Introduction to FAA's NextGen Weather Systems

CSS-Wx and NWP Overview/Status

Presented to: Friends and Partners in Aviation Weather (FPAW)

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Federal Aviation Administration

Purpose

- **Provide overview of NextGen Weather Systems**
  - Common Support Services – Weather (CSS-Wx)
  - NextGen Weather Processor (NWP) and Aviation Weather Display
- **Describe NextGen Weather Data Services**
  - Available weather products
- **NextGen Wx Systems Status**

NextGen Weather Programs Overview

Common Support Services – Weather (CSS-Wx)

NextGen Weather Processor (NWP)

- Improve weather information management and user access; provide new interface standards and formats
- Increase NAS efficiency and safety by improving weather product generation, translation, and display for aviation weather users
- Reduce FAA cost by enabling decommissioning of legacy weather dissemination and processor systems (e.g., WARP, WINS, FBWTG, CIWS, CDDS)

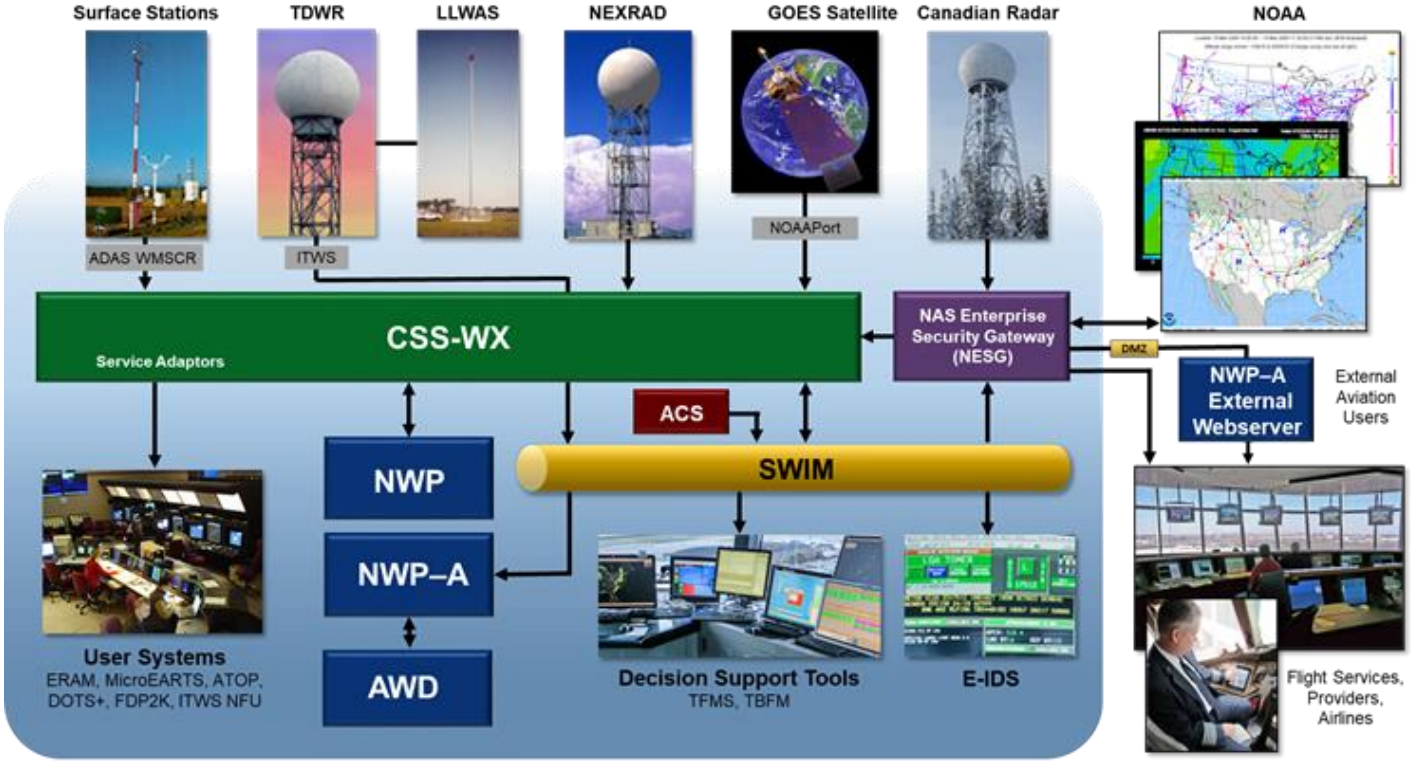
CSS-Wx Capabilities

- **Single provider of weather data products within the NAS, using standards-based weather dissemination**
- **Makes weather products available from NOAA, NWP and other data sources for integration to air traffic systems**
- **Provides weather products via a set of common Web Services for weather, using international data access and data format standards**

NWP Capabilities

- **Produces advanced aviation specific weather products, e.g.,**
  - Real-time weather radar information (e.g., ERAM)
  - 0 to 8 hour aviation weather products
  - Convective Weather Avoidance Fields
- **Translates weather information into weather avoidance areas for integration into decision support tools (e.g., TFMS, TBFM)**
- **Provides Aviation Weather Display (AWD) of NextGen weather information for AT users**

NextGen Weather Providers/Consumers



Aviation Weather Display (AWD)

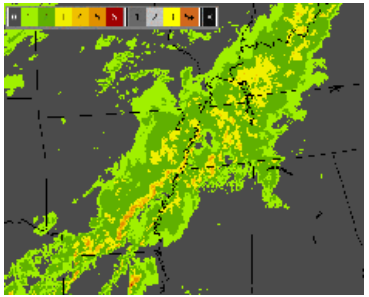
- **AWD provides users with access to aviation specific weather information from CSS-Wx generated by NWP, NOAA, other sources**
  - AWD Servers obtain information from CSS-Wx published on SWIM
  - AWD will be used in designated Air Traffic (AT) facilities by users such as AT specialists, Center Weather Service Units (CWSU) meteorologists
  - Authorized users internal and external to the FAA will have access to the AWD via the internet through the AWD website
- **Replaces legacy weather displays, e.g., WARP Briefing Terminals, CIWS Situation Displays and Website**

Legacy Weather Displays

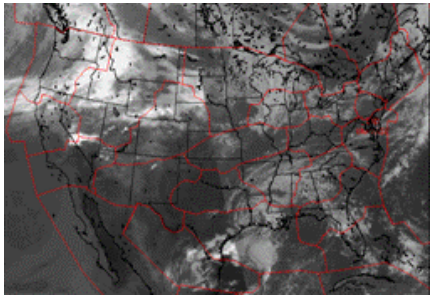
Aviation Weather Display

Types of Data Products: Gridded Data

- **Gridded products represented as uniformly spaced observations or computed values on rectangular arrays**



Precipitation (VIL) Mosaic



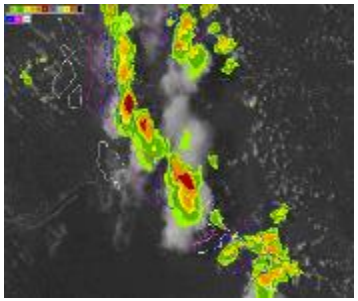
Satellite Mosaic

Terminal Winds

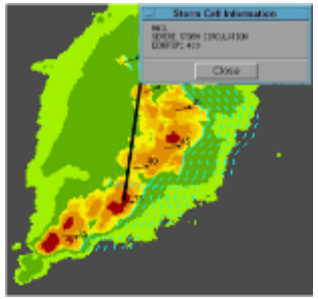
- **Mapping projection needed to map data grid to earth's surface**
  - Examples: Lambert Conformal, Lambert Azimuthal Equal Area
- **Network Common Data format (NetCDF4) used to model gridded data products**

Types of Data Products: Non-Gridded Data

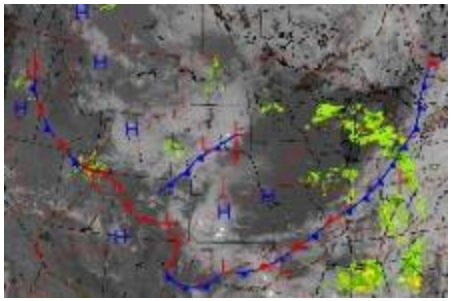
- **Non-gridded products express singular or sparsely distributed geospatial sets of observations or forecasts**
  - Contours, point products, text products



Precipitation Contours



Storm Motion Vectors, Extrapolated Positions, Hazard Text



Fronts and Fronts Forecast

- **XML format and extensions used to represent non-gridded data**
  - Geography Markup Language (GML), ICAO Weather Exchange Model (IWXXM), etc.
- **Geo-reference coordinates (latitude, longitude) used to represent data locations.**

CSS-Wx Data Access Services

- Ingests weather sensor, NWP data and NOAA data (e.g., satellite, models, alphanumeric)
- Makes weather data available through Web Services/JMS
- Adheres to international standards for handling and representing geospatial data
- Consumers subscribe to CSS-Wx products through SWIM

OGC®
Open Geospatial Consortium

Java Message Service

- Queue(s) configured to consumer's specific data needs
- Notifies as new data is published

Web Coverage Service

- Filters and transforms large gridded dataset
- NetCDF format

Web Feature Service

- Filters and transforms non-gridded data sets
- XML format

Web Map Service

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

CSS-Wx and NWP Program Status

- **Recently reached Initial Operating Capability (IOC) milestone**
  - Includes centralized processing at Atlanta and Salt Lake City
  - NWP Aviation Weather Displays at keysites
- **Data is onramped onto operational SWIM**
- **Working toward In-Service Decision (ISD) milestone in first half of CY25**
  - Marks acceptance of systems in NAS and allows full deployment of systems

- **Questions about CSS-Wx or NWP? Contact…**
  - Doug Murphy (douglas.e.murphy@faa.gov) or
  - Wil Brown (william.n.brown@faa.gov)

Backup

NextGen Weather Products – Gridded

Gridded Weather Data	
• Precipitation (VIL) • Precipitation (VIL) with Mask • Precipitation (VIL) Forecast • Precipitation (VIL) Forecast with Mask • Echo Tops • Echo Tops Forecast • Precipitation (Base Reflectivity) • Precipitation (Composite Reflectivity) • Precipitation (Composite Reflectivity) with Mask • Surface Precipitation Phase • Surface Precipitation Phase Forecast	• Icing Layer • Composite Icing • Icing Layer Forecast • Composite Icing Forecast • Turbulence Layer • Turbulence Layer Forecast • Composite Turbulence • Composite Turbulence Forecast • Convective Weather Avoidance Fields • Convective Weather Avoidance Field Forecast • Satellite • Terminal Winds • *NOAA Model Data (RAP, HRRR, GFS, NAM)**
*NOAA Produced**	

NextGen Weather Products – Non-Gridded

Non-Gridded Weather Data

- **Precipitation (VIL) Forecast Accuracy**
- **Precipitation (VIL) Forecast Contours**
- **Echo Tops Forecast Accuracy**
- **Echo Tops Forecast Contours**
- **Lightning**
- **Storm Information Hazard Text**
- **Storm Information Leading Edges**
- **Storm Information Motion Vectors**
- **Fronts Forecast**
- **Growth Trends**
- **Decay Trends**
- **Forecast Confidence (or Traffic Flow Impact)**
- **Convective Weather Avoidance Polygons / CWAP Forecast**
- **Wind Profiles**
- **Tornado Detections**
- **Icing Layer Contours**
- **Composite Icing Contours**
- **Turbulence Layer Contours**
- **Composite Turbulence Contours**
- **Pilot Report (PIREP)**
- **Urgent Pilot Report (PIREP)**
- *ICAO Aircraft Report (AIREP)**
- *Significant Meteorological Information (SIGMET)**
- *Convective Significant Meteorological Information (Convective SIGMET)**
- *TFM Convective Forecast (TCF)**
- *Airmen's Meteorological Information Advisories (AIRMET)**
- *Graphical AIRMET (G-AIRMET)**
- *Winds Aloft Forecast**
- *Surface Weather Observations*
- *Aviation Watch Notification**
- *Tornado Warnings**
- *Severe Thunderstorm Warnings**
- *Public Severe Weather Watch Notification (SEL)**
- *Volcanic Ash Advisory Statement (VAAS)**
- *Terminal Area Forecast (TAF)**
- *Center Weather Advisories**
- *Meteorological Impact Statements**
- *Severe Weather Statements (SVS)**

*NOAA Produced**