

Next**GEN**

U.S. Aviation Meteorology



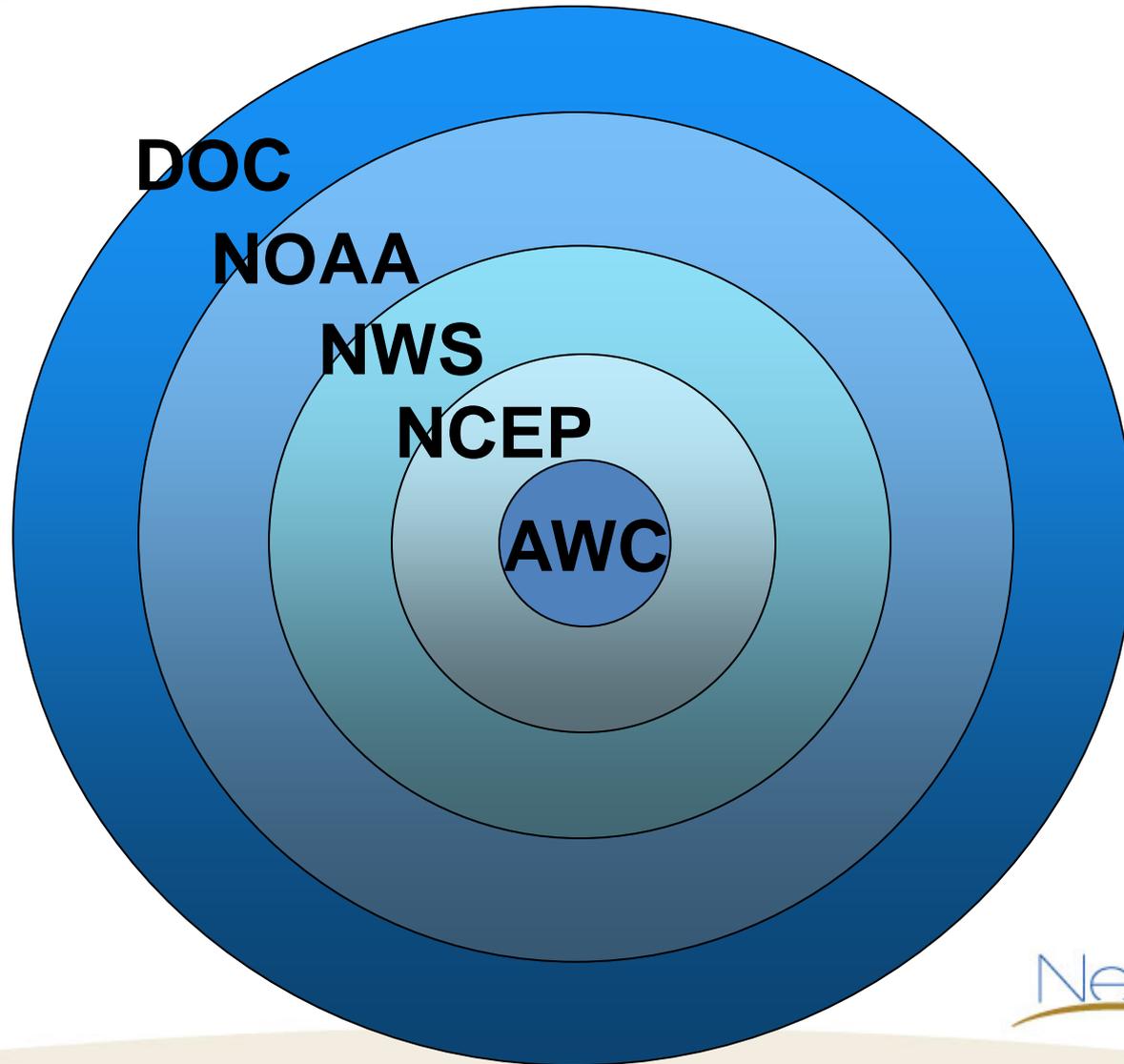
FAA

U.S. Aviation Meteorology

- FAA is U.S. Meteorological Authority for Aviation
 - ✦ FAA and NWS share costs and ownership of observation systems
 - ASOS/METAR
 - Weather Radar
 - ITWS
- NWS is U.S. Meteorological Provider for Aviation
 - ✦ Provides all forecast information
- Private contracts with FAA for some movement and display of Met Information



NWS Meteorological Service Provider for Aviation



- NOAA
 - ✦ 2 Volcanic Ash Advisory Centers
 - ✦ 1 Space Weather Center
 - ✦ 2 Tropical Cyclone Advisory Centers

- NWS

- ✦ 122 Weather Forecast Offices

- 675 TAFs
- 1500+ METARs

- ✦ 21 Center Weather Service Units

- Support to 21 Air Route Traffic Control Centers

- ✦ 3 Meteorological Watch Offices

- Aviation Weather Center
- Alaska Aviation Weather Unit
- WFO Honolulu

- ✦ 1 FAA Air Traffic Control System Command Center

- ✦ 1 World Area Forecast Center



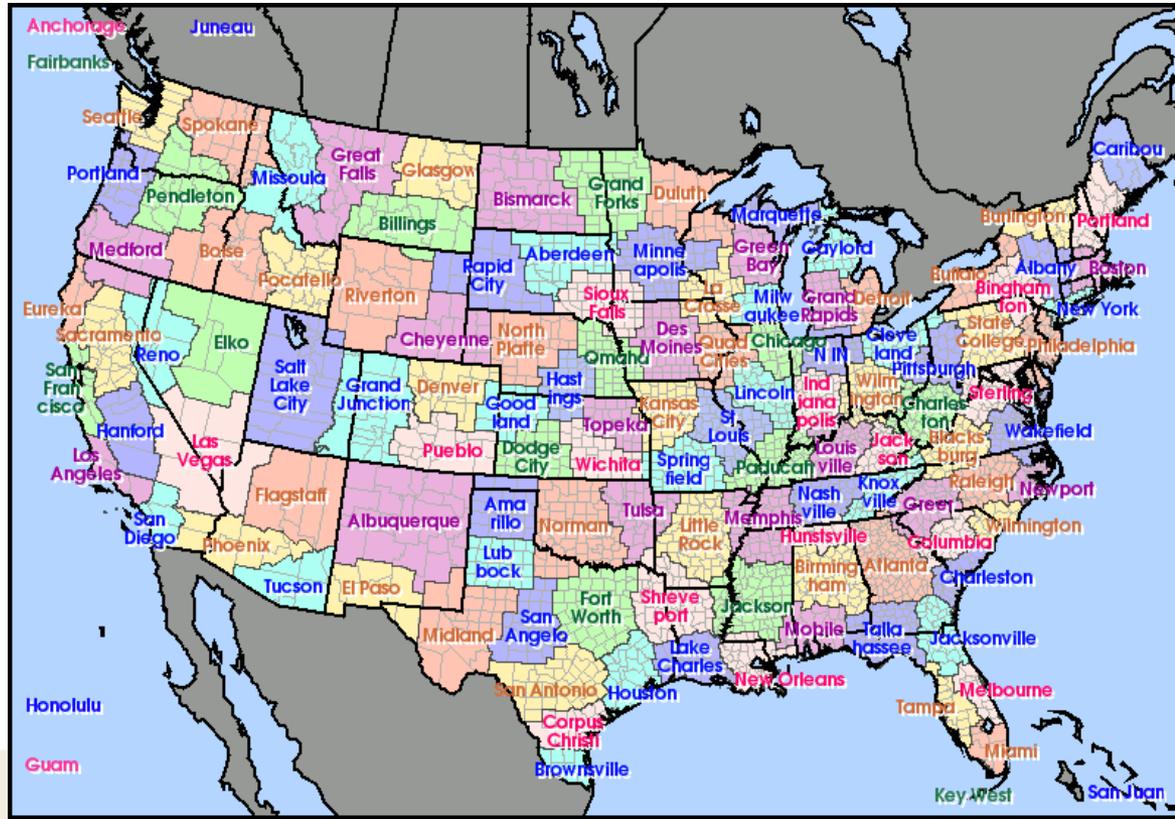
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● WAFC Washington

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Weather Forecast Offices

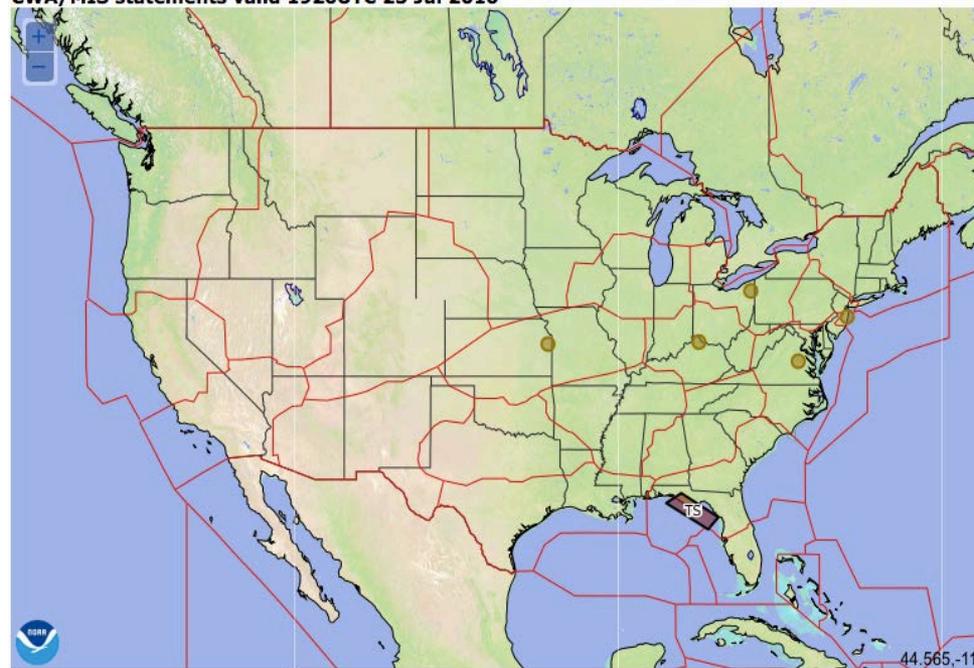
- 122 Weather Forecast Offices
 - ✦ Local Watch/Warning
 - ✦ Public Forecasts
 - ✦ Marine
 - ✦ Fire Weather
 - ✦ Aviation
 - TAF
 - Airport Weather Warning



FAA

Center Weather Service Units

- 21 Center Weather Service Units
 - ✦ Implemented 1977
 - ✦ Support to ATC and Traffic Flow Management
 - ✦ Products
 - Center Weather Advisory
 - Meteorological Impact Statement
 - CCFP/CAWS collaboration
 - Locally defined needs



FAA

Alaska Aviation Weather Unit

- Alaska Aviation Weather Unit
 - ✦ One of 3 U.S. Meteorological Watch Offices
 - ✦ Products issued:
 - AIRMET
 - SIGMET
 - Area Forecast
 - Low and Mid Level SIGWX

WFO Honolulu

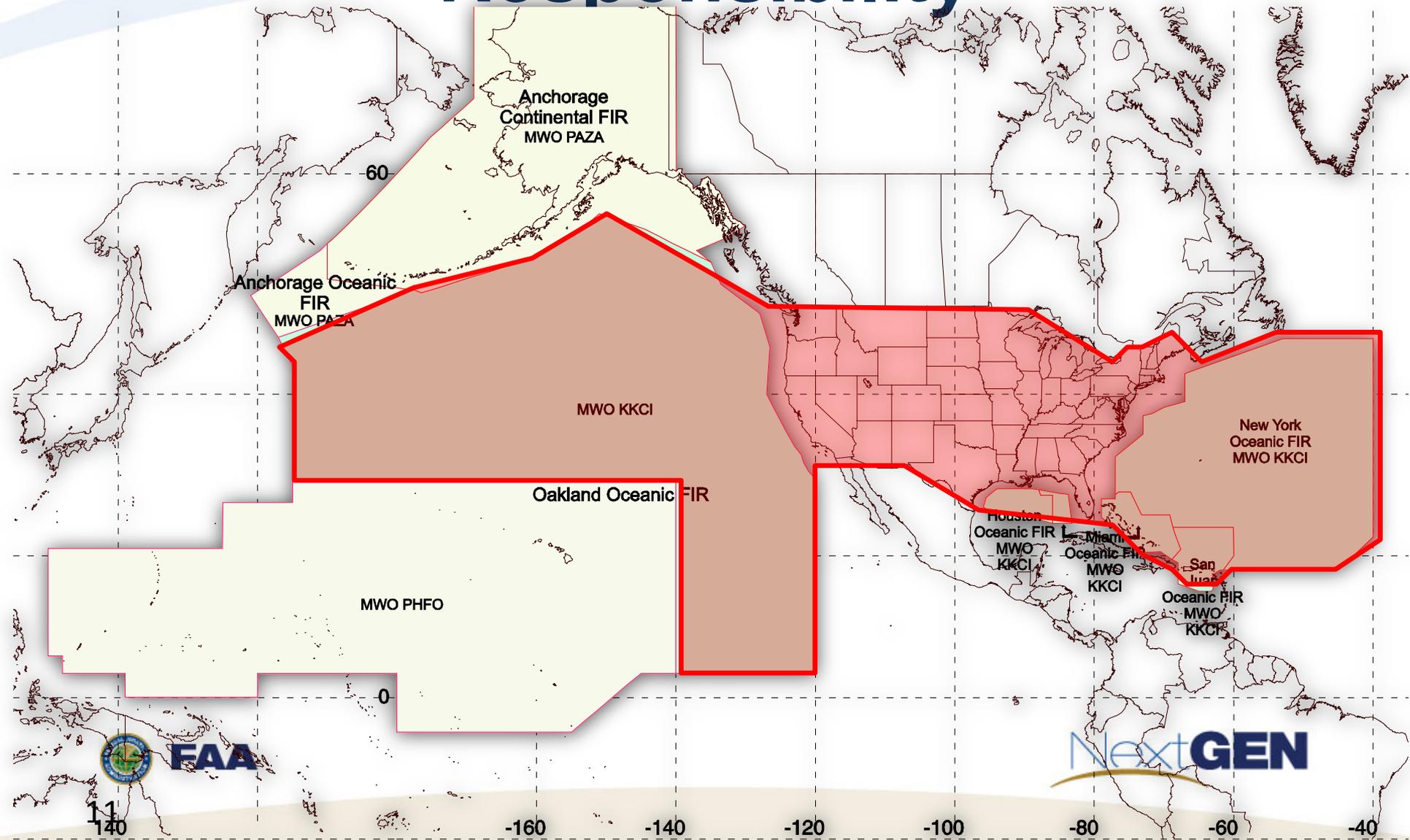
- WFO Honolulu
 - ✦ Issues TAFS for Hawaii
 - ✦ One of 3 Meteorological Watch Offices
 - AIRMET
 - SIGMET
 - Area Forecast
 - Low and Mid level SIGWX

Aviation Weather Center

- 1 of 3 U.S. Met Watch Offices
 - ✦ Areas of Responsibility
 - Contiguous United States
 - Northwestern Atlantic
 - Northeastern Pacific
 - Gulf of Mexico/Caribbean
 - ✦ Products
 - AIRMET
 - SIGMET
 - Area Forecast
 - SIGWX
 - CAWS/CCFP
- WAFC Washington

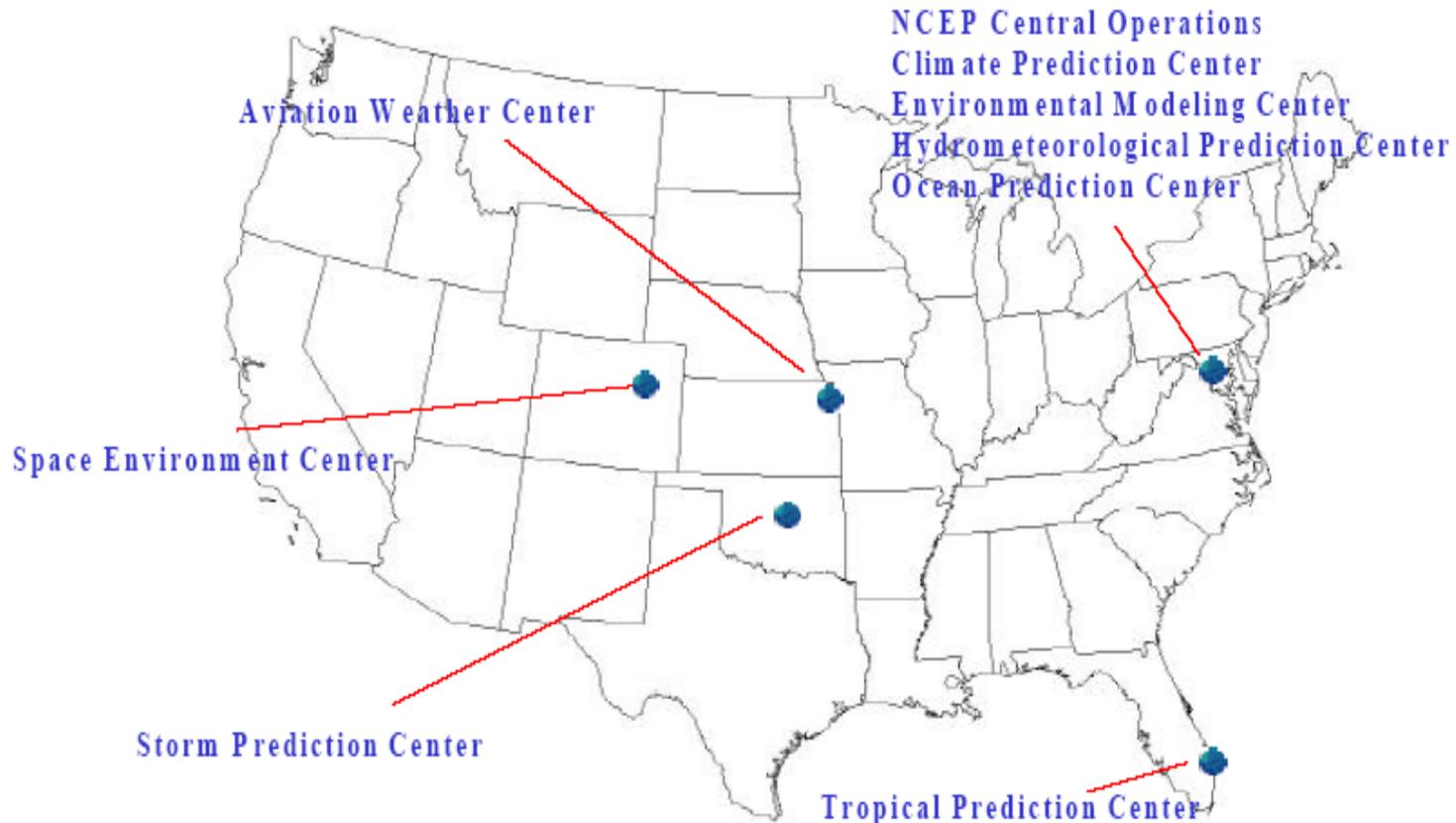


U.S. Aviation Weather Responsibility

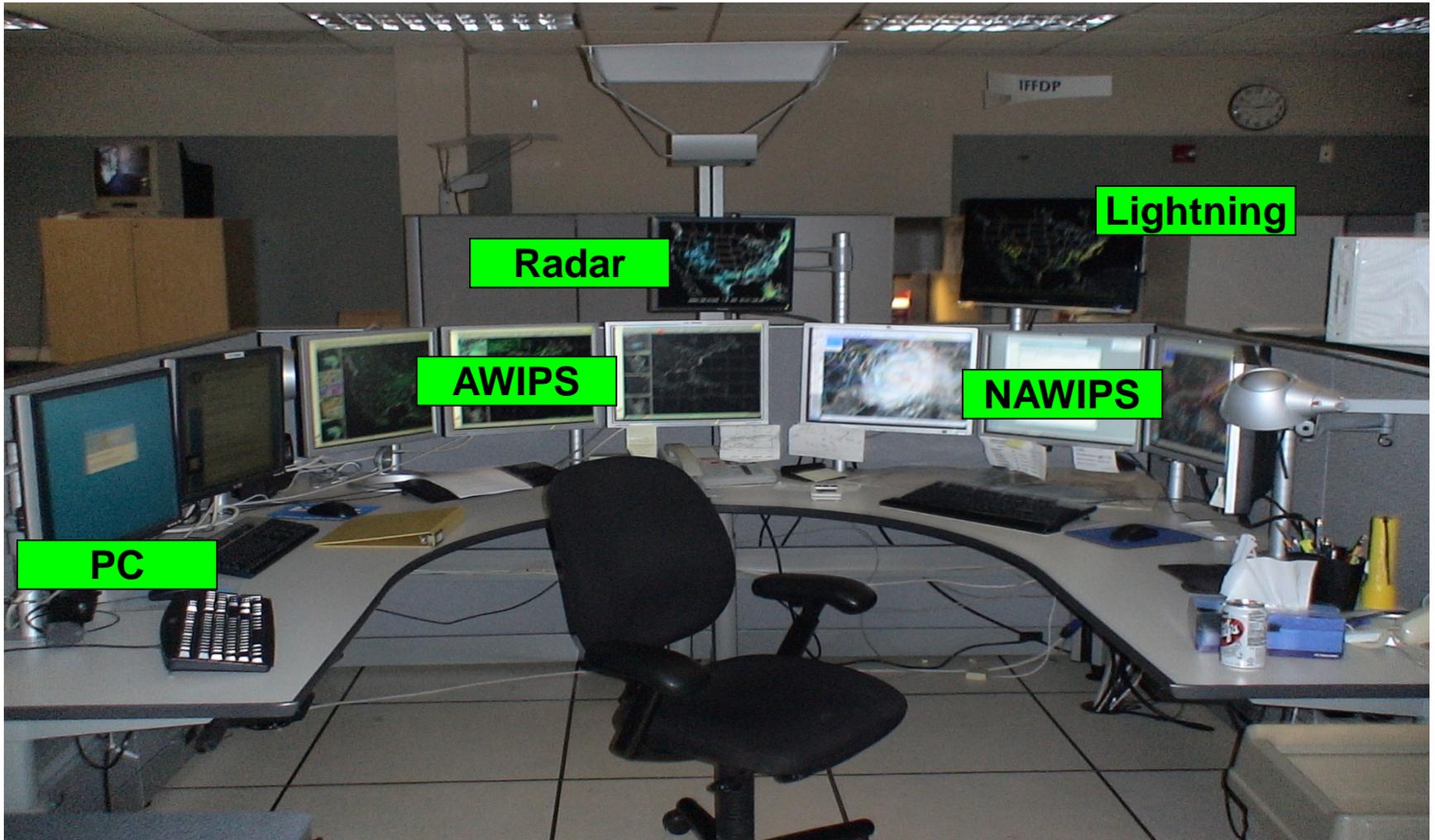


Aviation Weather Center One of Nine NCEP Centers

NCEP Center Locations



Typical Forecast Desk



AWC Product Issuances

Product	Approx #/Year
Convective SIGMET	30,000
AIRMETs	26,000
CCFP	25,000
Significant Weather High	18,890
Area Forecasts (FA)	6,570
Significant Weather Low	1,460
Non-Convective SIGMET	500



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Domestic Products



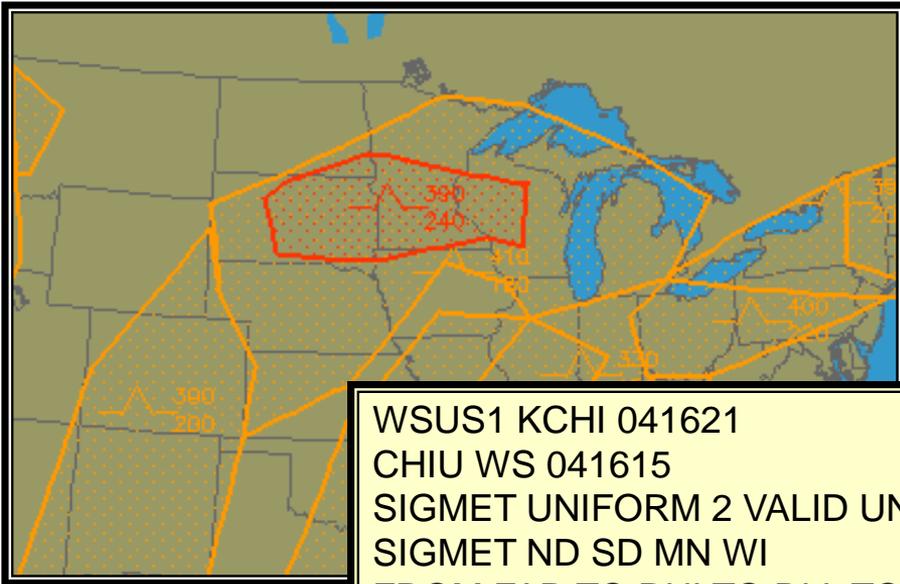
FAA

SIGMETs

(**SIG**nificant **MET**eorological Information)

Weather potentially hazardous to *all* aircraft

- Tstorms, svr icing, svr turb
- Dust/sand storms with vis < 3 mi
- Volcanic ash



WSUS1 KCHI 041621
CHIU WS 041615
SIGMET UNIFORM 2 VALID UNTIL 042015
SIGMET ND SD MN WI
FROM FAR TO RHI TO DLL TO ODI TO 30S
FSD TO 65NW ANW TO DPR TO 60S BIS TO
FAR
OCNL SEV TURB BTN FL240 AND FL390.
RPRTD BY BE40 AND LJ25. THIS UPDATES
UNIFORM 1 AND EXTENDS AREA INTO WI.
CONDS CONTG BYD 2015Z.
JNR

- Area ≥ 3000 mi²
- Conv. SIGMETs valid for 2 hrs
- Non-conv. SIGMETs valid up to 4 hrs

AIRMETS

(AIRmen's METeorological Information)

→ Extensive mtn obscuration

→ IFR conditions

→ Moderate Turbulence

→ Moderate Icing

→ Sustained sfc winds
≥ 30 kts

→ Frz level data

→ 3,000 mi²

```
WAUS43 KPCI 261445  
CHIS WA 261445  
AIRMET SIERRA UPDT 2 FOR IFR VALID UNTIL 262100  
AIRMET IFR...NE KS IA MO WI LM MI LH IL IN  
FROM MKG TO 30SE ECK TO FWA TO IRK TO 50E ICT TO 40NW ICT TO HLC  
TO 50S ANW TO ONL TO MKG  
CIG BLW 010/VIS BLW 3SM PCPN/BR. CONDS CONTG BYD 21Z THRU 03Z.
```

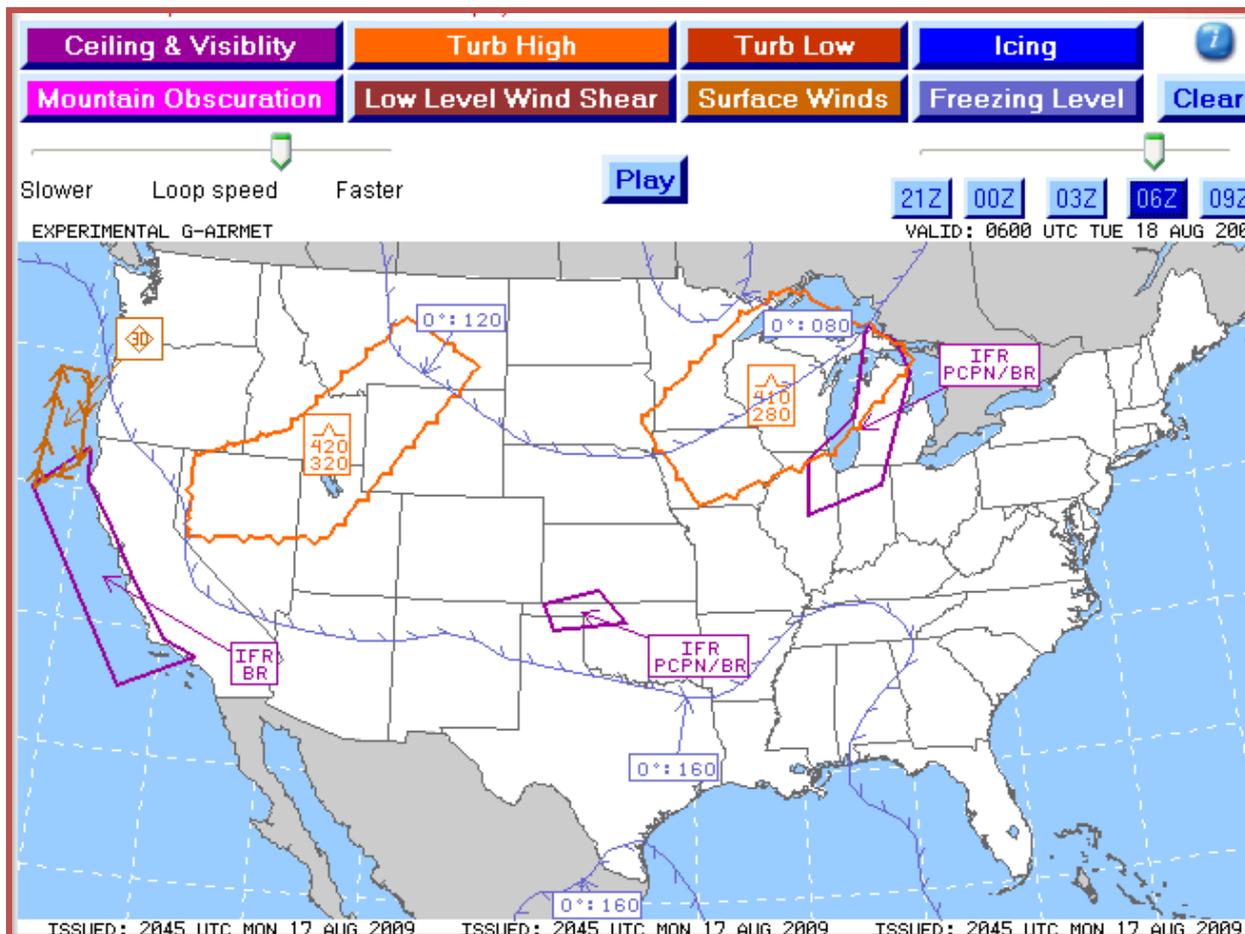
```
WAUS43 KPCI 261445  
CHIT WA 261445  
AIRMET TANGO UPDT 2 FOR TURB VALID UNTIL 262100  
AIRMET TURB...ND SD NE MN IA WI LM LS MI LH IL IN  
FROM 30N INL TO YQT TO SSM TO YVV TO 30SE ECK TO FWA TO FOD TO  
LBF TO BFF TO 70SW RAP TO DIK TO 30N INL  
MOD TURB BTN FL270 AND FL410. CONDS CONTG BYD 21Z ENDG 00-03Z.
```

```
WAUS43 KPCI 261445  
CHIZ WA 261445  
AIRMET ZULU UPDT 2 FOR ICE AND FRZLVL VALID UNTIL 262100  
AIRMET NO SGFNT ICE EXP OUTSIDE OF CNVTV ACT.
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Graphical AIRMET (G-AIRMET)

➤ Series of graphics depicting en-route AIRMET hazards valid at 00, 03, 06, 09, and 12 hours from issuance.



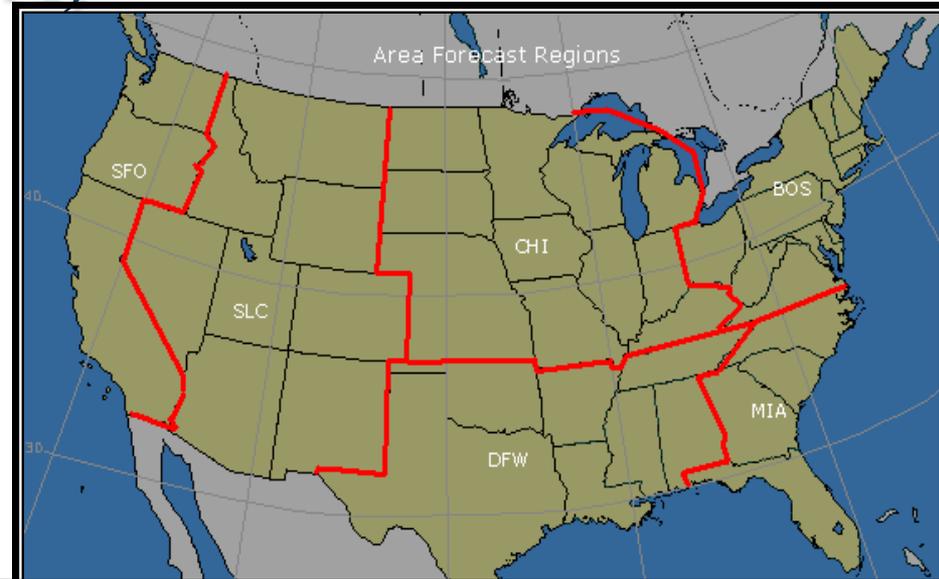
➤ Identifies hazardous weather in space and time more precisely than text products.

➤ A picture's worth a thousand contractions.

Area Forecast

(FA)

- Issued 3 times per day
- 18-hr synopsis
- 12-hr forecast for visible en-route wx < FL450
- 6-hr categorical outlook
- One text product per region (SFO, SLC, CHI, DFW, BOS, MIA, AK, HI, Gulf, Carrib)
- VMCs including clouds, and general weather conditions



SYNOPSIS...AT 02Z LOW PRES NWRN MN WITH CDFNT BJI-PIR-DDY LN AND WRMFNT BJI-EAU-PMM LN. TROF FSD-TBE LN. BY 20Z LOW PRES CNTRL WI WITH CDFNT DLL-PWE-GLD LN AND WRMFNT DLL-ECK LN. ...DARRAH...

ND SCT100. OCNL BKN080 TOP FL180. ISOLD -SHRA. OTLK...VFR. .

SD WRN 1/3...SCT060 SCT120 TOP FL180. TIL 06-08Z OCNL CIG BKN050. WDLY SCT -SHRA/-TSRA. TS TOPS FL400. OTLK...VFR.

CNTRL 1/3...SCT080. OCNL BKN060. WDLY SCT -SHRA ISOLD -TSRA. TS TOPS FL400. OTLK...VFR.

ERN 1/3...SCT100. BY 05-07Z OCNL BKN080 TOP 160. OTLK...VFR SHRA. .

NE PNHNDL...AGL SCT050. TIL 04-06Z ISOLD -SHRA/-TSRA. TS TOPS FL400. OTLK...VFR.

CNTRL AND E...AGL SCT040 BKN080 TOPS LYRD FL180. OCNL CIG OVC030. WDLY SCT -SHRA/-TSRA. TS TOPS FL450. TS POSS SEV.

CNTRL BY 06-08Z SCT030 OCNL CIG BKN020. CONDS SPRDG ACRS RMNDR BY 11-13Z. OTLK...VFR. .

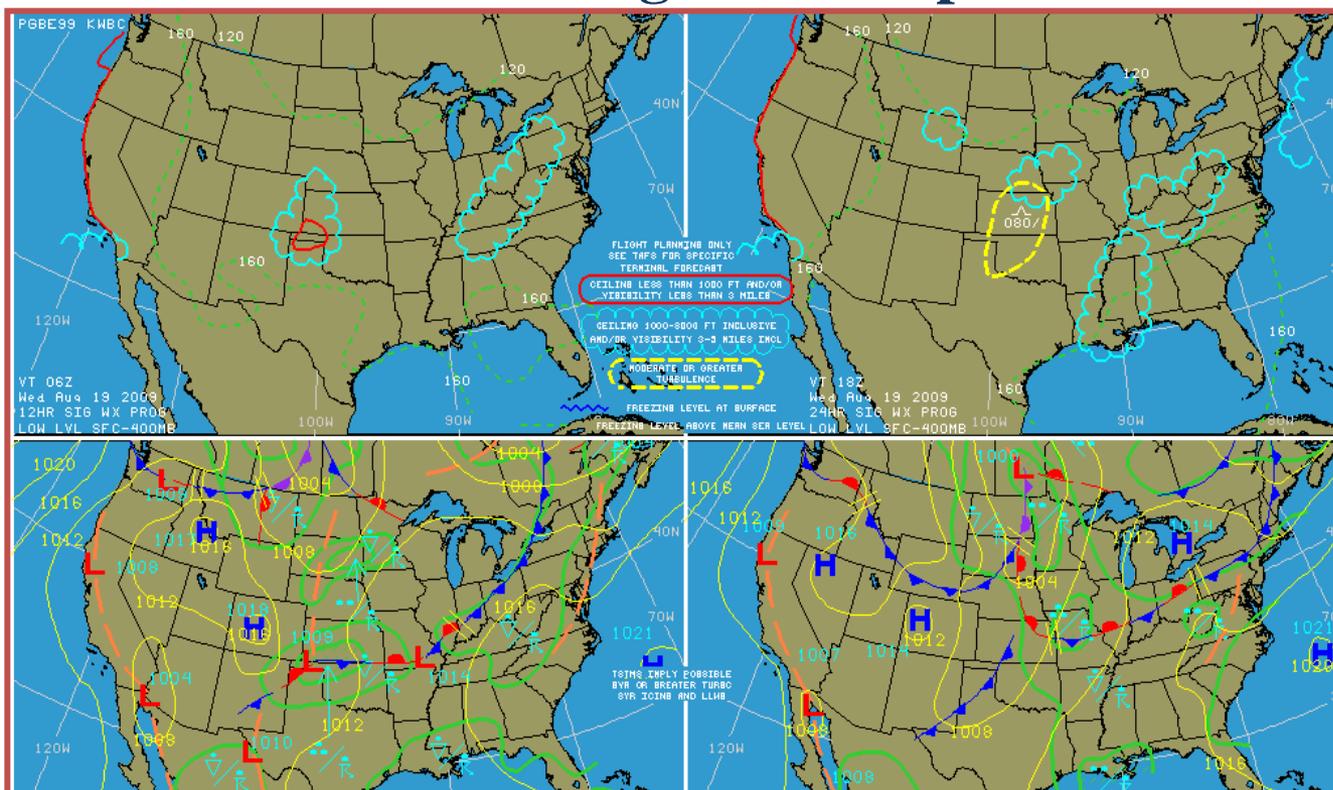


Low Level Significant Wx

- Graphics product issued four times per day (00, 06, 12, 18Z)
- Frz levels, turb, low ceilings, and MVFR/IFR condition
- Surface forecasts of fronts and precipitation
- Intended for briefing the VFR pilot

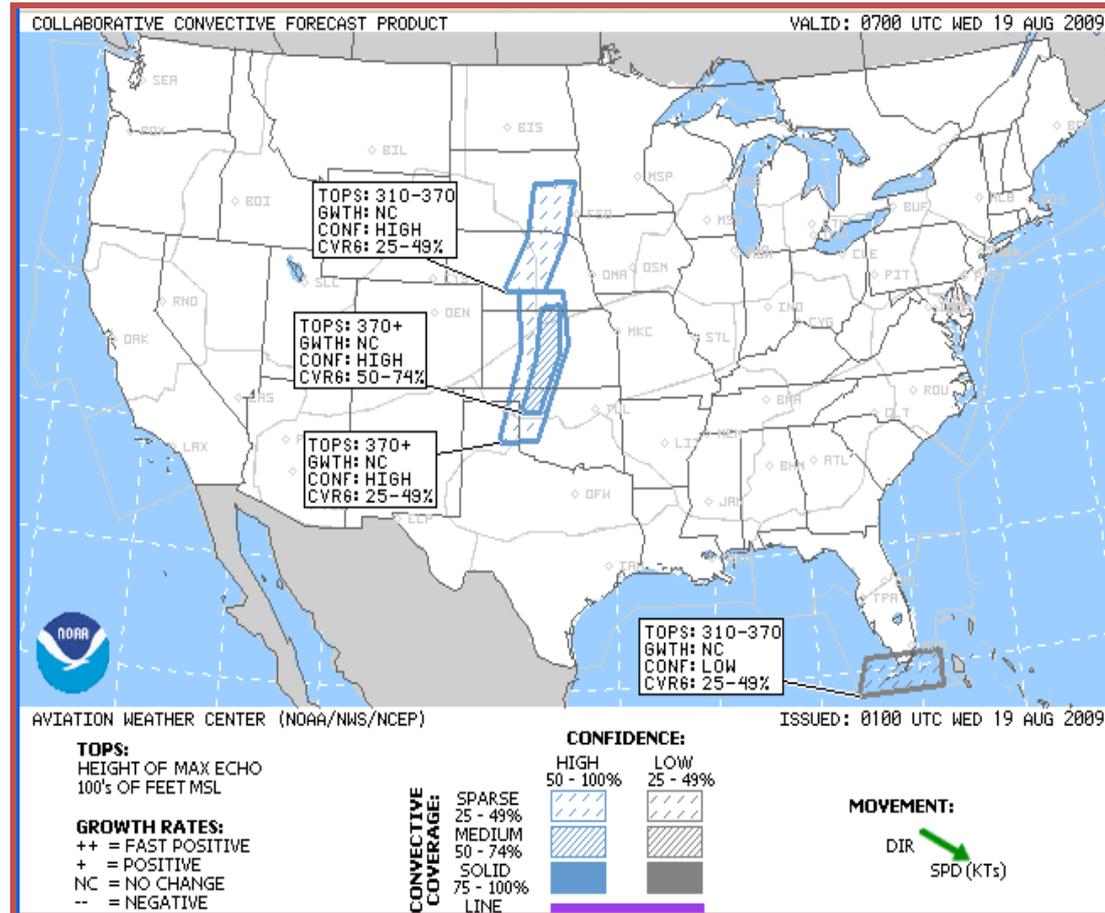
→ Covers the 48 contiguous states, southern Canada and the coastal waters for altitudes below 24 kft

→ Each 4 panel chart is divided on the left and right into 12 and 24-hr forecasts



CDM Convective Forecast Product (CCFP)

- Automated graphical forecast of convection at 2/4/6/8 hours
- Convection is defined as a polygon of at least 3,000 mi²
- Coverage of at least 25% with echoes of at least 40 dbZ and at least one ET > 25 kft
- “Collaborated” with Canada



Collaborated Aviation Weather Statement (CAWS)

- Event Driven Convective Forecast
- Focused on ‘Impact’ to TFM
- Collaborated by government and industry Meteorologists
- Used with CCFP
 - ✦ CCFP scheduled, ‘big picture’, Automated
 - Supports longer range (4-8 hours) and 2 hourly SPO call
 - ✦ CAWS unscheduled, impact-based
 - Supports decision making (0-4 hours)

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International Products



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World Area Forecast System

→ World Area Forecast System (WAFS)

→ Developed by ICAO and the WMO

→ To improve the quality and consistency of enroute guidance provided for international aircraft operations.

→ WAFS Supported by Two World Area Forecast Centers (WAFCs)

→ WAFS – Washington

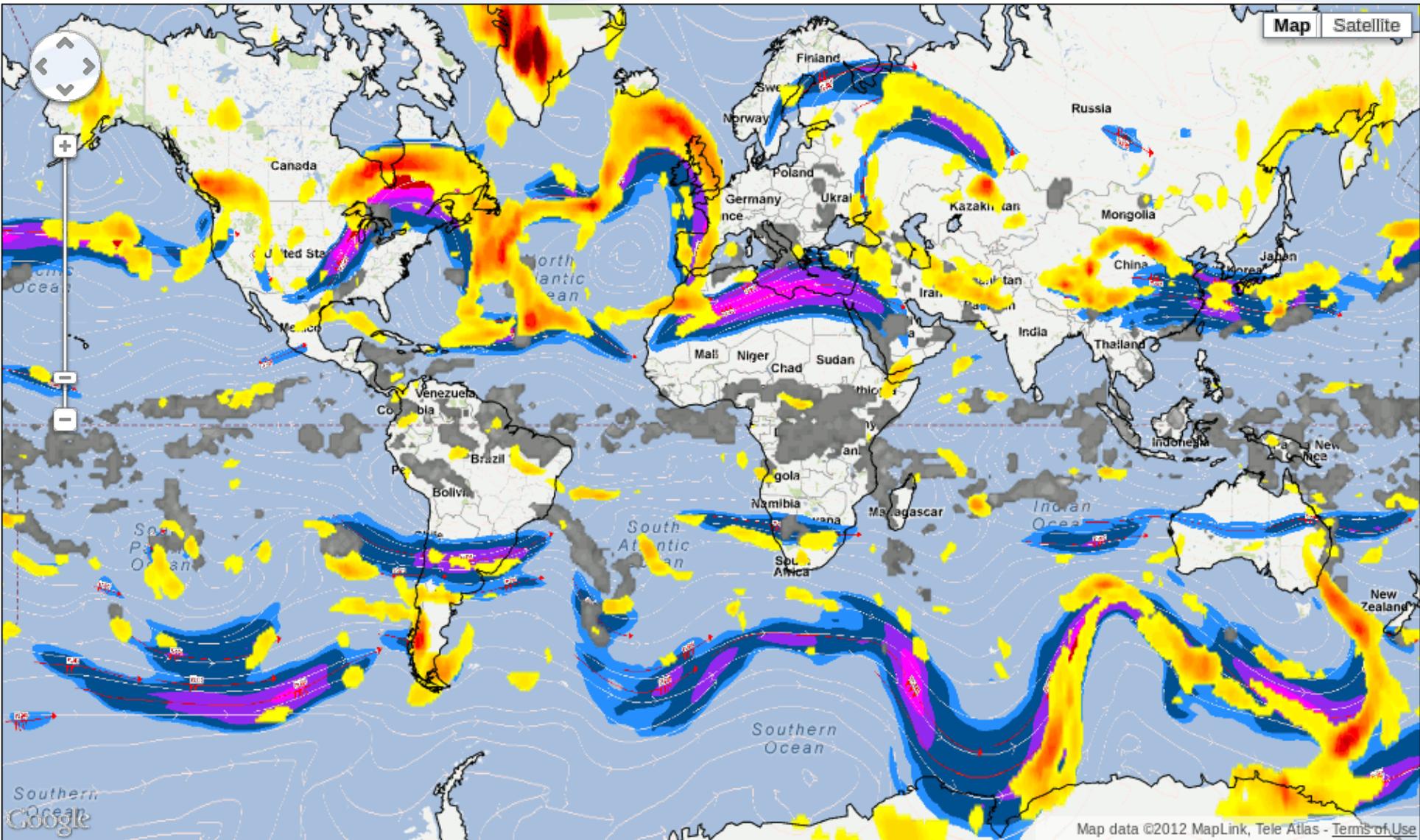
→ WAFS – London



WAFS Global Grids

WAFS Model Data

6hr Forecast valid 12UTC Mon Apr 16 2012



International Operations Branch

→ Global graphics

- High level graphics - FL250 – FL630
- Mid level graphics – FL100 – FL180

→ Oceanic SIGMETs

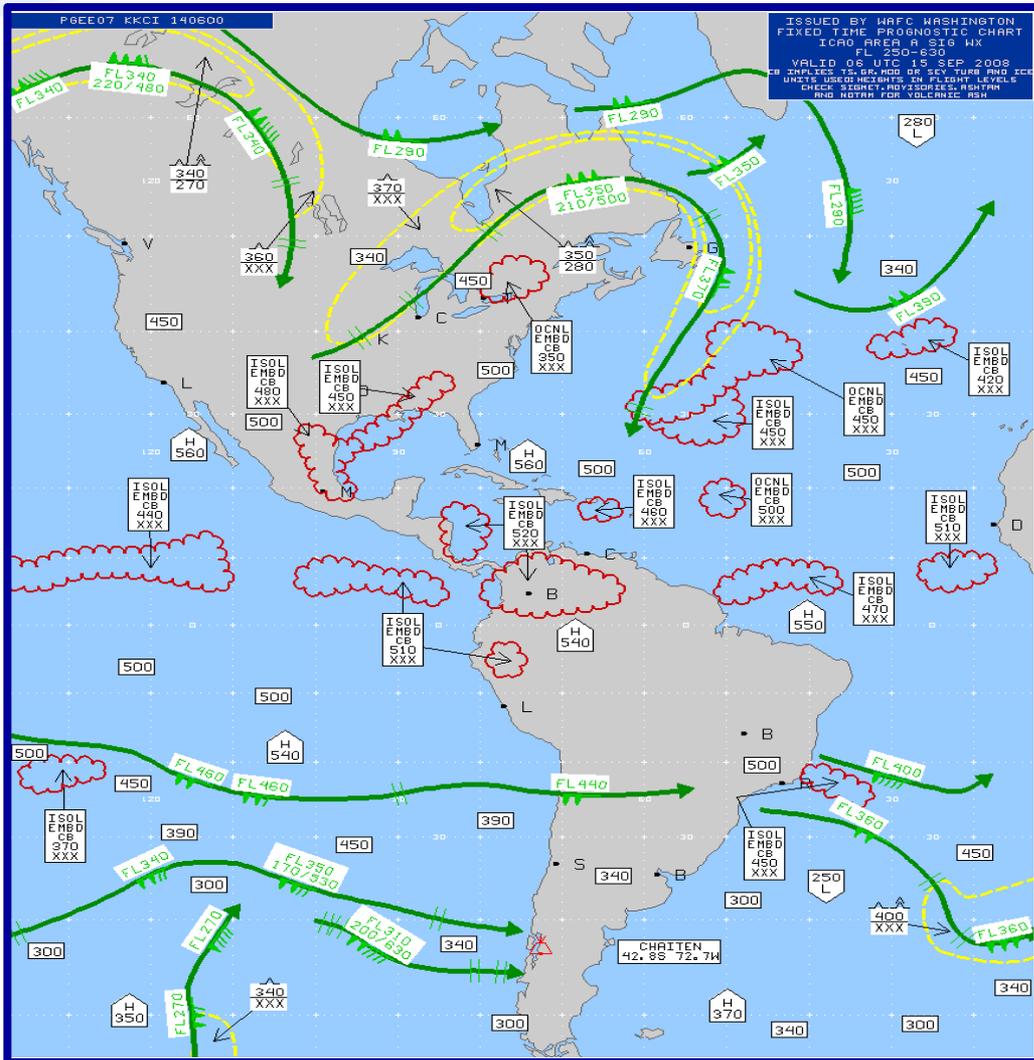
- Turbulence
- Icing
- Thunderstorms
- Volcanic ash
- Tropical cyclones

→ Area Forecasts for the Gulf of Mexico and the Caribbean



Significant Weather Forecasts

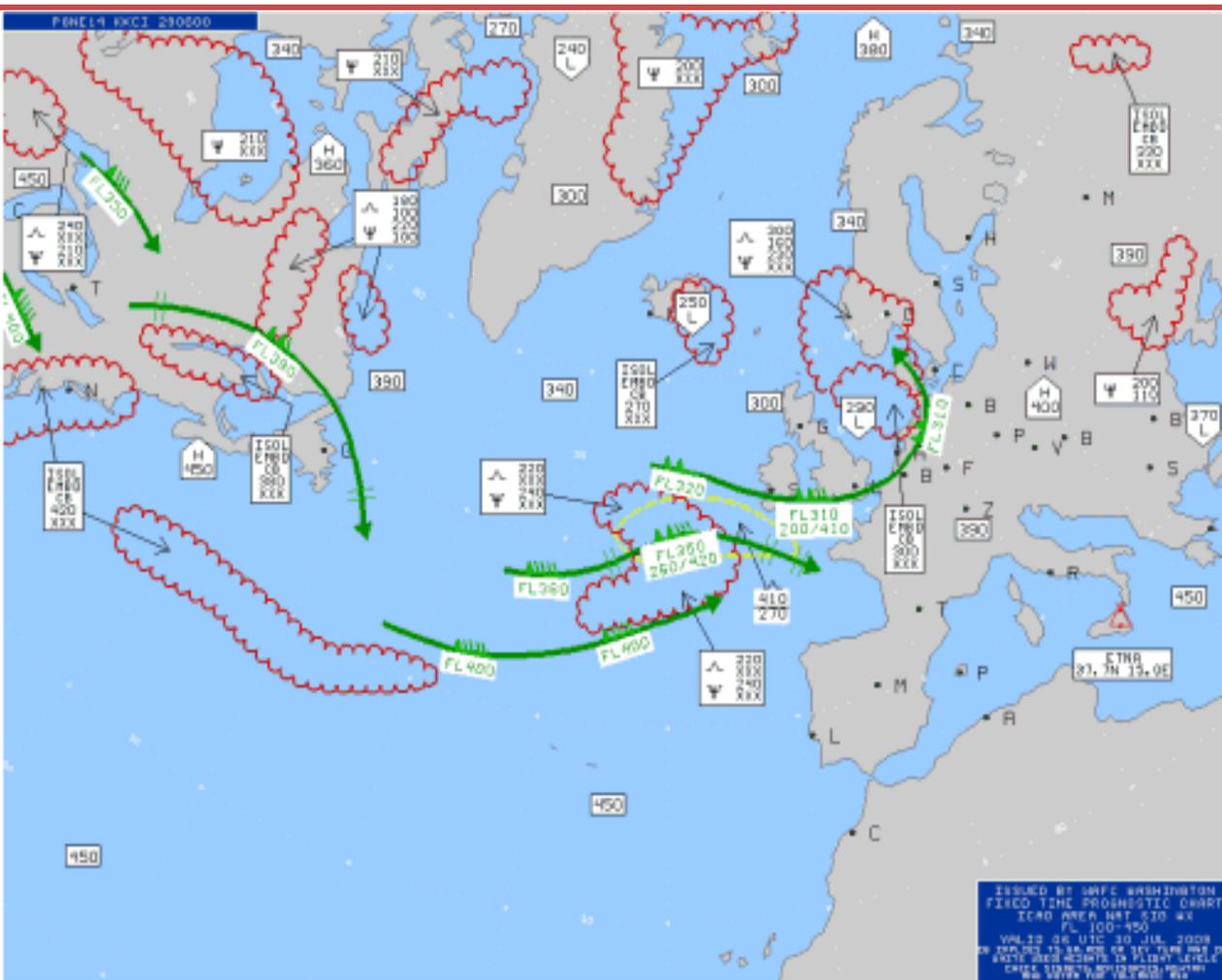
High Level Graphic



- Covers FL250 - FL630
- Worldwide forecast
- 24 hour forecast for:
 - Jet Streams
 - Thunderstorms
 - Turbulence
 - Tropopause Heights
 - Active Volcanoes
 - Tropical Cyclones

Mid Level Significant Weather Graphic

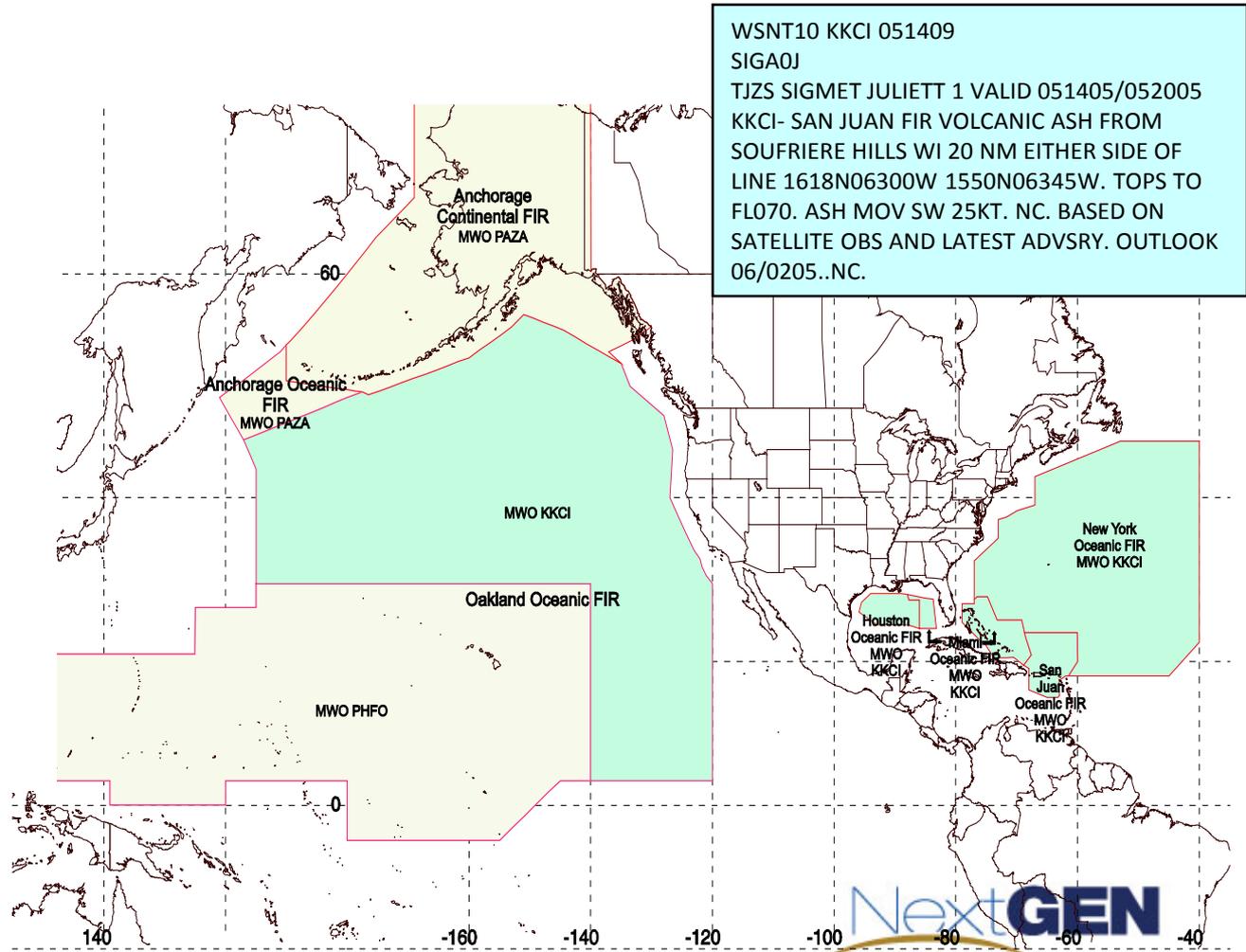
→ Covers FL100 – FL450 over the North Atlantic region



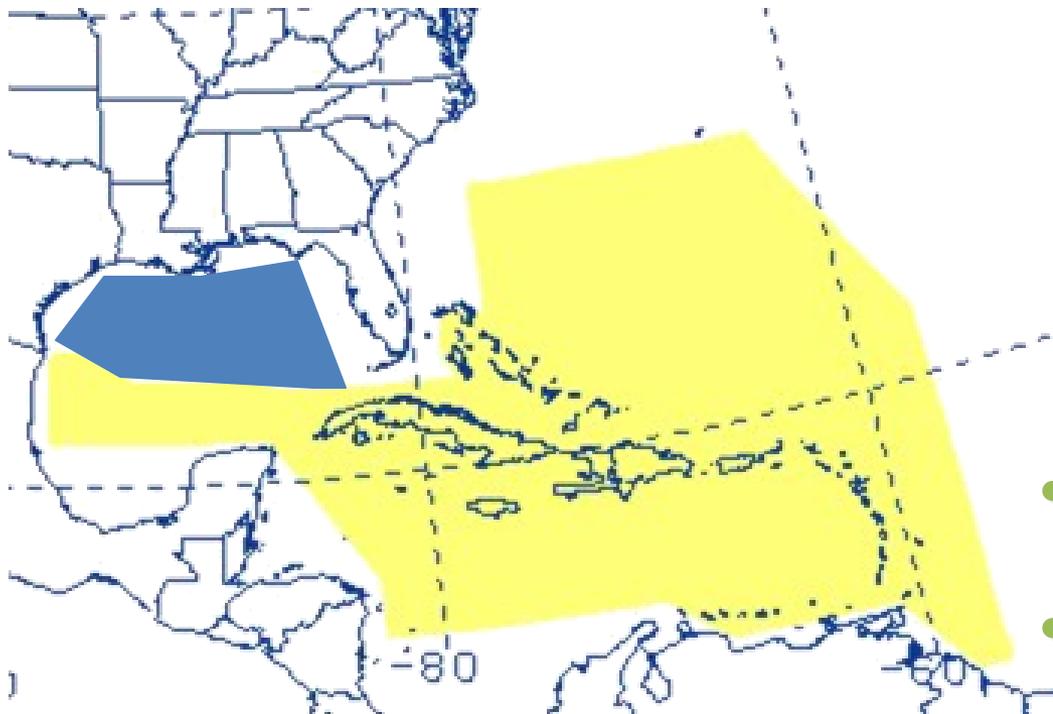
- ✦ Jet Streams
- ✦ Thunderstorms
- ✦ Turbulence
- ✦ Trop Hts
- ✦ Volcanoes
- ✦ Tropical Cyclones
- ✦ Icing

Oceanic SIGMETs

- Thunderstorms
- Tropical Cyclones
- Severe Icing & Turbulence
- Dust & Sand Storms
- Volcanic Ash



Gulf of Mexico & Caribbean Area Forecasts



- To Support Helicopter Operations
 - ✦ Clouds
 - ✦ Visibility
 - ✦ Thunderstorms
 - ✦ Rain/Fog
 - ✦ Wind
- 4,000 Operating Oil Platforms
- 30,000 personnel living on oil platforms
- 600 Helicopters
- 1.3 Million flights annually

International Flight Folder Program

- Since 10/1/98 the AWC has provided meteorological information to operators and flight crews for:
 - ✦ Dispatch planning
 - ✦ Pre-flight briefing
 - ✦ En-route guidance
- Wind/temp forecasts, SIGWX, TAFs, METARs, AIRMETs, and much more all available by fax and/or internet
- Became digital internet service 2011
- AWC shares about 40,000 charts per month!



Aviation Digital Data Service (ADDS)

- www.aviationweather.gov
- Free publicly accessible web site
- Full range of meteorological data products tailored to aviation needs.
 - TAFs and METARs in both text and graphical format
 - Winds/Temps
 - Satellite
 - Radar
 - Model forecasts
 - Interactive Java Tools
 - International Flight Folder data
 - Much more!



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Collaborative Decision Making



FAA

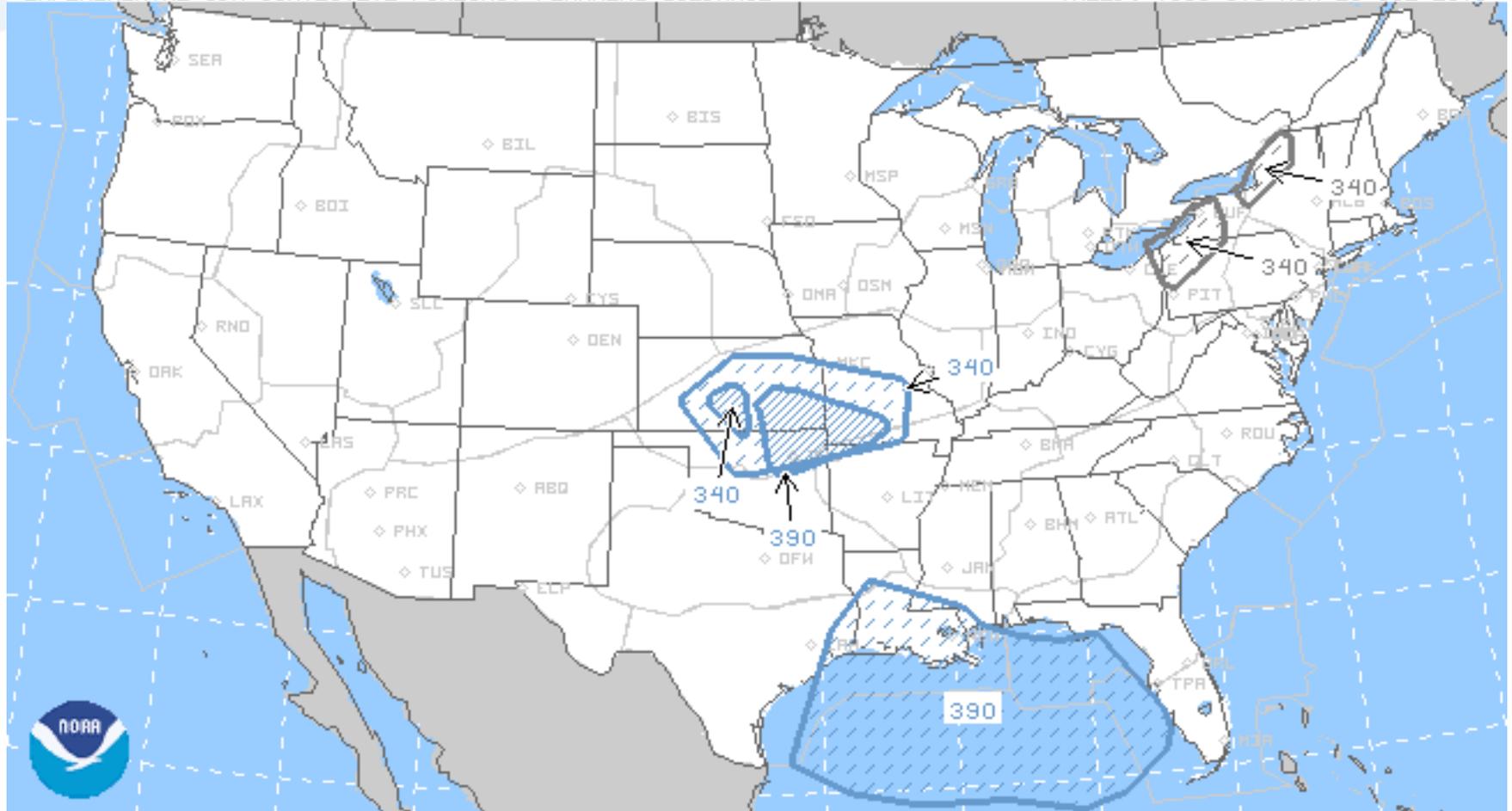
Collaborative Decision Making

- Weather Evaluation Team (WET)
- CDM sub-team
- Developing tools and procedures to enhance Traffic Flow Management Strategic Planning

CCFP

EXPERIMENTAL CDM CONVECTIVE FORECAST PLANNING GUIDANCE

VALID: 1500 UTC MON 25 JUL 2016

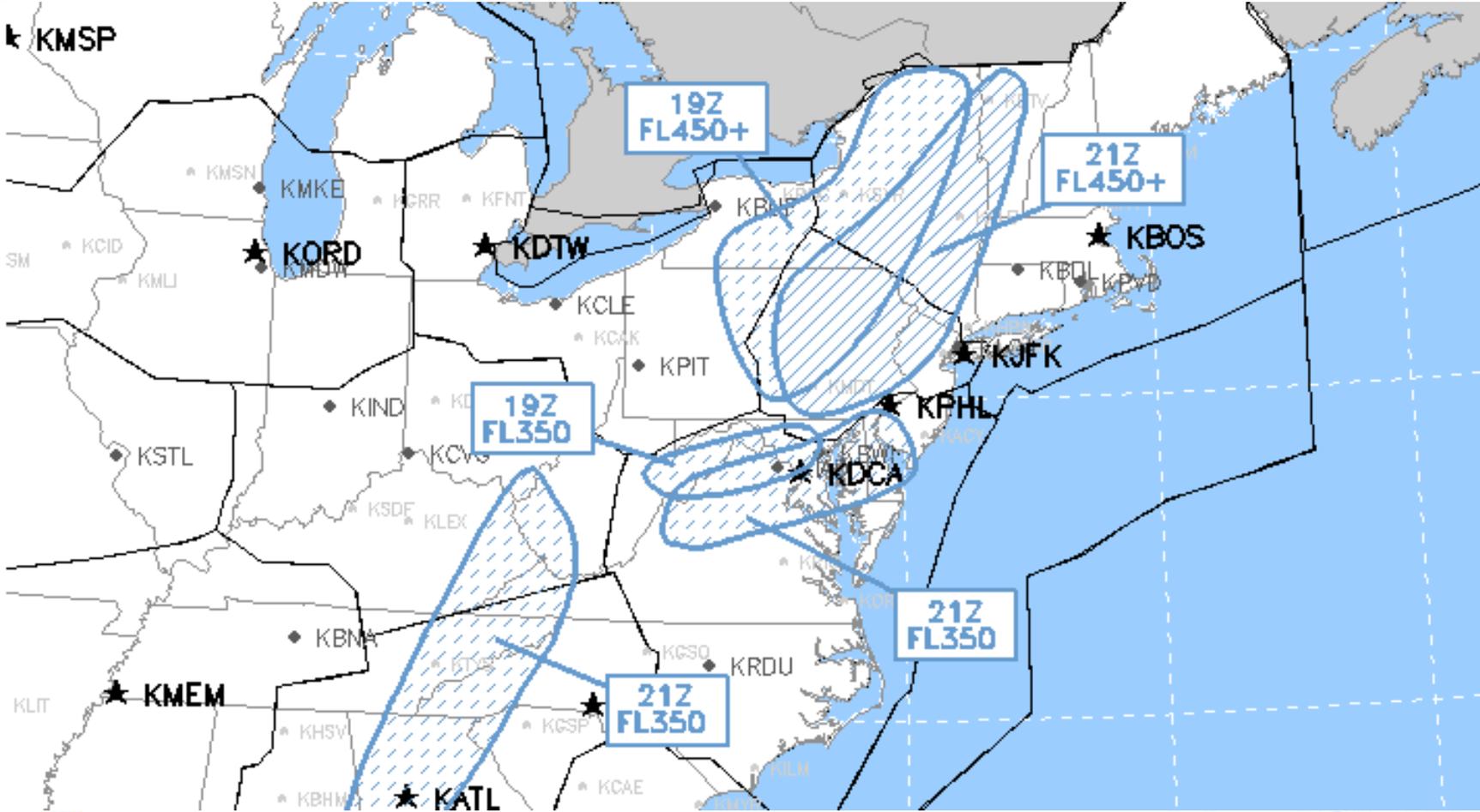


AVIATION WEATHER CENTER (NOAA/NWS/NCEP)

ISSUED: 1300 UTC MON 25 JUL 2016



CAWS



CAWS

Collaborative Aviation Weather Statement 003
NWS Aviation Weather Center Kansas City MO
1312 UTC Mon 25 Jul 2016

Weather: Thunderstorms
Valid: 1900-2100Z

ARTCCs affected: ZBW, ZDC, ZID, ZNY, ZOB, ZTL
Terminals affected: KBWI, KDCA, KIAD

CCFP: 13Z Issuance - Coverage/confidence too low, location adjustment

SUMMARY: High confidence areas of thunderstorms over
ZBW/ZDC/ZNY/ZOB/ZTL/ZID at 19Z & 21Z.

DISCUSSION: High confidence area of thunderstorms over ZBW/ZDC/ZNY/ZOB
at 19Z & 21Z with tops FL450+ ((over ZNY/ZOB/ZBW), tops FL350 (over ZDC/ZNY),
tops FL350 (over ZTL/ZID).

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.



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ICAO Weather Exchange Model (IWXXM)



FAA

Key IWXXM Issues

- November 2016 - ICAO Annex 3 amended to make the exchange of XML products a *recommended* practice.
- November 2018 - ICAO Annex 3 amended to make the exchange of XML products a *mandatory* practice.
 - ✦ MIE recommend to METP to push back to 2020 amendment 80
- MIE Leaning toward providing the actual measured value in IWXXM messages
 - ✦ Will not affect current FAA or ICAO regulations
 - ✦ Human-readable conversions can display “binned” or “rounded” values as desired
 - ✦ Provides higher resolution data for higher end users or more sophisticated decision makers
 - ✦ Higher resolution observed data will enable improved precision in forecasts and more efficient use of airspace

Key IWXXM Issues

- Many states will not be able to provide IWXXM messages even by 2020
- MIE developing guidance for ICAO regions to transition and implement
 - ✦ Bilateral agreements
 - ✦ ROC as translation center

