IATA Turbulence Aware

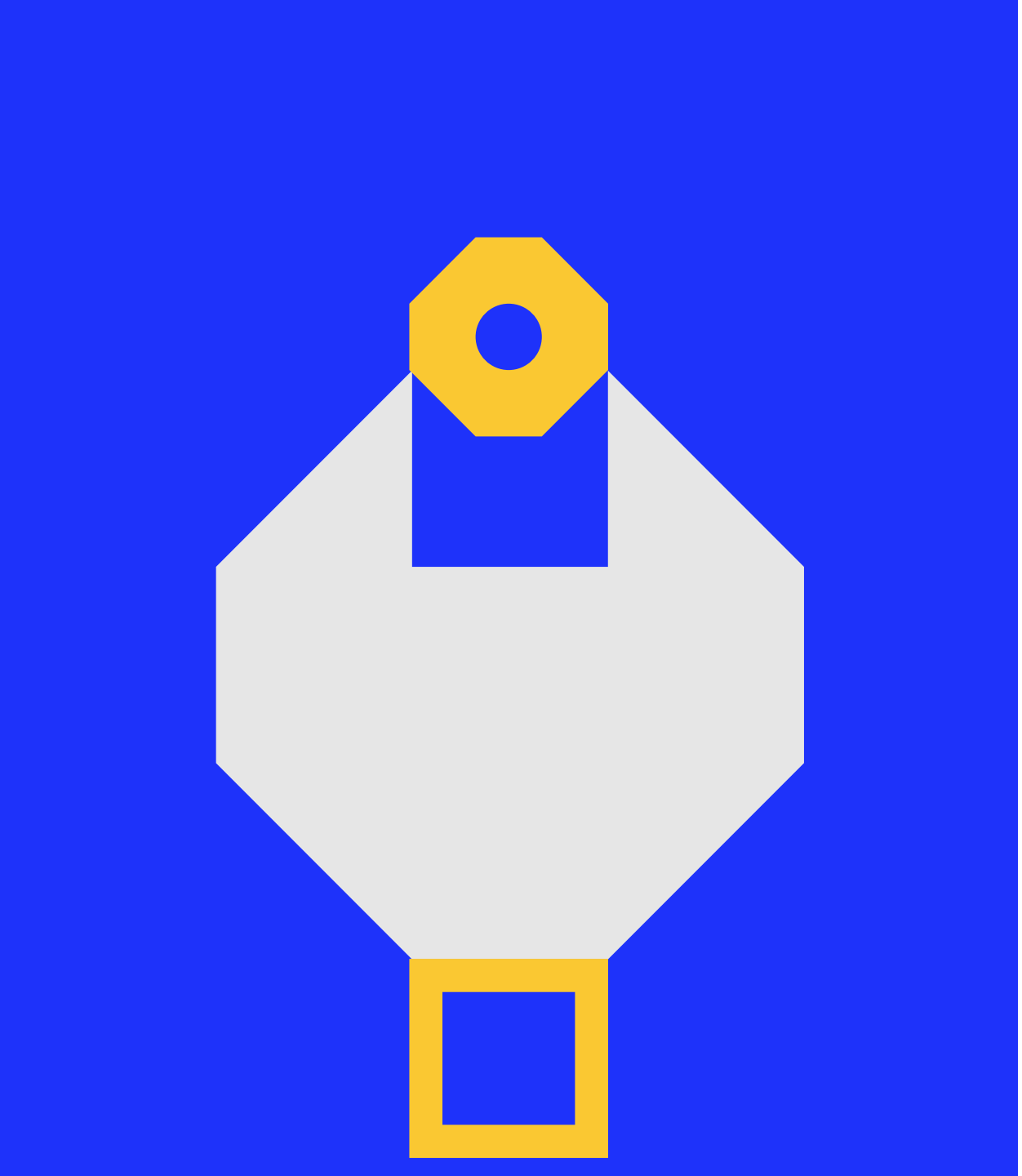
Revolutionizing Turbulence Mitigation

Turbulence is

The leading cause of injuries to cabin crew and passengers in non-fatal accidents (FAA)

Costing the aviation industry hundreds of millions of dollars every year

Causing brand damage and contributing to the fear of flying



Existing tools for managing turbulence have limitations

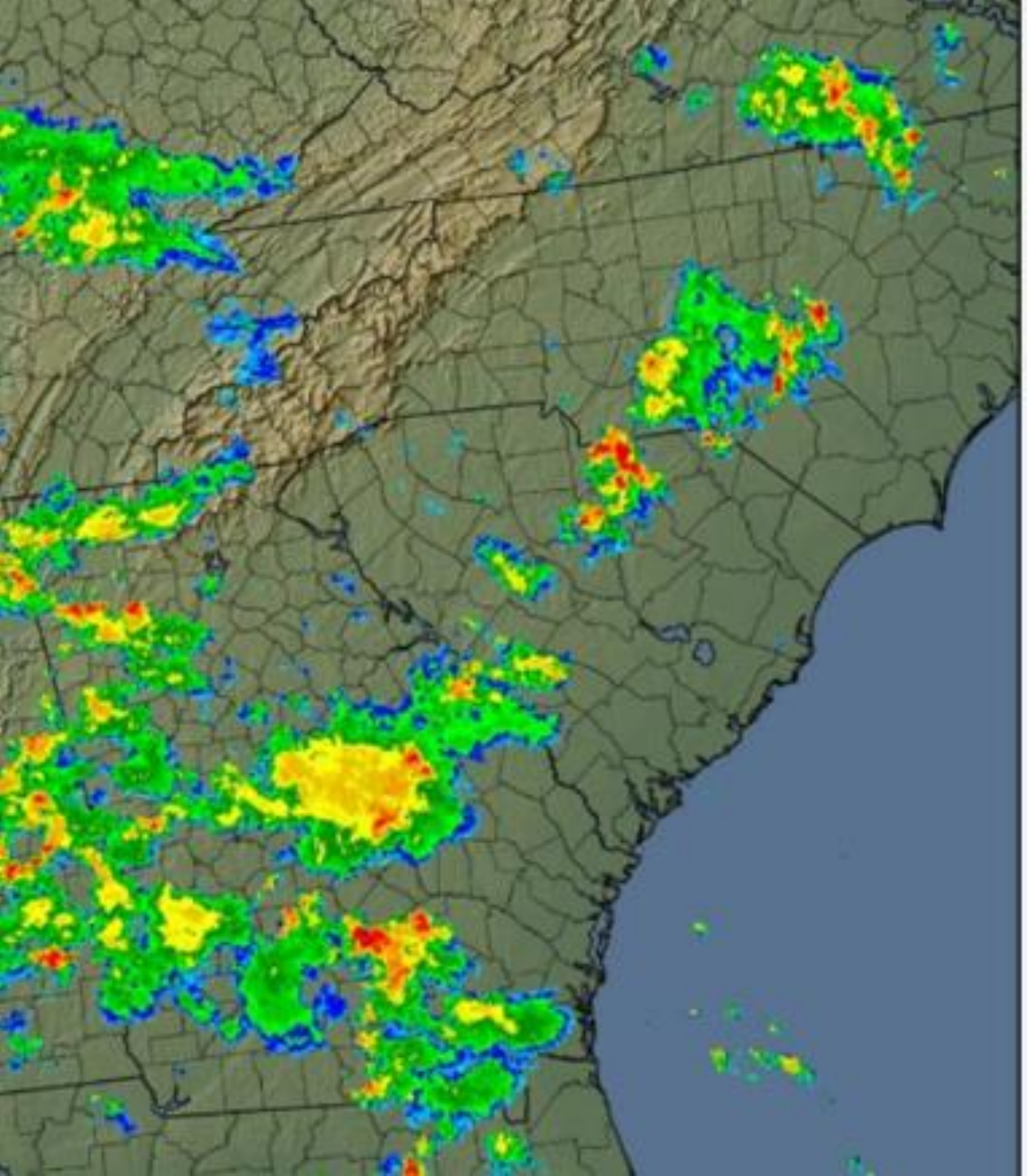
KCMH UA /OV APE 230010/TM 1516/FL085/TP BE20/SK BKN065/WX FV03SM HZ FU/TA 20/TB LGT

- KCMH - Closest weather reporting airport (Columbus Ohio)
- UA - Routine PIREP
- /OV APE 230010 - location
one zero miles southwest of Appleton VOR
- /TM 1516 - time 1516 UTC
- /FL085 - altitude eight thousand five hundred
- /TP BE20 - aircraft type Beech 200 Super King Air
- /SK BKN065 - base of the broken cloud layer is six thousand five hundred
- /WX FV03SM HZ FU - flight visibility 3 miles with haze and smoke
- /TA 20 - air temperature 20 degrees Celsius
- /TB LGT - light turbulence

Pilot Reports are Subjective

Light turbulence in a King Air is likely little to no turbulence to an A320

Forecasts may be inaccurate and hours old



Weather radar cannot detect clear air turbulence

149%

The projected increase in the frequency of severe turbulence*

*Williams, 2017

Industry shift to data-driven turbulence management

Recent technical advancements now enable aircraft to accurately calculate the turbulence state of the atmosphere in flight

What is real-time turbulence data?

Eddy Dissipation Rate (EDR)

- Turbulence intensity metric measuring the state of the atmosphere around an aircraft in flight
- An aircraft independent absolute value
- Simple software installation based on NCAR v2 open source algorithm
- No hardware required to calculate EDR

IATA Turbulence Aware

A global platform for sharing automated EDR turbulence reports in real time

Real-time turbulence data is collected from airlines, business aviation or third party ground servers

Data is consolidated, quality controlled and de-identified

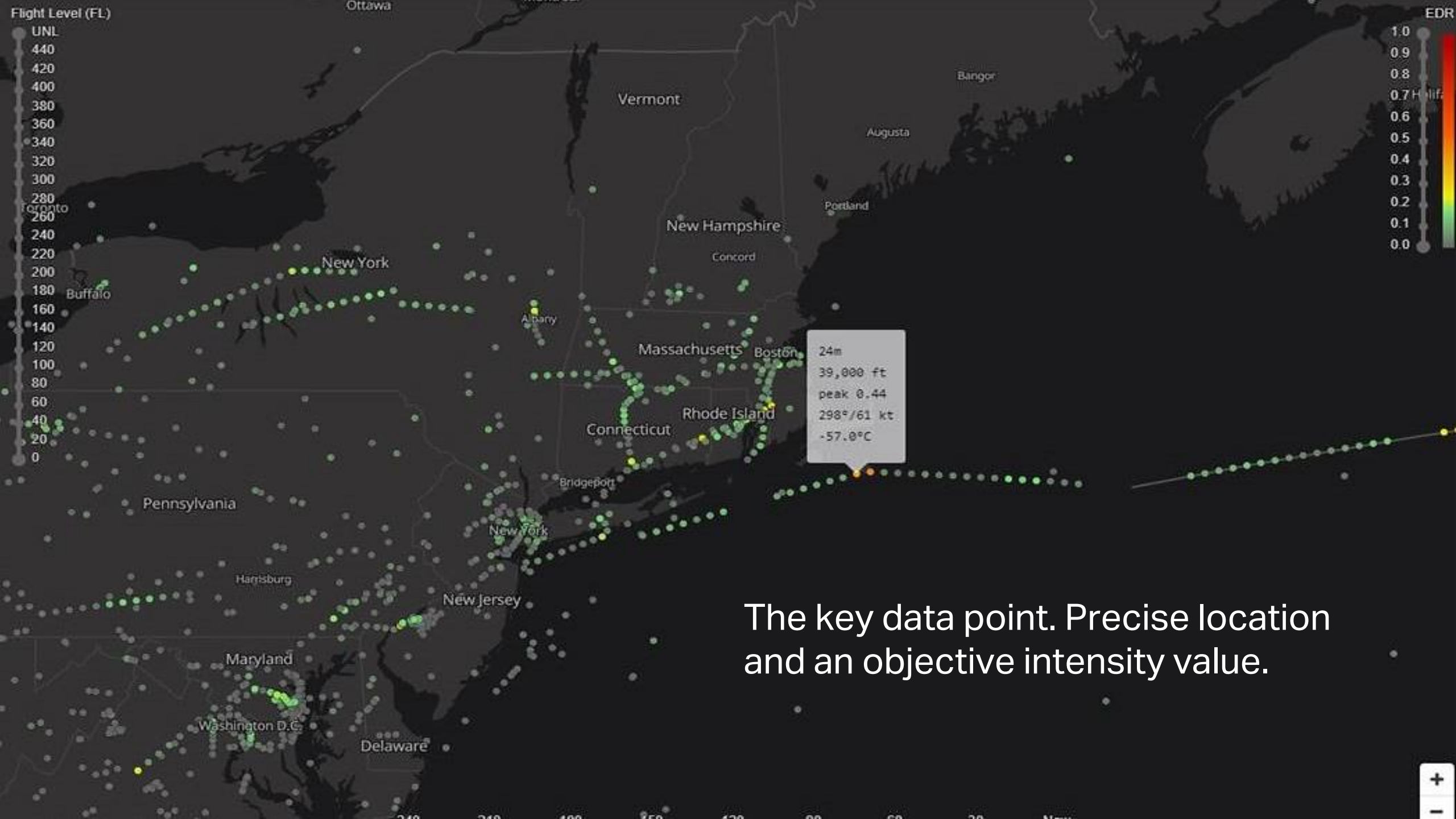
Data is currently processed through the platform within 1 second

Turbulence data points are made available for immediate operational use via a range of vendor applications

IATA

Turbulence Aware

Turbulence data collected
and submitted to platform
(ACARS or API)



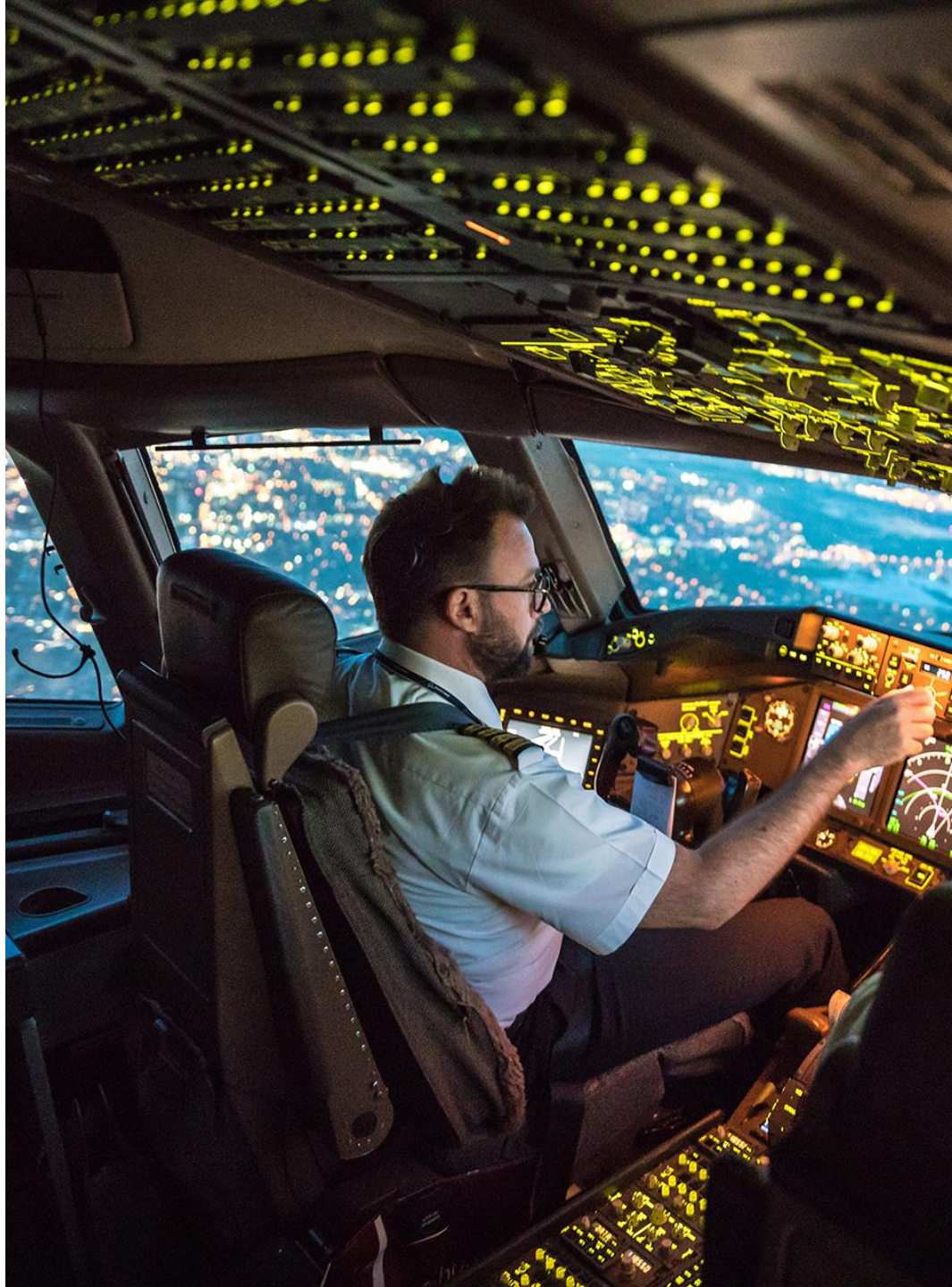
The key data point. Precise location and an objective intensity value.

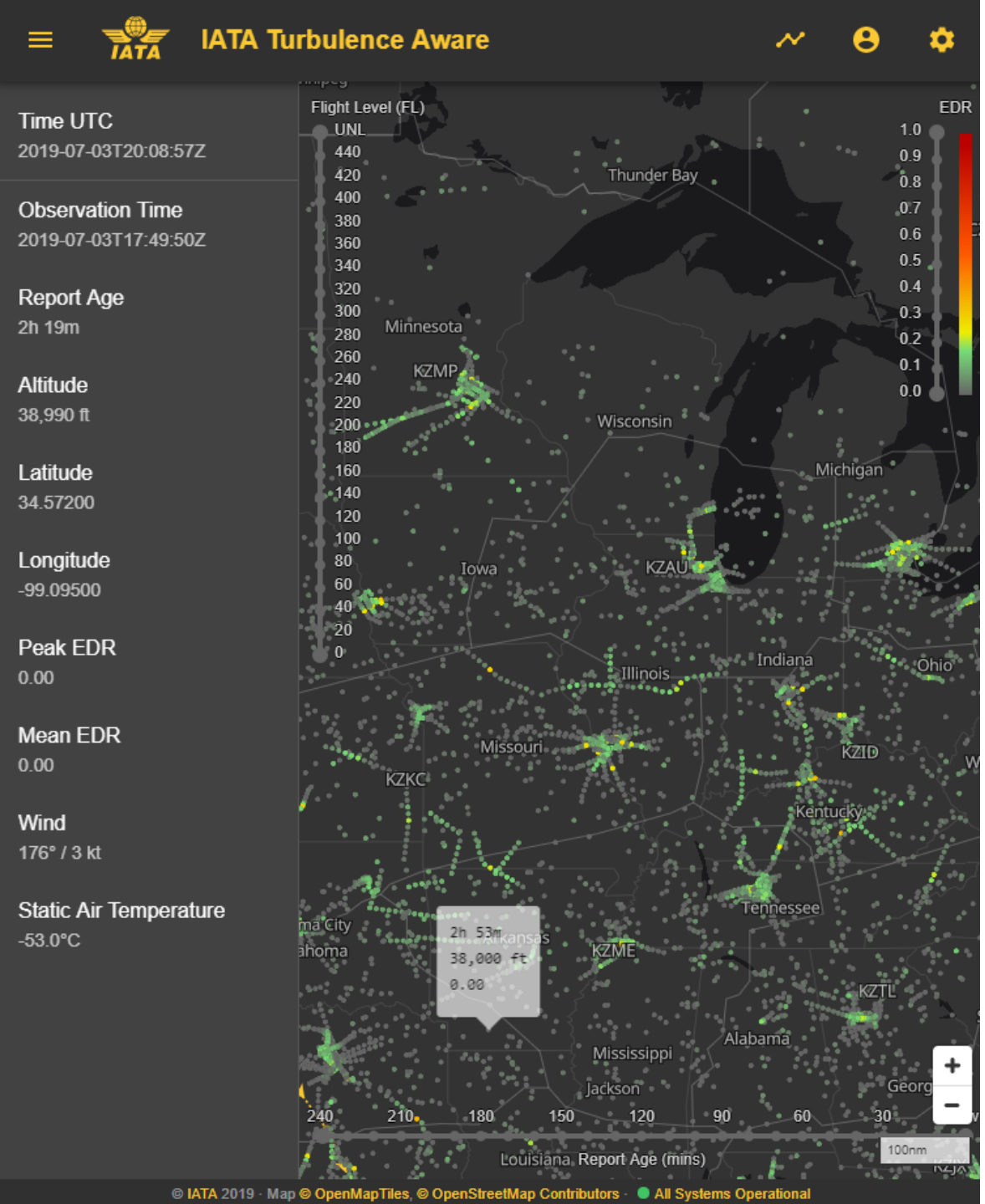
Practical Use of EDR Data

Secure the cabin and coordinate service

Change altitude to avoid turbulence for a better ride based on:

- Real-time, precise information about the location, altitude and intensity of turbulence
- Heartbeat reports identifying areas of smooth air





Display of Turbulence Reports

Use your own flight planning and in-flight applications to display the data provided by the platform

Use third party flight planning and in-flight tools to integrate the data

Use IATA's Turbulence Aware Viewer (web-based) tool in Operations Control Center or in-flight via Wi-Fi

Benefits of data driven turbulence mitigation

Improved safety outcomes

Enhanced customer experience and brand image

Efficient fuel planning and optimum burn in-flight

Fewer engineering inspections

Lower insurance premiums

Highly collaborative development with airlines

MET Viewer Operational Use Case Examples

Areas of Benefit discovered during the Trial

Airline Meteorologists

Dispatchers for **flight planning**

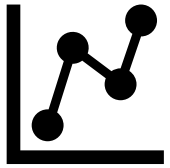
Cabin crew and flight deck crew for pre-flight **awareness**

Flight deck / Cabin crew in-flight

Dispatchers/OCC/ATC for **flight following**

Engineers for inflight and post flight analysis

Safety department for post-flight **analysis/investigation**



Analytics / Research

Comparing the Accuracy of Forecasts

Forecast products or **validation** of forecast vs actual

Significant interest of research and forecast entities in EDR values

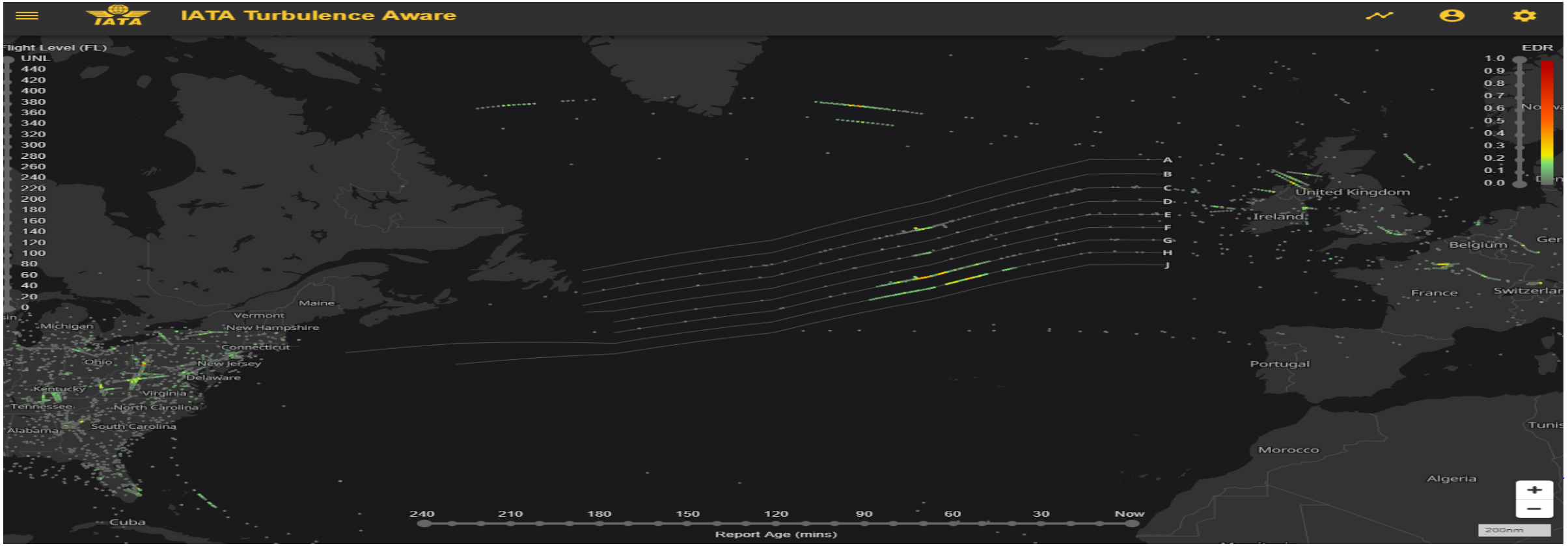
"During the last year we had some high EDR reports on our fleet, so we contacted several weather providers for more information. By providing time, position and the EDR value the three entities provided us with an extensive explanation about the occurrence including an insight into their weather models."

Flight Planner

Route selection

-turbulence, **temperature**, **wind**, shear rates

Tactical and **strategic** route planning



Pilot – Flight Preparation

Forecast vs actual

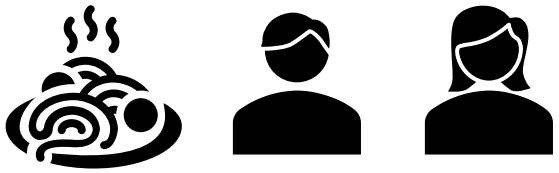
SIGWX / SIGMET areas

Wind and temperature plots / shear rates

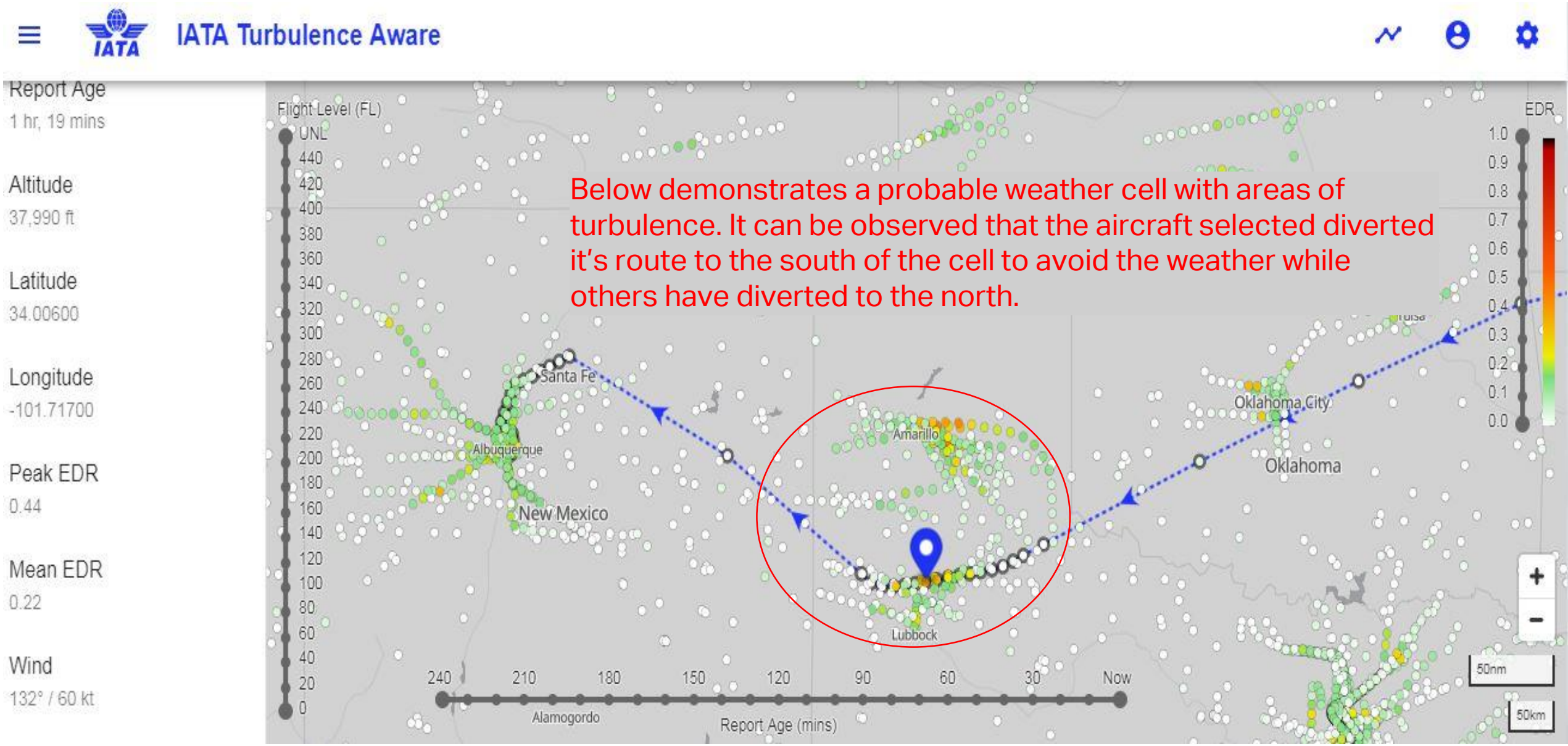
Brief cabin crew

-meal service plan?

Awareness for non-connected flight deck



Thunderstorm Awareness



In-Flight

Change level or route

Convection awareness

Update FMS

Smooth ride at **optimum**

Fuel at optimum. Environmental

Manage expectations - pax and crew

Cabin secure – **descent planning**

Runway in use

Wind on finals- aircraft configuration

Possible Wake Turbulence

Time UTC
2019-05-08T20:37:32Z

Observation Time
2019-05-08T17:37:20Z

Report Age
3 hrs, 0 mins

Altitude
38,990 ft

Latitude
40.09400

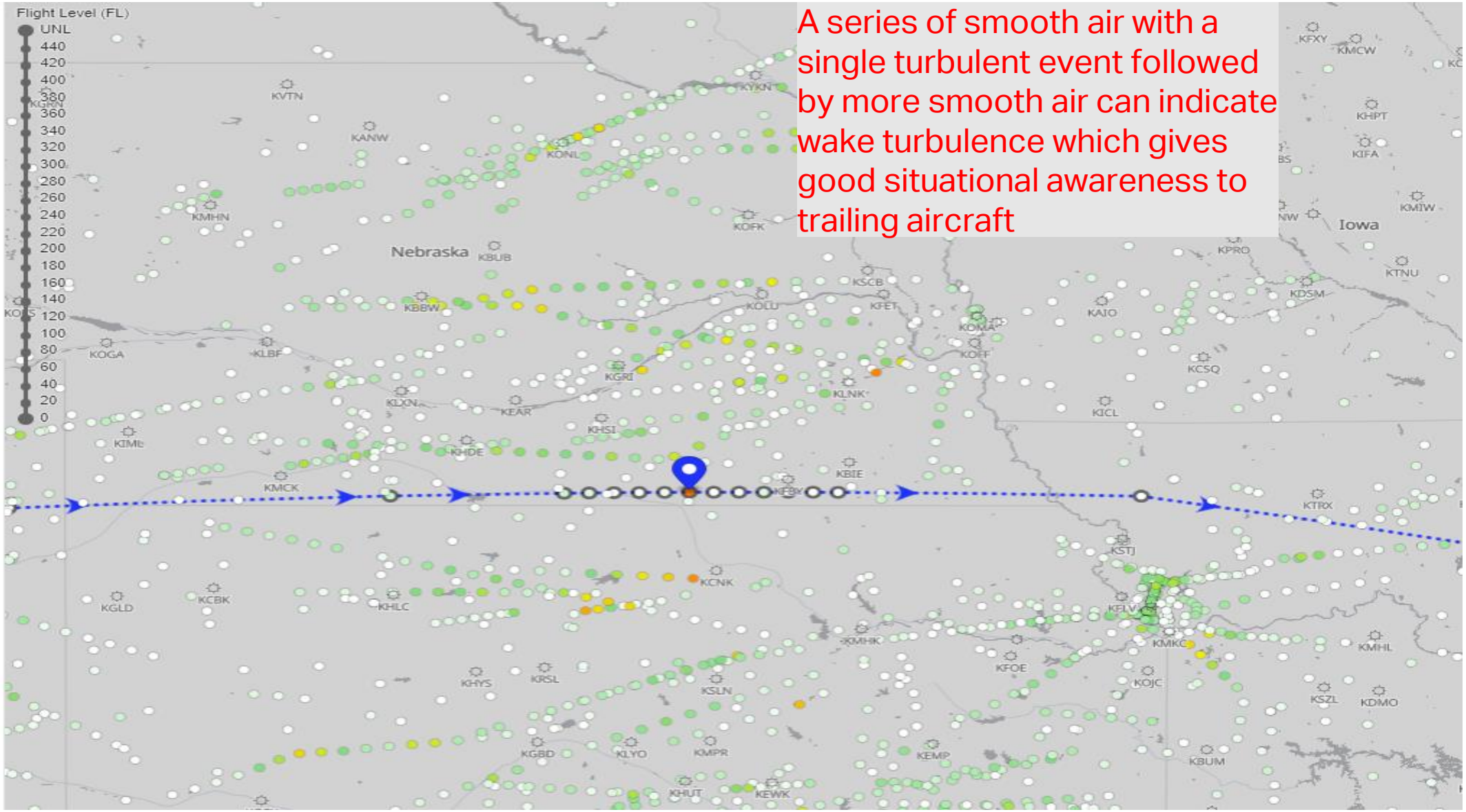
Longitude
-97.83500

Peak EDR
0.54

Mean EDR
0.26

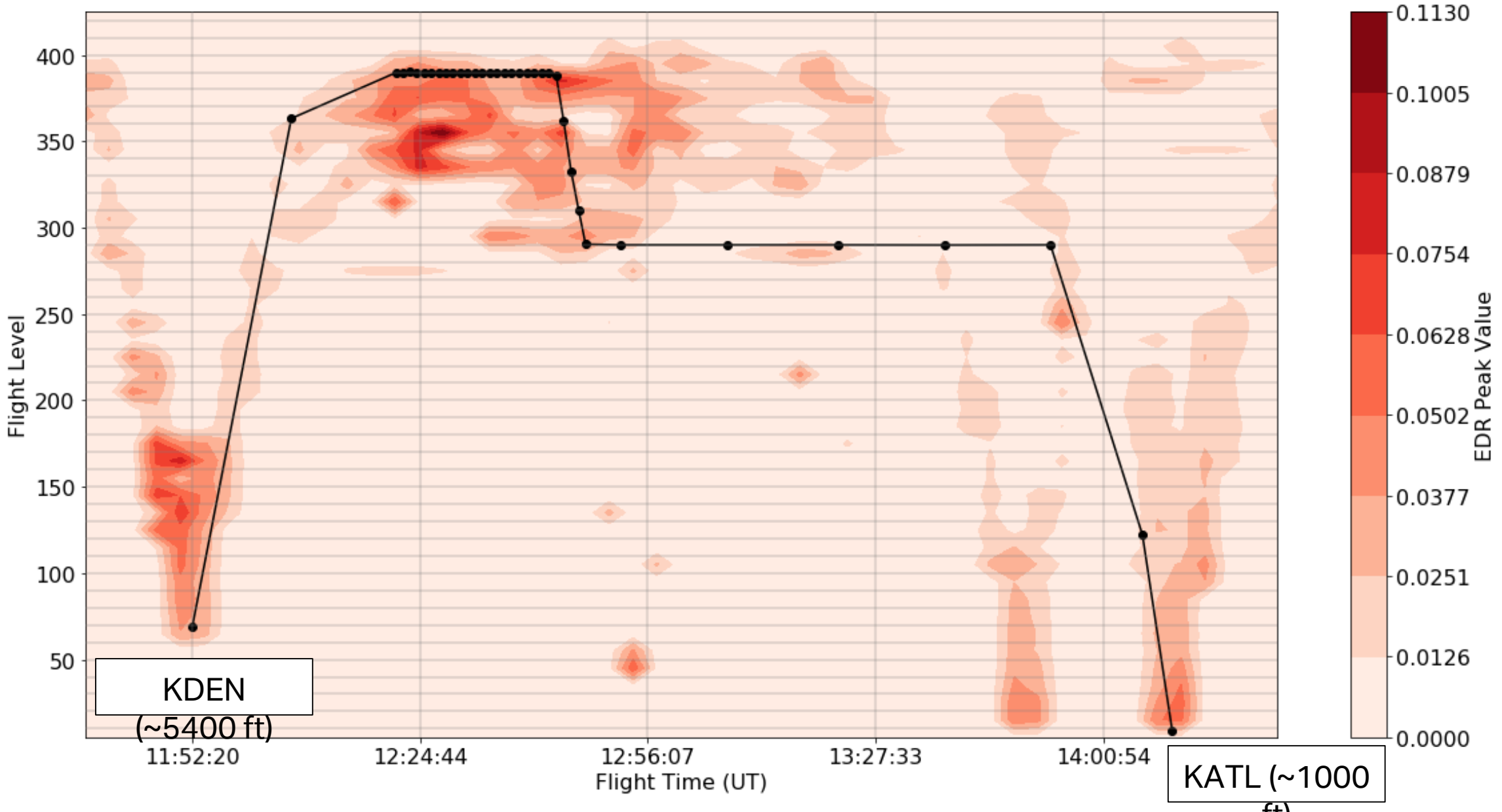
Wind
154° / 113 kt

Static Air Temperature
-56.0°C



A series of smooth air with a single turbulent event followed by more smooth air can indicate wake turbulence which gives good situational awareness to trailing aircraft

Post-flight analysis: cross-section



OCC/ATC Monitoring

- Social media
- Maintenance for severe inspections.
- ATC **Traffic Management** and Warnings
- *"IATA Turbulence Aware is a useful and necessary tool for meteorologists, pilots and air traffic controller watching the FIR"*
- *"According to ICAO (Annex3/Appendix4) a SIGMET could be generated in this case:* ***SEV TURB EDR 0.58 FL270 46.4N09.0E****"*

Summary

Situational awareness tool – reactive / non predictive

Integration of raw data into **vendor tools**/data lakes

Multiple derived **benefits**

Ongoing **discovery** phase and enhancement

Continuous airline **education** and promotion

Access Turbulence Aware Data

Email iataturbulence@iata.org for more information