Monday into early Tuesday morning, and areas of IMC fog possible. Near surface moisture, with dry/stable air above it, was forecast, with light southerly winds aloft. This supported conditions favorable for radiation fog development, particularly near moisture sources and valleys, but typically not widespread or long duration.

Forecast confidence in a LIMC fog event increased Monday evening, as lowland fog began to develop earlier than anticipated. DCC weather, NWS and DAL all began forecasting a low or very low IMC fog at Sea-Tac early Tuesday morning, with a larger coverage area.

## Northeast Winter Storm – 11/15/18

**Overview:** Low pressure developing along the southeastern U.S. coast moved north into the Mid-Atlantic and northeastern US. A variety of precipitation occurred with mostly snow inland and a mixture of snow, sleet, freezing rain and rain along and east of the I-95 corridor.

Model forecasts, from November 13th-14th, were mostly favoring the rain/snow line moving west of the I-95 corridor Thursday morning in the DC area, with PHL and N90 airports turning over to rain during the afternoon. The rain/snow line moved westward much slower than anticipated, and resulted in a more lengthy period of heavier snow and sleet than originally forecast.

06z TAFs were used, due to the fact that they were based on the 00z model guidance. Early morning decisions were being made on the overnight TAFs. After 12z the TAFs were frequently amended to better fit the ongoing weather situation(s) at the individual airports.

**Verification:** The High Resolution Rapid Refresh model (HRRR) seemed to resolve the rain/snow line position and movement much better than other guidance for this event in the DC to PHL corridor. The HRRR was too quick with the change to rain from PHL to N90.

**Images included:**
- 24 hour snow/ice accumulation analysis
- 11/15/18 - 00Z HRRR (High Resolution Rapid Refresh) forecasts of precipitation type valid 12z, 15z, 18z, 21z & 00z

**Key Data Included:**
- 06Z NWS TAFs for DCA, IAD, RWI, PHL, EWR, LGA & JFK
- 06Z DAL TAFs for DCA, LGA & JFK
- 06Z UAL TAFs for IAD & EWR
- 07Z AAL TAF for DCA, PHL & JFK
- Key METARs for DCA, IAD, BWI, PHL, EWR, LGA & JFK

## Sea-Tac IAP (SEA) TAF & METAR

**NWS TAF 18Z Monday, 19 November**

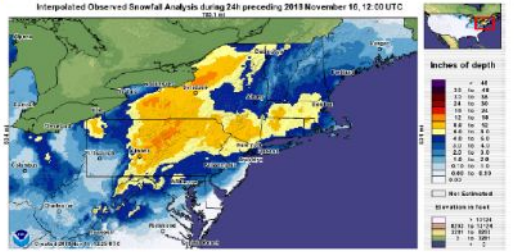
SEA KSEA 191743Z 1918/2024 VRB03KT P6SM VCFG
FEW002
TEMPO 1918/1919 5SM BR SCT002
FM192000 35005KT P6SM SKC
FM200500 05004KT P6SM SKC
**FM201000** 05004KT **2SM BR BKN005**
**TEMPO 2012/2016 1SM BR BKN002**
**FM201600** 05005KT **5SM BR** SCT005 SCT200
FM201800 34006KT P6SM SCT200
FM202100 35006KT P6SM SCT150 BKN200

**DAL TAF 23Z Monday, 19 November**

FM192300 26005KT P6SM SKC
FM200400 05004KT P6SM SKC
**FM201100** 05004KT **1/2SM FG BKN002**
**TEMPO 2011/2016 1/4SM FG OVC001**
**FM201700** 04004KT **1SM BR BKN004**
FM201900 32005KT P6SM SCT250
FM210000 15004KT P6SM BKN200

Both NWS and DAL TAFs begin forecasting potential for LIFR Ceilings Tuesday morning the day prior with similar start and end times. DAL TAF is slightly more aggressive, with cig/vis lower and longer.

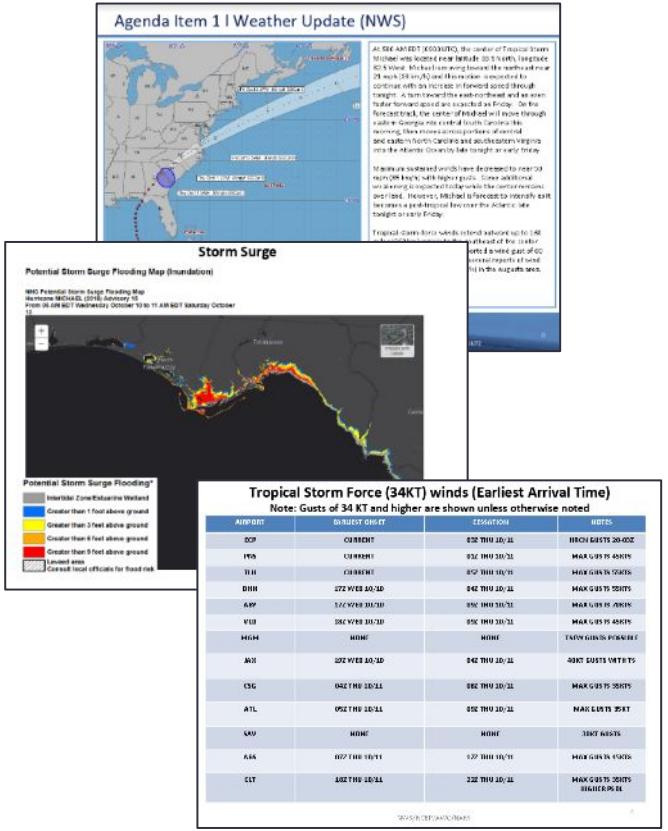
## Snow/Sleet Totals – Valid 12z 11/15/18 – 12z 11/16/18



# JATOC/J-CAT Support

*What is the JATOC Crisis Action Team?*

- Part of the Joint Air Traffic Operations Command's (JATOC) Incident Command System
- NAMs provide support during J-CAT activation similar to NWS support to State/Federal Emergency Operations Centers
- Activation triggered by a wide spectrum of events, from civil unrest to natural disasters
- Routine support to ATO Watch Officer (AWO) continues when J-CAT not active



# Key Aviation Weather Websites

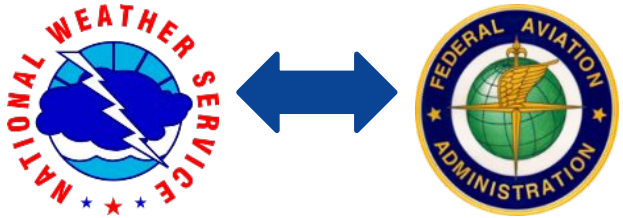
- https://www.weather.gov/aviation/
  *NWS Aviation Weather Services Homepage*
- https://www.aviationweather.gov/
  *Aviation Weather Center Homepage*
- https://www.aviationweather.gov/trafficflowmgmt/portal
  *Traffic Flow Management Portal*
- https://www.weather.gov/###
  *Center Weather Service Units (### is ARTCC…e.g. zdc)*
- https://mobile.weather.gov/
  *Mobile browser friendly page*
- [illegible]

*“First, it should be understood that forecasts possess no intrinsic value. They acquire value through their ability to influence the decisions made by users of the forecast.”*

- Allan H. Murphy, Weather and Forecasting (June 1993)

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

- Bryan Beck, ATCSCC National Operations Manager



# Questions?