

Airport Meteorology Analysis

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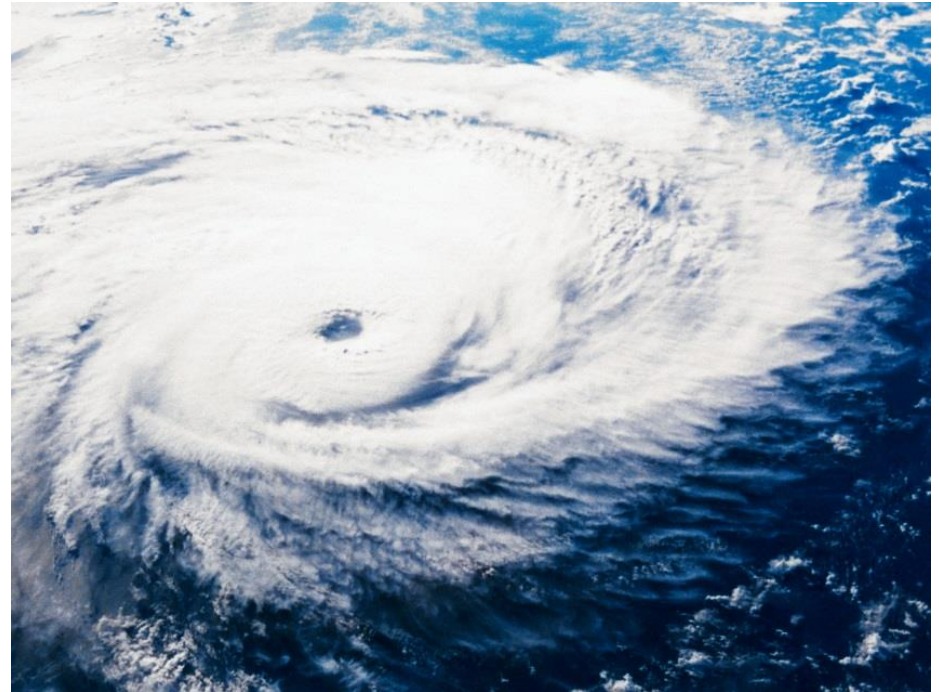
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MITRE

Agenda

- **The Problem**
- **The Solution**
- **The Implementation**
- **Product Overview**
- **Questions & Answers**



The Problem

Airports, air carriers, and oversight organizations often need to dig into the “whys” behind meteorologically impacted operations at a specific airport on a specific day—to research macro-perspective issues, such as: “What was a specific snow storm’s overall operational effect?”

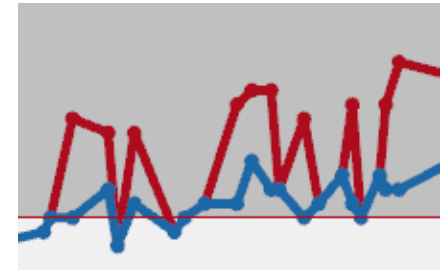
Other times a weather chapter is needed to complete the “flight story” or “operations story”—to research micro-perspective issues, such as: “Did gusting wind play any role in this aircraft incident?”

The Problem (Concluded)

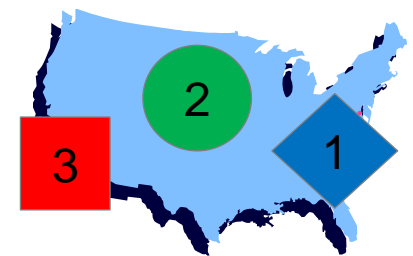
Textual and tabular airport meteorology data is sub-optimal for analysis, pattern detection, trend identification, and outlier tracking.

	A	B	C	D	E
1	1	1	1	1	1
2	2	2	2	2	2
3	3	3	3	3	3
4	4	4	4	4	4
5	5	5	5	5	5
6	6	6	6	6	6
7	7	7	7	7	7
8	8	8	8	8	8
9	9	9	9	9	9
10	10	10	10	10	10

Conversely, data visualization is ideal for airport meteorology analysis.



Airport meteorology data originates from various data providers and is presented in a variety of non-standardized formats.

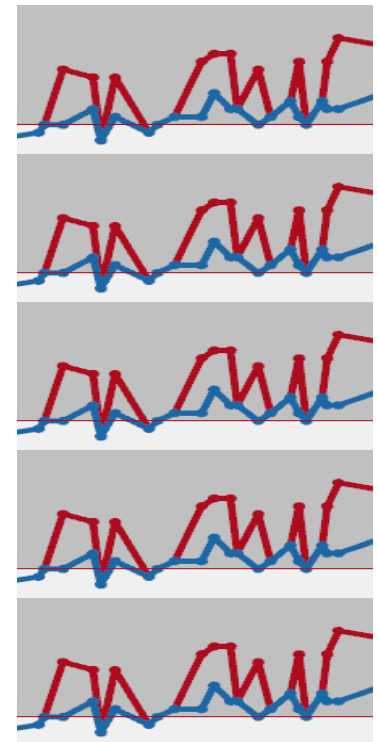
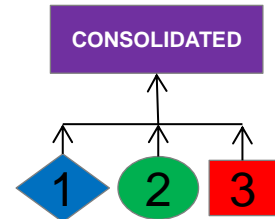


The Solution

All of this scattered airport meteorology data can be retrieved, standardized, and consolidated into a single dataset.

This consolidated dataset then can be transformed into a series of graphs to take advantage of modern data visualization techniques.

These graphs need to be presented in an easy to use graphical user interface—allowing users to select a specific airport and a specific date for analysis.



The Implementation

Develop an application that gathers, computes, stores, manages, and disseminates airport meteorology data.

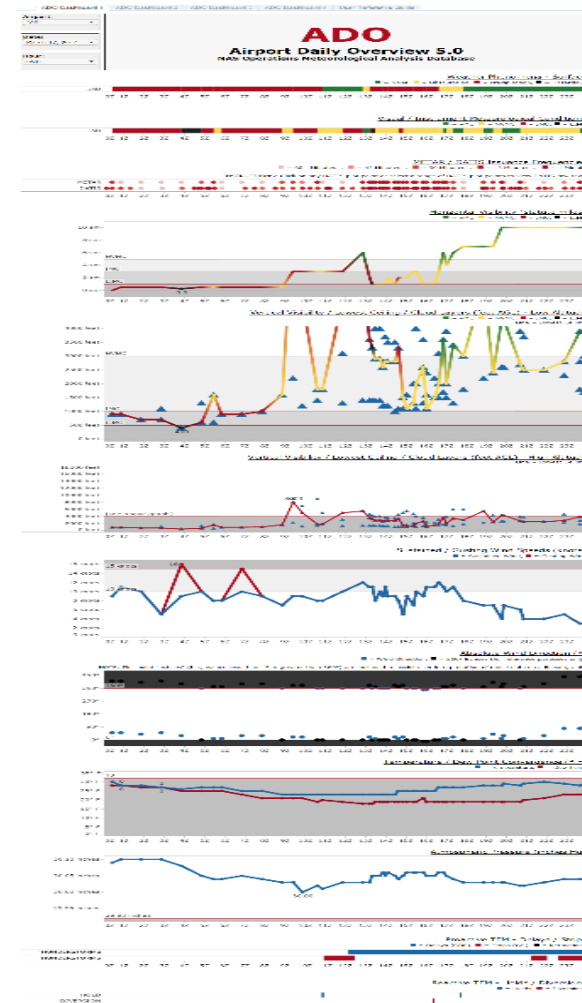
Design a collection of themed dashboards, each containing a series of airport meteorology graphs.

Make these dashboards interactive, allowing users to tailor their analysis as needed.

The Implementation (Continued)

“Airport Daily Overview” (ADO)

ADO provides an interactive user experience, allowing users to investigate the challenges of examining airport meteorology using rich visualization techniques.



The Implementation (Concluded)

ADO currently contains data for 250 United States (US) airports, 10 Canadian airports, and will soon contain data for an additional 450 US airports, as well as 100 additional international airports.

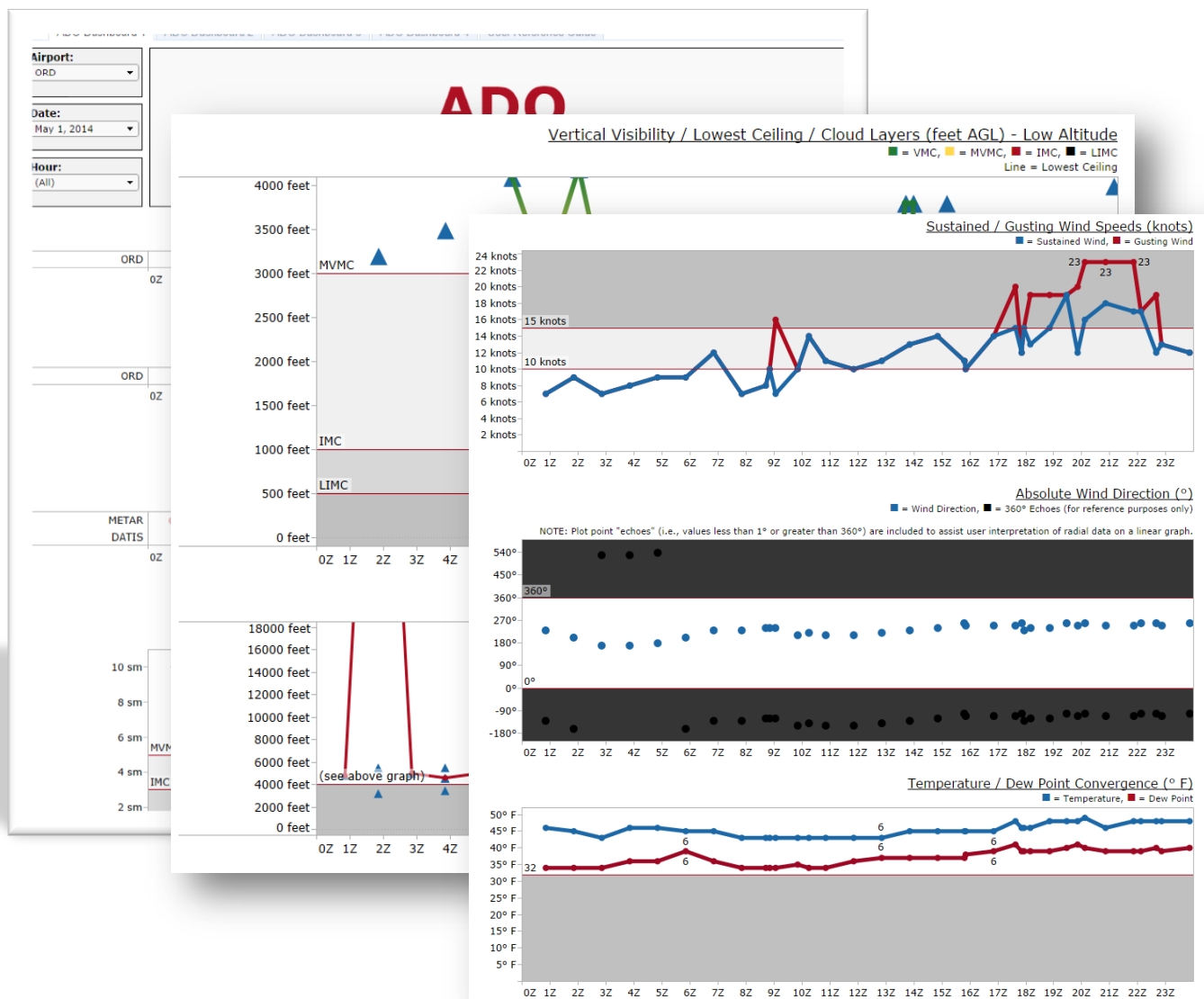
The underlying ADO database contains five years of archived data, thus allowing year-over-year trend analysis.

The data utilized in ADO is extracted from various sources, including NOAA, FAA, and commercial vendors.


NOAA - National Oceanic and Atmospheric Administration

FAA – Federal Aviation Administration

Product Overview



Product Overview - 1

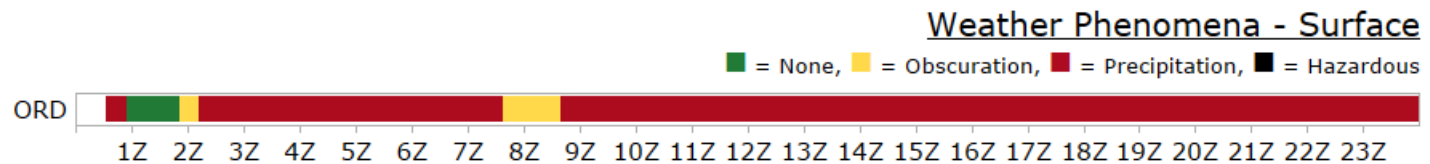


The image shows two stacked filter controls. The top control is labeled 'Airport:' and contains a dropdown menu with 'ORD' selected. The bottom control is labeled 'Date:' and contains a dropdown menu with 'January 5, 20...' selected. Both controls have a light gray background and a thin black border.

Dashboard Controls

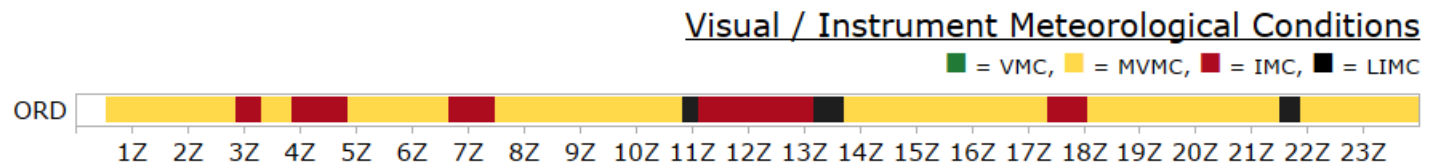
(apply “Airport” and “Date” filters to all meteorological graphs)

Product Overview - 2



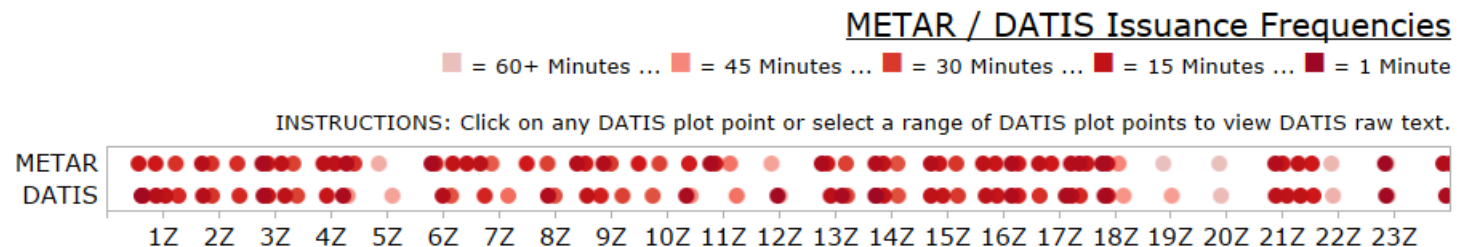
Weather Phenomena Timeline Graph
(tracking obscuration, precipitation, and aviation hazards)

Product Overview - 3



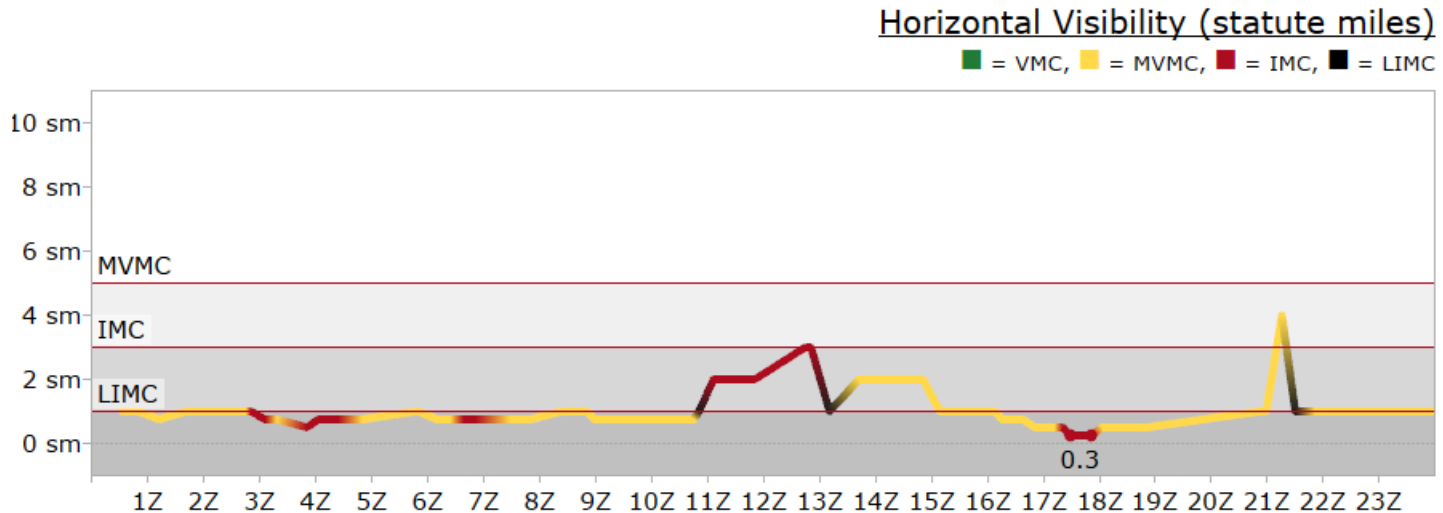
**Visual & Instrument Flight Rules Timeline Graph
(tracking VMC, marginal VMC, IMC, and low IMC)**

Product Overview - 4



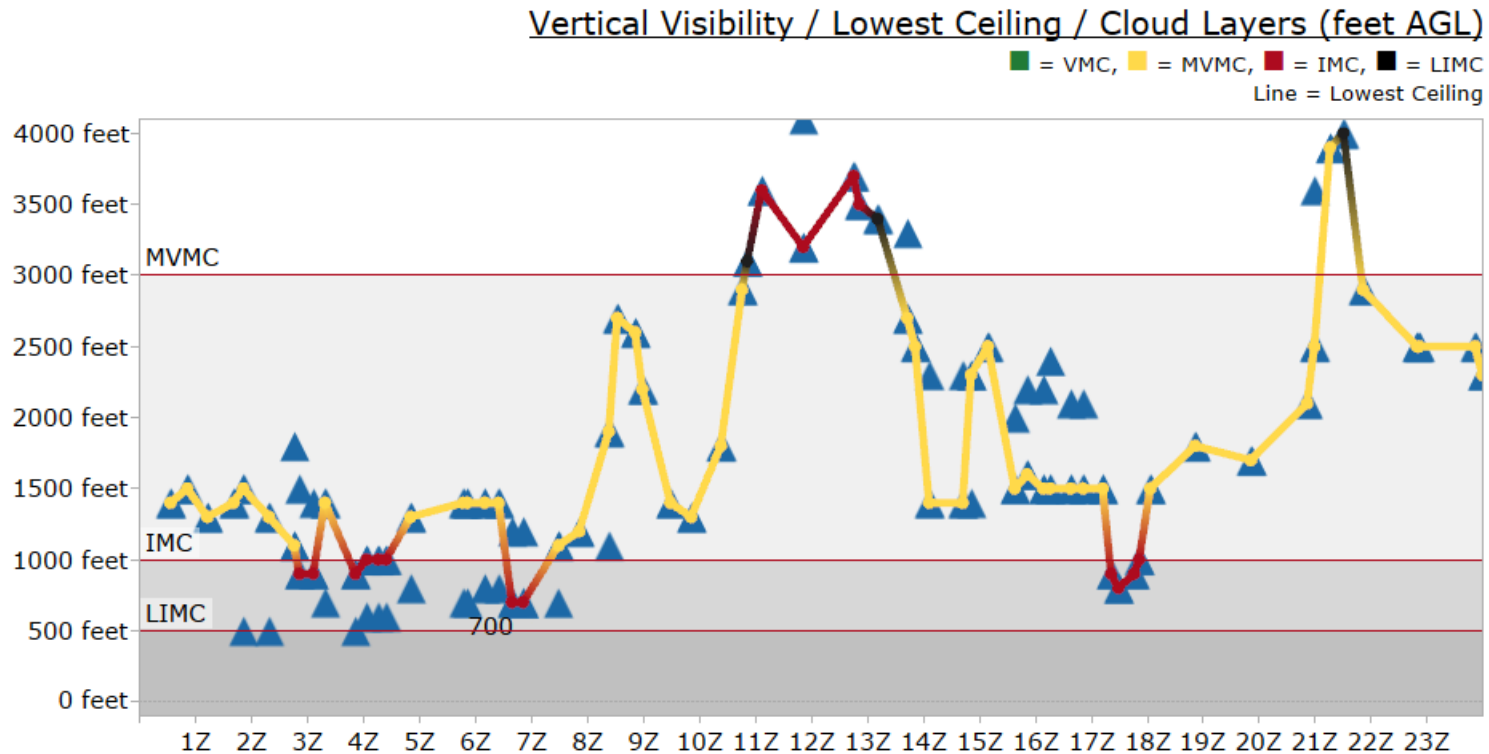
**Issuance Frequencies Graph for
METAR Surface Observations & DATIS Pilot Briefings
(one per hour when weather is stable)**

Product Overview - 5



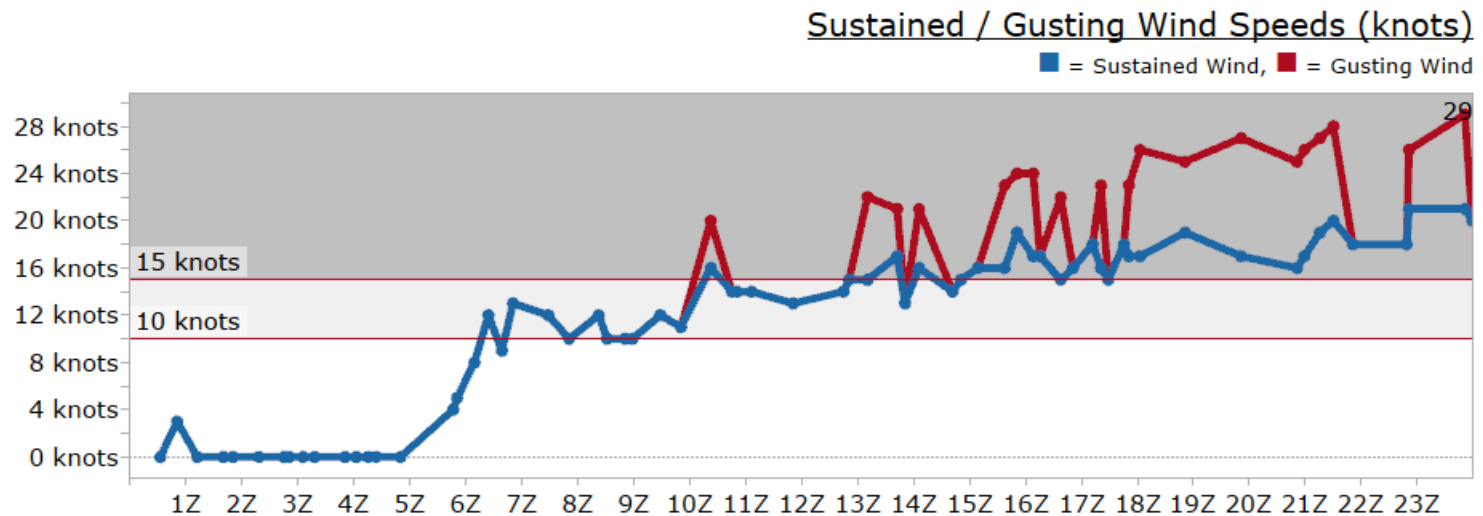
Horizontal Visibility Graph
(radius visibility from air traffic control tower)

Product Overview - 6



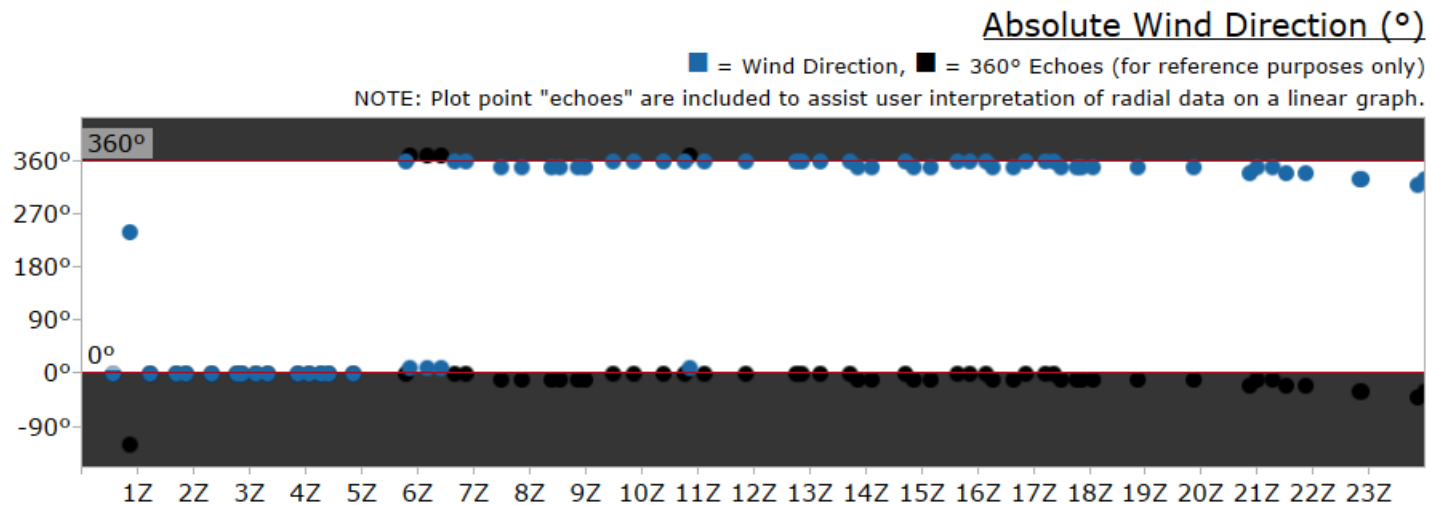
Vertical Visibility Graph
(based on lowest cloud ceiling)

Product Overview - 7



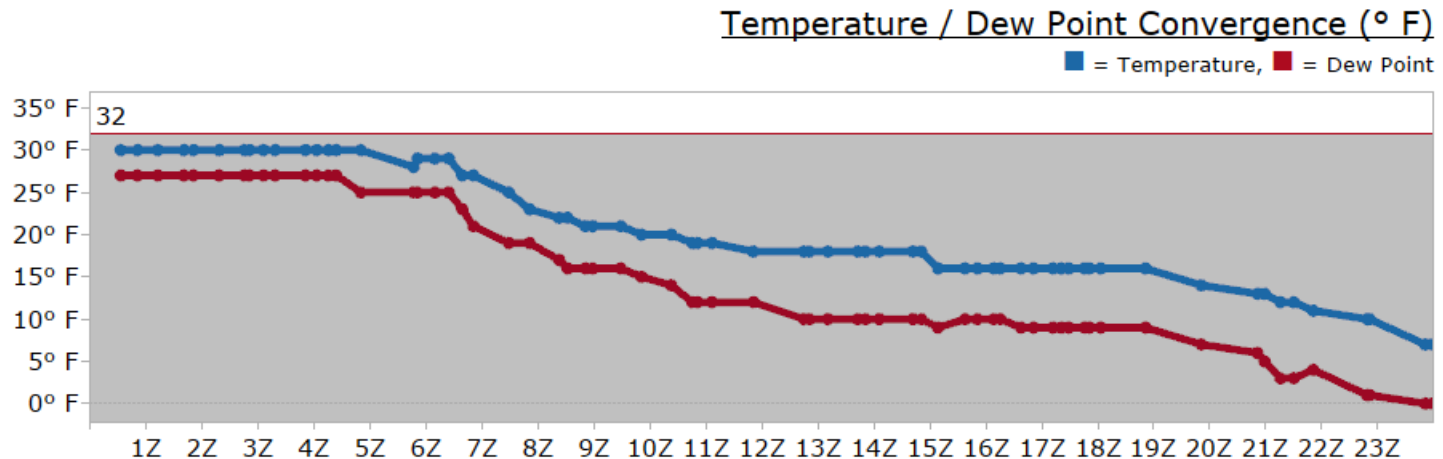
Sustained & Gusting Wind Speeds Graph
(line divergence when wind gusts are present)

Product Overview - 8



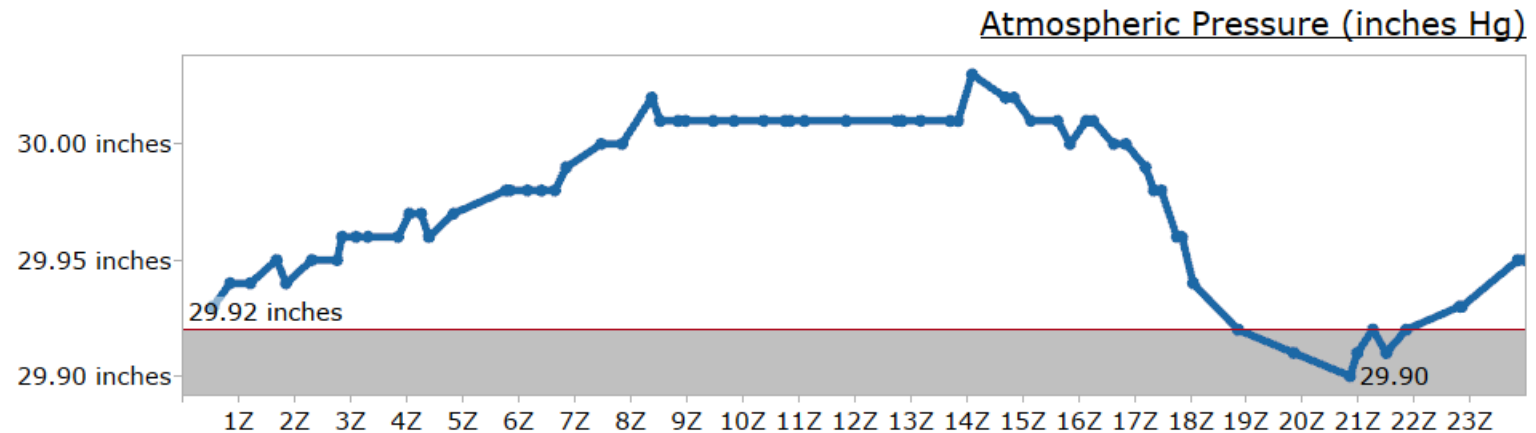
Absolute Wind Direction Graph
(radial data is presented here in linear form)

Product Overview - 9



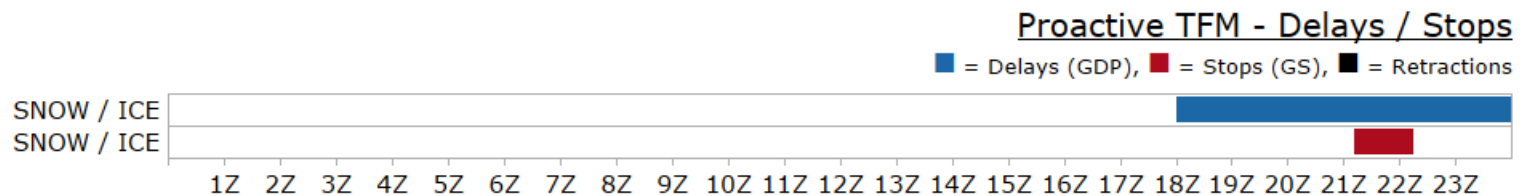
**Temperature & Dew Point Graph
(able to easily track convergence)**

Product Overview - 10



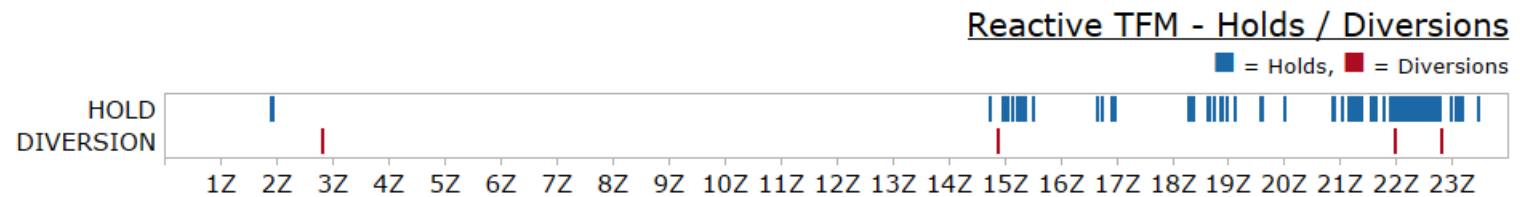
Atmospheric Pressure Graph
(able to easily track “falling rapidly” and “rising rapidly”)

Product Overview - 11



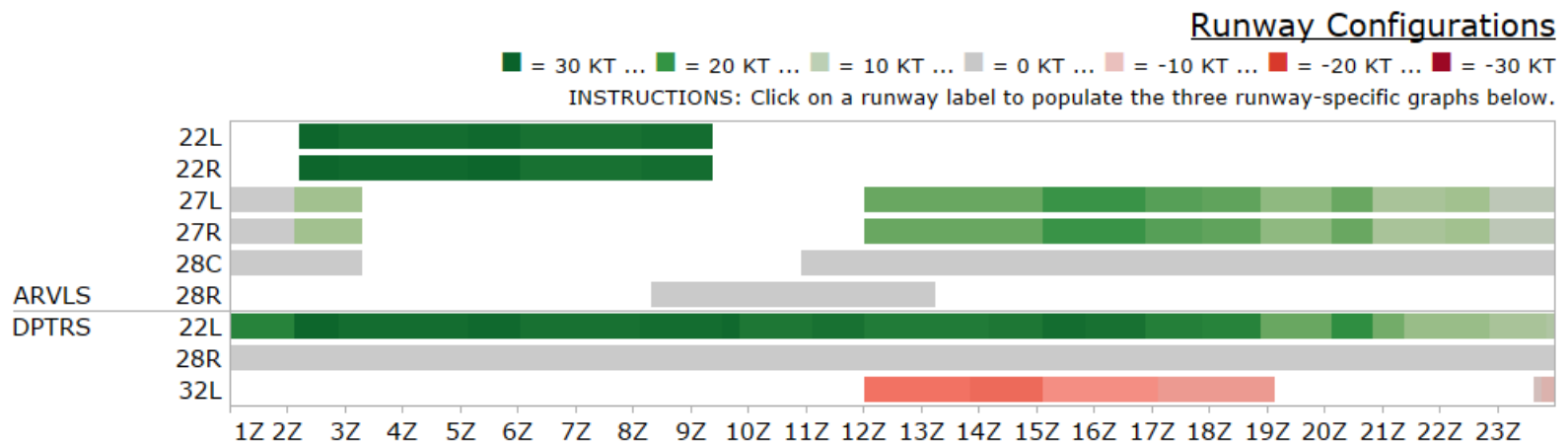
**Proactive Traffic Management Graph
(tracking ATCSCC Ground Stops and Ground Delay Programs)**

Product Overview - 12



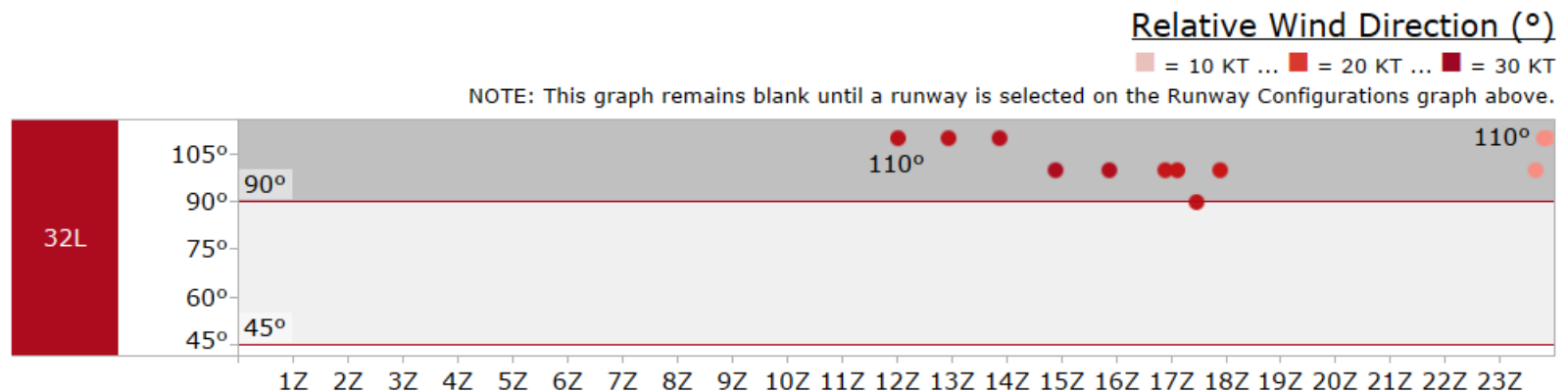
**Reactive Traffic Management Graph
(tracking in-flight holds and diversions)**

Product Overview - 13



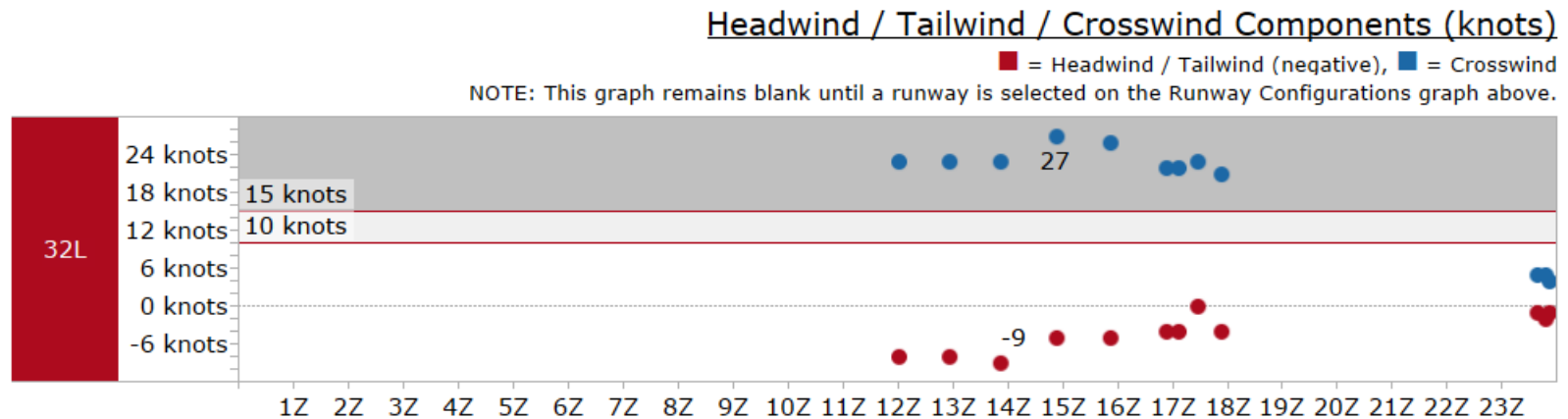
Runway Configurations Graph
 (color gradient indicates headwind or tailwind)

Product Overview - 13



**Runway-Specific Relative Wind Direction Graph
(able to easily identify when beyond 90 degrees)**

Product Overview - 14



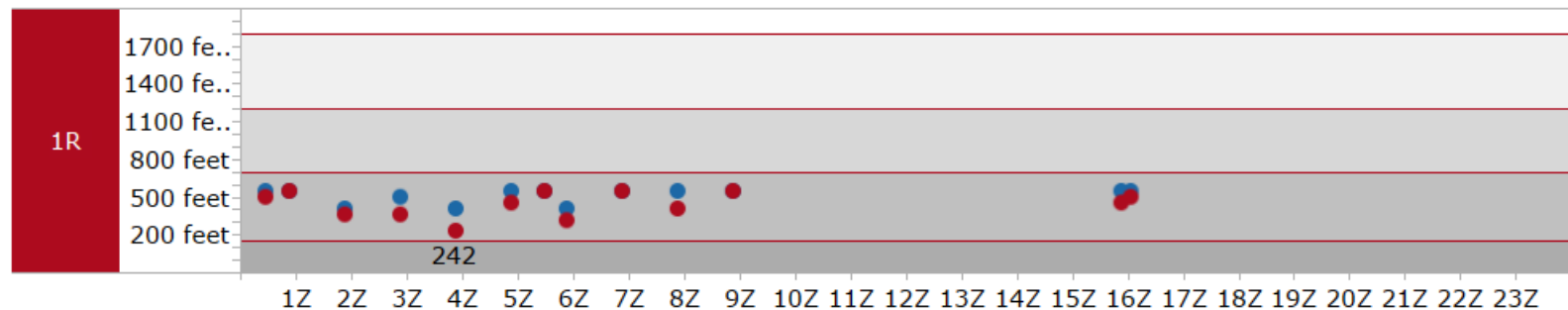
Runway-Specific Wind Components Graph
(tracking headwind, tailwind, and crosswind components)

Product Overview - 15

Runway Visual Range (feet)

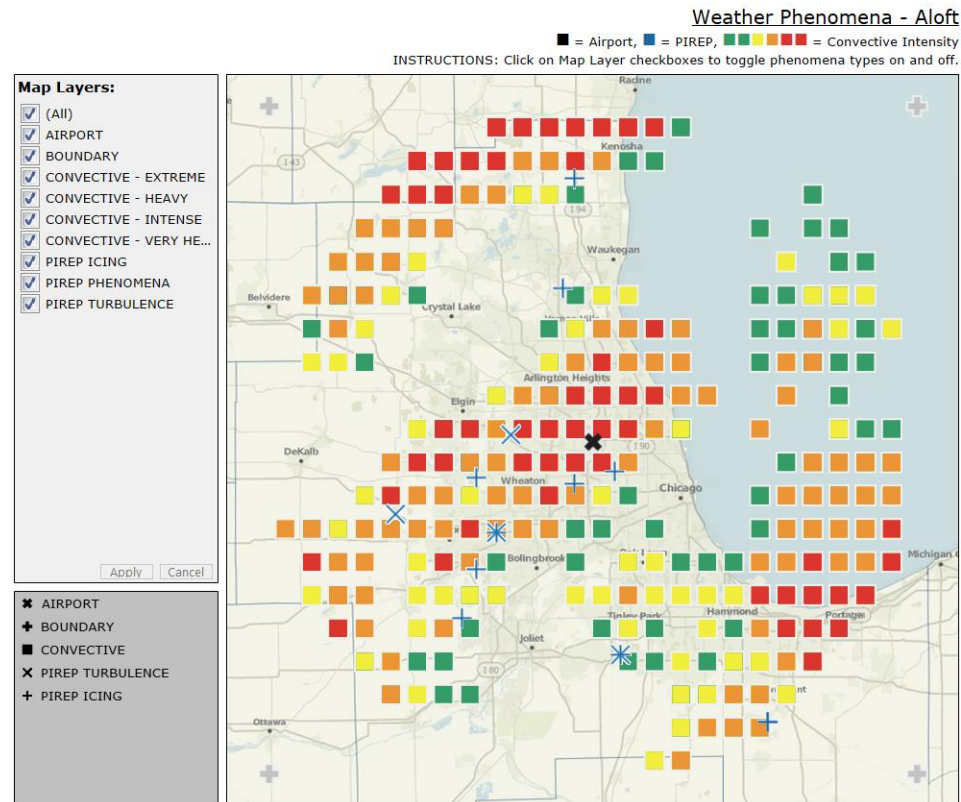
■ = Minimum, ■ = Maximum

NOTE: This graph remains blank until a runway is selected on the Runway Configurations graph above and is only populated if RVR data exists.



Runway-Specific Horizontal Visibility Graph
(tracking RVR minimum and maximum, whenever reported)

Product Overview - 16

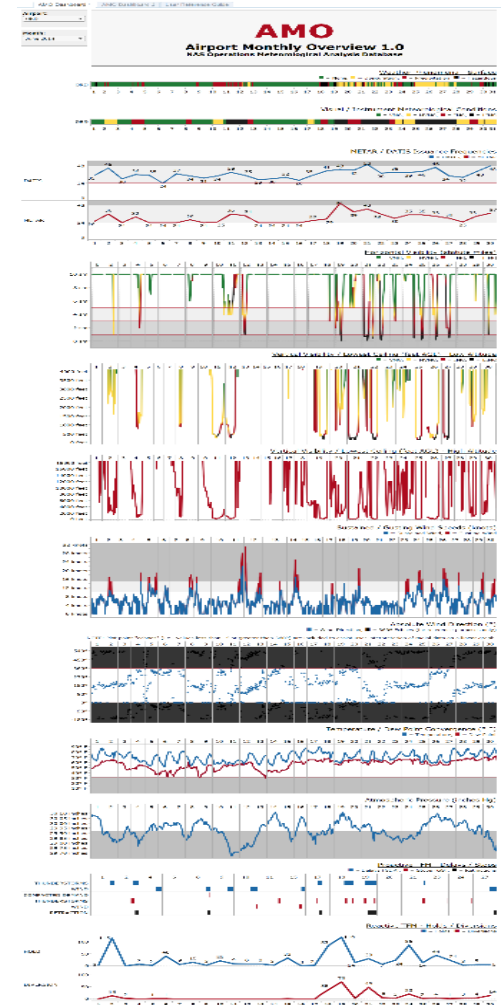


Weather Phenomena Map
(tracking convective weather, turbulence, and icing)

Companion Product - AMO

“Airport Monthly Overview” (AMO)

- Contains identical graphs as ADO, but in monthly aggregated form.
- Provides one-month timelines vs. 24-hour timelines.
- Functions as a “zoomed-out” table of contents for ADO.
- Days of greatest interest are immediately identifiable.



Companion Product - AMO



Questions & Answers



Thank you!

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