

*Global Information  
Management*

# Information: WXXM Status

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FAA Manager, NextGen Wx Systems*

*Date: August 25, 2015*



Federal Aviation  
Administration



## **AIR TRANSPORTATION INFORMATION EXCHANGE CONFERENCE**

**Global Information Management**

**August 25-27, 2015**

**NOAA Auditorium and Science Center • Silver Spring, MD**

# Overview

- **WXXM / IWXXM Background and Status**
- **ICAO Meteorological Panel (MET/P)**
  - Working Group for Meteorological Information Exchange (WG-MIE)
    - IWXXM/SWIM Implementation Focus
- **FAA NextGen Wx Programs**
  - NextGen Weather Processor (NWP)
  - Common Support Services-Weather (CSS-Wx)

# Wx Data Models

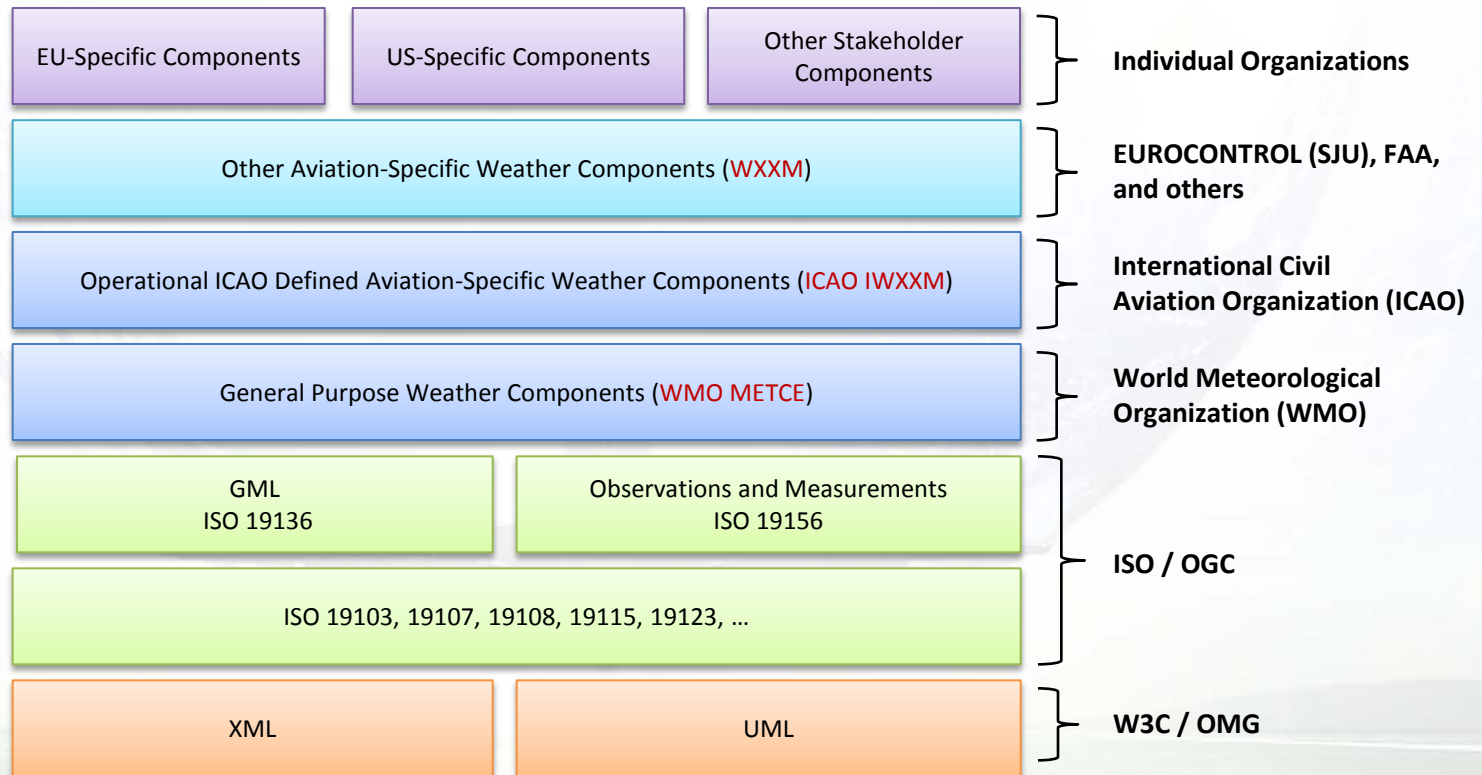
Data Model  
Component Agility

Standards Governance Body

High  
(months)



Low  
(years)



Descriptions of US and International weather data models are available at <https://wiki.ucar.edu/display/CSSWX/Weather+Data+Models>

# IWXXM Regulation



ICAO Responsibility  
Aviation regulation and  
requirements



WMO Responsibility  
Weather regulation and technical  
implementation

# Wx Standards Correlation



ICAO Annex 3 / WMO No. 49  
products:  
METAR/SPECI,  
TAF, SIGMET



US Specializations of  
ICAO Annex 3 products:  
US METAR/SPECI,  
US TAF, US SIGMET



Next-generation aviation  
weather products:  
Contours, aircraft  
reports, gust front,  
motion vector, etc.

Next-generation products will feed into  
IWXXM over time

# IWXXM and WXXM

## IWXXM 1.0 released September 2013

- Strict and complete representation of ICAO Annex 3 products – METAR, SPECI, TAF, SIGMET (**regulated** products)
- Business rules strongly enforced
- Managed by ICAO and WMO
- Updated on roughly the same time scale as ICAO Annex 3 (currently 3 years)

## WXXM 2.0 released March 2015

- Next-generation aviation and weather data representations
- General purpose, reusable data types (aerial report, profile, trajectory, area forecast, point forecast, etc.)
- Open/extensible content policy
- Many products and data types beyond ICAO Annex 3
- Managed by Eurocontrol, FAA, and other partners
- Updated roughly every year

# Next Releases-Timeline

## IWXXM 2.0 release around September 2016

- Specific work items to be discussed shortly by WMO TT-AvXML, such as:
  - Additional ICAO Annex 3 products (notionally VA Advisory, TC Advisory)
  - Incorporate fixes
  - Direct utilization of AIXM representations
  - Address feedback gathered from IWXXM 1.0

## WXXM 2.1 release as needed

- No specific timeline at present, but typically minor releases (2.x) are performed on an annual basis
- Released as bug fixes or new products are required

## WXXM 3.0 release as needed

- No specific timeline at present, but typically major releases are performed every 2-3 years

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## APPENDIX 3. TECHNICAL SPECIFICATIONS RELATED TO METEOROLOGICAL OBSERVATIONS AND REPORTS

(See Chapter 4 of this Annex.)

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### 2. GENERAL CRITERIA RELATED TO METEOROLOGICAL REPORTS

#### 2.1 Format of meteorological reports

...

2.1.3 **Recommendation.**— *METAR and SPECI should be disseminated, under bilateral agreements between States in a position to do so, in the ~~WMO BUFR code~~ digital form, in addition to the dissemination of the METAR and SPECI in accordance with 2.1.2.*

*Note.*— ~~The BUFR code form is contained in WMO Publication No. 306, Manual on Codes, Volume I.2, Part B—Binary Codes.~~

2.1.4 METAR and SPECI if disseminated in digital form shall be formatted in accordance with a globally interoperable information exchange model and shall use extensible markup language (XML)/geography markup language (GML).

2.1.5 METAR and SPECI if disseminated in digital form shall be accompanied by the appropriate metadata.

*Note.*— *Guidance on the information exchange model, XML/GML and the metadata profile is provided in the Manual on the Digital Exchange of Aeronautical Meteorological Information (Doc 10003).*



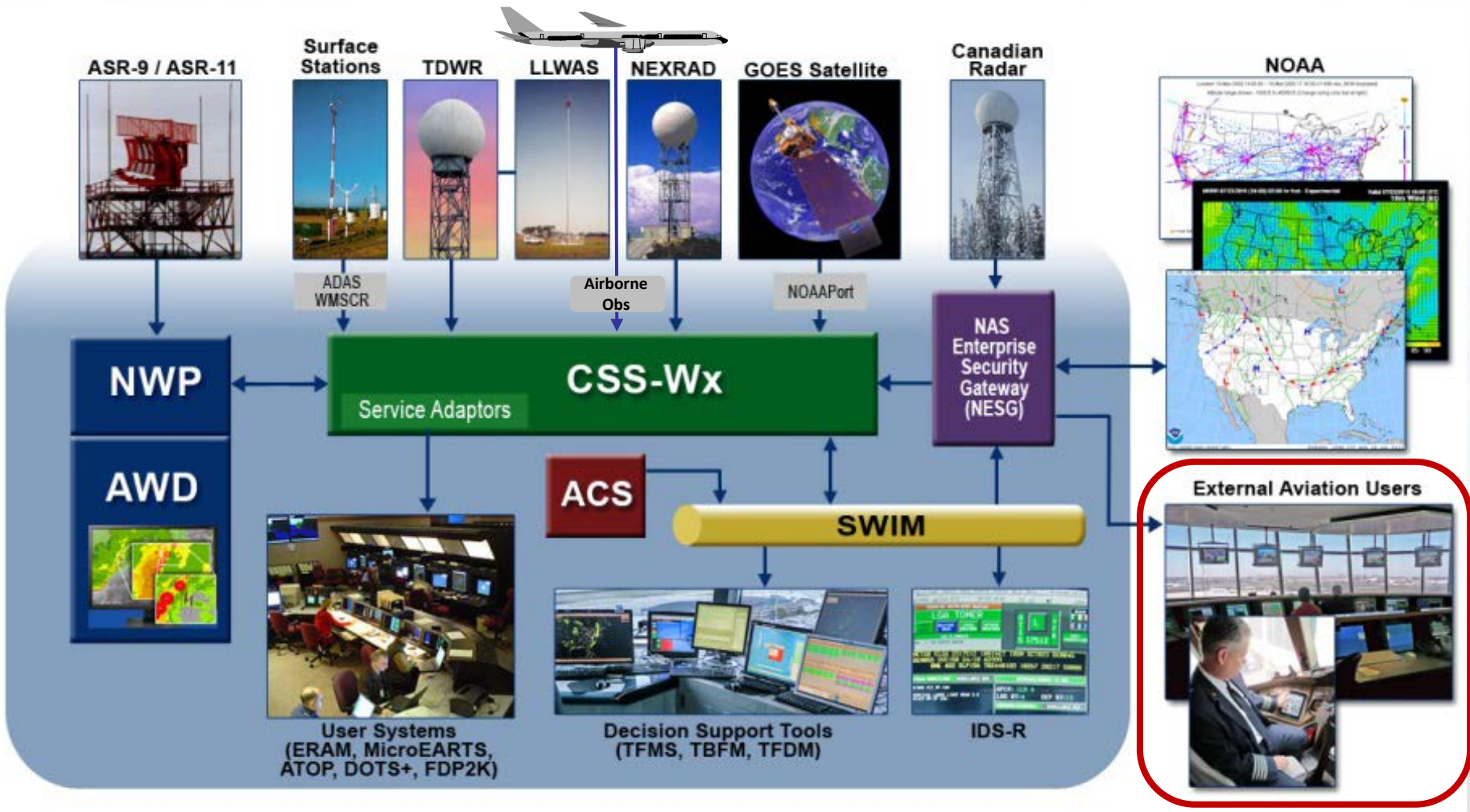
# ICAO Meteorology Panel

- **New Meteorology Panel (MET/P)**
  - Resulted from recommendations of the 2014 MET Divisional meeting
- **Four MET/P Working Groups**
  - IWXXM and SWIM implementation under the Working Group for Meteorological Information Exchange (WG-MIE)
    - Key Tasks:
      - 2016 - AMHS Transition: Develop test objectives and criteria for validating AMHS capability to support IWXXM compliant data exchange  
Note: Global testing will be managed by the ICAO Comm Panel; State Bi-Lateral testing may also be pursued
      - 2018 – Annex 3: Expand IWXXM exchange for additional required products
      - 2022 – Annex 3 & PANS-MET: Introduce the meteorological component of SWIM, i.e. move toward WCS/WFS/WMS

# FAA NextGen Wx Systems

- **NextGen weather systems are being fielded to support FAA ATM and evolving NextGen capabilities**
  - Weather products generated in OGC format
  - SOA Web Services publishing weather information
- **Contracts have been awarded for:**
  - NextGen Weather Processor (NWP)
    - Raytheon
  - Common Support Services – Weather (CSS-Wx)
    - Harris Corporation

# NextGen Weather Architecture



# NWP Program Scope



- Produces advanced aviation specific weather products
- Translates weather information into weather avoidance areas for integration into decision support tools
- Enables decommissioning of legacy weather processor systems (e.g., WARP, ITWS, CIWS)

# CSS-Wx Program Scope

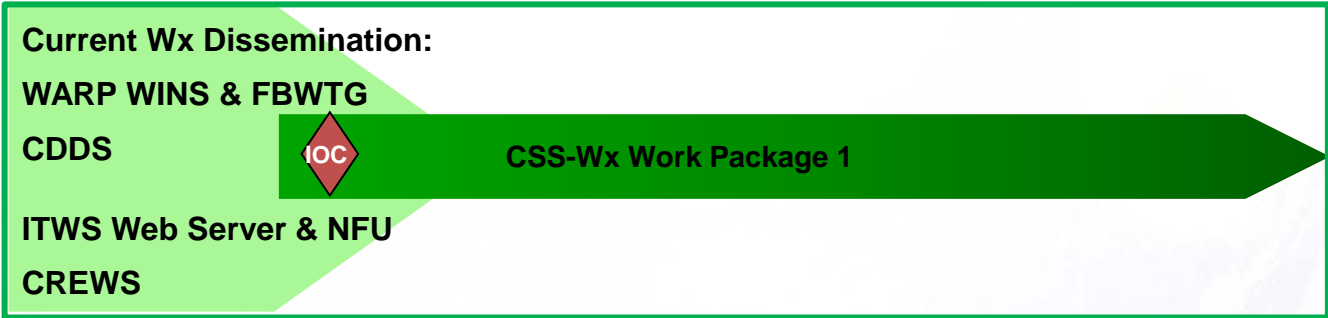


- Provides a single source for FAA weather information and establishes enterprise level common support services using SWIM
- Provides users with the right information at the right time
- Consistent with global standards (e.g., WXXM)
- Enables decommissioning of legacy weather dissemination systems (e.g., WARP WINS, FBWTG, CDDS)

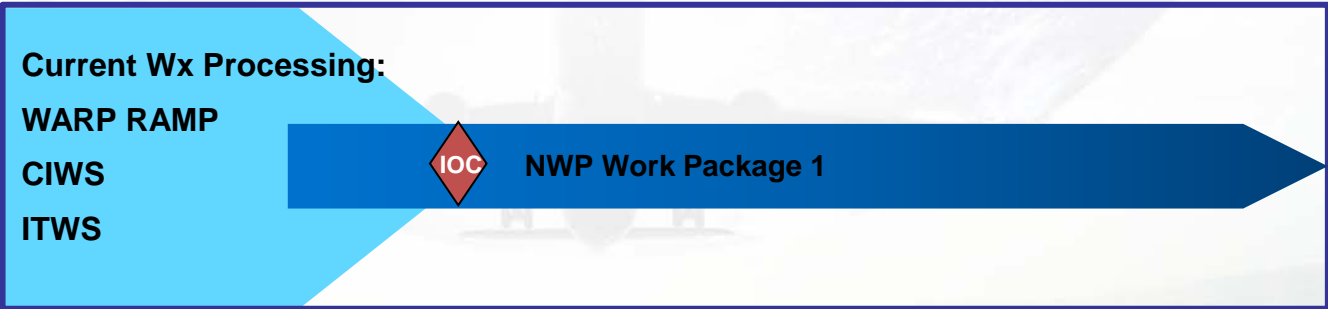
# NextGen Weather Roadmap

CY 2015 2020 2030 2040

## CSS-Wx



## NWP



# CSS-Wx Data Access Services

- Ingests weather sensor and processor data as well as other NOAA data (e.g. Satellite, models) for FAA
- Makes weather data available through Web Services
- Adheres to international standards for handling and representing geospatial data



## Web Coverage Service

- Filters and transforms large gridded datasets
- NetCDF format

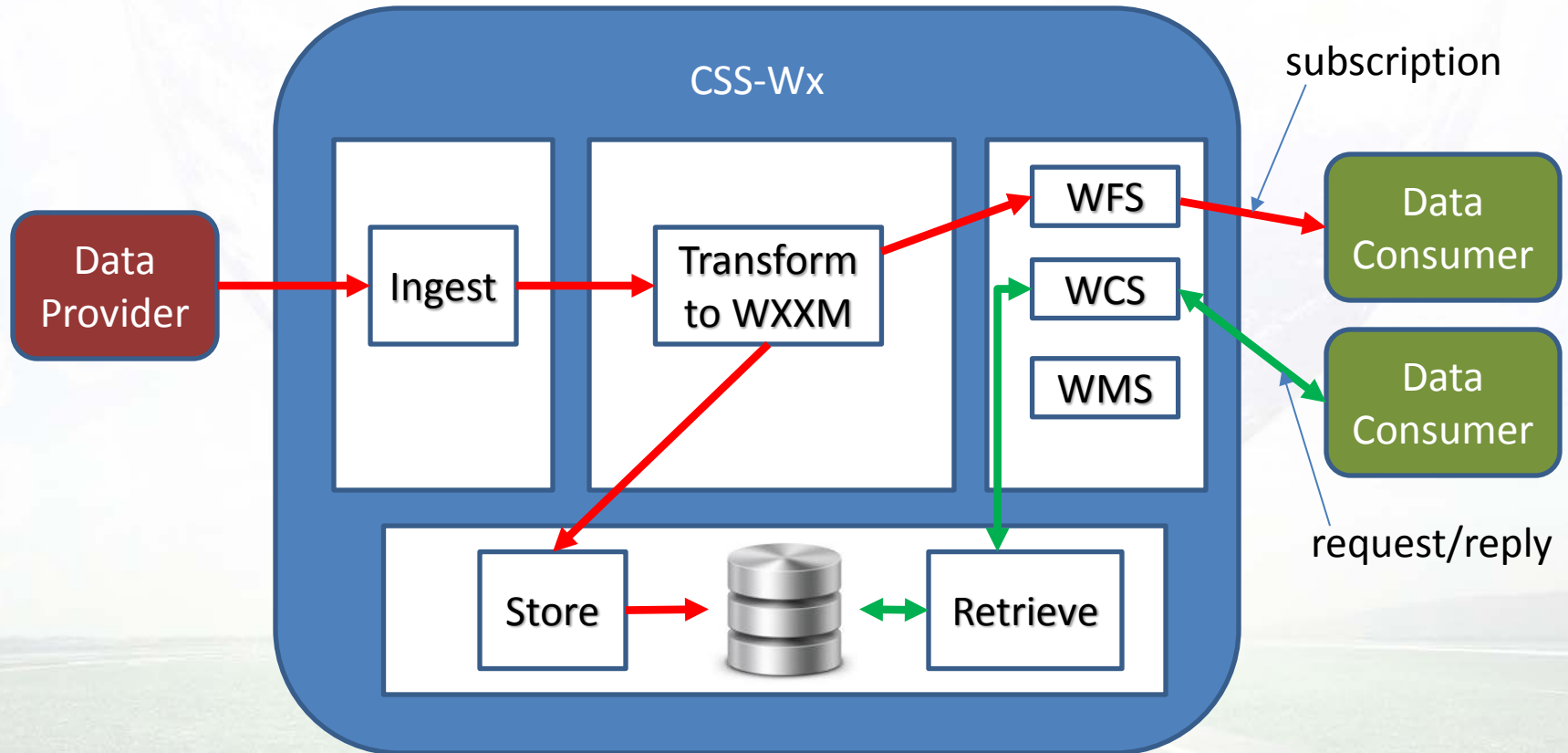
## Web Feature Service

- Filters and transforms non-gridded datasets
- WXXM 2.0 XML format

## Web Map Service

- Renders weather data as single large image or sets of tiled images for display
- JPEG, PNG, GIF, KML format

# CSS-Wx WXXM Usage





# NWP WXXM Products

## NWP Non-Gridded Analysis Products

- Precipitation (VIL) Forecast Accuracy
- Echo Tops Forecast Accuracy
- Aggregated Lightning Flashes
- Aggregated Tornado Detections
- Storm Information Echo Tops
- Storm Information Hazard Texts
- Storm Information Leading Edges
- Storm Information Motion Vectors
- Storm Information Precipitation Cells
- Precipitation (VIL) Contours
- Echo Tops Contours
- Fronts
- Growth Trends
- Wind Profiles
- Convective WAF Mosaic Polygons
- Jet Stream
- Airport Status Summary

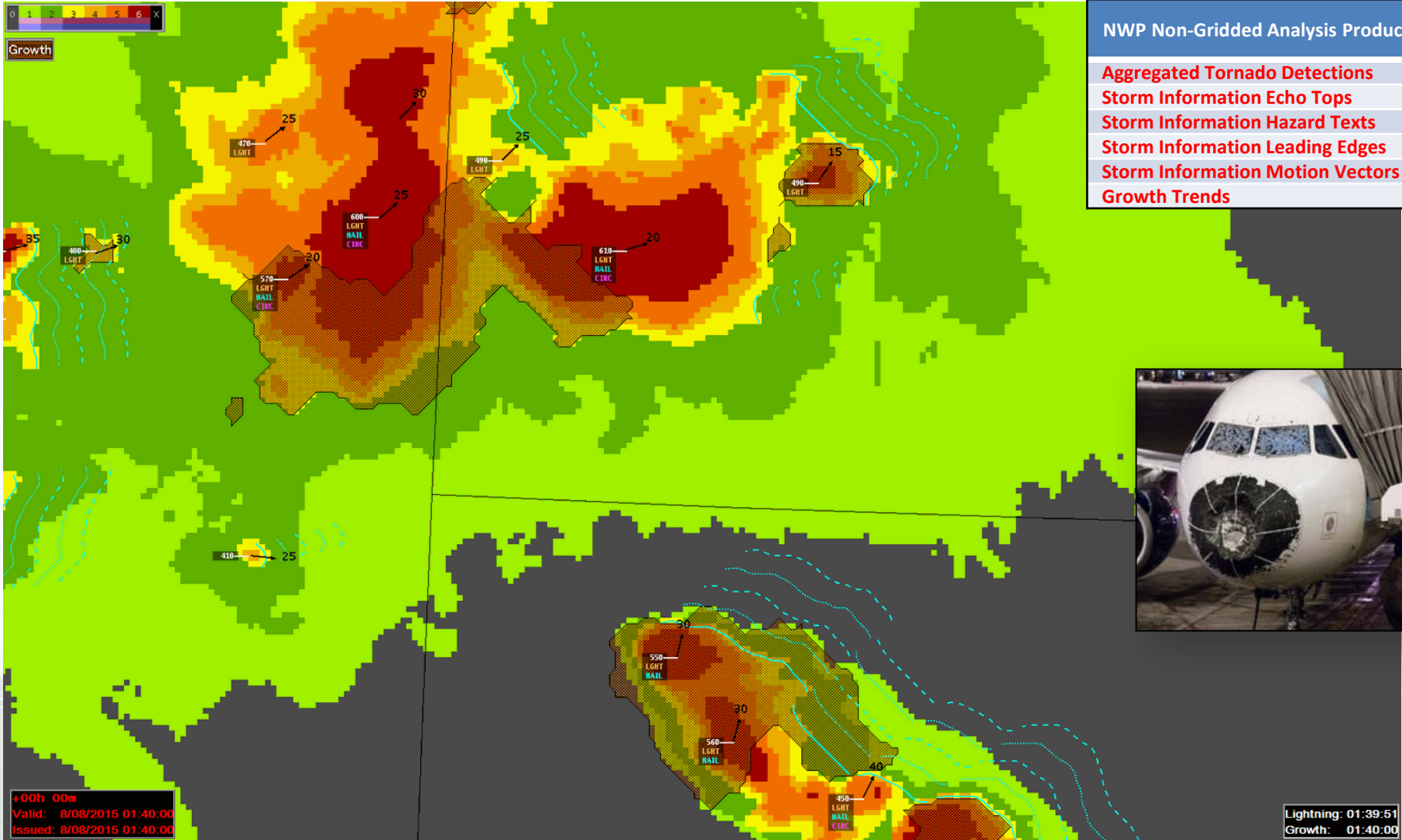
## NWP Non-Gridded Prediction Products

- Forecast Confidence
- Precipitation (VIL) Forecast Contours
- Echo Tops Forecast Contours
- Fronts Forecast
- Convective WAF Forecast Polygons

## NWP Non-Gridded Terminal Products

- Microburst TRACON Map
- ATIS Panel Message
- Gust Front TRACON Map
- Gust Front Estimated Time of Impact
- Configured Alerts
- Tornado Alert
- Airport Lightning Warning
- Storm Information Motion Vectors (ASR)
- Storm Information Leading Edges (ASR)
- Storm Information Hazard Texts (ASR)
- Runway Configuration
- AP Status
- Terminal Weather Information for Pilots

# NWP Product Examples

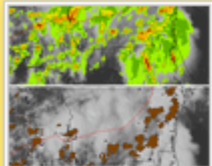


**DAL 1889 Hail and Turbulence Encounter**  
**August 8, 2015 01:40 - 02:12 UTC**

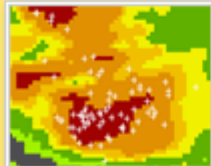


# NWP Product Examples

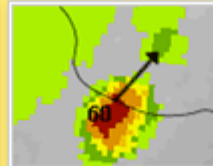
## Analysis Products



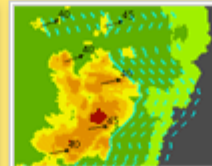
**Growth Trends**



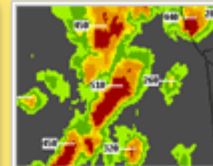
**Lightning Mosaic**



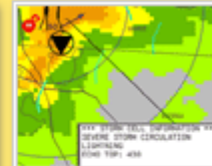
**Storm Information: Motion Vectors**



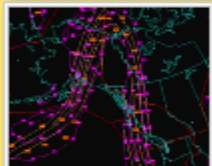
**Storm Information: Leading Edges**



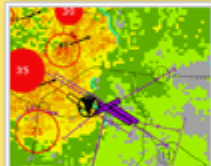
**Storm Information: Echo Tops**



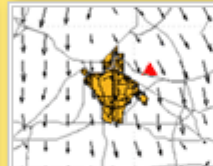
**Storm Information: Hazard Texts**



**Jet Stream Winds**



**Tornado Detections**

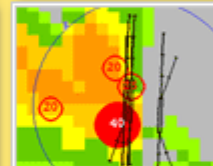


**Terminal Winds**

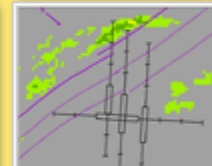
LGA - Terminal Winds (ALT DIR SPD)

| VALSRT     | LGA 22-5   |           |
|------------|------------|-----------|
| 110 230 49 | 030 210 18 |           |
| 100 230 48 | 020 170 16 |           |
| 090 240 48 | 010 140 14 |           |
| 080 240 49 |            |           |
| VALSRT     | LGA 13-5   | LGA 13-10 |
| 040 240 25 | 040 230 26 |           |
| 030 210 17 | 030 190 13 |           |
| 020 190 18 | 020 190 14 |           |
| 010 170 10 |            |           |

**Terminal Winds Profile**



**Microburst TRACON Map**



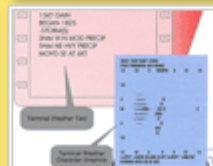
**Gust Front TRACON Map**

|     |     |              |
|-----|-----|--------------|
| MBA | WSA | Tornado 10nm |
|-----|-----|--------------|

**Alerts**

| 0    | 300 | 16011 | 1630 | HLN | OFF |
|------|-----|-------|------|-----|-----|
| 1794 | MBA | 15k+  | 3F   | 350 | 15  |
| 1714 | MBA | 15k+  | 3F   | 350 | 15  |
| 3514 |     | 170   | 15   |     |     |
| 3594 |     | 350   | 15   |     |     |
| 0049 |     | 350   | 15   |     |     |
| 03-0 |     | 100   | 14   |     |     |
| 2544 | MBA | 35k-  | 1HD  | 350 | 15  |
| 2614 | MBA | 35k-  | 1HD  | 350 | 15  |

**Ribbon Display Alerts**



**TWIP**



**Airport Status Summary**

# Operational Use

- **IWXXM and WXXM are starting to be integrated into operational systems now and increasingly so in the next 2-3 years**
- **Utilized within the United States (FAA CSS-Wx, FAA NWP, and NOAA NextGen IT Services) and tested in operational contexts internationally (ICAO/WMO)**
- **In November of 2016 IWXXM will become a recommended practice for ICAO member states**

# Summary

- **IWXXM 1.0 & WXXM 2.0 released**
  - ICAO testing of IWXXM through collaboration between the ICAO MET and Comm Panels
  - Updates planned
- **FAA NextGen Wx Systems in solution implementation**
  - Target IOC by 2019
  - Challenge to get concurrent user system upgrades

# Contact Information

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