Part 121 Flight Dispatch Weather Planning

FPAW Spring 2024

Flight Planning Process

Dispatcher Needs

1. Accurate Information
2. Consistency
3. Deterministic Information
   - Probabilistic can certainly be helpful, but in the end, we must make go/no-go decisions

Flight Planning

Generally broken down into two areas:

1. En-Route
2. Terminal

Example Flight:
San Francisco (SFO) to
Newark (EWR)

Enroute Planning

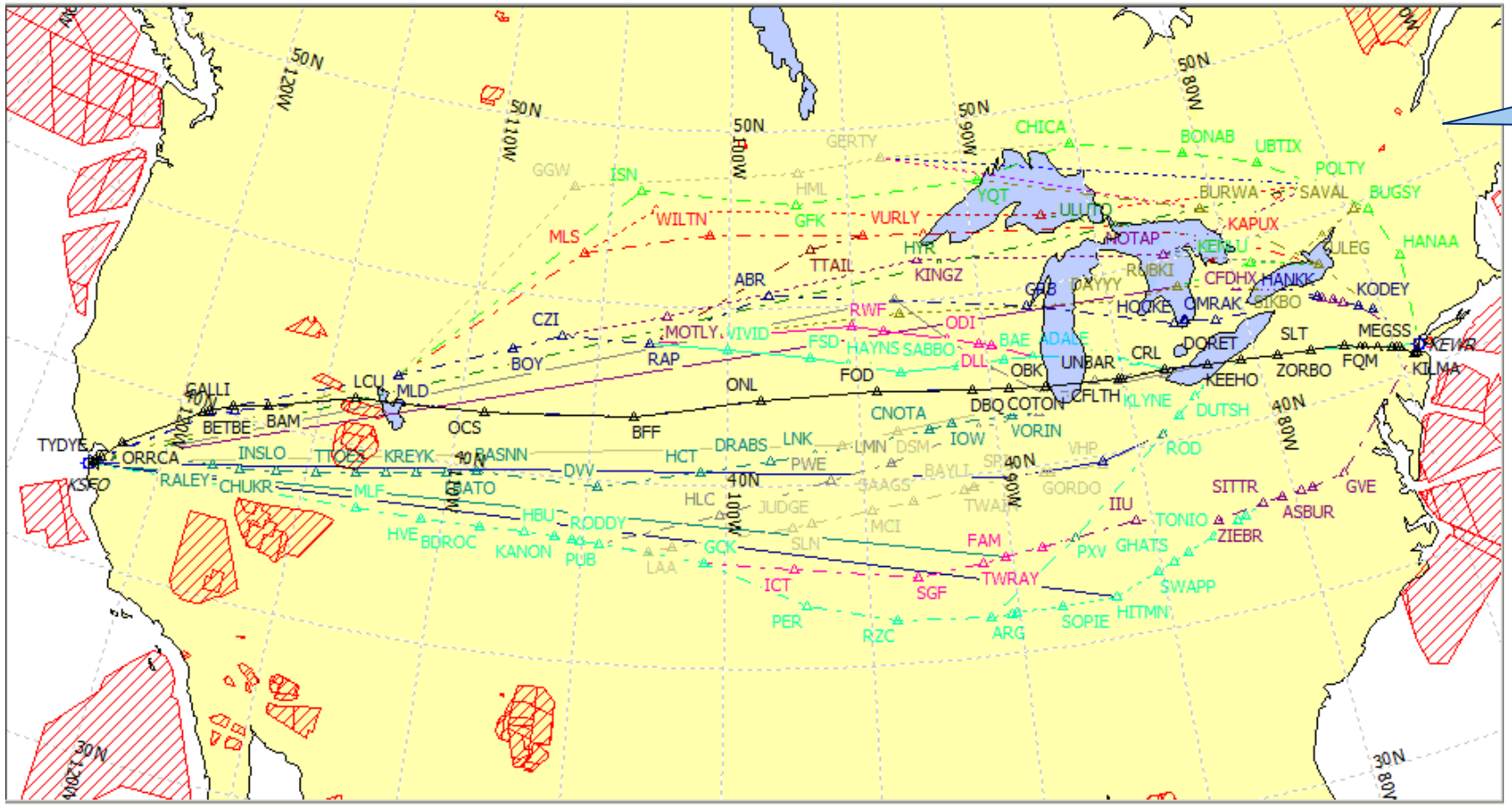
Enroute Planning

When planning, Dispatchers plan routes with the following items in mind:

1. Optimal Winds (maximum tailwind/minimum headwind)
2. Thunderstorm Avoidance (usually laterally)
3. Turbulence Avoidance (either laterally or vertically)

Options

- Route selection is a large part of the dispatch role



Many, many route options are possible!

The computer flight planning system is quite good at picking optimal route based on upper-level winds.

However, most systems do not incorporate any turbulence or convective information.

Options

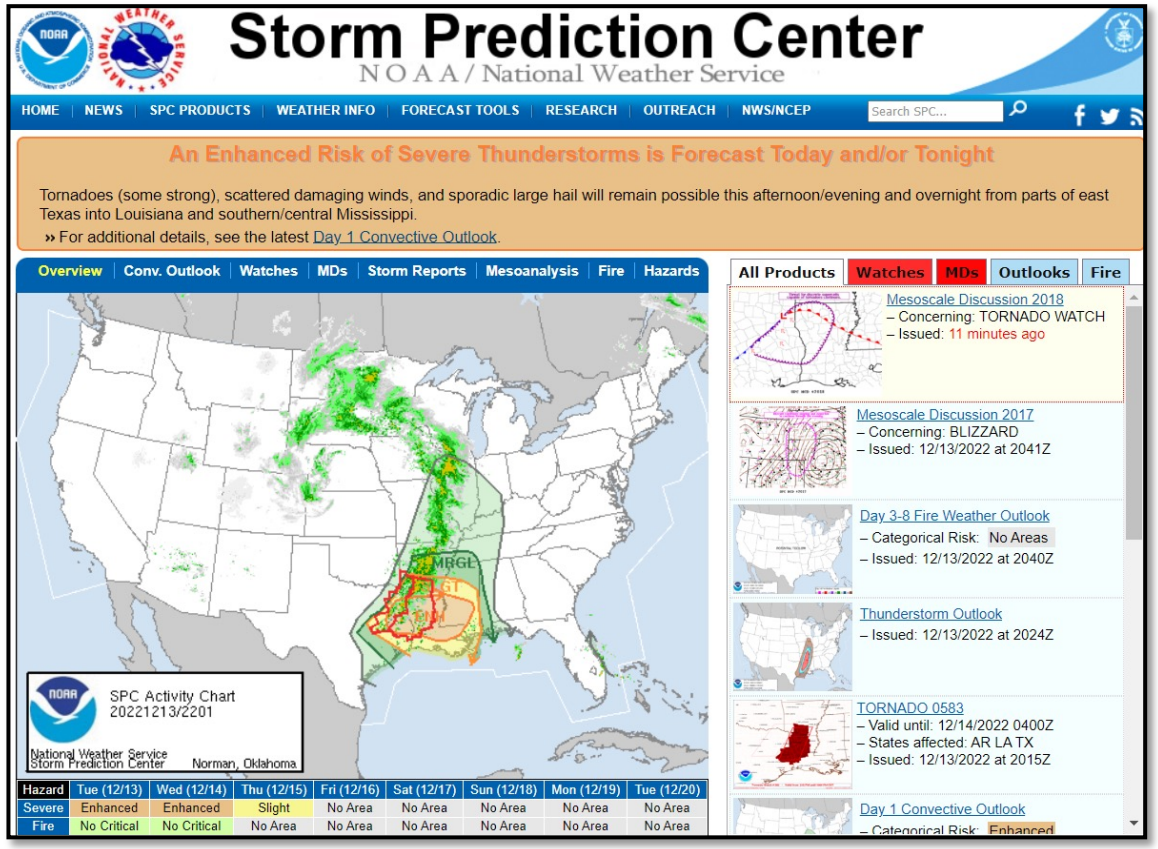
- Ideal world: flight planning systems could incorporate turbulence and convective risk data

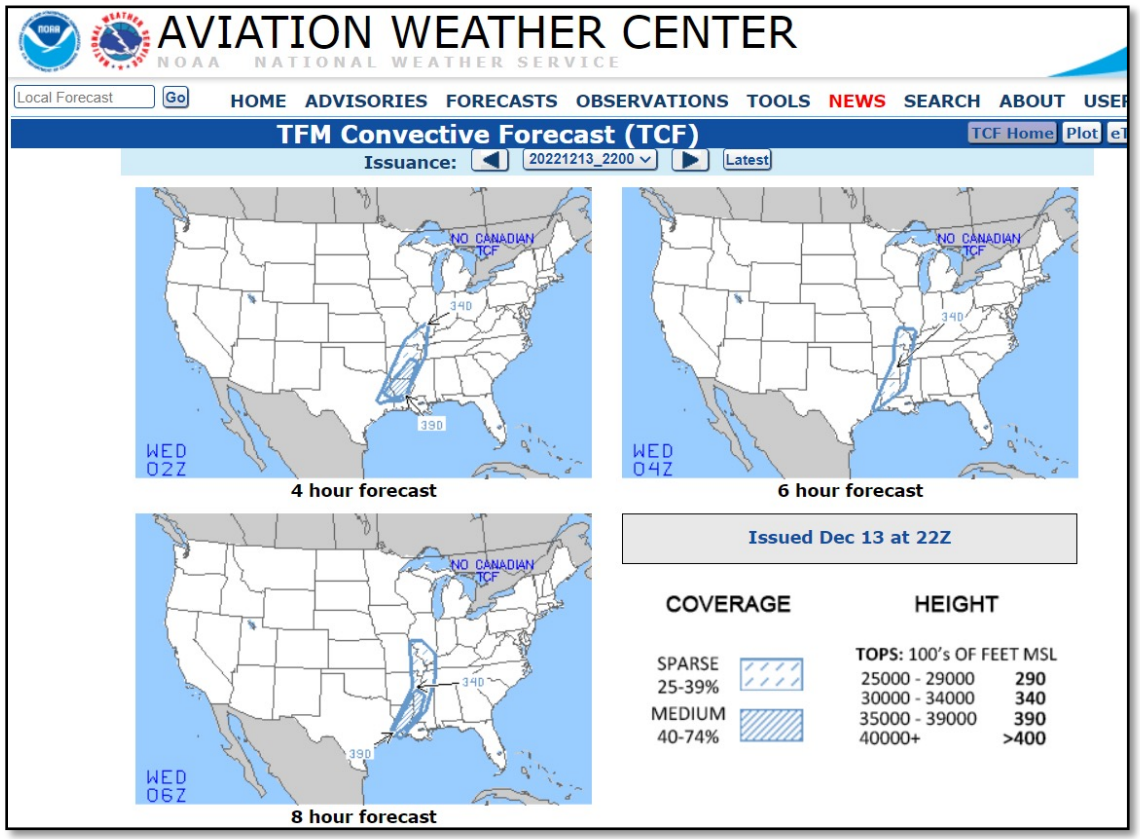
Various route options comparing distance, fuel, and time.

To	Rt	Dist	AFL	TripF	Time
KEWR	102	2283	397	44741	4.37
KEWR	201	2283	397	44741	4.37
KEWR	101	2290	398	45563	4.42
KEWR	103	2326	397	45614	4.43
KEWR	106	2350	391	46365	4.47
KEWR	104	2393	398	46967	4.50
KEWR	105	2384	398	47260	4.50
KEWR	107	2453	390	50142	4.53

Perhaps add a “turbulence risk score” or a “convective risk score” to compare.

Need to Change Route for Convection?





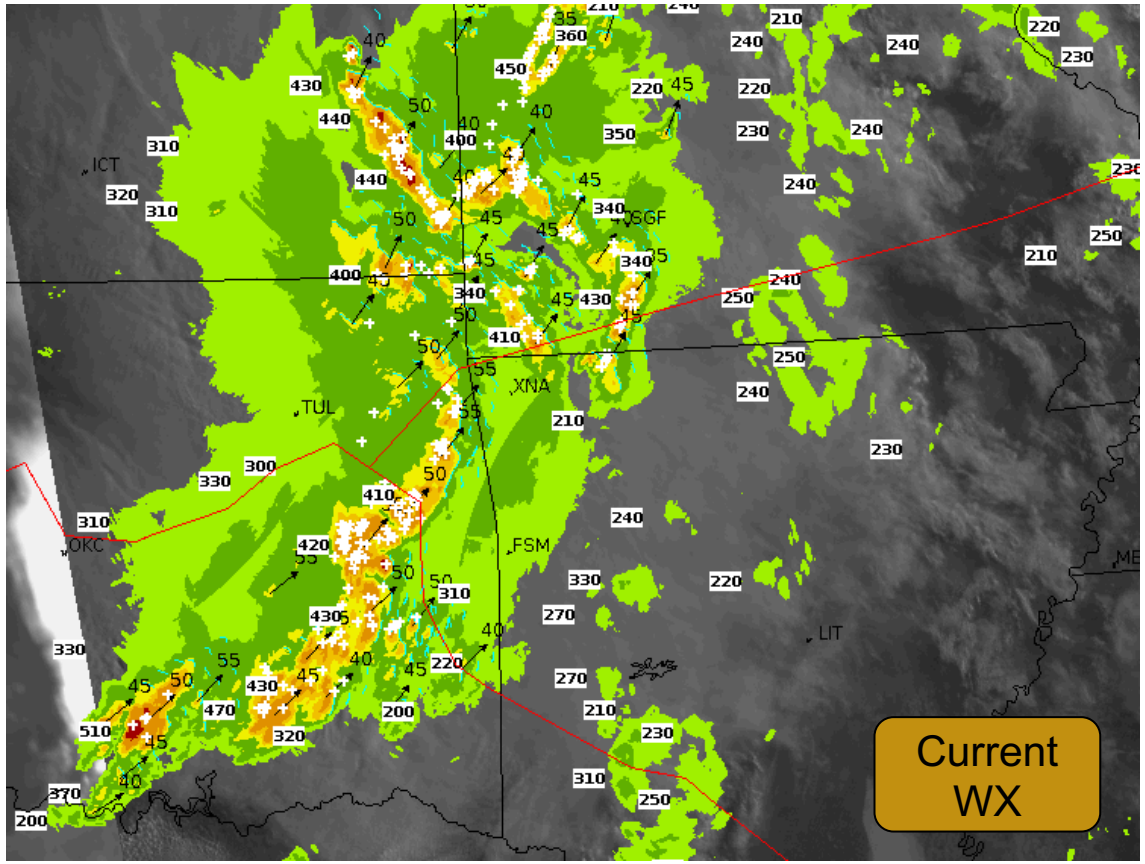
SPC Products (Outlook, Watches, MDs):

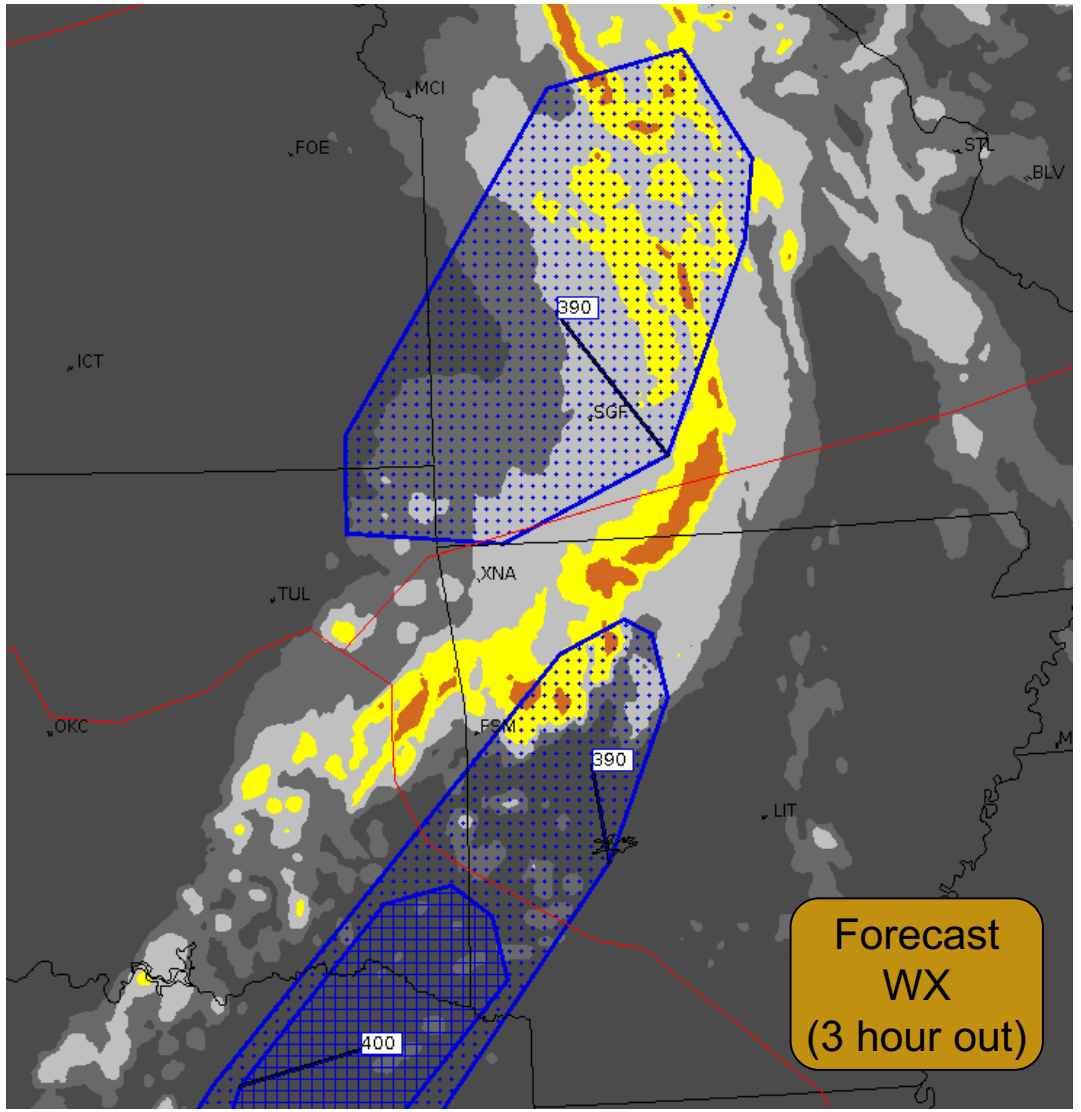
- Good for general situational awareness
- Not aviation-specific
- Not always time or altitude specific

TCF:

- Aviation-specific
- Somewhat time specific (2-hr blocks)
- Often treated as “no-fly zone” despite possible permeability

CoSPA



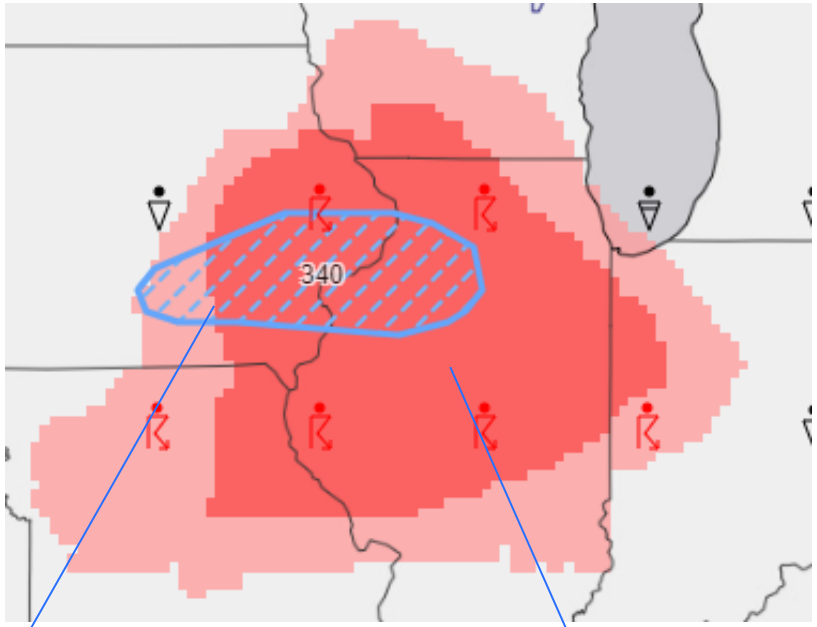


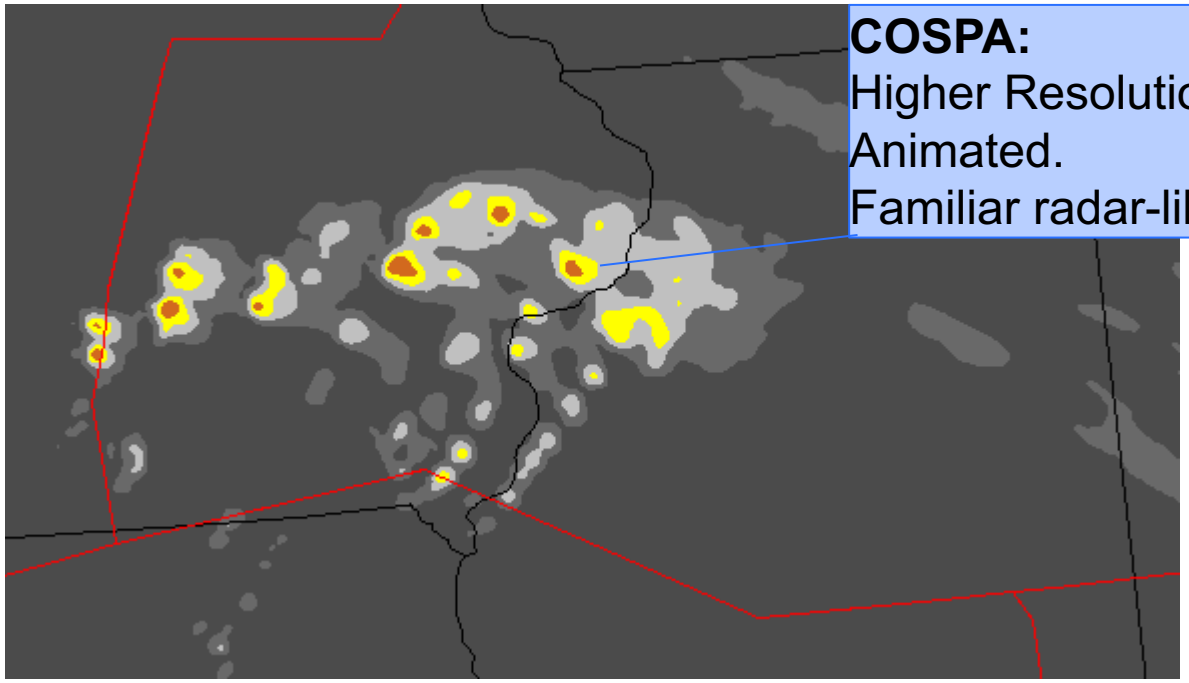
CoSPA:

- High-resolution
- Aviation-focused
- Animated
- Subject to same errors as with any weather model

Extensively used product in Dispatch

Decisions, Decisions





COSPA:
Higher Resolution.
Animated.
Familiar radar-like display.

TCF:
Tells me that I may need to avoid this area, especially at lower altitudes.

Limited time snapshots.

GFA Tool:
Broader area.

Limited gradations make it difficult to determine permeability and tops.

Dispatcher Options:

1. "Good to go" - no concerns. (Nothing showing up)
2. Route through area with caution and apply mitigations (add extra fuel for potential deviations)
3. Avoid the area. (Adds time/fuel, leads to airspace saturation)

The Good and Bad of Enroute Planning

What is done well:

- Plethora of information available.
- High-Resolution hour-by-hour forecasts.
- Ability to compare time/fuel costs of various route options.

What needs improvement:

- Information overload.
- Conflicting information from various sources.
- Decision point thresholds (at what point is it necessary to make a change to the flight plan?).
- Additional integration of graphical depictions into flight planning systems; less reliance on text-based entries.
- Incorporating turbulence or convection forecasts into flight planning systems is a good idea.

Terminal Planning

Terminal Planning

Most Dispatchers use the TAF, and only the TAF, for determining terminal weather impacts

KSFO 291129Z 2912/3018 17007KT P6SM FEW020 BKN100
FM291400 17010KT P6SM -SHRA BKN050
FM292000 13020G25KT 5SM RA BR OVC025 WS015/15055KT
FM300200 16015G22KT 6SM -SHRA VCTS SCT025 BKN050CB
FM300700 16015G22KT 6SM -SHRA BR SCT025 BKN050
FM301200 11015KT 5SM -SHRA SCT025 BKN050

KEWR 291122Z 2912/3018 32017G24KT P6SM SCT040 BKN150
FM291500 31019G28KT P6SM SCT050
FM300100 30014G23KT P6SM SCT050
FM300500 29012G20KT P6SM SKC
FM301300 28015G22KT 1SM SN BR OVC010

May need to plan for wet runways.

Potential wind shear and thunderstorm hazards on departure.

Gusty winds may limit available runways for takeoff.

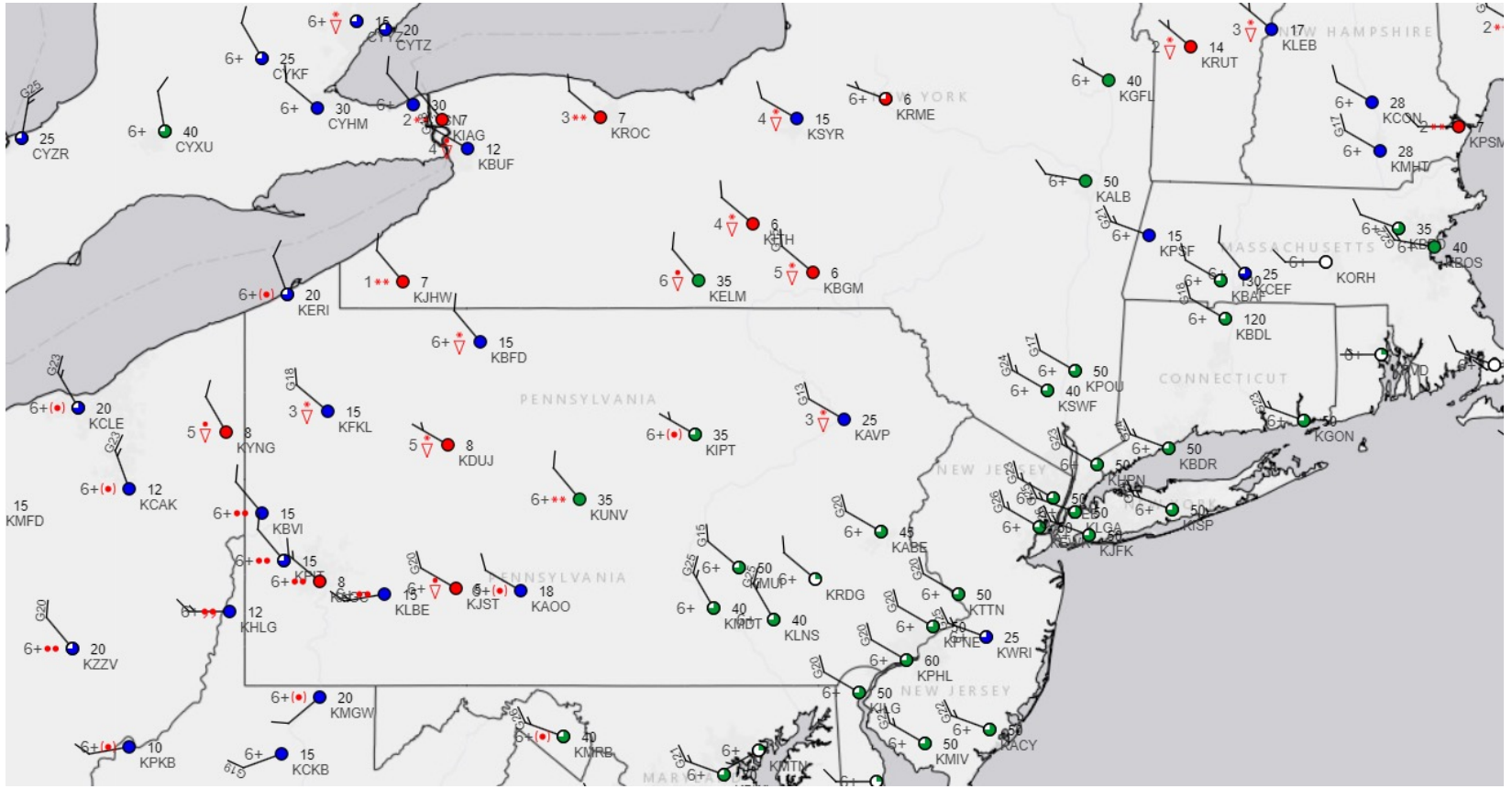
No ceiling or visibility concerns today. Alternate airport not required.

Gusty winds may limit available runways for landing. More likelihood of missed approaches.

Low visibilities and ceilings later on will require an alternate airport.

Snow may impact field conditions and landing distance.

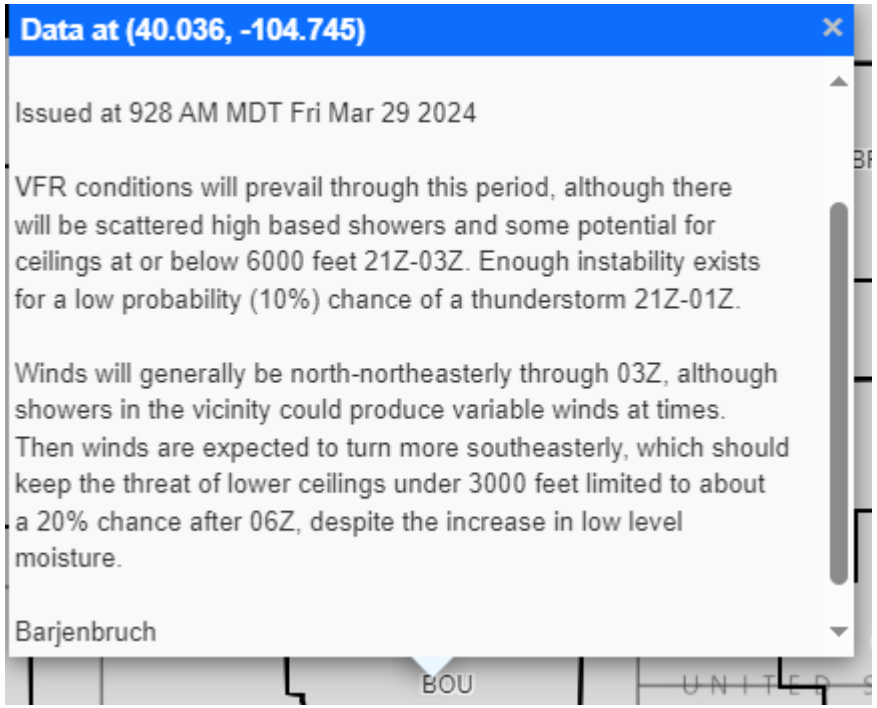
AWC Interactive TAF Map



- Great way to visualize regional weather and determine potential alternate airports
- No longer has a “TEMPO” option to view temporary conditions from the TAF

Forecast Discussions/Other Forecasts

- Forecast Discussions help to provide additional context and reasoning behind TAF.
- Not all dispatchers are aware of these discussions.
- High workload prevents reading all information.



Forecast on Demand

Forecast on Demand (FoD) for Airport: KEYW Updated: 29/1835z

Hour (z)	18	19	20	21	22	23
Flight Rule	VFR	VFR	VFR	VFR	VFR	VFR
Ceiling (ft)						
Visibility (SM)	P6SM	P6SM	P6SM	P6SM	P6SM	P6SM
Weather						
Air Temp (°C)	26	26	26	26	25	24
Dew Point (°C)	14	16	16	16	16	16
Precip Risk (%)	1	1			1	3
Hourly Precip (in)						
Snow Accum (in)						
Ice Accretion (in)						
QNH (inHg)	30.1	30.08	30.06	30.06	30.06	30.07
Wind						
Direction	NE	NE	NE	ENE	ENE	ENE
Degrees (°)	37	42	51	62	71	77
Sustained (kts)	12	12	12	12	10	10
Gust (kts)			14			

- Automated High-Resolution forecasts are used to determine takeoff performance, looking at temperature, pressure, and winds in particular.
- Overall, contains accurate and good information.
- More fidelity than a traditional TAF.

The Good and Bad of Terminal Planning

What is done well:

- Concise, easy to read forecasts.
- TAFs are very deterministic; makes for easier go/no-go decisions.
- Hi-Res forecast data enables accurate performance planning.

What needs improvement:

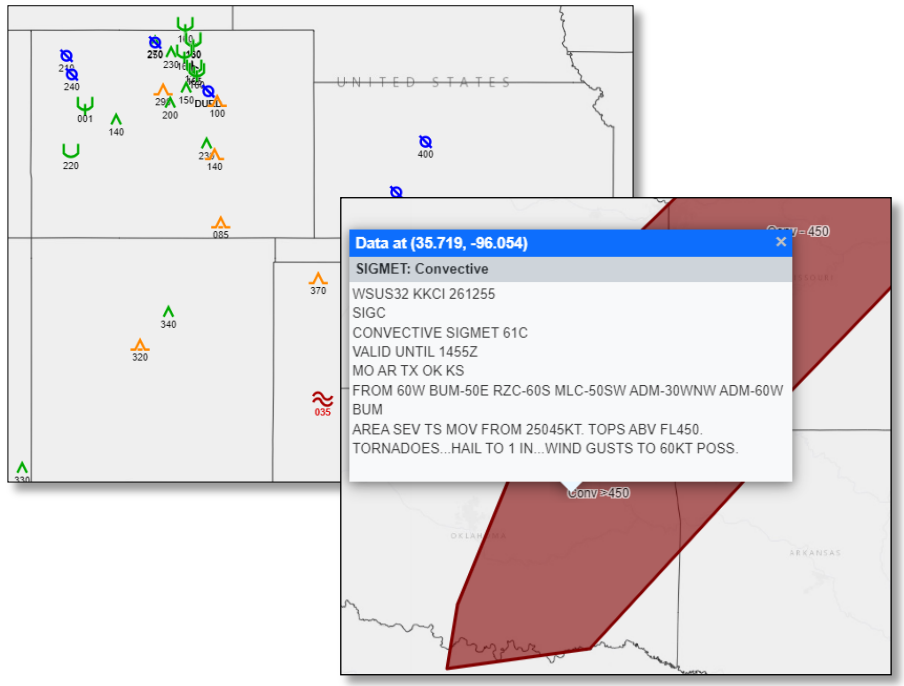
- Unable to effectively convey nuance.
- Difficult to convey low-probability or low-confidence elements.
- Lack of dispatcher knowledge surrounding TAF creation process and rules.
- Regulations require always following TAF content, regardless of degree of certainty/uncertainty.
- Better integration of high accuracy forecasts (temperatures, pressures, winds) into flight planning systems would be beneficial.

Flight Following

Flight Following

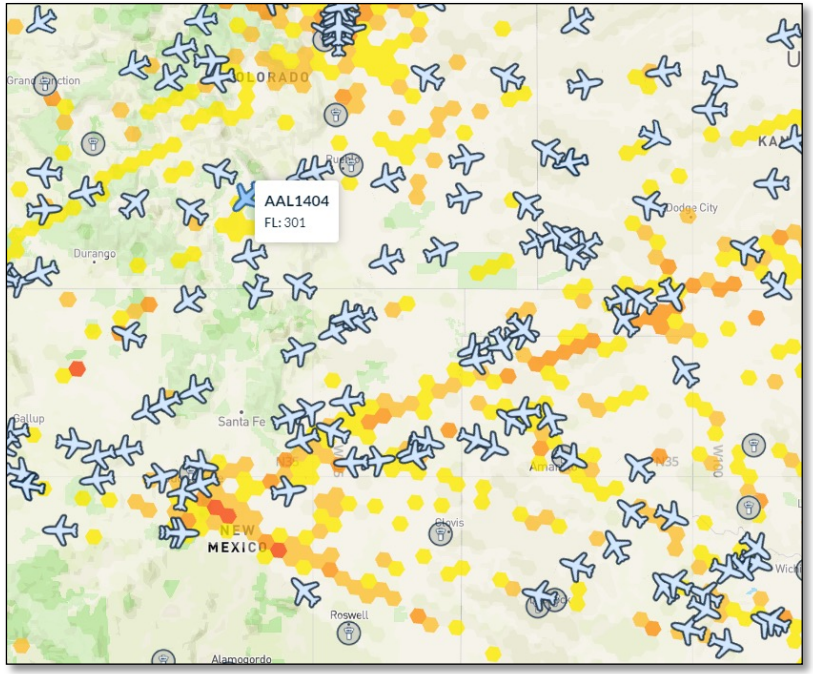
- Much of the dispatcher's job concerns alerting airborne flights about changing conditions and hazards that pop up during the course of the flight.
- Many tools exist, and will vary from airline to airline, but have several common elements.
- At most airlines, a single dispatcher will be monitoring 10-20 airborne flights at one time.

Flight Following & Automation



PIREPs/SIGMETs

- Pro: Time-tested and familiar
- Pro: Useful for current hazards
- Con: Reactive, not predictive



Automated Reports:

- Provides data w/o need for manual PIREP submission
- Airline Operations-specific
- Lots of data! – Mostly good, but has drawbacks.
- Difficult to evaluate impact for a specific flight
  - What action should I advise the crew to take?
  - Easy decision w/ the extremes (SVR or smooth), more difficult for the middle points.
- Observational and reactive, not forecast based

The Good and Bad of Flight Following

What is done well:

- Timely information is available
- Communications between flight crew and dispatch are generally rapid and reliable
- Wi-Fi in flight deck has leads to pilots having a lot of weather information available

Potential Problems:

- Information overload
- Dispatcher complacency by assuming pilots already have information that they may not actually have
- Lack of pilot and dispatcher training or understanding about weakness of certain products in use
- Dispatchers have a high workload and may find it difficult to advise every single flight of every single hazard

Summary

Summary: Greatest Needs in Dispatch

- Forecast Accuracy
  - Will forever be a problem for meteorologists
- Turbulence
  - How to find best route and/or altitude to avoid turbulence
  - Where to draw line between nuisance bumps and true safety concern?
  - Does info crew has via Wi-Fi match what I have in Dispatch?
- Thunderstorms
  - How to know when and where will the storms will develop?
  - Permeability/need to change route
- Flight Planning Systems
  - Greater integration of graphical capabilities and additional weather parameters; less reliance on text entry
- Training
  - Better training on meteorological basics; as well as weather product use

Any Questions?

Thank you for your time