



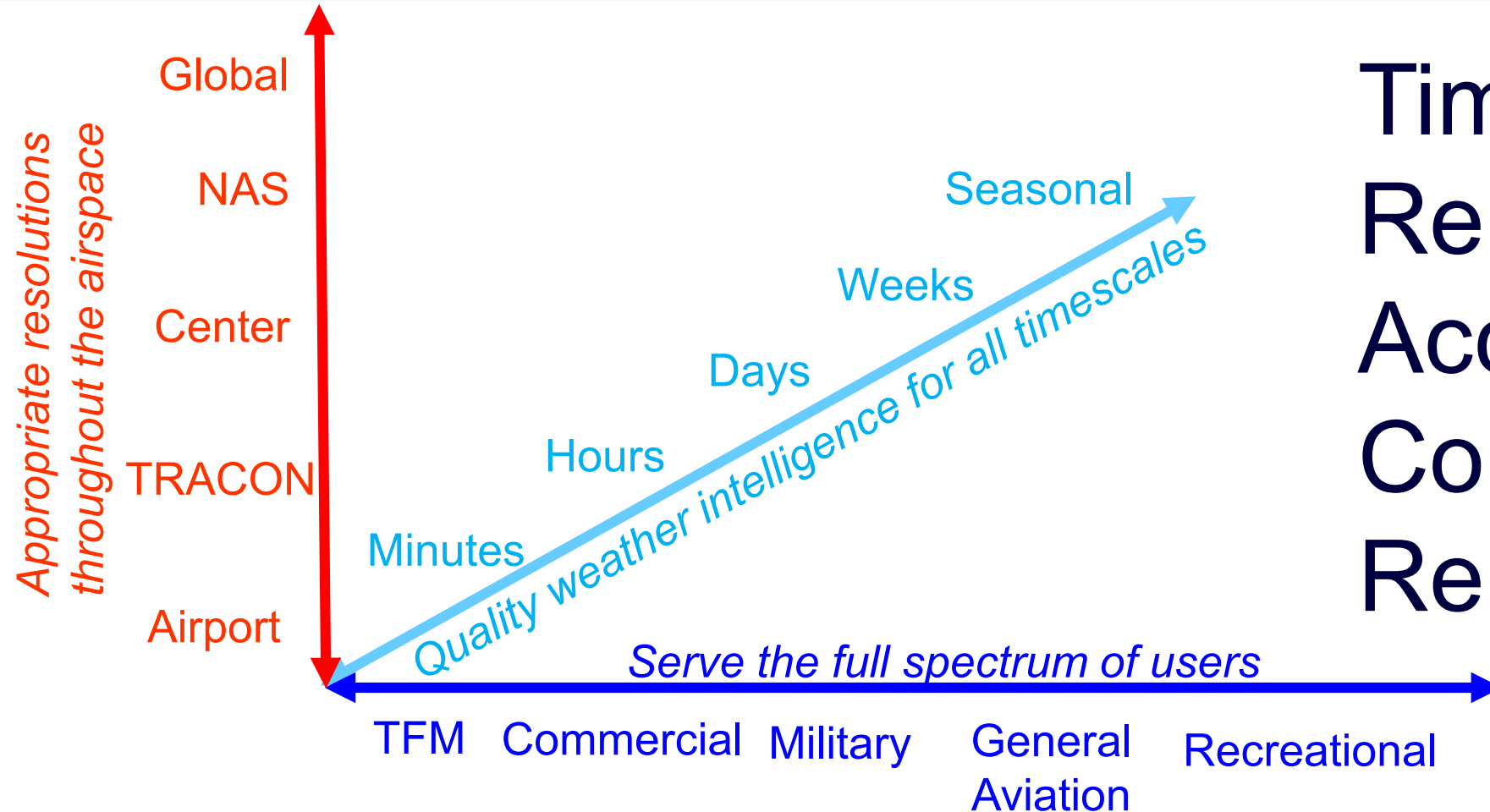
A Future Concept for Aviation Weather Intelligence A 2025 Vision

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Friends and Partners in Aviation Weather

October 18, 2018

Continuum of Users, Airspace, and Time Scales



Timely
Relevant
Accurate
Consistent
Reliable

NextGen SWIM Weather Formats: NetCDF and IWXXM

Grid

Outlook

Advisory

SIGMET



Higher level of
Model Dependence



Scheduled

Aviation Grids

Hourly Forecasts
Issued Hourly

3 Hour Forecasts
Issued every 6 Hours

6 Hour Forecasts
Issued every 6 Hours

Outlook

6 Hour Outlooks
Issued every 6 hours

12 Hour Outlook Issued Twice Daily

24 Hour Outlook Issued Daily

Event-driven

Aviation Forecasts

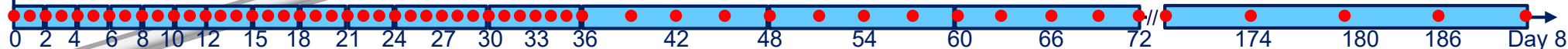
Advisory

Hazardous or impactful conditions

SIGMET

WARN

Severe/High-Impact Conditions imminent or occurring



Short-time scales

Long-time scales

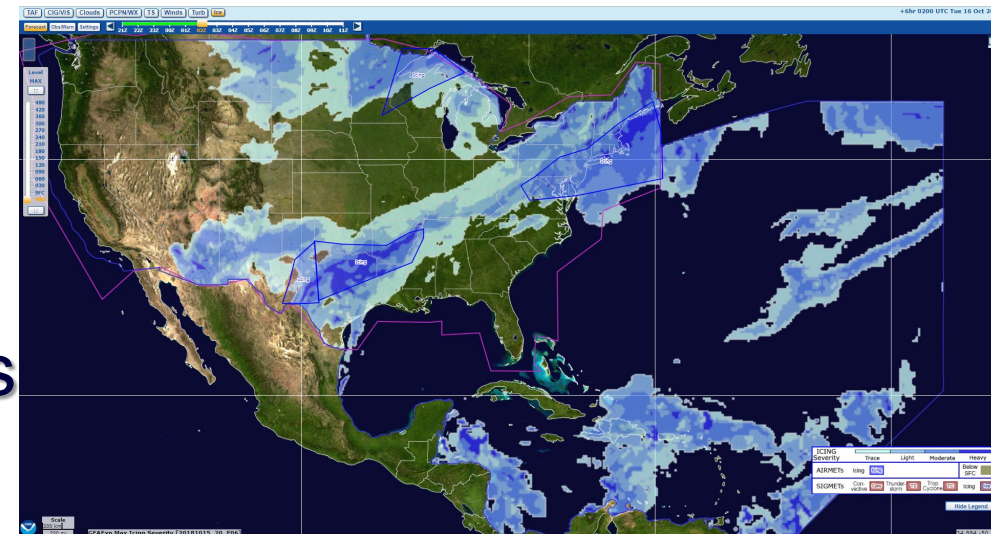


Higher level of
Meteorologist Engagement

Aviation Grids



- **Airspace specific spatial and temporal resolutions**
 - Challenge: Ensure consistency between domains
- **NWS's “*Best Available*” gridded information**
- **Eliminates need for major implementations/transitions due to model upgrades**
- **Short-term:**
 - Graphical Forecasts for Aviation grids available hourly for the CONUS, GOM, Caribbean, and Atlantic Oceans via SWIM in NetCDF formats



Airspace Appropriate Spatial and Temporal Resolutions



Terminal

Every 5 minutes to an hour
500 m Resolution

TRACON

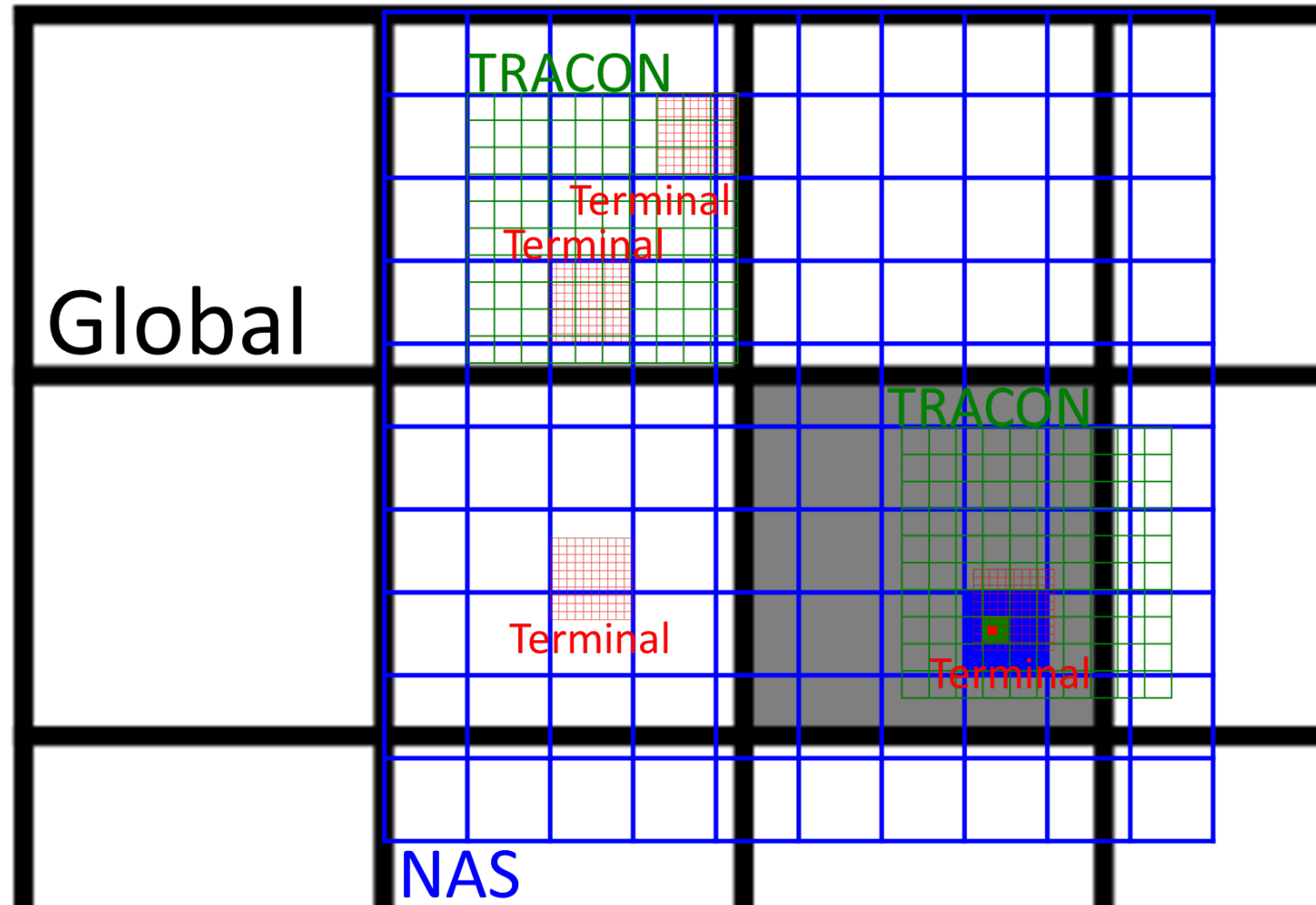
Every 15 minutes to a few hours
1 km Resolution

NAS

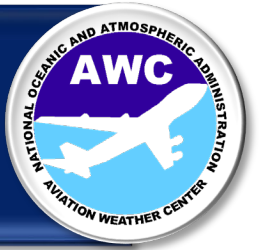
Every hour to several hours
Then every 6 hours to a few days
3 km Resolution

Global

Every 6 hours to several days
13 km Resolution



Aviation Advisories



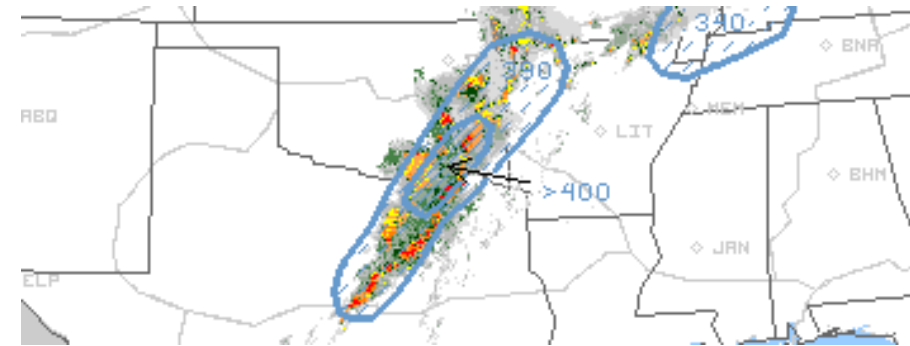
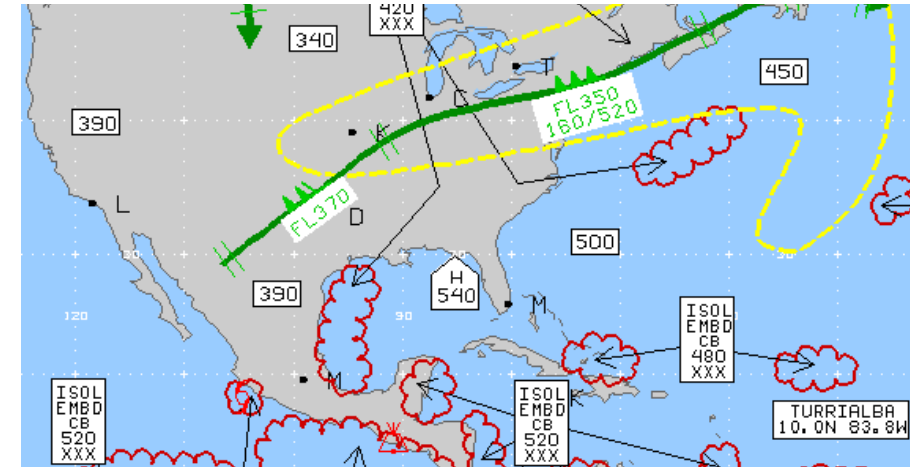
- **Event-Issued versus Scheduled**
- **Standardized event-issued Aviation Advisories replace AIRMET/G-AIRMET and Center Weather Advisories**
 - **Impact and Severity Based**
 - **Issued/re-issued as needed as early as a few hours in advance for up to 6 hours in the future**
- **Available in an IWXXM format**

Aviation Outlooks



- **Aviation Forecasts out to many days to weeks**
- **Current types of Outlooks**
 - TAFs
 - Fusion Products
 - WAFS Significant Weather Charts
 - NAS Outlook
 - Risk based outlooks
 - TFM Convective Forecast

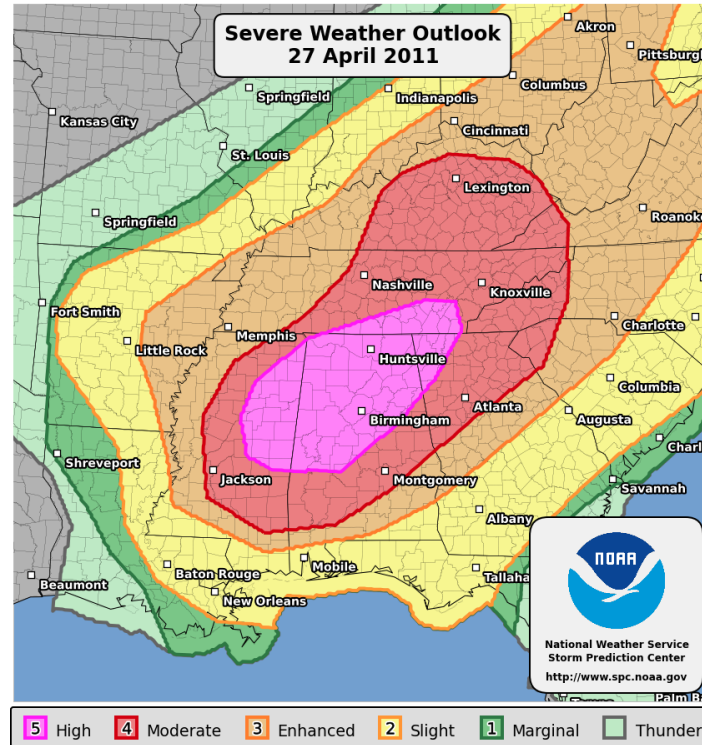
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FM152100 23013KT 5SM -SHRA BR OVC015
FM160000 23019G28KT P6SM VCSH FEW025 SCT050 BKN100
TEMPO 1602/1604 25025G35KT 2SM TSRA BKN015CB
FM160400 29022G34KT P6SM BKN050
FM160700 30019G27KT P6SM FEW035 BKN090
FM160900 31016G24KT P6SM FEW035 SCT120 SCT250
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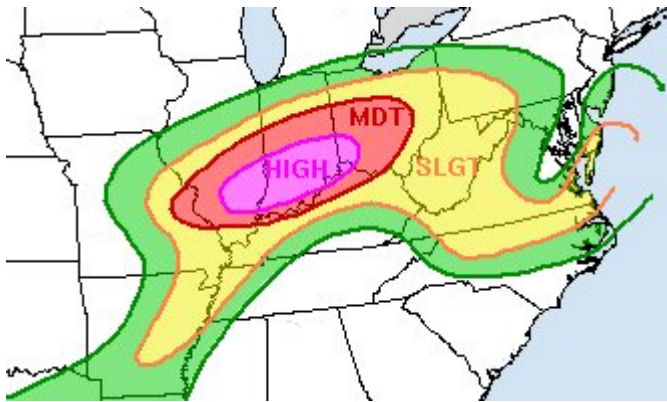
Risk-based Outlooks



SPC Severe Weather Outlook



WPC Excessive Rainfall Outlook



- Standardized hazard risk index
 - Example: Scale from 1-9
- Index mapped to Risk Categories
- Usable by full spectrum of users

One Example of a Risk Matrix

Likelihood

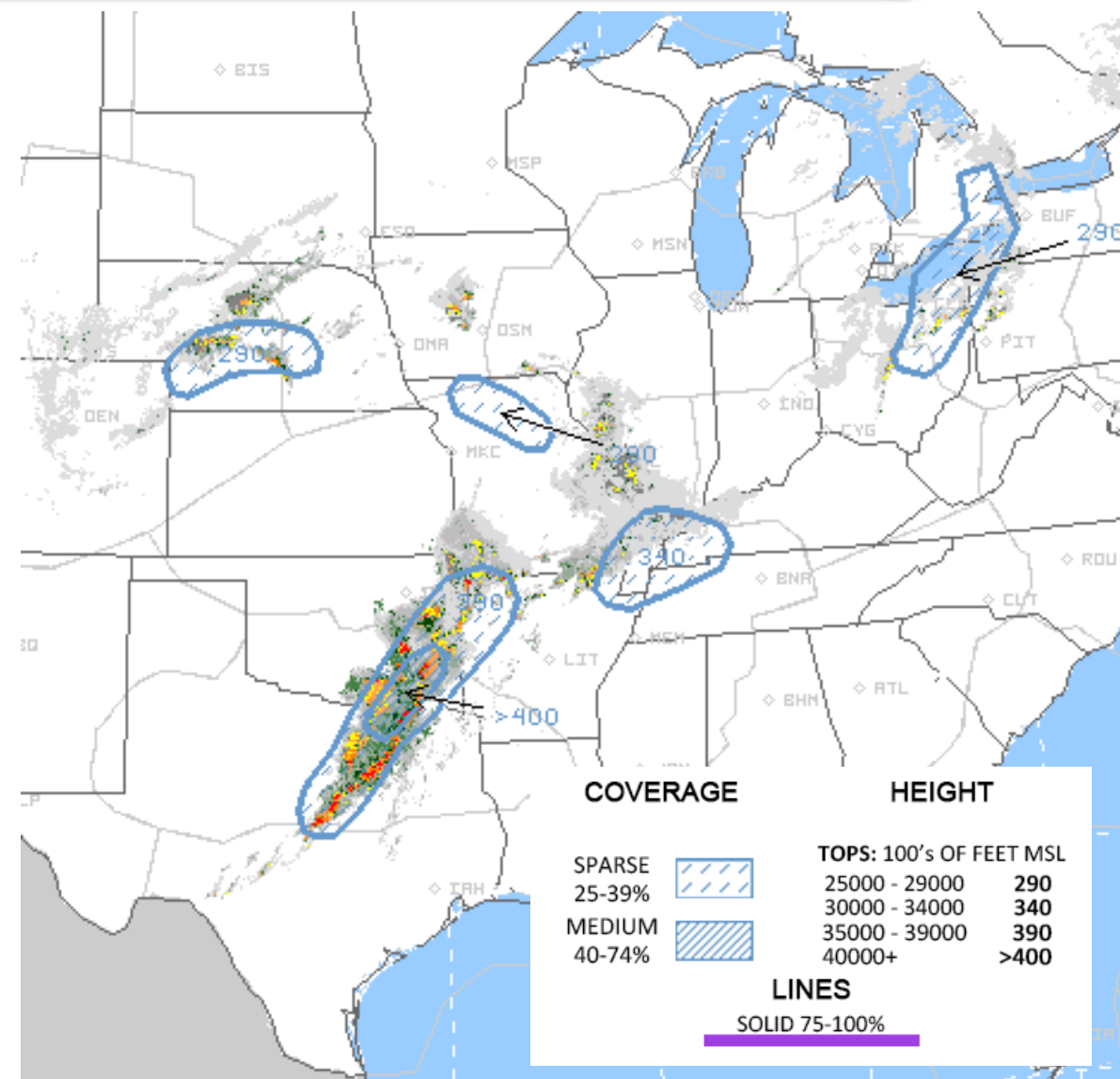
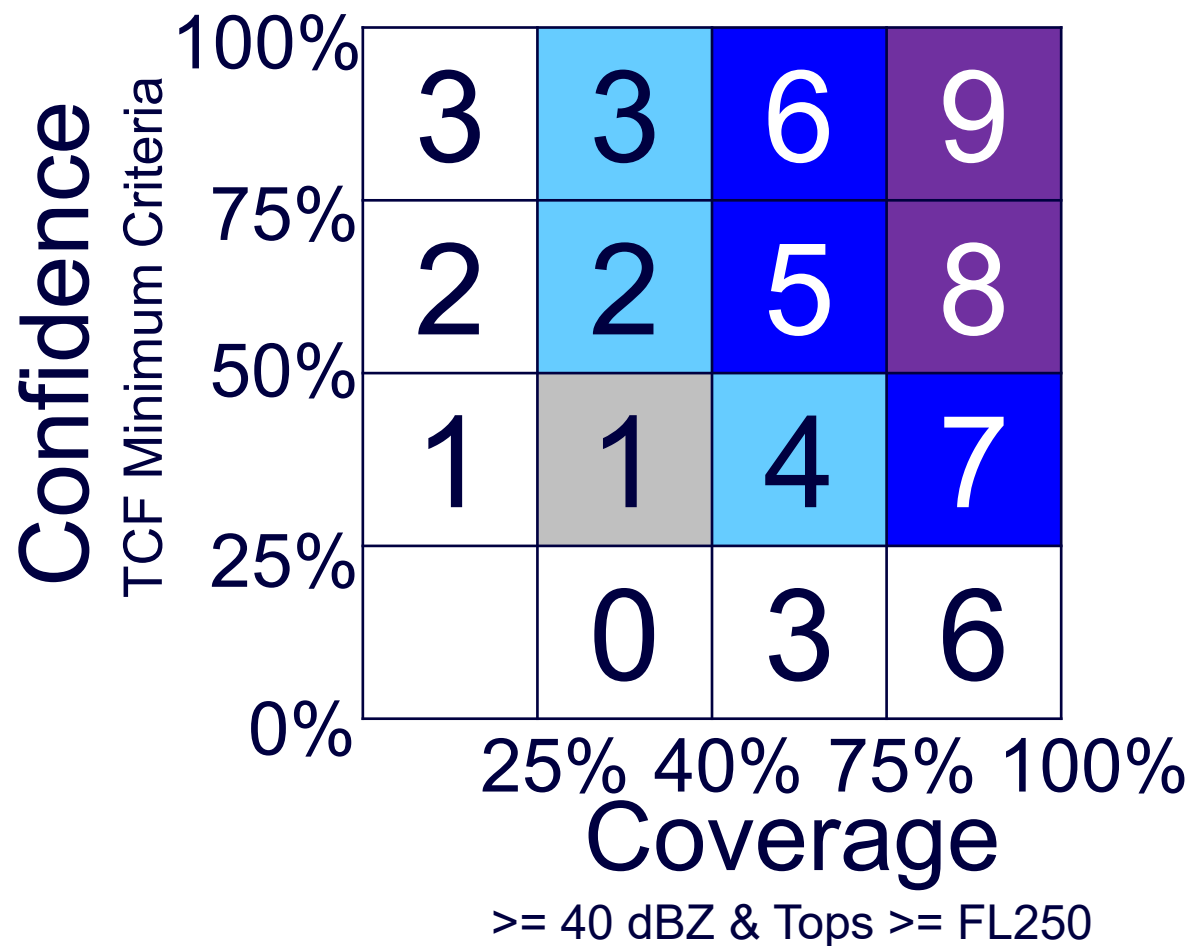
3	3	6	9
2	2	≠	8
1	1	4	7
0	3	6	

Impact

Risk Categories

Slight 1-2	Low 3-5	Medium 6-8	High 9
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TCF Index



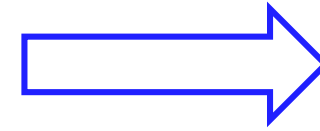
Sparse Low 1	Sparse High 2-4	Medium High 5-7	Solid 8-10
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A Ceiling Risk Concept

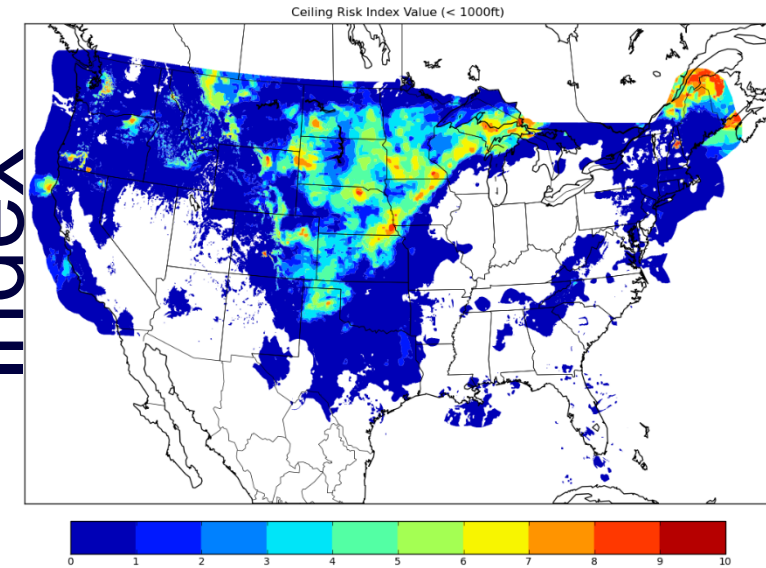


Likelihood CIG < 010	100%	3	3	6	9
	75%	2	2	5	8
	50%	1	1	4	7
	25%		0	3	6
	0%				
		010	005	002	000
		Ceiling Height AGL			

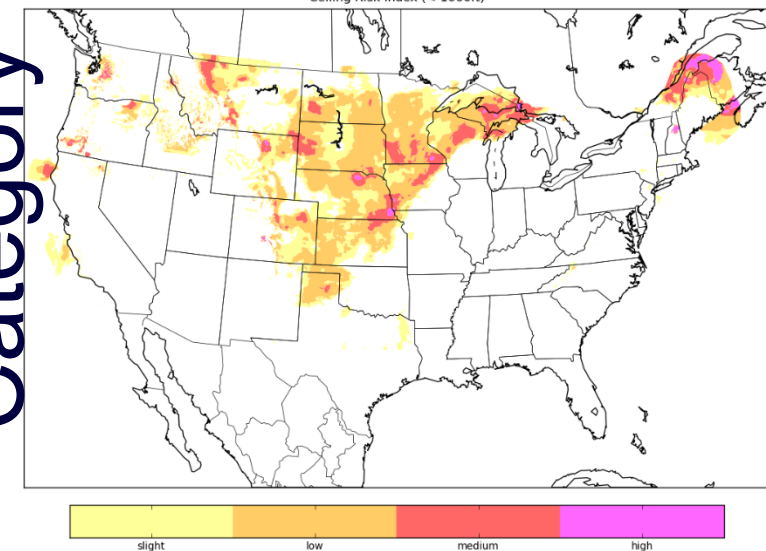
Slight 1-3	Low 4-5	Medium 6-7	High 8-9
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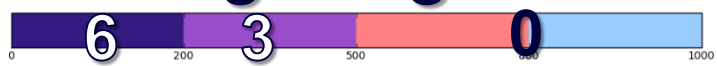
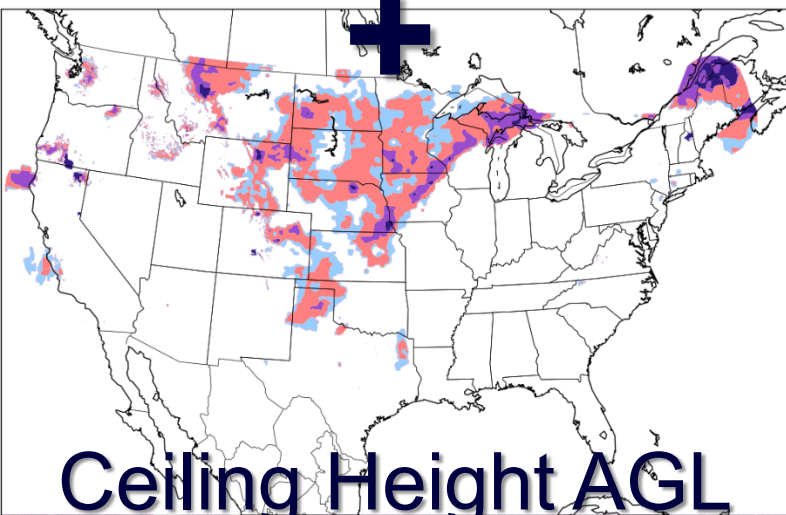
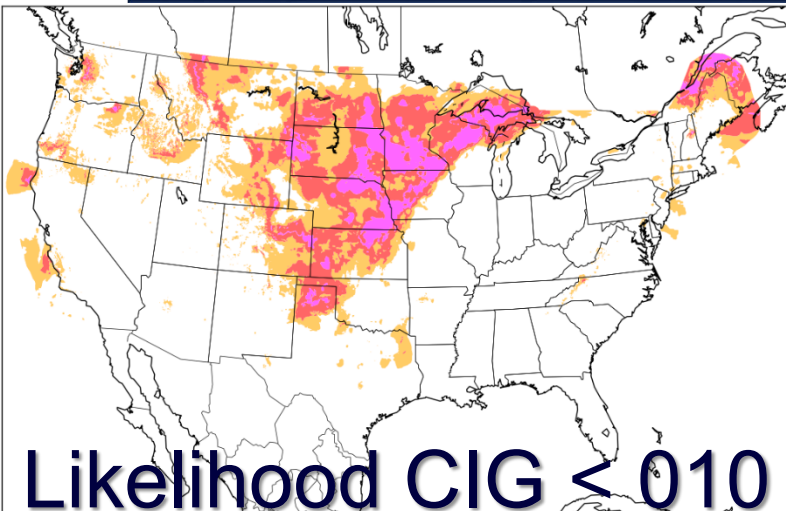
Index



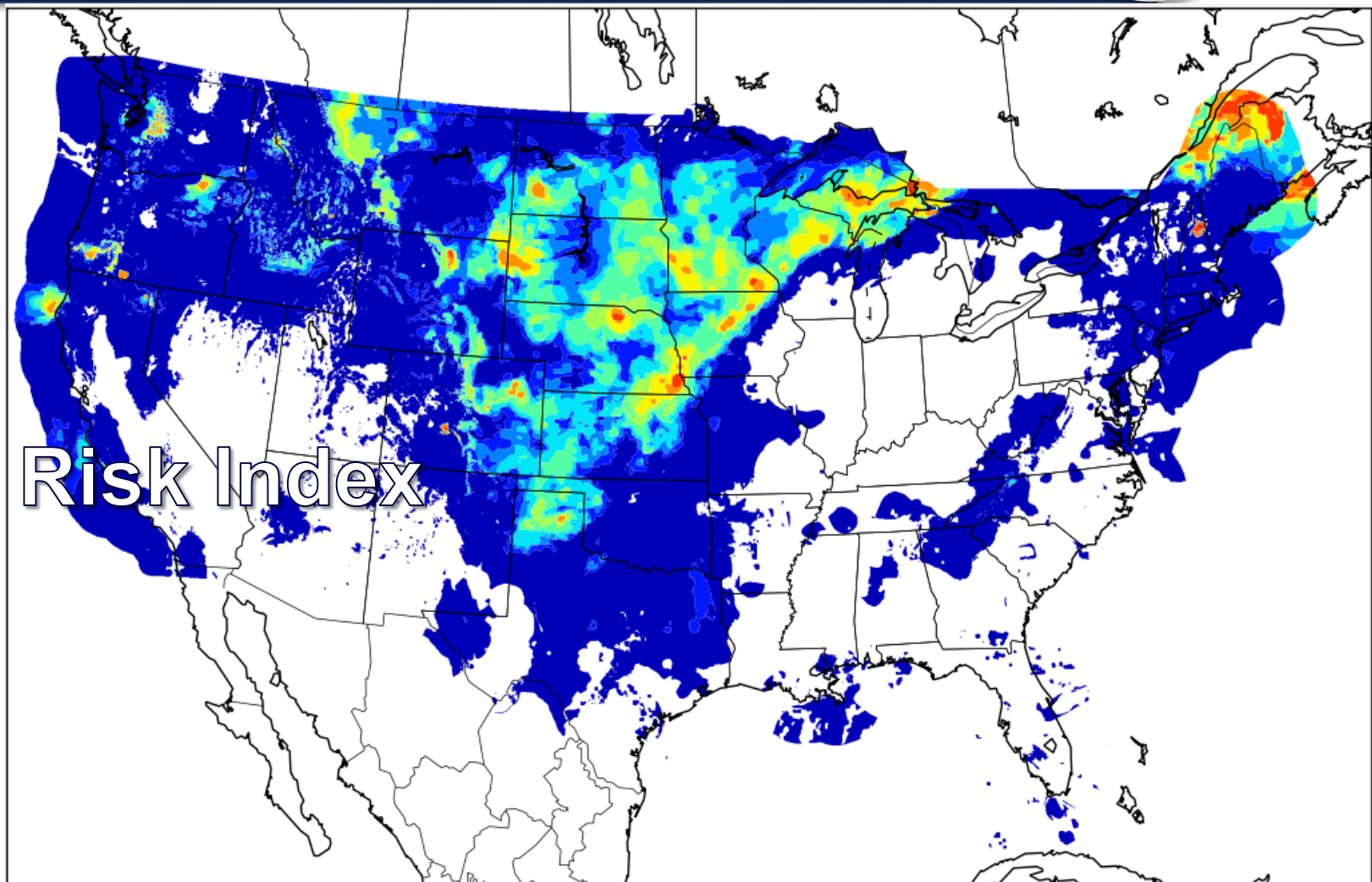
Category



A Conceptual Ceiling Risk Example



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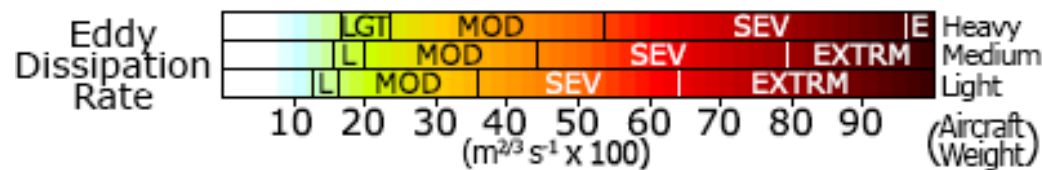
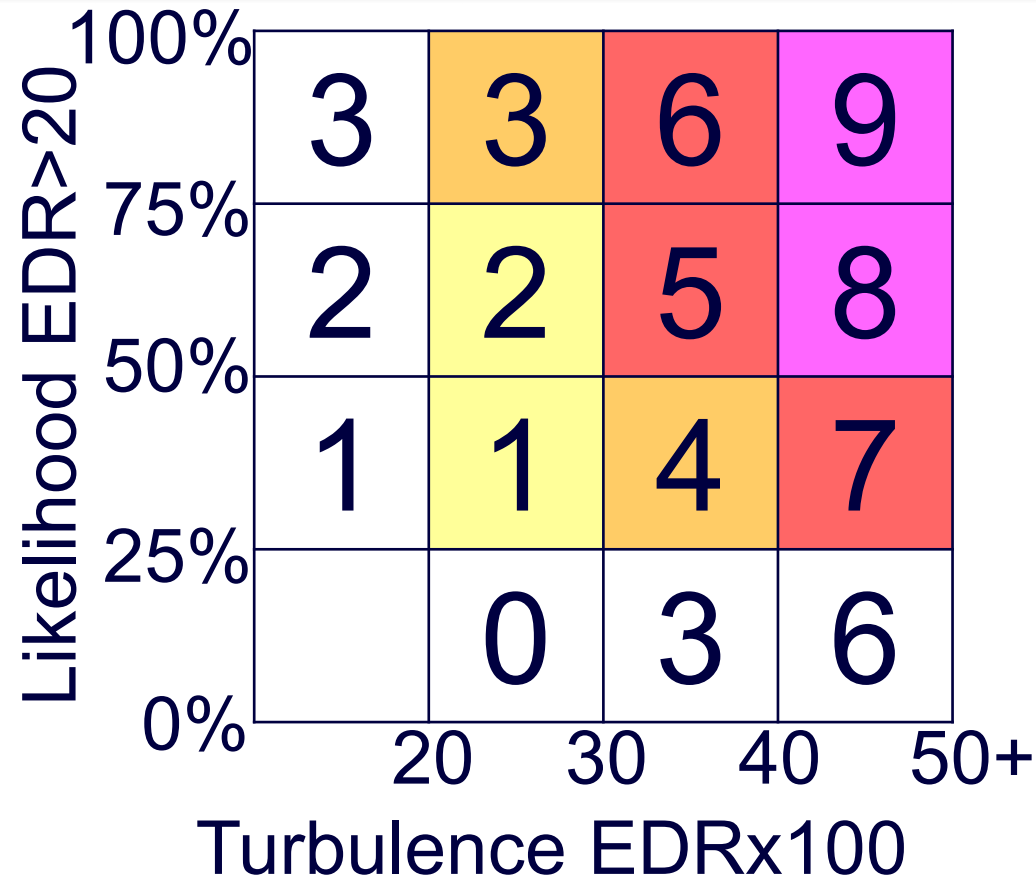
Risk Index



Risk for Any Aviation Hazard



Turbulence Risk



Combining probability with the hazard severity can produce risks for

- Turbulence
- Mountain Waves
- Icing
- Thunderstorms
- Ceilings and Visibility
- Strong Surface Winds
- Low-Level Wind Shear
- etc.

What Next



- **Validate need for Aviation Grids, Risk-based Outlooks, and Event issue Advisories**
- **Development and Experimentation with research partners in the Aviation Weather Testbed**