



IATA Global Turbulence Database & Eddy Dissipation Rate (EDR)

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WORLD METEOROLOGICAL ORGANIZATION (WMO)

AFRICAN CONFERENCE ON METEOROLOGY FOR AVIATION (ACMA)

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Topics to be Covered

There is a Need for Turbulence Data:

- Why do Airlines want Access to Turbulence data?
- What type of Turbulence Data is needed?
- How can an Airline or State Met Service address the need?

IATA is Helping to Address the Need

- What is IATA's very specific Focus?
- How?
 - Global Turbulence Database: "Turbulence Aware"
 - Guidelines Document

WHY?

Costs from turbulence can range in the Millions*

- Employee (Flight Attendant) & Passenger Medical Bills
- Crew (Flight Attendant) time off work
- Damaged cabin interiors
- Aircraft inspections / out-of-service time
- Extra fuel burn
- Diversions
- Increased insurance premiums after serious accidents
- Legal fees
- Cost of brand damage
- Etc.

***For a medium-size airline**

What type of real-time turbulence data?

An aircraft in flight is now able to accurately calculate the atmospheric turbulence state around it using avionics data.

Eddy Dissipation Rate (EDR) **ICAO's Turbulence Standard**

- An objective, aircraft independent, turbulence metric
- Calculates ambient sea state turbulence around an aircraft on a scale 0.0 (good) - 0.8 (bad). Accurate number rather than subjective PIREP.
- Example: A320 will experience moderate turbulence at EDR 0.35 whereas B787 will experience light-to-moderate at EDR 0.35
- Simple software installation is required to capture existing avionics parameters to calculate and report EDR values

WHAT?

EDR Measures “Sea State” of the Atmosphere



Small boat
(tossed violently)

vs.

Larger boat
(much less affected)

&

2 seat aircraft
(large g-load)

vs

widebody
(much lower g-load).

But same sea state
&
same EDR value.

Ships on a Rough Sea (Johannes Christiaan Schotel, 1827)

How can airline implement ?

Vertical Wind EDR Calculation & Reporting*

Three Components

➤ Access to Databus Variables

➤ *Primary Variables: True Airspeed & Angle-of-Attach*

- roll, pitch, pitch-rate, and inertial vertical velocity also used to
- adjust for aircraft attitude, gross vertical motion, and changes in pitch.

➤ Computer for Processing EDR Algorithm

➤ *Capable of collecting & crunching data 8 X's/second*

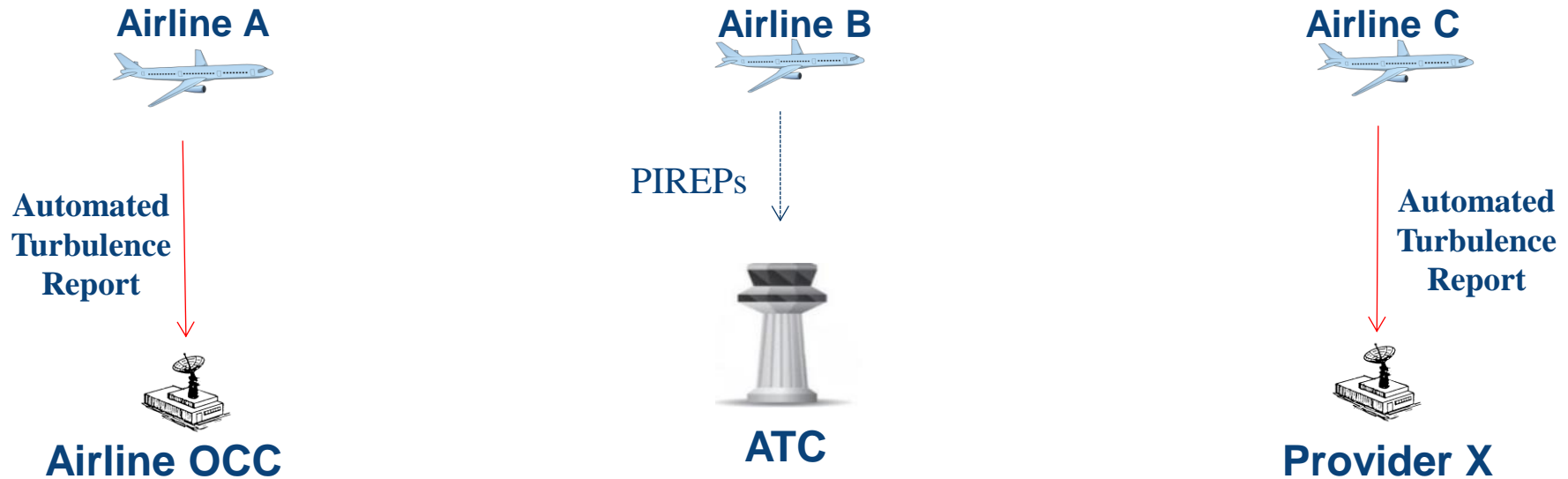
➤ Communications to Ground

➤ *ACARS &/or Cellular &/or SAT Com*

*A Detailed Technical Description is available from IATA

What Problem is IATA's Specific Focus?

Turbulence data is shared -BUT- **Too Little & Too Late**



Current limitation: Too often the case with aircraft flying through turbulence

- All 3 aircraft will hit the same turbulence because the data is too often not shared by ATC, nor between airlines or different solution providers
- All available data needs to be shared to mitigate turbulence encounters globally
- Airlines have requested **IATA to be the global turbulence data consolidator**

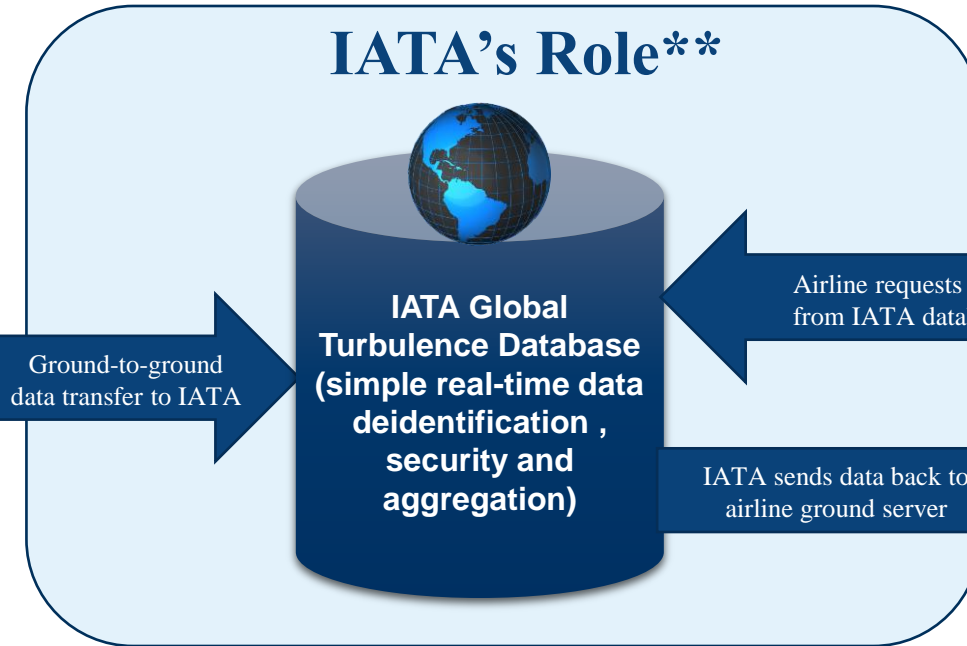
How & How Not?

IATA is facilitating ground-to-ground, **not airborne** turbulence data sharing amongst airlines



Automated
Turbulence
Report *

Ground
Server (either
airline, or
SITA/ARINC/
or airline's
third party



Airline Operation
Control Center
or Trusted Agent
(ground server)
for operational
use***

* AMDAR
or
Airline
Independently
Implementing
Turbulence
Reporting

- **IATA**
- Receives airline data from ground servers
 - Consolidates data into one database (managed by IATA contracted vendor)
 - Provides data back to airlines via ground-to-ground transfer via push or pull.

*** Airlines free to
use data
operationally w/
their dispatch
tools &/or send
to airborne
alerting tools

How?

IATA's Progress to date

- Global Turbulence Study completed to validate need: 2016
- Regional workshops held: 2017
 - DOH, BJS, SIN, MIA, LON to validated the concept and create a base set of requirements
- Buy-in from multiple airlines globally to start build phase
- Request for Proposal released to industry in Jan 2018 to build the IATA Turbulence Data Exchange Platform
 - Snowflake Software selected as partner to build platform
 - Historical Airline Data used for development
- IATA Turbulence Advisory Group established

Highly Collaborative Development



How?

Platform Implementation Accomplishments & Timeframe

- **Development kick-off workshop**
 - Held June 2018 in London with 12 major Airlines represented
 - **Minimum Viable Product (MVP) operational platform**
 - Delivering via software development sprints (Jul-Dec '18)
 - Three Airlines provided Historical EDR data for Development
 - November '18: Two Airlines are prepared to feed live EDR data
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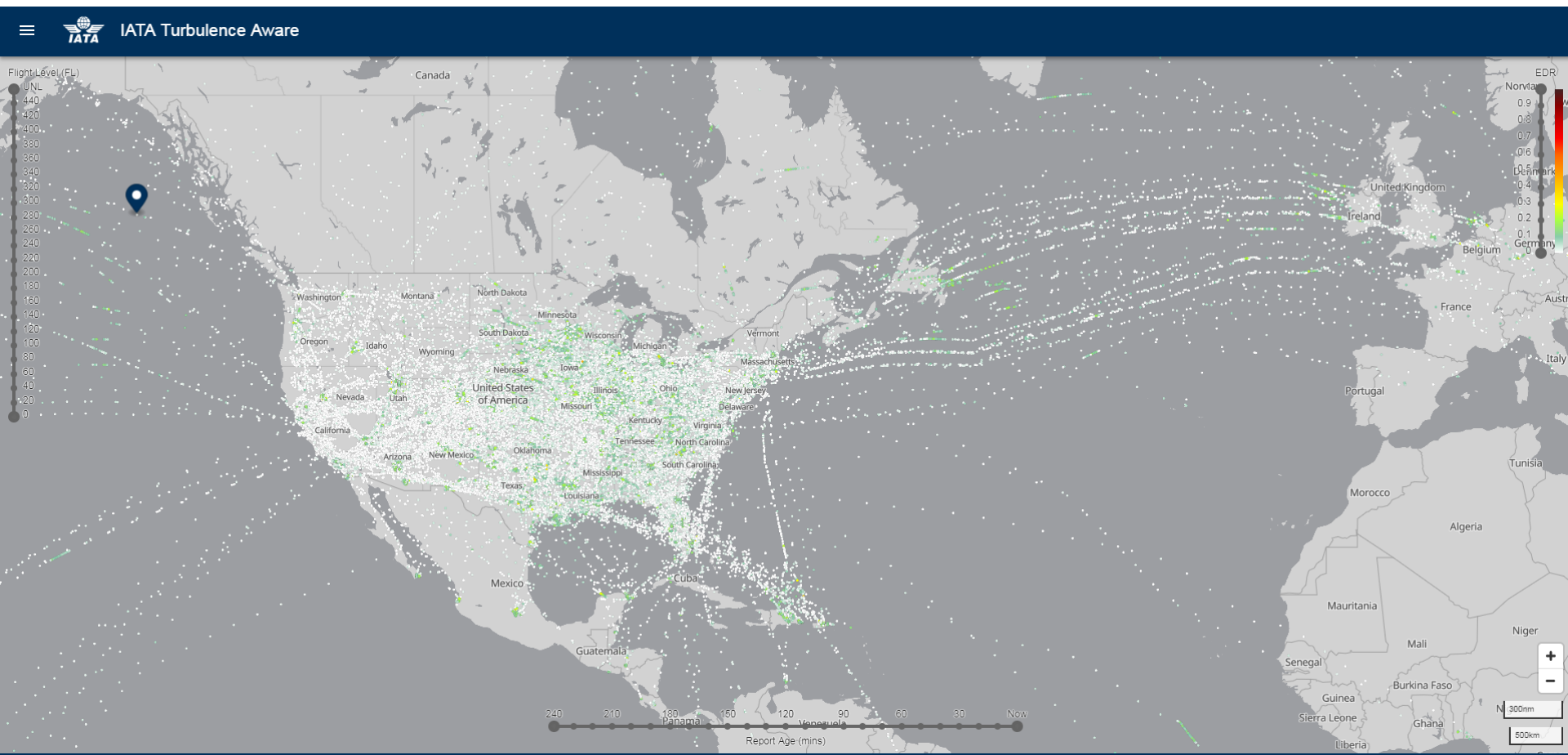
Pilot Phase - 2019

- Jan/Feb 2019: Soft launch & Show and tell workshop
- Feb-Sep'19: Operational Trials & Releases with 24/7 support
- Q4 2019: Final show and tell workshop prior to Full launch

Full Launch - Q1 2020

Example: Platform Functionalities

➤ Basic turbulence viewer



Basic Turbulence Viewer: Detailed Report

Observation Time
2018-10-08T23:13:00Z

Altitude
10,400 ft

Latitude
39.73200

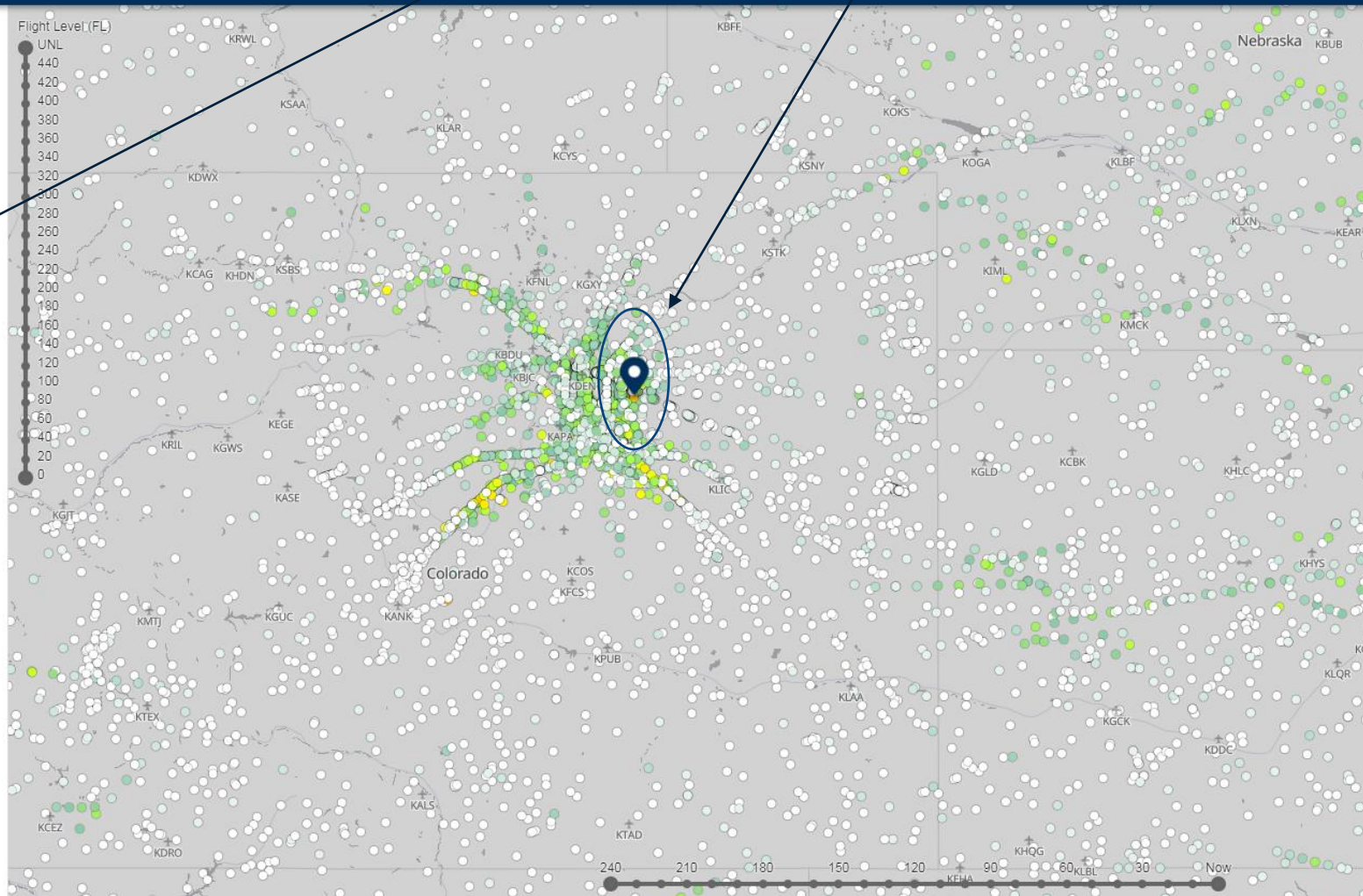
Longitude
-104.30000

Peak EDR
0.42

Mean EDR
0.20

Static Air Temperature
1.1°C

Wind
053° / 17 kt



CURRENT IATA AREAS OF FOCUS

SHARING DATA

- Turbulence Data Sharing Platform Development
 - Real-time EDR data to be fed from Airlines to the database

OUTREACH

- Outreach to airline community encouraging adoption of reporting technology globally (i.e. critical mass):
 - Distributing IATA Guidelines: describes how airlines can add turbulence reporting capability on their aircraft
- Outreach to technology solution providers
 - Encouraging cost-effective turbulence reporting solutions development
 - While respecting airlines' data ownership rights

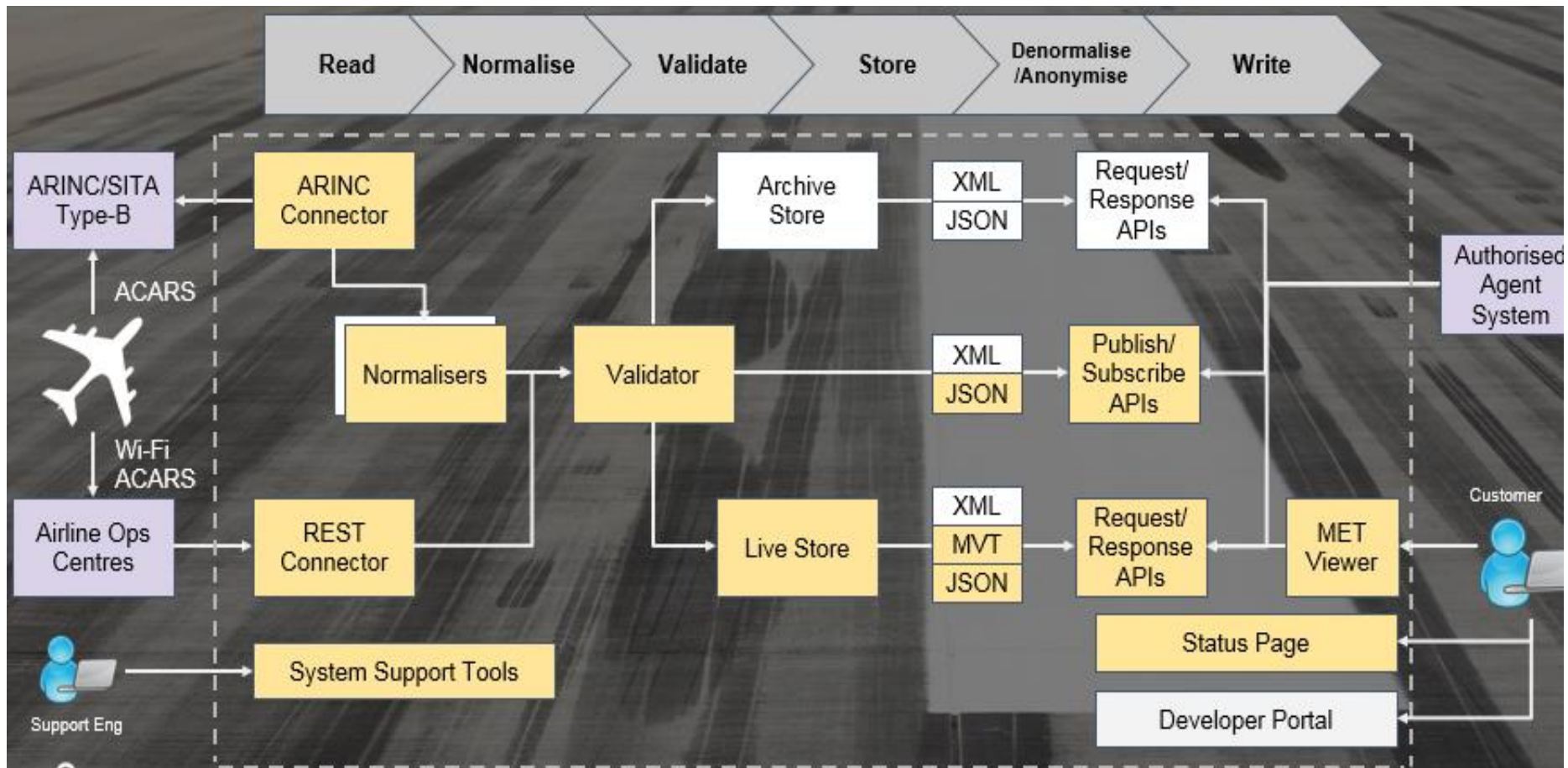
Thank you. Questions?

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Back-up Slides

How?

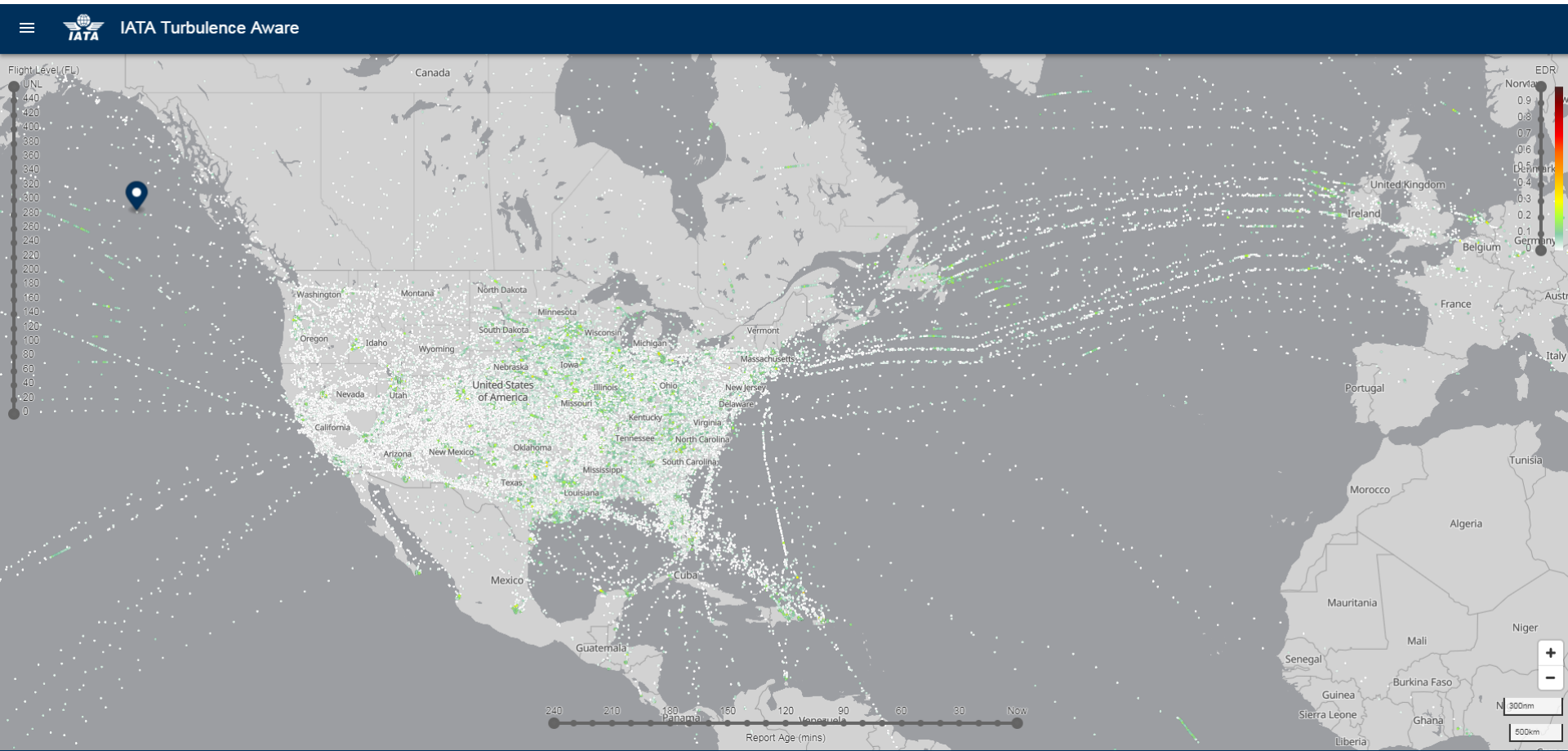
Platform Architecture Details



- 99.9% Availability
- Highly Scalable
- 24/7 Monitoring
- Highly Secure
- Anonymized Data
- Full logging & audit
- 30 seconds for data throughput

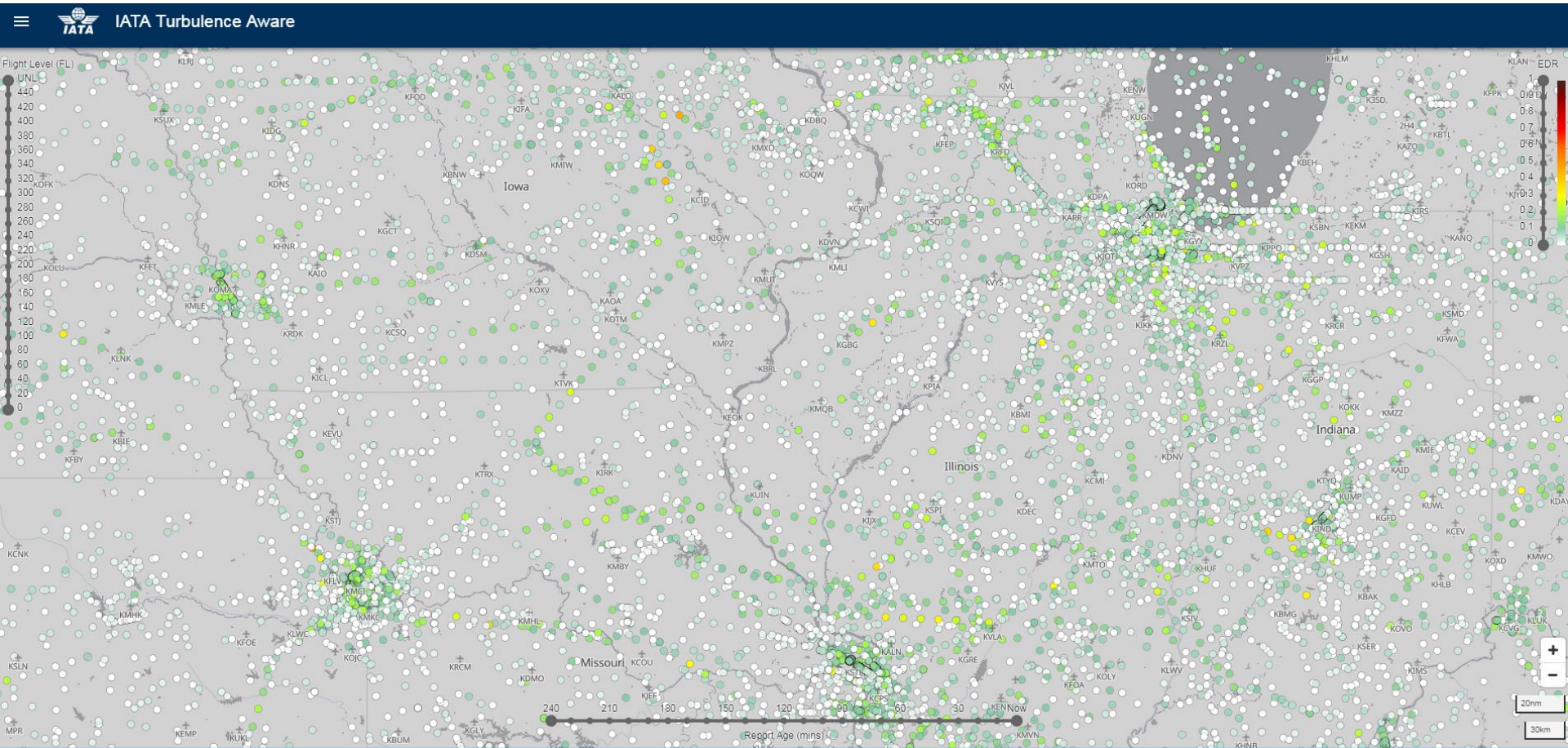
Basic Turbulence Viewer

➤ Worldwide Coverage



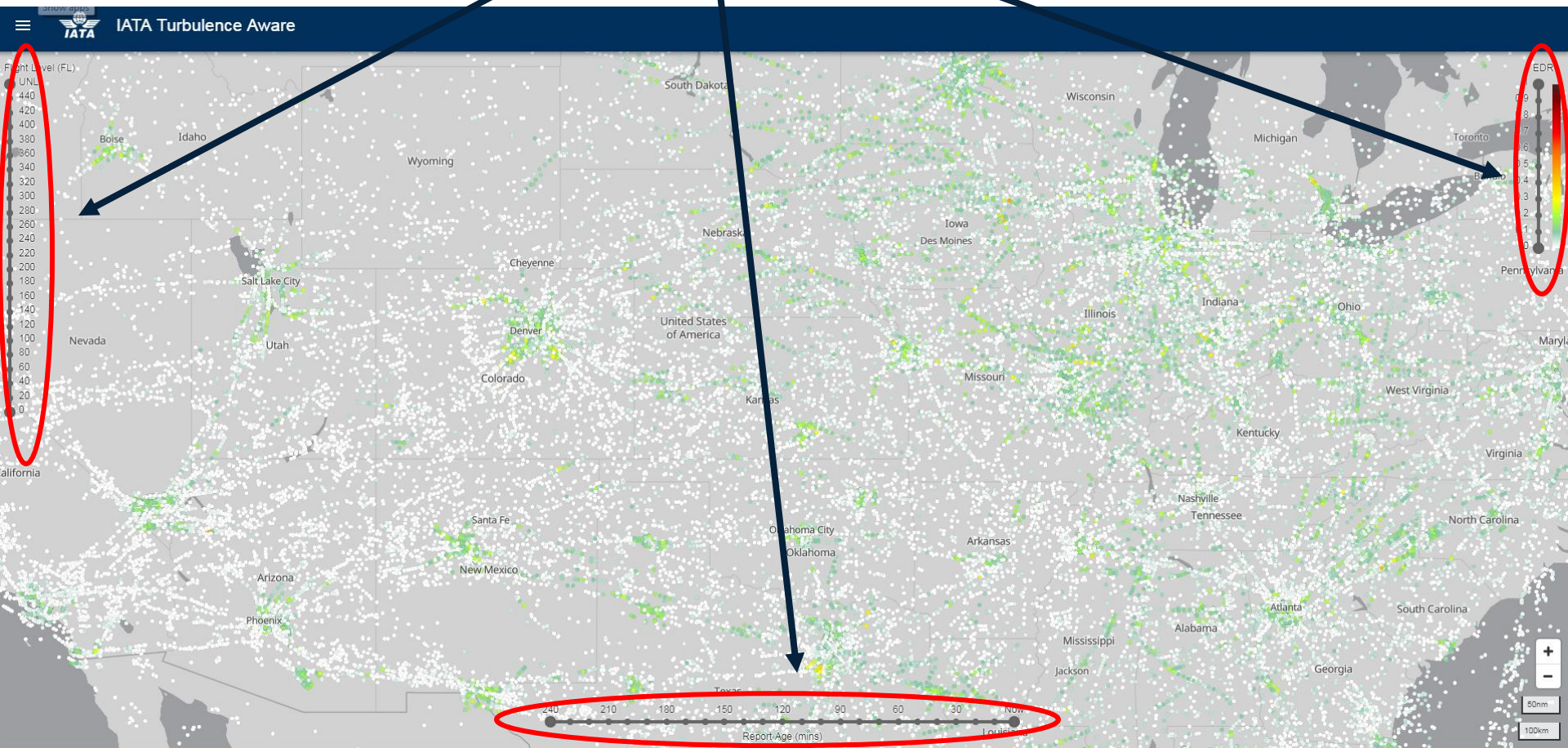
Basic Turbulence Viewer

➤ Color coded EDR reports



Basic Turbulence Viewer

➤ Altitude, Time & EDR Sliders



Basic Turbulence Viewer: Altitude, Time, EDR Sliders

➤ Altitude (FL240 & below), Time (Current -150 min) , EDR (> smooth)

