IATA
GLOBAL
MEDIA DAY

IATA
Turbulence Aware

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#IATAGMD

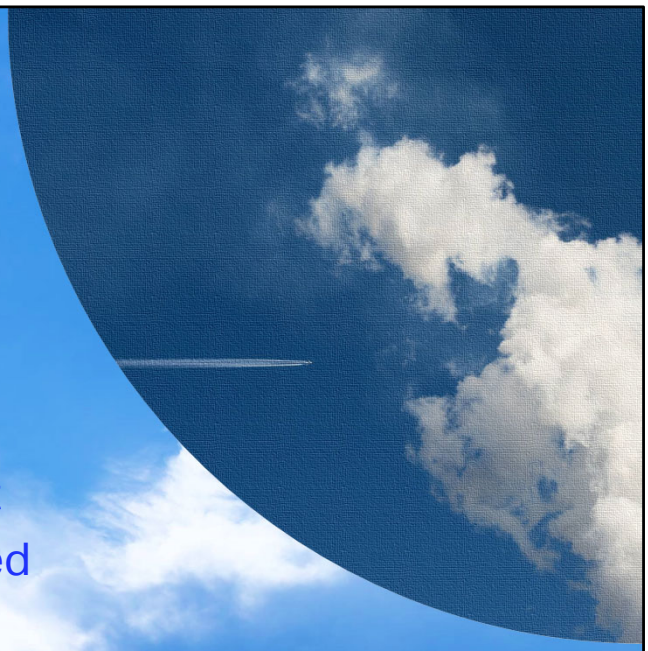
Turbulence

Can take several forms
- Clear air (CAT)
- Cloud associated (convective)
- Mountain wave
- Wake vortex
- Mechanical

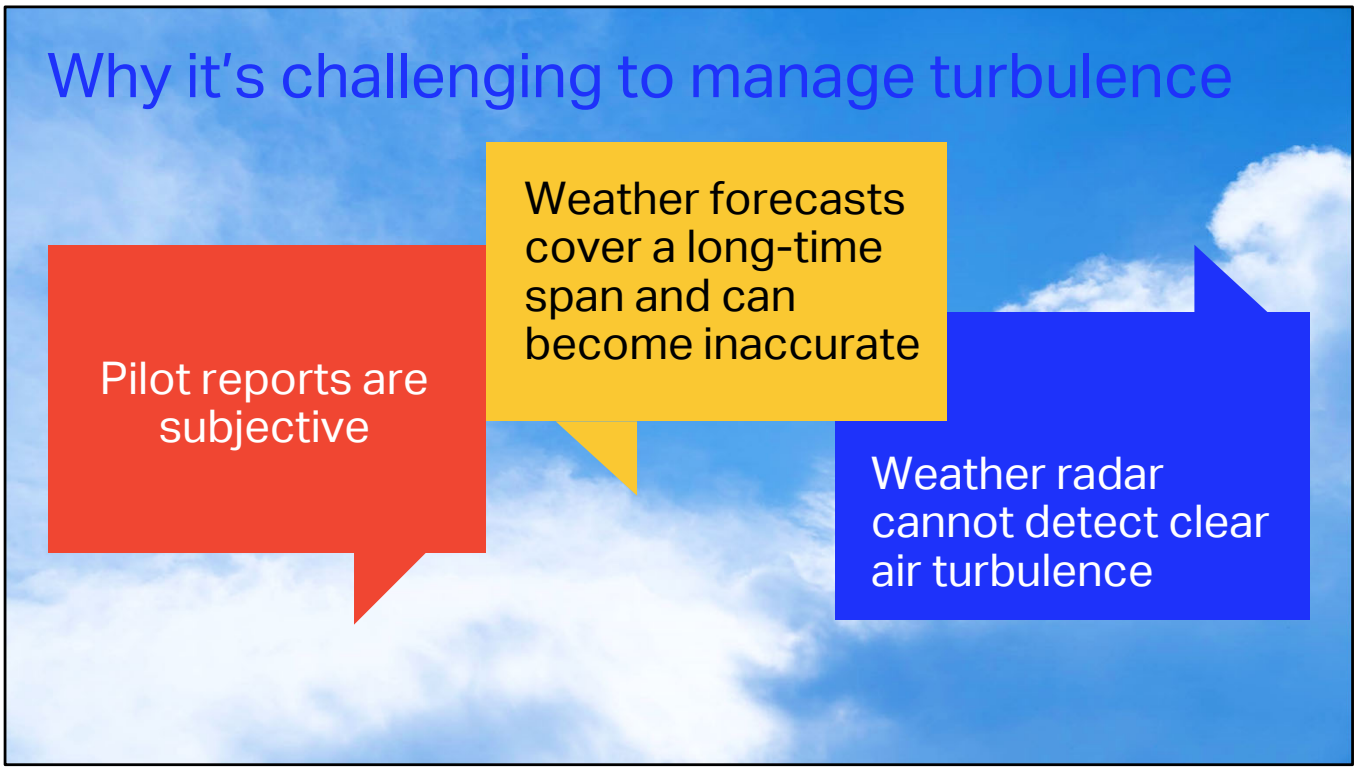
Is present on almost every flight

Can never be completely avoided

Is difficult to predict and assess



- A study done by Prof Paul Williams from Univ. of Reading, published in 2017, indicated an increase in the frequency of severe turbulences by 149% in the upcoming decade after the study was published (after 2017);
- Turbulence is the leading cause of injuries to cabin crew and passengers in non-fatal accidents (Source: FAA);
- It is a major contributor to the fear of flying;
- It is costing the aviation industry hundreds of millions of dollars every year – main cost drivers are: diversions, injuries, higher fuel consumption (especially not flying at the optimum level), maintenance and reputational loss after a turbulence occurrence, as well as CO2 emissions.

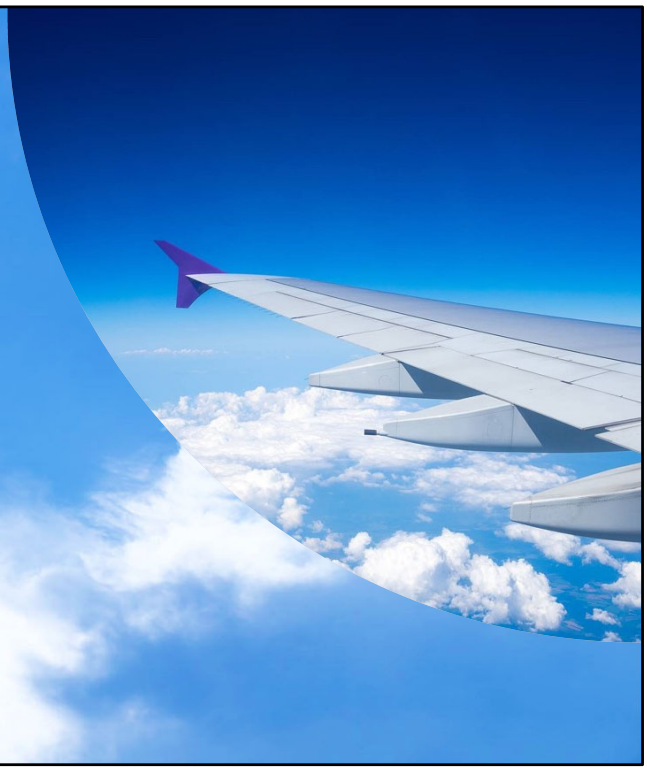


Conventional tools are inadequate to manage turbulence

- Pilots reports have the tendency to be subjective – depends on the type of the aircraft that flies through a turbulence event, and the pilot's experience
- Forecast usually cover larger geographical areas, can be hours long and sometimes inaccurate
- Clear Air Turbulence cannot be detected by weather radars

Industry shift to data-driven turbulence management

Recent technical advancements 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

*NCAR – National Center for Atmospheric Research in the US

The on-board software required to capture data off the sensors and calculate EDR turbulence values was developed by the National Center for Atmospheric Research (NCAR) in the US.

NCAR makes this software available at no cost.

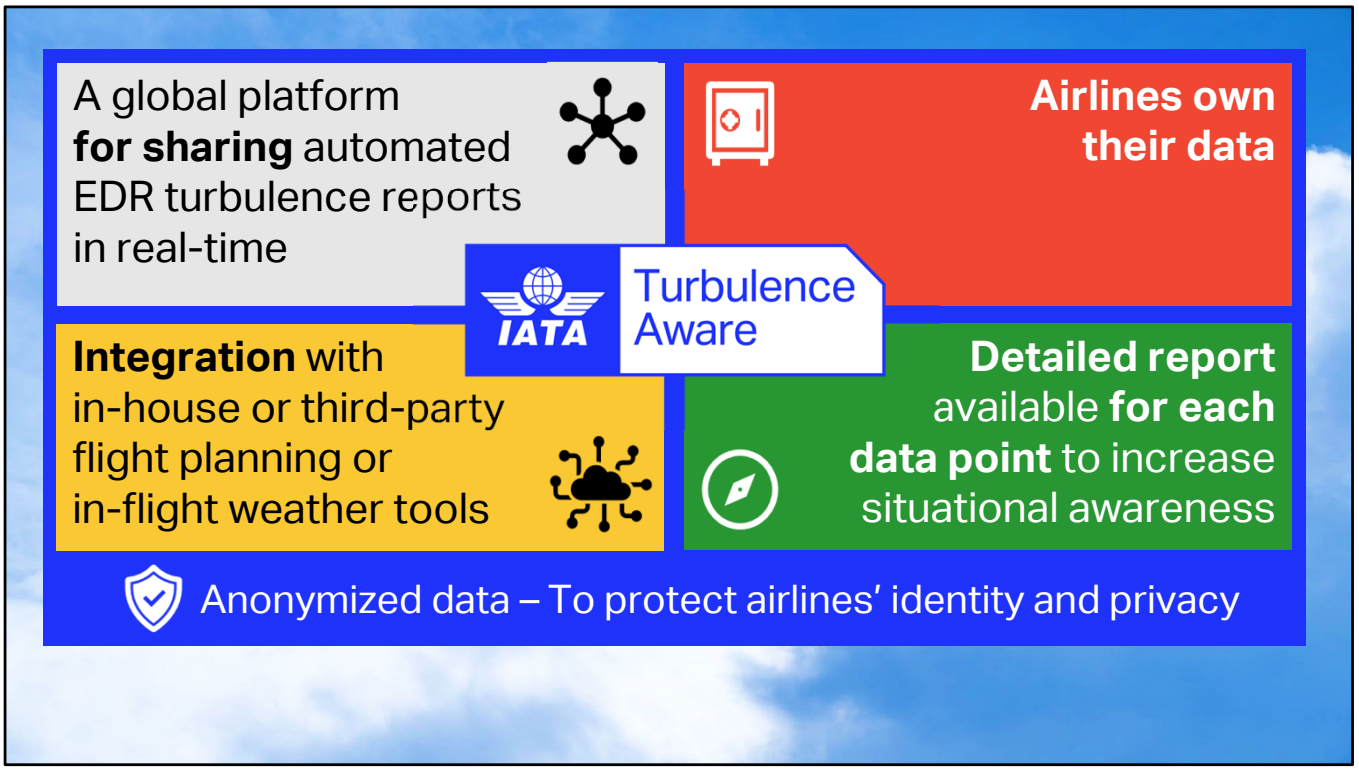
Airlines have various implementation options available.

IATA is facilitating an industry shift to data-driven turbulence mitigation

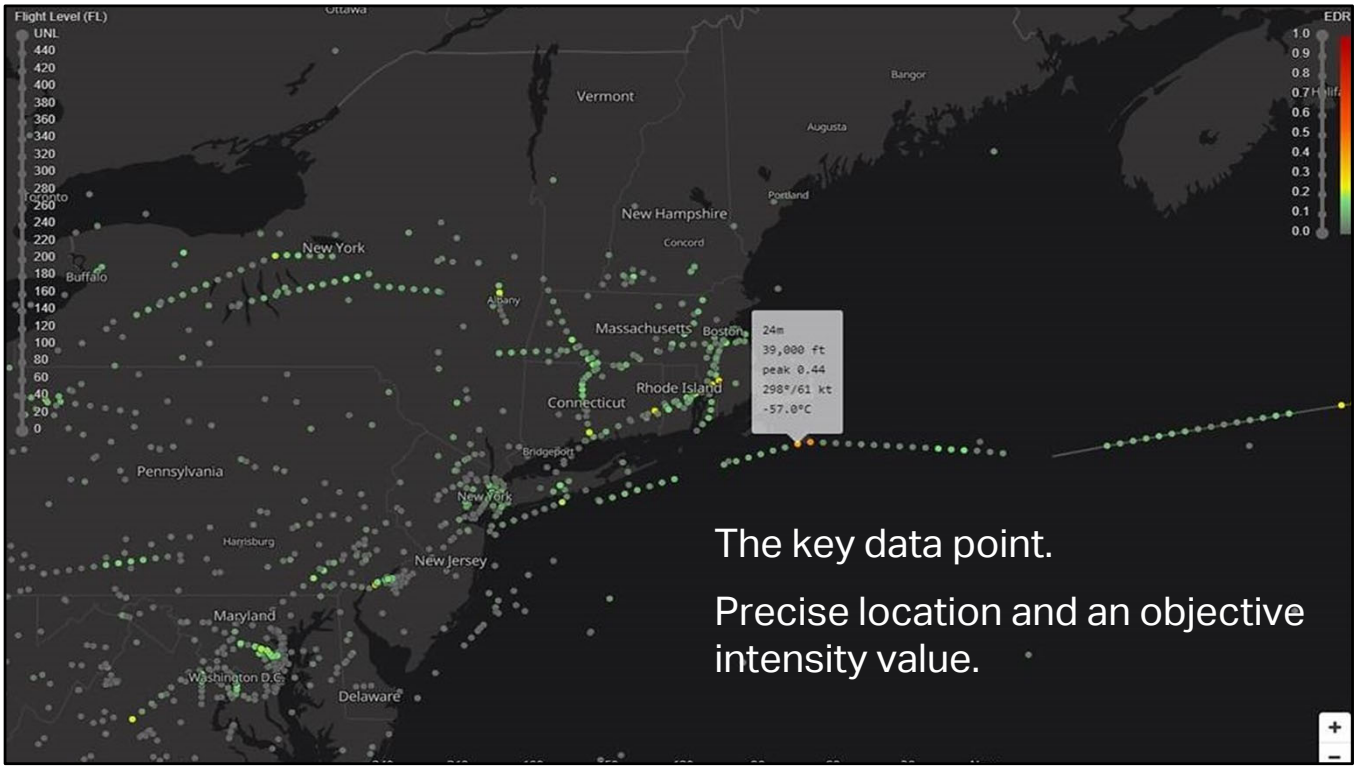
Inform airlines on the concept and benefits of automated turbulence observations

Facilitate the implementation of turbulence reporting by airlines globally to grow data coverage

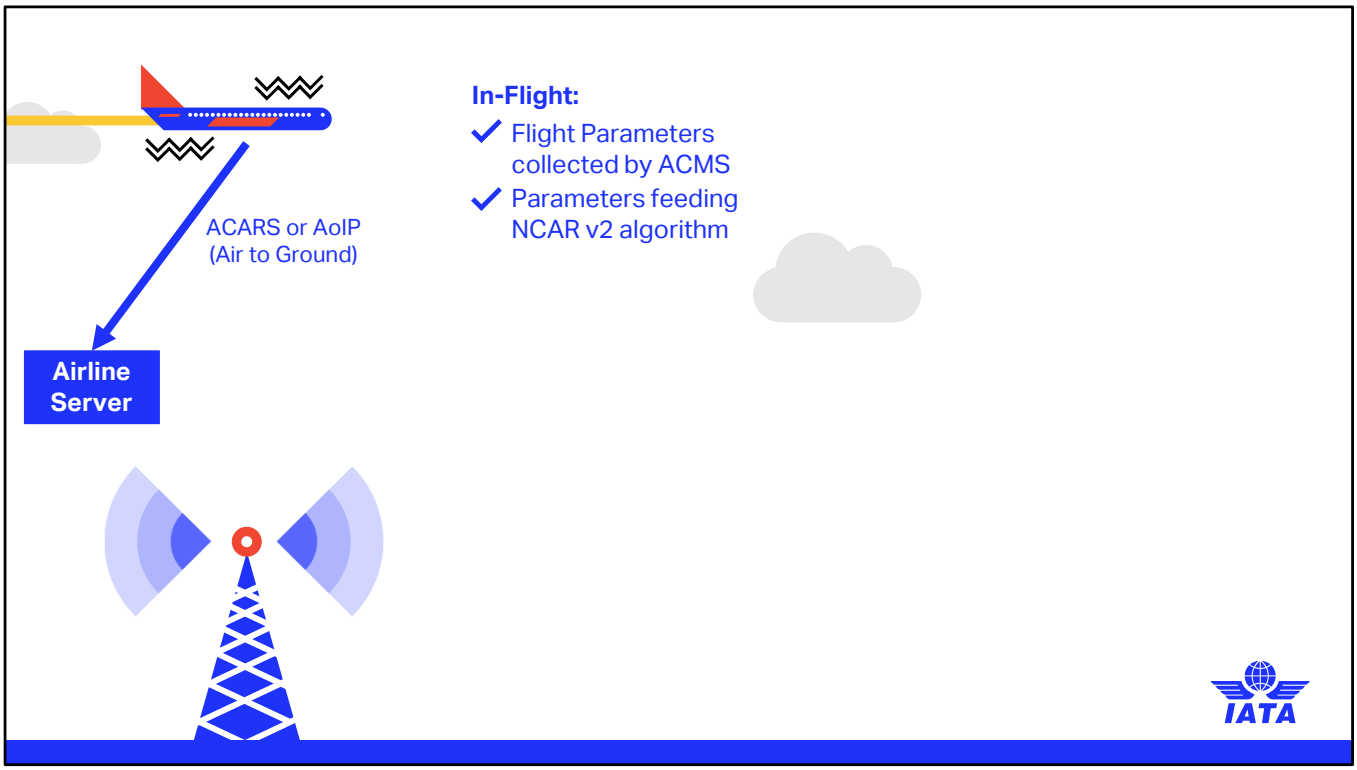
Consolidate fragmented turbulence data sets from airlines/third parties to maximize the value



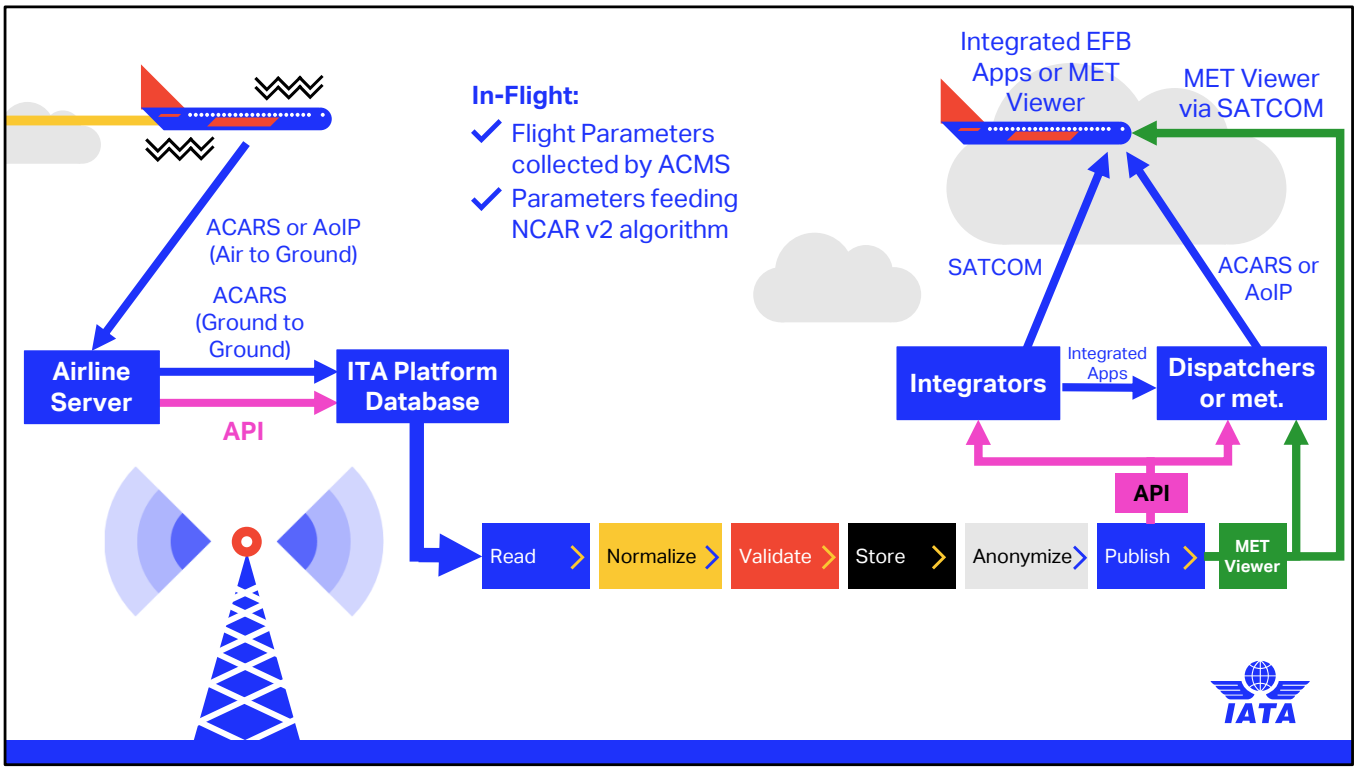
- Airlines continue to own their data even after they join the program. We have strict release policies in place put together with an Advisory Group consisting of airlines part of the program;
- The integration with in-house or third-party applications allow pilots, dispatchers and flight planners to access the EDR Turbulence Aware data in these applications directly as an additional data layer, together with all the other weather information they are getting from these apps. This eliminates the need for additional screens in the flightdeck or at the dispatch level;
- Each report includes the following parameters: observation time, report age, altitude, coordinates, peak and mean EDR values, wind direction, wind speed and air temperature.



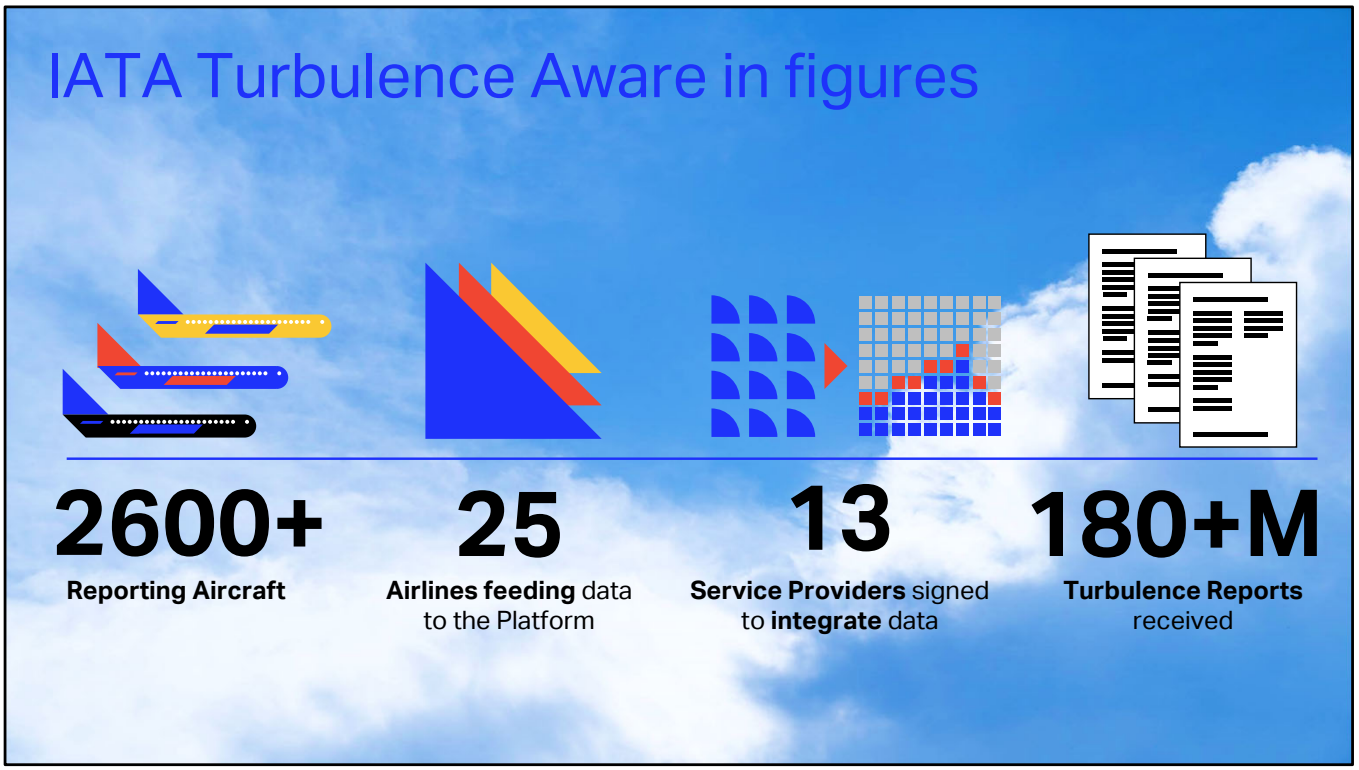
- This is a screenshot of the IATA MET Viewer, our URL based in-house application.
- The screen represent EDR reports generated by over 2,600 aircraft that are currently part of the program.
- With Turbulence Aware we now have a precise location and an objective intensity value of the turbulence events.
- A demo of the IATA MET Viewer will be provided later on in the presentation.



- The software starts working from the moment the aircraft takes off till the moment the aircraft lands;
- Wi-fi is not required to generate the data, the system works in the back-end and generates the data in real time;
- The data is transferred from the aircraft to the Airline server via ACARS or ACARS over IP (AOIP);



- From the Airline server, the data is transferred to the IATA Turbulence Aware (ITA) platform database, where there is a whole process in place;
- The data is read, normalized, validated, stored, anonymized – in less than 1/3 of a second, and
- The data is published for consumption to the airlines part of the program
- If Wi-Fi is available in the flightdeck – the pilot can consume the data in real time, either through an application we are fully integrated with, or through the IATA MET Viewer;
- If Wi-Fi is not available in the flightdeck, the most common use case is for the dispatchers to monitor the flights through an application we are fully integrated with, or through the IATA MET Viewer and communicate with the pilot through ACARS messages in case of an event reported in front of the aircraft



- We currently have over 2,600 aircraft actively reporting data in the program;
- We started in 2019 with 2 airlines, we are at 25 currently involved with the program;
- There are13 integrators / application providers currently involved with the program;
- Over 180 million turbulence reports since the program's inception.

Implementation options

Implementation options depend on the airframe and the avionics:

OEMs	Teledyne	In-house (Teledyne Hardware)
AIRBUS, BOEING	TELEDYNE TECHNOLOGIES INCORPORATED	

In-house option: The Turbulence Aware Team can assess an airline's fleet and advise on viable options.

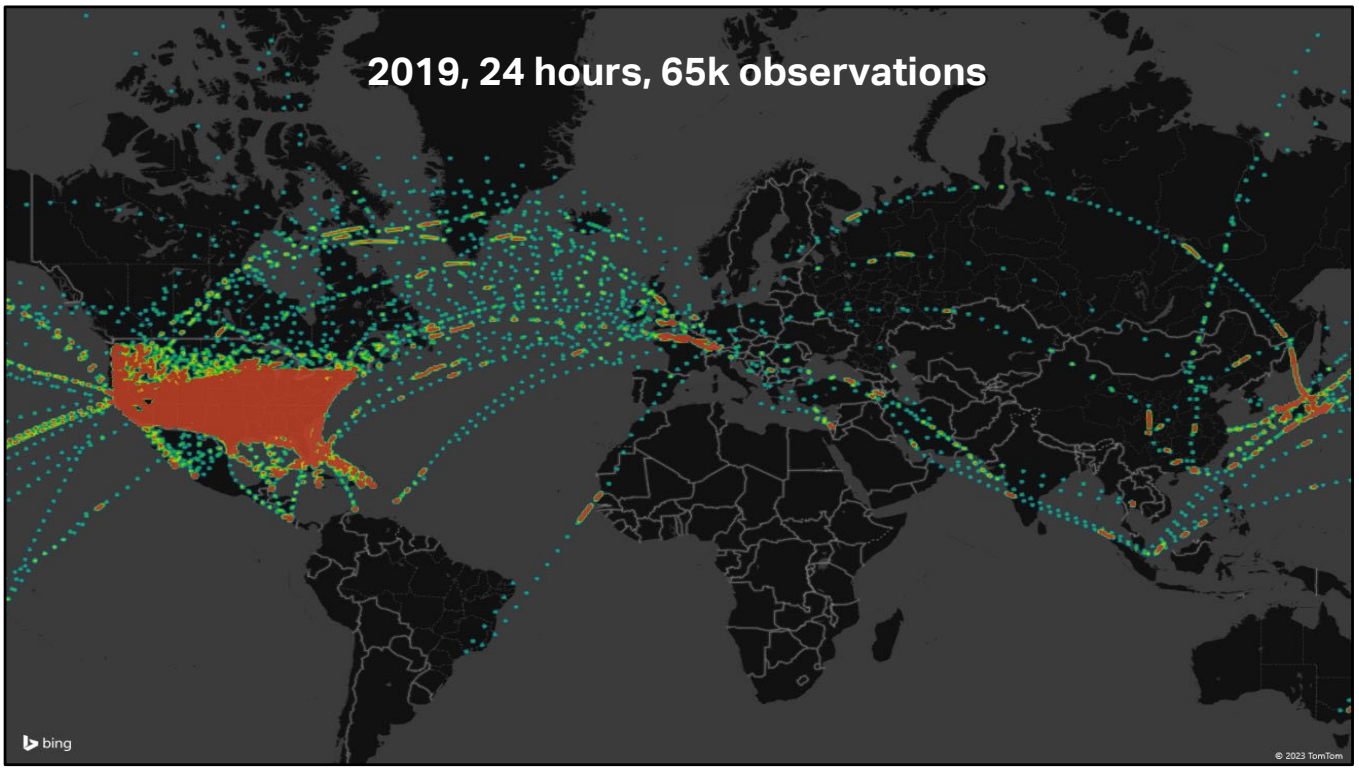
IATA provides the NCAR EDR source codes, documentation and coordinates with NCAR to validate the installation.

IATA

- The EDR solution is provided by:
- Boeing - offering the solution for the B737 MAXs, B777s and B787s.;
- Airbus - retrofit and linefit for the A350s, the solution for the A320s and A330s is expected to be fully rolled out by the end of the year;
- Teledyne can be used for most aircraft;
- In-house solution implementation is also available, IATA provides the codes and coordinates with NCAR for the validation

Integrators onboard

Integration fully completed	Currently in development	Ongoing discussions
SITA CAE GeoRobotiX FL/GHTKEYS skyconseil JEPPESEN The Weather Company TXT PACE Lufthansa Systems	LAMINAR AVIATION BCI APiJET STORKJET	NAVBLUE AN AIRBUS COMPANY AVIOBOOK


2019, 24 hours, 65k observations
bing
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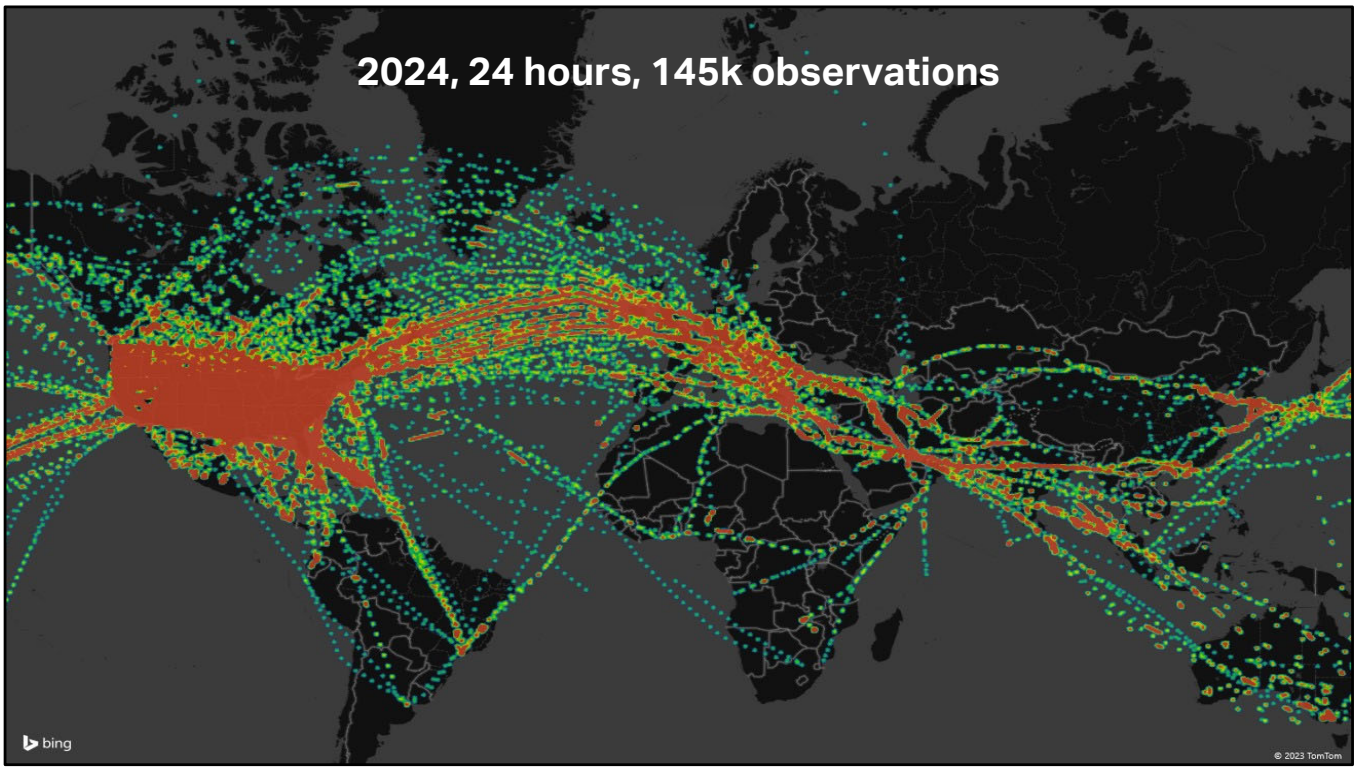
2024, 24 hours, 145k observations
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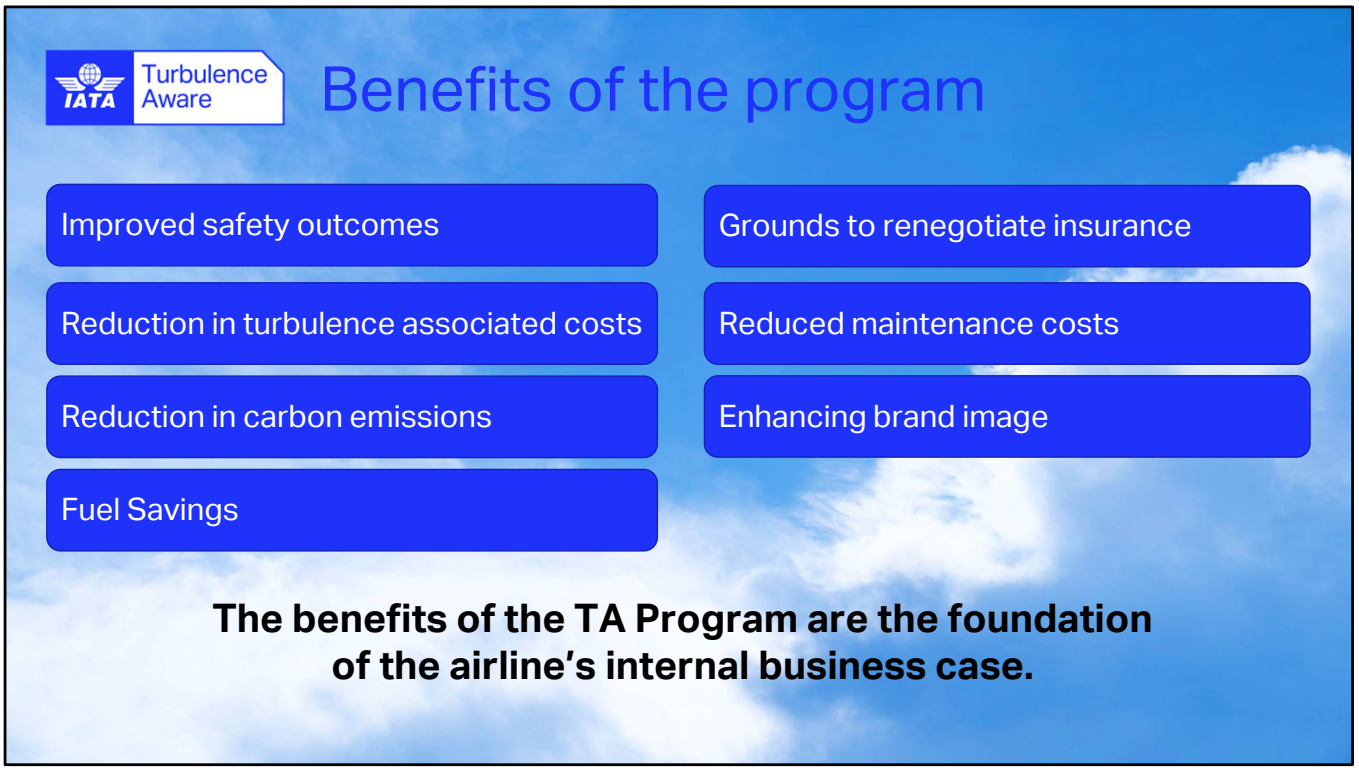


These are just a few key examples however as we have seen there are many other benefits. Let's go through these one last time to review:

Direct Potential Benefits:

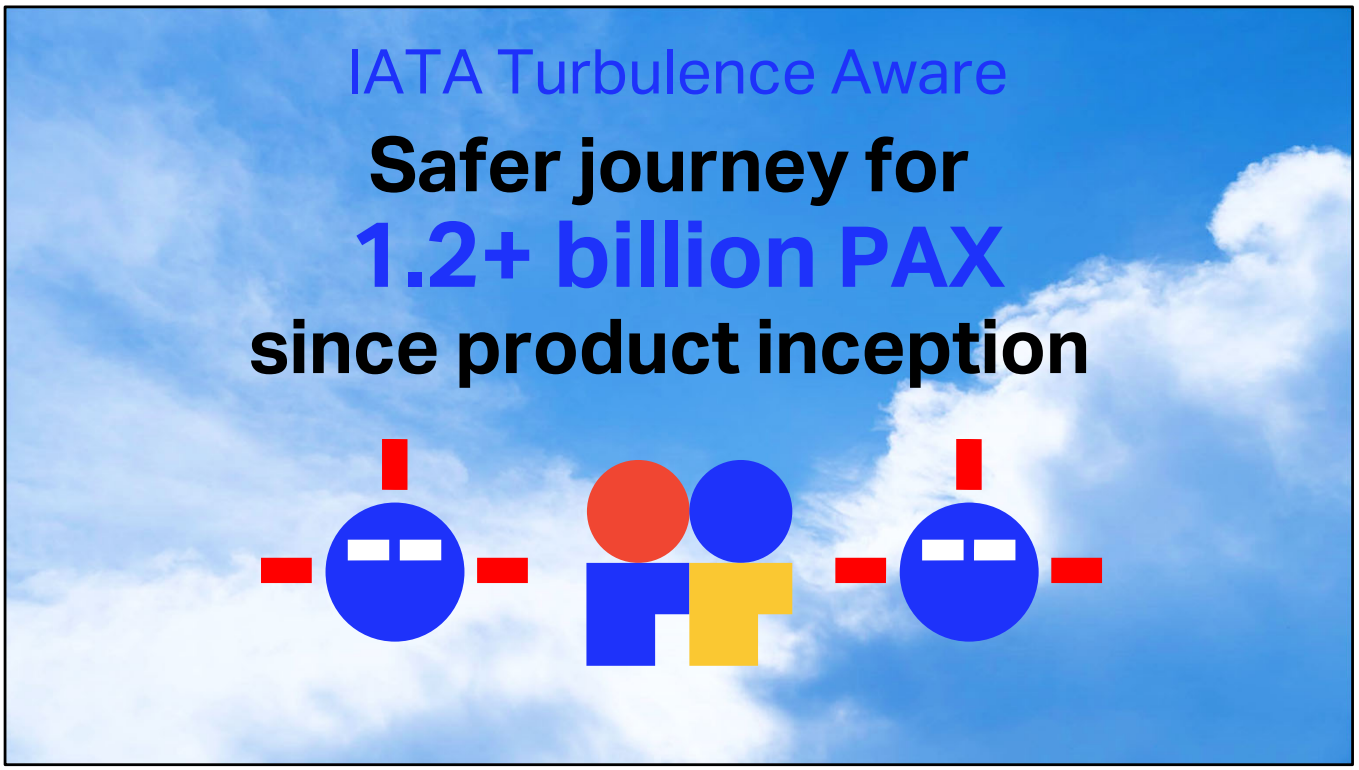
1. Additional reduction in turbulence related flight attendant and passenger injuries
2. Fuel savings in reduced off optimum altitude flying, while attempting to find smooth air with less complete and or less defined turbulence information
3. CO2 emission reduction will be realized and IATA typically uses a multiplier of 3.16 times the weight of fuel savings.

Indirect Potential Benefits:

- Reduced costs of Insurance
- Reduced costs of maintenance

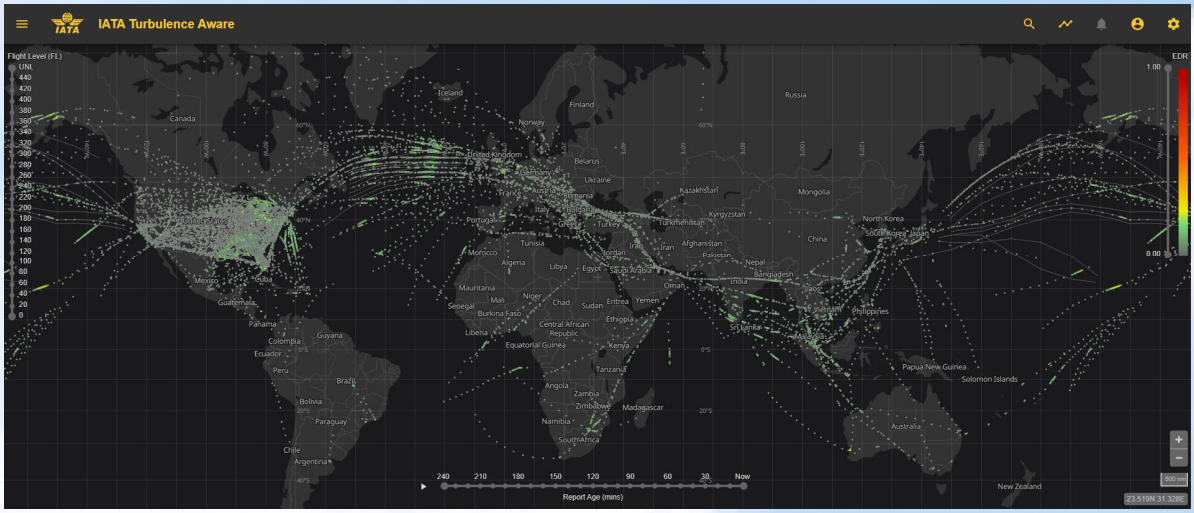
Communication in between flight crew and cabin crew:

- Anticipated turbulence - Where turbulence is unavoidable, the flight crew should advise the cabin crew as far in advance as possible; The SCCM (Senior Cabin Crew Member) should determine if alterations to service are necessary to mitigate the potential of injury during services;
  Unanticipated turbulence - Operators should ensure that this is included in the risk assessment relating to onboard service;
- Many benefits of the platform which can be outlined by the above – IATA's incentive is to increase safety while simultaneously enhancing fuel efficiency environment impact and associated problems with turbulence. As we move forward with the platform – more and more is learned and we are able to understand use cases and more benefits on which this platform can facilitate

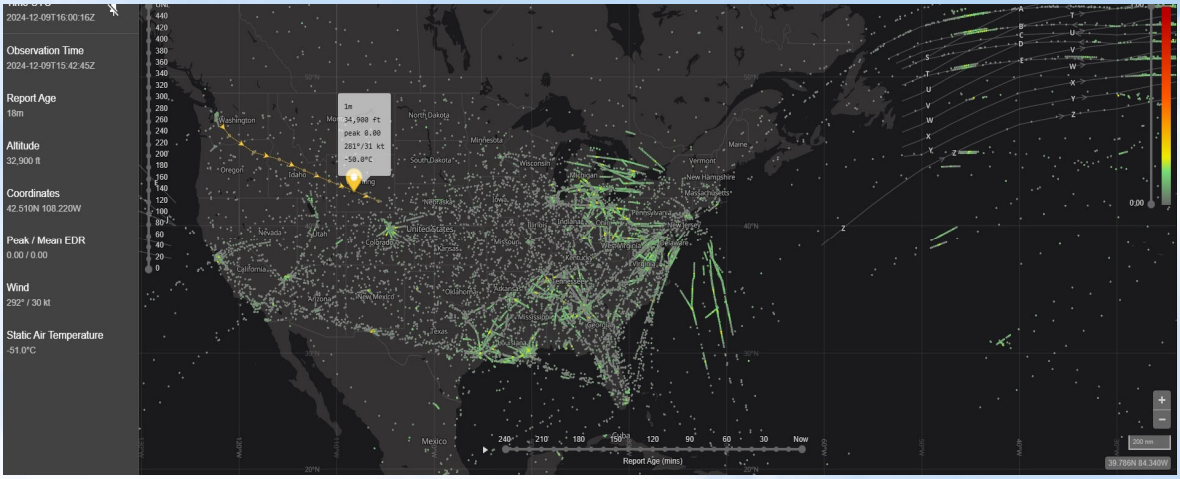

IATA Turbulence Aware
Safer journey for
1.2+ billion PAX
since product inception

IATA MET Viewer

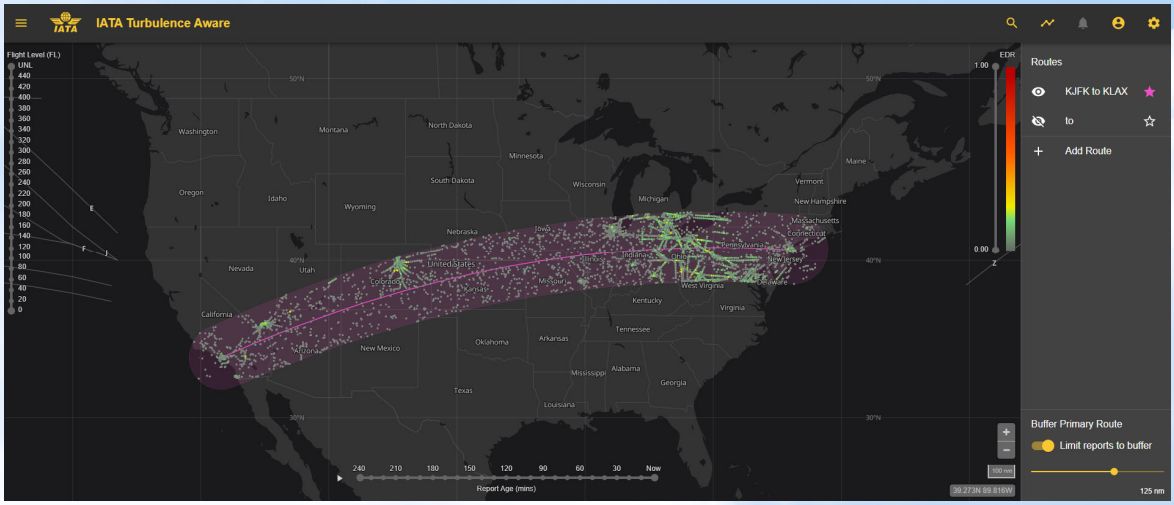
IATA MET Viewer – global view



IATA MET Viewer



IATA MET Viewer – Flight Plan function



Q&A
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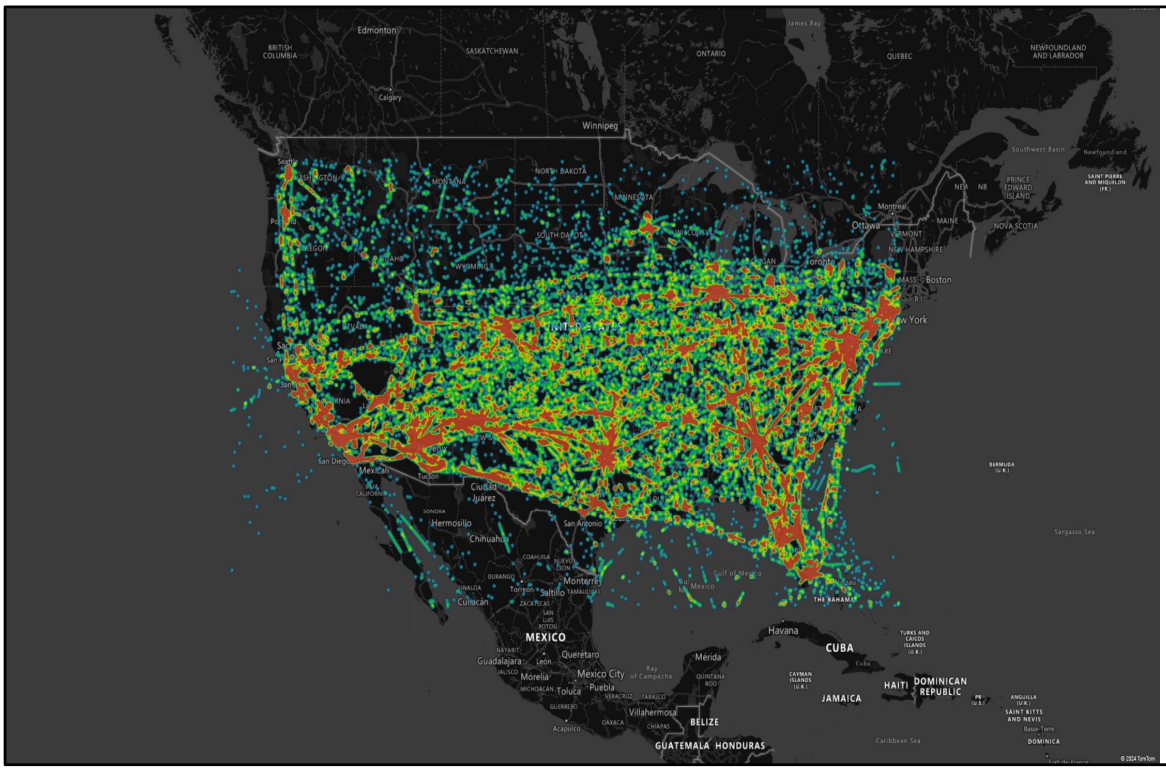
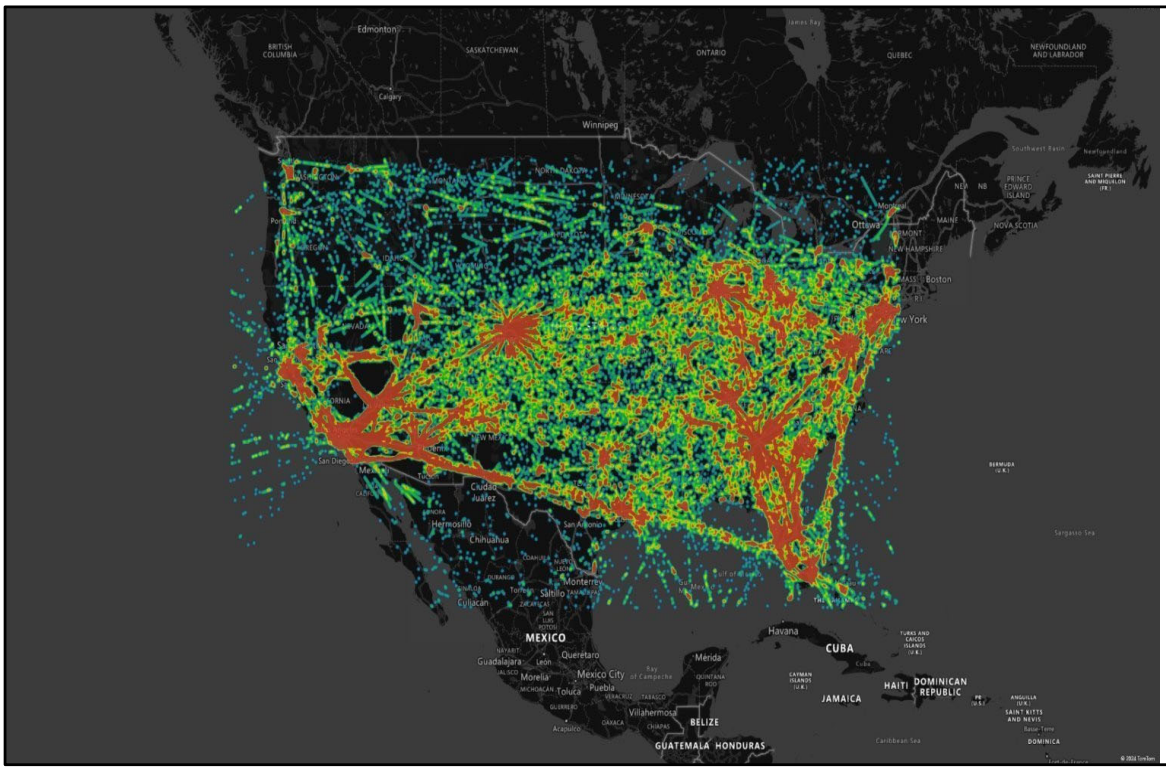
Turbulence
Aware

Appendix



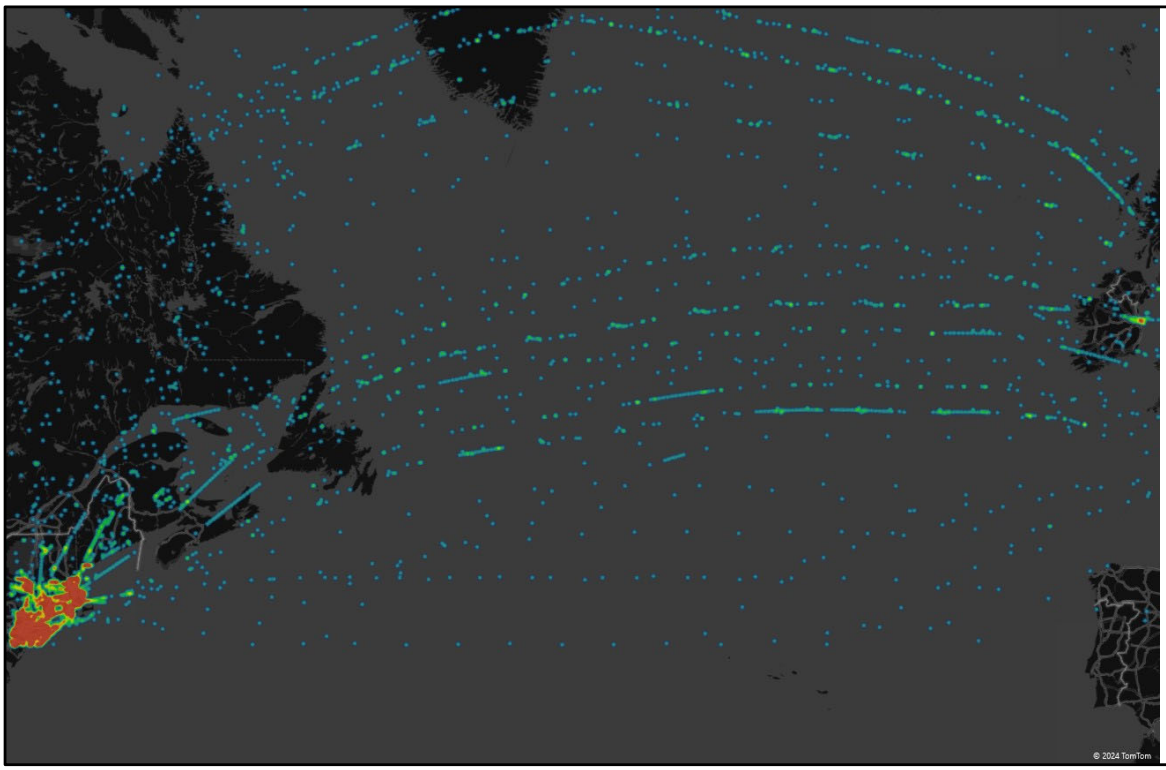
USA
2019, Nov
24 hours

75k observations



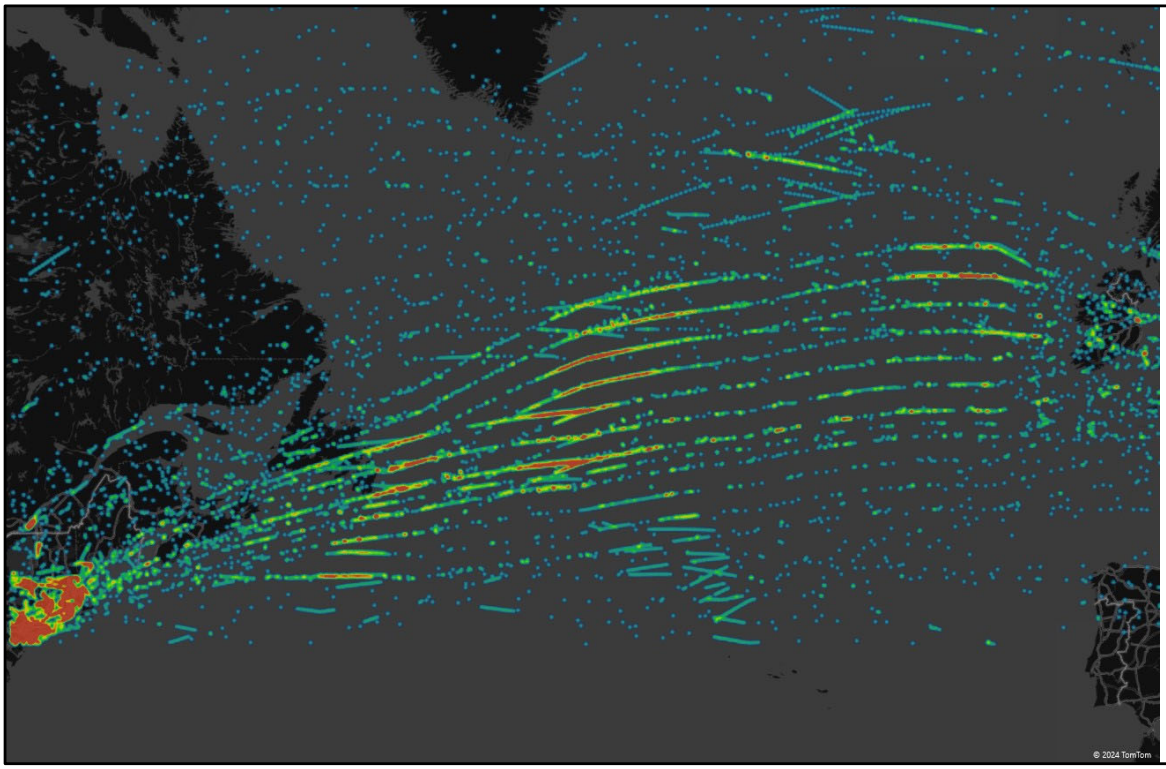
USA
2024 , Nov
24 hours

90K observations



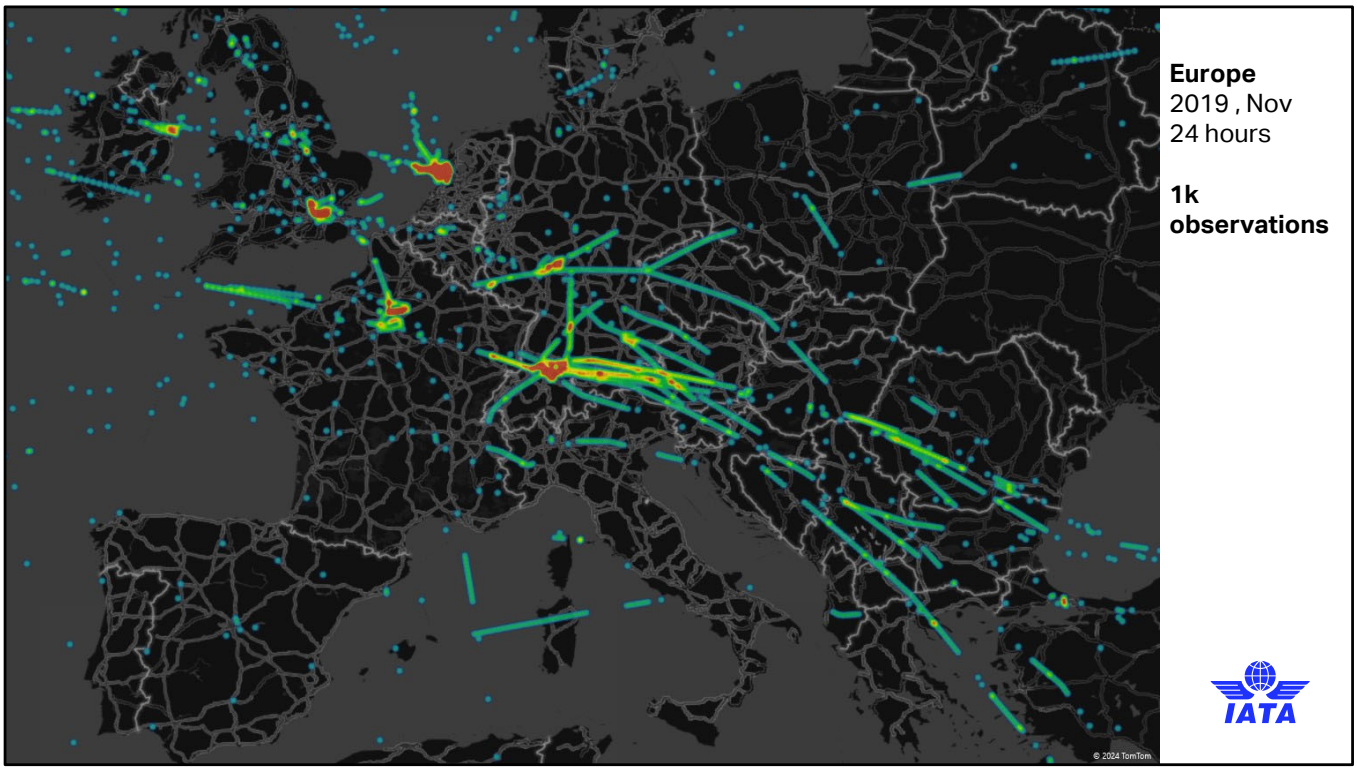
NATs
2019, Nov
24 hours

8k observations



NATs
2024 , Nov
24 hours

19k observations


Europe
2019 , Nov
24 hours
1k
observations
IATA
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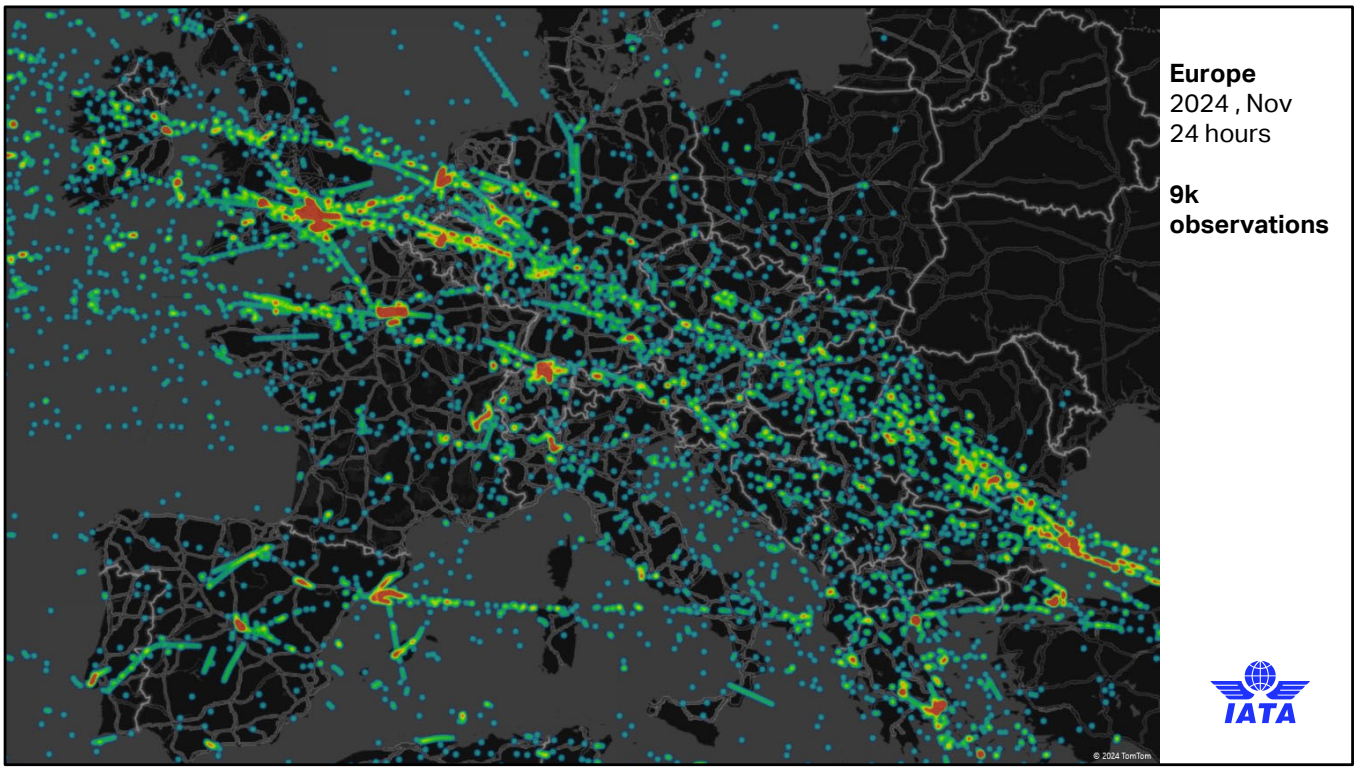
Europe
2024 , Nov
24 hours
9k
observations
IATA
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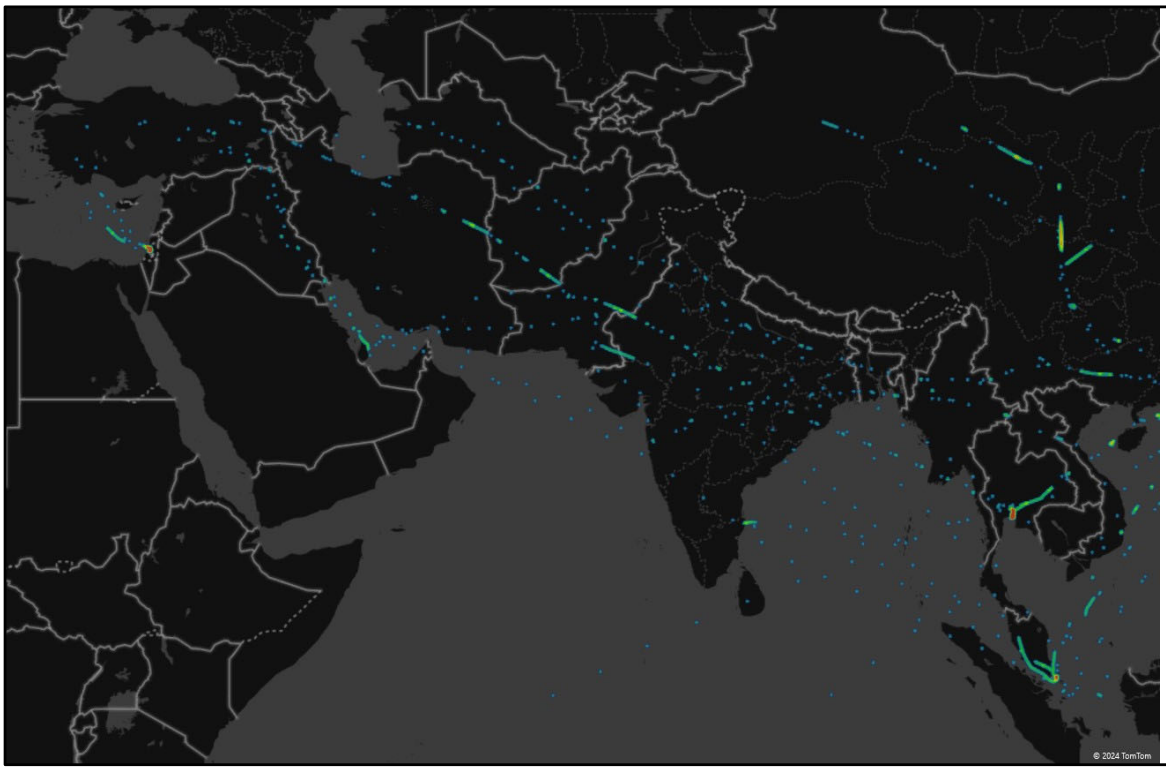
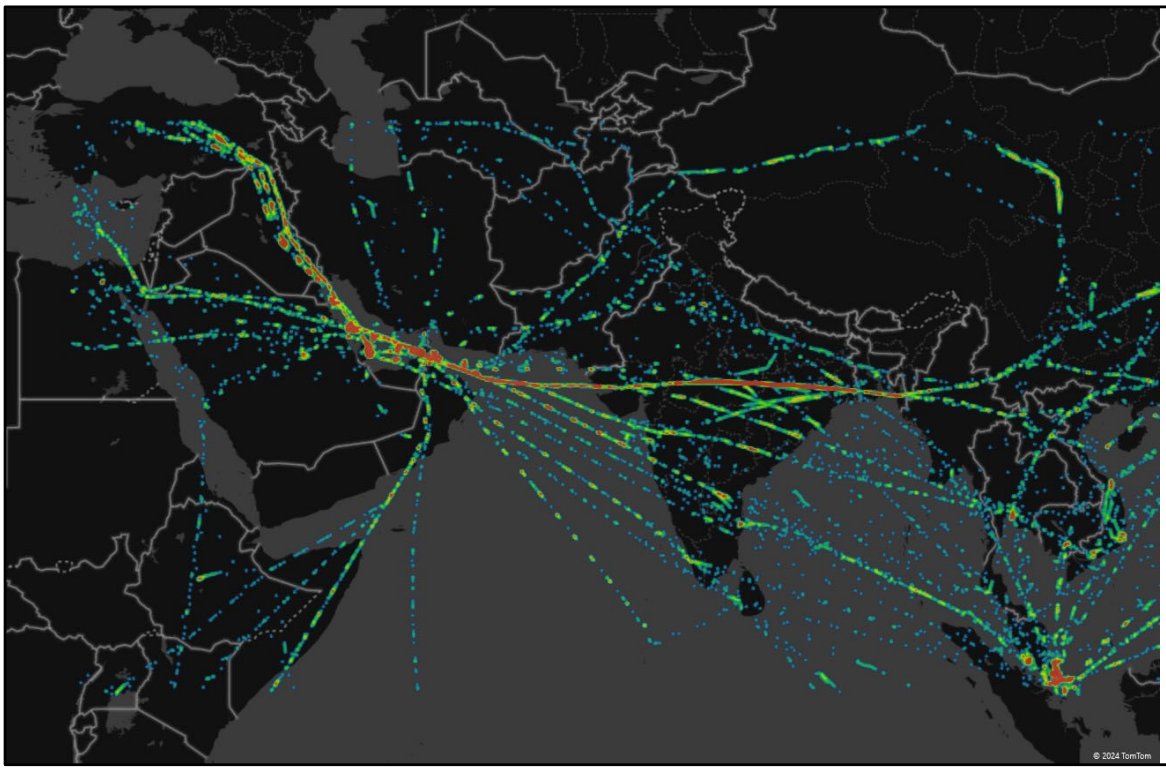


Middle East and South Asia
2019 , Nov
24 hours

2k observations



Middle East and South Asia
2024 , Nov
24 hours

15k observations