

Cockpit Weather Existing Capabilities vs. Future “Must Haves”

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Weather Importance

- Weather information is still one of the most important pieces of information pilots need for their daily operations - not just to meet the regulation but to maintain safety of flight

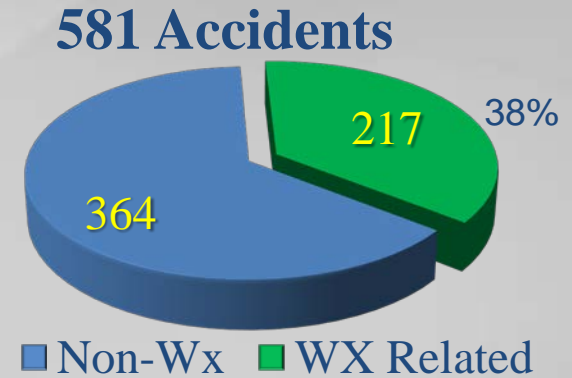
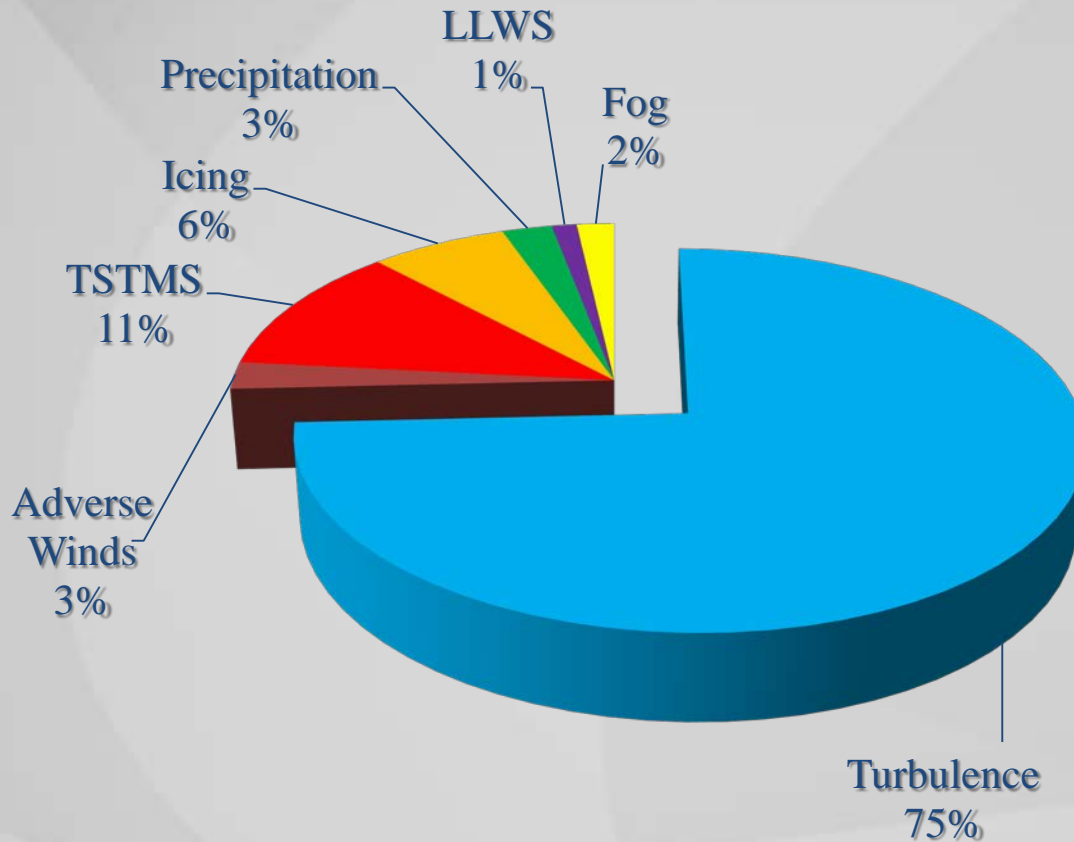


By Regulation

- §121.613 Dispatch or flight release under IFR or over the top
 - no person may dispatch or release an aircraft for operations under IFR or over-the-top, unless *appropriate weather reports or forecasts, or any combination thereof*, indicate that the weather conditions will be at or above the authorized minimums at the estimated time of arrival at the airport or airports to which dispatched or released.



Part 121 Air Carrier Weather Related Accidents 2000 - 2016



- ### Weather Factors
- Turbulence
 - Adverse Winds
 - Thunderstorms
 - Icing
 - Precipitation
 - LLWS
 - Fog



2016 Part 121 Air Carrier Accidents

- 29 Accidents

- **Turbulence** **15**
- Engine Failures/Fires 4
- Gear Issues 3
- Ground Collisions 2
- Overruns - Wet/Contaminated RWY 2
- Rapid Decompression 1
- Landed Wrong Runway 1
- Tail Strike - Adverse Winds 1



Turbulence Events

- 15 Turbulence events with 14 serious and 60 minor injuries officially reported in NTSB data base. Many other incidents with minor injuries not included in data base.



Gaps in Forecast Accuracy/Information

- There is still a significant gap in forecast accuracy for adverse weather conditions in the following areas
 - Turbulence
 - Icing
 - Volcanic Ash Detection
- These areas still pose a significant operational safety hazard to the flying community and further research needs to continue in order to improve the efficiency and safety of flight

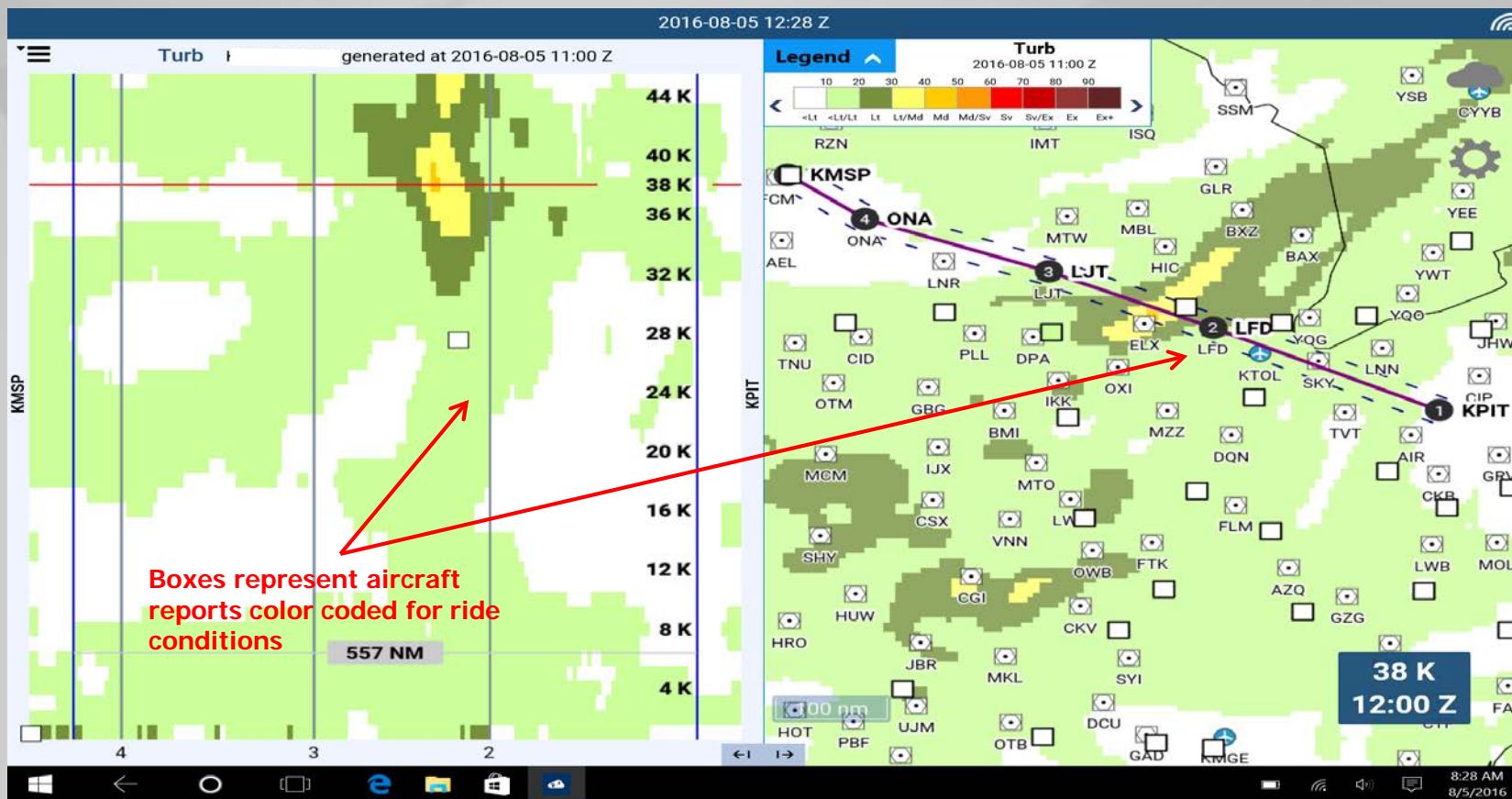


Turbulence Information

- Predicting the where, when and intensity of turbulence is notoriously difficult to do. But Delta has developed a new, industry-leading app that's helping pilots better spot and avoid it.
- Delta's Flight Weather Viewer app provides pilots with real-time graphics of turbulence observations and forecasts on the flight deck.



Tool in the Cockpit for Operational Decisions



Reports Validate Forecast and Facilitate Operational Decisions

The screenshot displays a flight data interface. On the left, a table lists turbulence reports for an aircraft on August 5, 2016. The table has columns for Time, Date, Lat / Long, Alt. Ft., Winds Kts, Temp °C, and Peak / Avg. A red arrow points from the text 'This is the actual turbulence level' to the 'Peak / Avg' column of the last row. Another red arrow points from the text 'Touching "View Report" when a report box is opened displays the Turbulence Report history of the aircraft.' to the 'View Report' button in a popup window on the right. The popup window shows details for a report at 11:55Z on 08/05 at location 41.982, -87.997, with a peak turbulence level of 16 and an average of 10. The background is a map of the United States with various airports marked. A '38 K 12:00 Z' box is visible in the bottom right of the map area.

Time, Date	Lat / Long	Alt. Ft.	Winds Kts	Temp °C	Peak / Avg
11:55Z, 08/05	41.982 / -87.997	3,000	278° / 24	19°C	16 / 10
12:09Z, 08/05	42.13 / -89.92	31,900	281° / 48	-35°C	2 / 0
12:24Z, 08/05	42.17 / -92.1	32,000	277° / 54	-33°C	2 / 0
12:39Z, 08/05	43.44 / -93.25	26,300	279° / 58	-22°C	4 / 2
12:54Z, 08/05	44.67 / -93.19	4,700	319° / 22	12°C	0 / 0
12:59Z, 08/05	44.852 / -93.233	1,100	326° / 14	18°C	16 / 12

This is the actual turbulence level

Touching "View Report" when a report box is opened displays the Turbulence Report history of the aircraft.



Future Advancements - Turbulence

- GTG Nowcast

- NEXRAD Turbulence Detection Algorithm combined with existing aircraft EDR reports fed back into the model makes it smarter
- Delta Airlines helping to validate this product domestically
- Need to move this technology into the Global GTG-N



Future Advancements Needed

- Over the next 5 to 10 years, technology advancements would help increase safety and efficiency relative to weather information in the cockpit
- ALPA would like to see advance detection and warning of High Altitude Ice Content (HAIC) provided to the flight crew



Validation is IMPORTANT

- With advancement, validation and verification of products is key to pilot and flight crew acceptance.
- In order for something new to be accepted within the operational environment of the carrier, long term studies and proven safety enhancements are needed in order for the company to adopt new safety information.



PIREP Information Critical

- Verification of upper-air forecasts as well as fill gaps in ground-station coverage
- NWS can only improve the system when it has accurate information—and reporting from pilots is key
- The more frequently pilots provide accurate inflight information, the more NWS can learn about unexpected conditions and, more importantly, refine its forecast models



PIREP Information

- ALPA strongly believes that more PIREP information and data sharing of PIREP information is critical to safety of flight
- Holding this information to gain a competitive advantage creates a negative environment in the long run and withholds critical safety information from those that need it most



Integrating Weather Information

- The more information and data that is integrated into avionics, the less workload it becomes for the flight crew
- Weather information combined with other flight information will minimize the workload and decision making for the crew and ultimately enhance safety and efficiency



Summary

- Weather information critical to aviation safety and helps compute aircraft performance for takeoff, landing and safe route selection
- Turbulence information helps find smooth air and reduce passenger/FA injuries.
- PIREP data helps pilots with detailed information for each phase of flight
- Integration helps decrease pilot workload and increase safety and efficiency



Together we are making a difference

THANK YOU



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