Airborne Observations: Unlocking the possibilities

Friends and Partners in Aviation Weather

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UNITED

Airborne Observations (AbO)

- Communications and sensing technologies are enabling new and improved weather sensing from aircraft
- RTCA DO-360, “Standards Development Activities for using Near Real-Time Aircraft-Derived Data in future applications” describes the need and potential uses for AbO
  - RTCA DO-360 was motivated by the ConOps described in RTCA DO-339, “Aircraft Derived Meteorological Data via Data Link for Wake Vortex, Air Traffic Management and Weather Applications – Operational Services and Environmental Definition (OSED)”

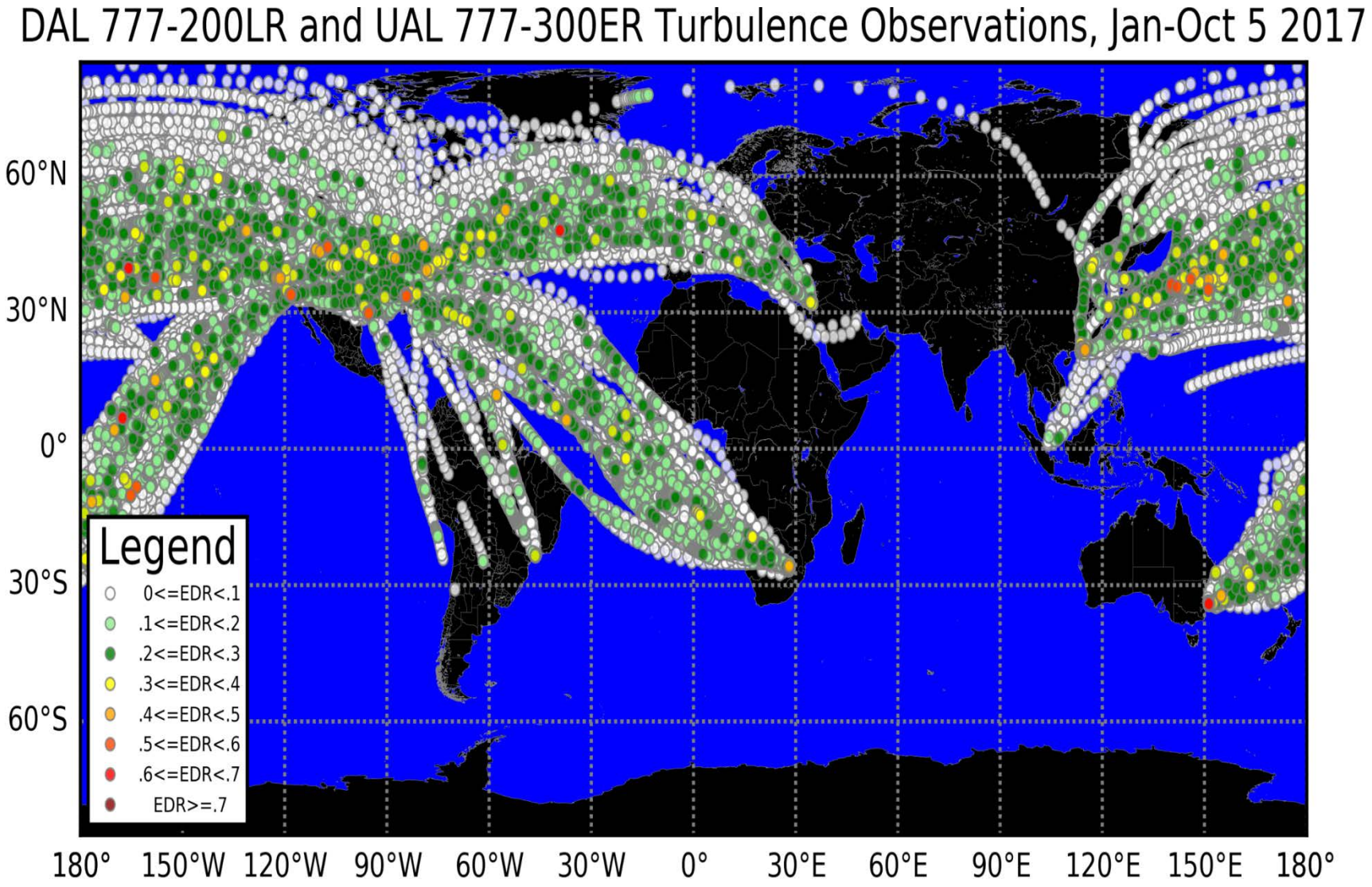
United Airlines current AbO participation

- United currently participates in Meteorological Data Collection and Reporting System (MDCRS) via Aircraft Communications Addressing and Reporting System (ACARS)
  - Reports wind and temperature
  - Latency is too high for “real time” use
- United also reports turbulence using two different algorithms
  - The Weather Company’s Turbulence Auto PIREP System (TAPS) installed on 90 Airbus 319/320 aircraft
    - Only distributed to customers of the Weather Company, and shared with the National Weather Service
  - Boeing Eddy Dissipation Rate (EDR) algorithm installed on 14 B777-300ERs
    - Shared with Boeing and The Weather Company

AbO issues

- For airlines to get the most out of AbO, it must be “operationalized”, i.e. used to send alerts to aircraft or used by dispatchers to modify flight plans
  - AbO via MDCRS has too much latency for “real time” use
  - AbO via TAPS has low latency, can be used to alert proximate aircraft
    - Installing the TAPS algorithm in the aircraft requires it to be woven into the software already resident in the Digital Flight Data Acquisition Unit (DFDAU)
    - After embedding the software, the algorithm must be validated that is working properly
    - Turn time to correct software and try a new load is 3-4 weeks
  - AbO via Boeing EDR algorithm also uses ACARS, but it could use other links off of the aircraft, and even using ACARS it is sent near “real time”, so it can be used to trigger alerts

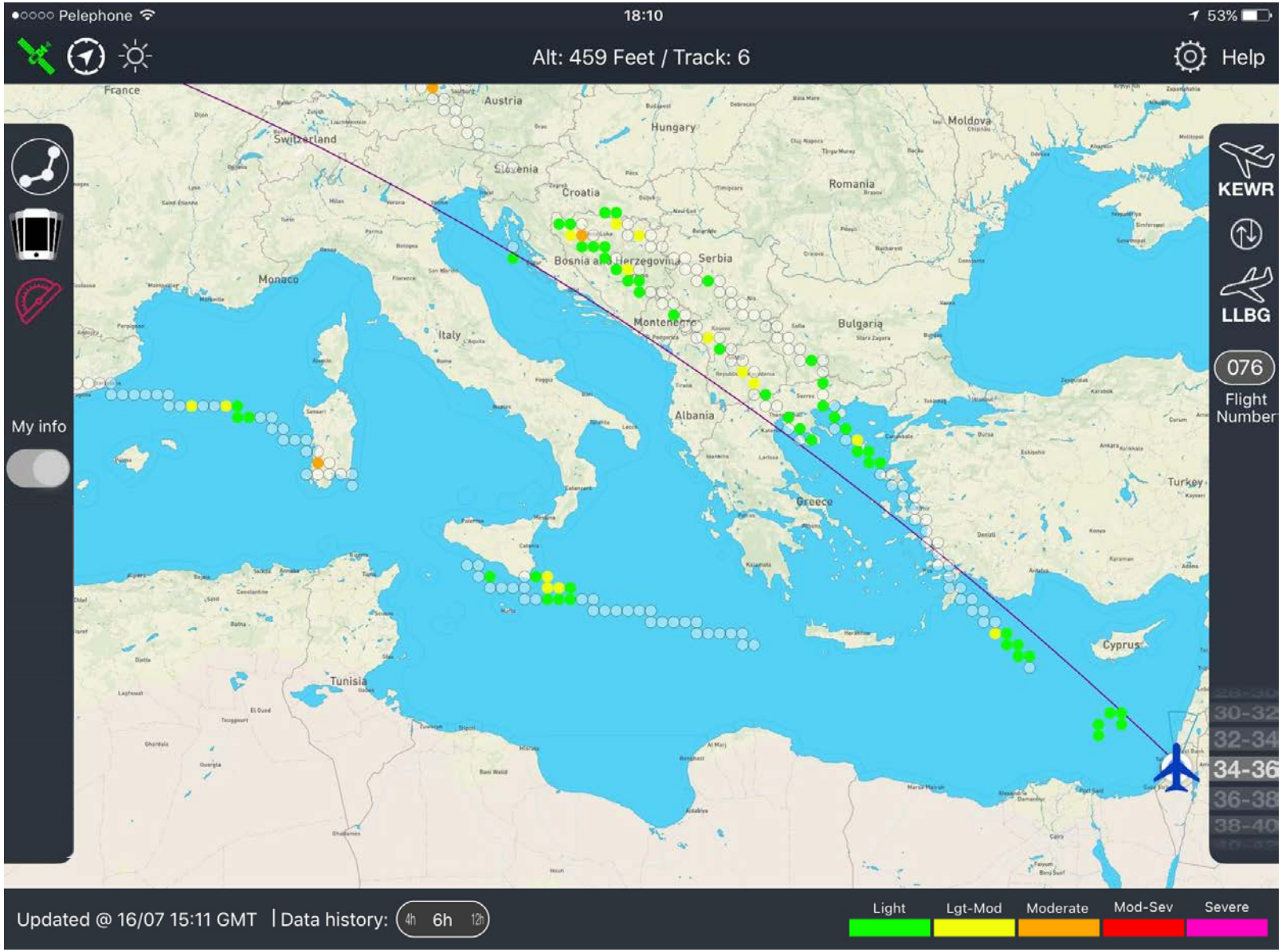
Boeing EDR algorithm from UAL and DAL aircraft



Another AbO possibility

- Skypath App by Yamasee
  - Uses iPad accelerometers to measure turbulence
    - iPad accelerometers are very accurate and run at 100 Hz
    - Intentional iPad motion must be filtered out
  - Uses the passenger Wi-Fi network to offload the data “real time” and download data from other aircraft
  - Greatly simplifies the task of gathering “real time” turbulence data versus installing algorithms in the DFDAU or other aircraft systems
  - Once shown to work, an entire airline could be equipped with turbulence sensing in a matter of days

Skypath App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Conclusion

- Beyond the value of initiating numerical weather models, AbO information must be “operationalized” to be useful
- The Yamasee Skypath App could revolutionize turbulence sensing and reporting from aircraft
- Much simpler than installing software resident in aircraft systems
- We still need other AbO technologies for wind, temperature, and humidity