Strengthening the CDM triad:
A view from the cockpit

Captain Rocky Stone
Chief Technical Pilot
United Airlines

Friends and Partners in
Aviation Weather
July 21, 2010

NextGen Weather Concept

- Current NextGen weather conops emphasizes ground based decision support tools
  - Integrating the cockpit into the Collaborative Decision Management (CDM) process is critical to achieving improved system performance during convective weather events
    - Pilots still have the ultimate authority for if they will fly in a certain area
    - Updated graphical weather displayed in the cockpit increases the probability that aircraft will be able to fly where it is predicted that they will fly

Graphical weather in the cockpit

- A game changer!
  - Updates while airborne via data-link
    - Situational Awareness - no longer limited to the preflight weather briefing
    - Graphical updates while airborne
    - Much more effective than voice or textual updates via Flight Watch or Dispatch
  - Having the cockpit updated to the same level as ATC and dispatch allows for more efficiency while improving safety

Weather Data Link Standards – RTCA SC206

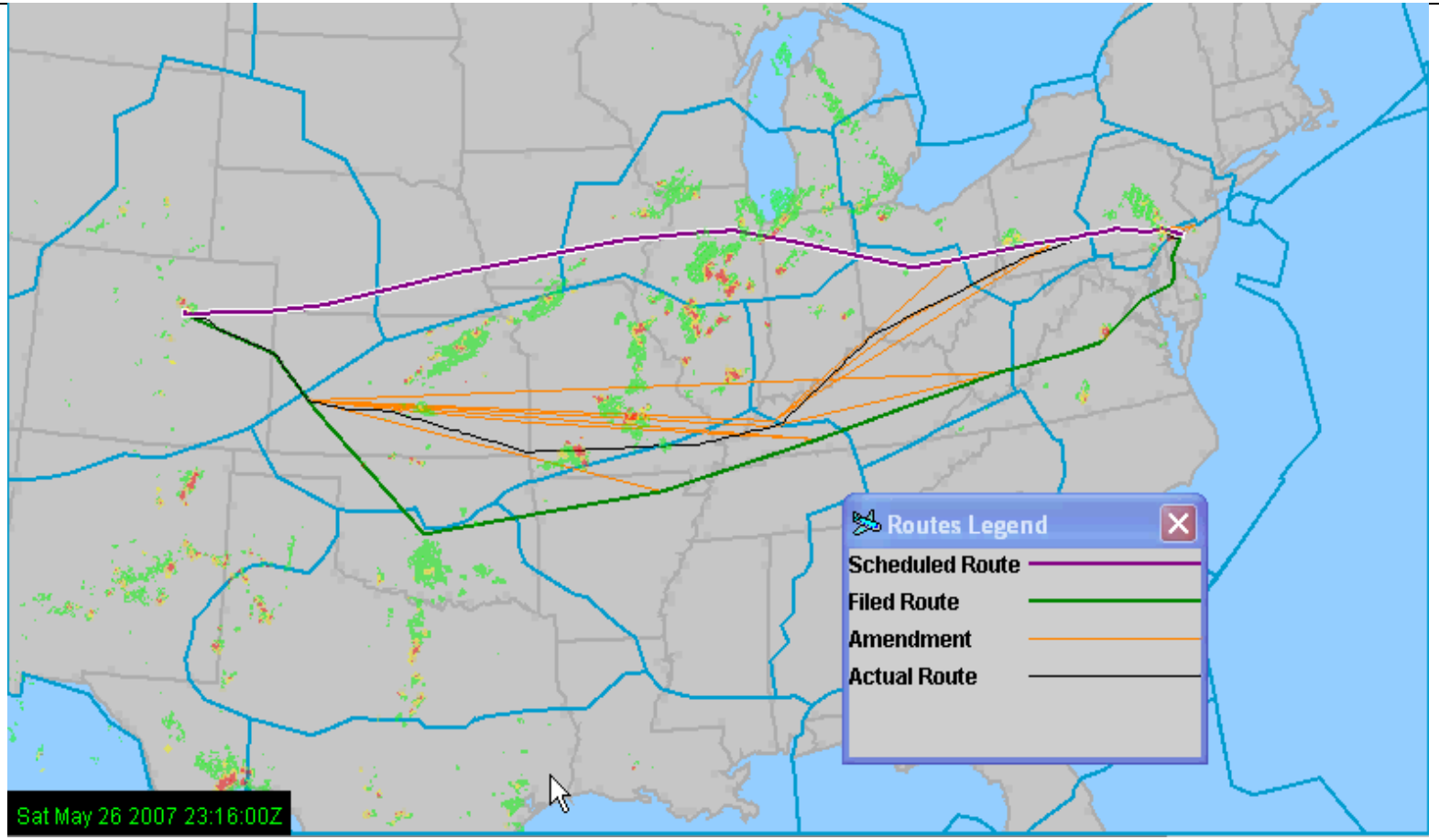
- Why work on Meteorological Data Link Standards?
  - Market forces have already created weather data link systems
    - Will these existing data links get us where we want to go?
  - The process to approve new weather products for use on data links systems is cumbersome
    - Weather science has advanced to the point where there are many new weather products
  - New data links standards can spur innovation by streamlining the operational approval process

Examples of Meteorology data link applications:

- Better tactical decisions when deviating around convective weather (efficiency):
  - EFB displays with long range convective weather
  - Allows for strategic decisions with our dispatchers and ATC
  - Gives pilots a better tool to advocate for a more efficient solution
- Potential turbulence products for uplink (safety):
  - Graphical Turbulence Guidance
  - Turbulence Remote Sensing
    - NCAR's NEXRAD Turbulence Detection Algorithm
  - Oceanic Cloud top uplinks

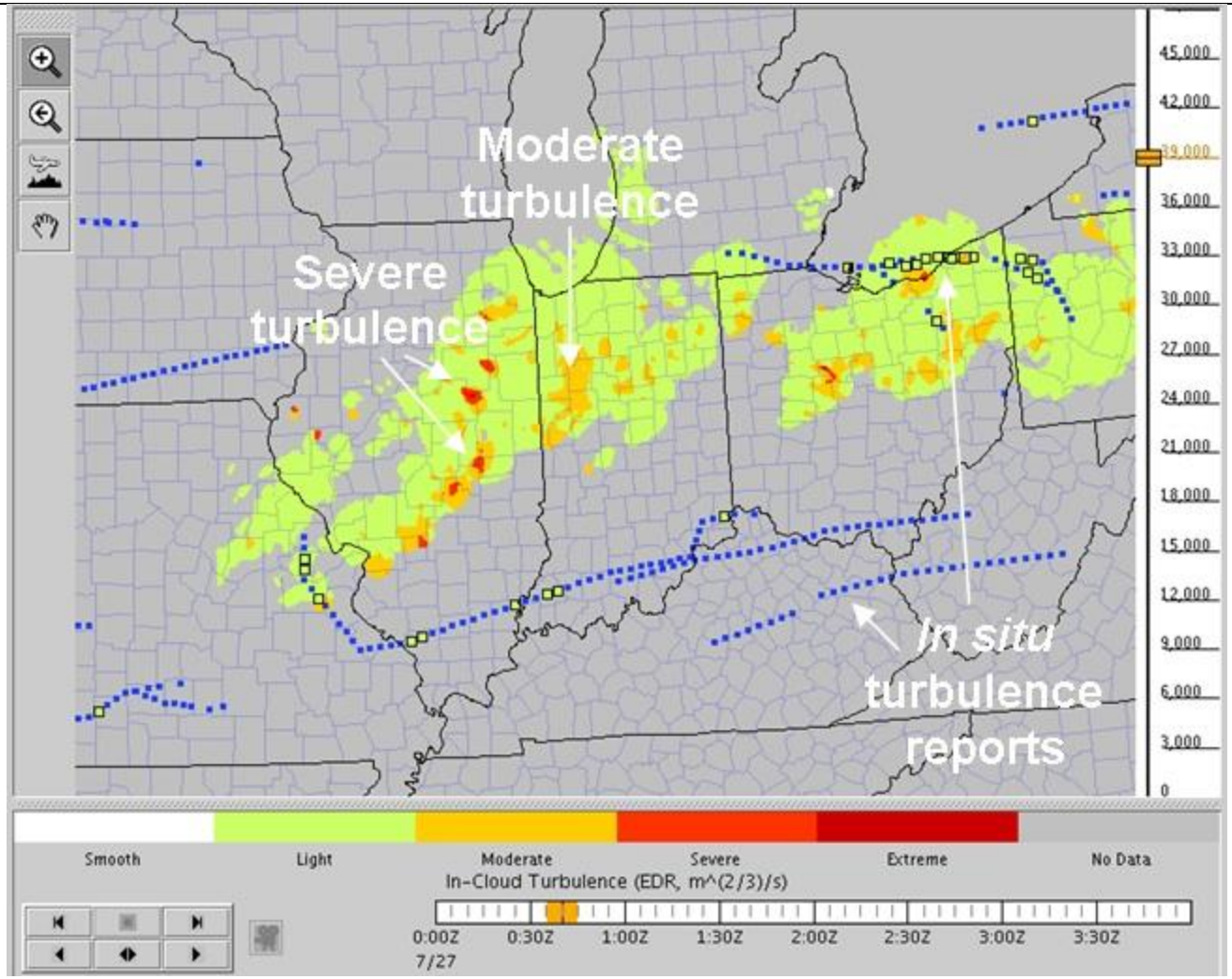
Longer range weather – beyond the airborne weather radar

An Example of convective weather reroute savings



- Normal flight plan time = 3:00
- Playbook routing flight plan time = 3:45
- Actual flight time = 3:20

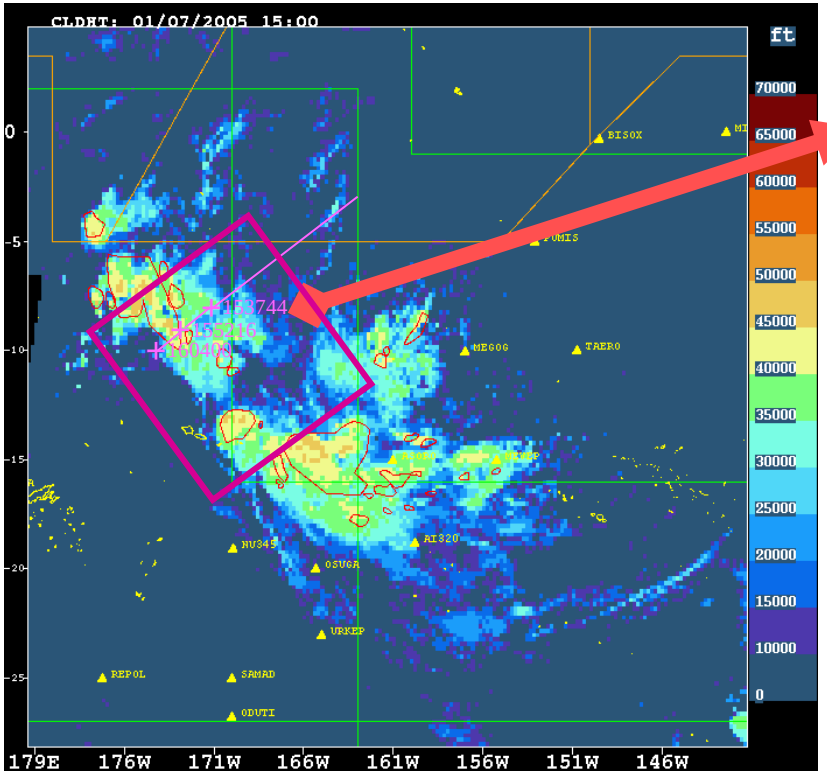
Turbulence remote sensing: in-cloud turbulence

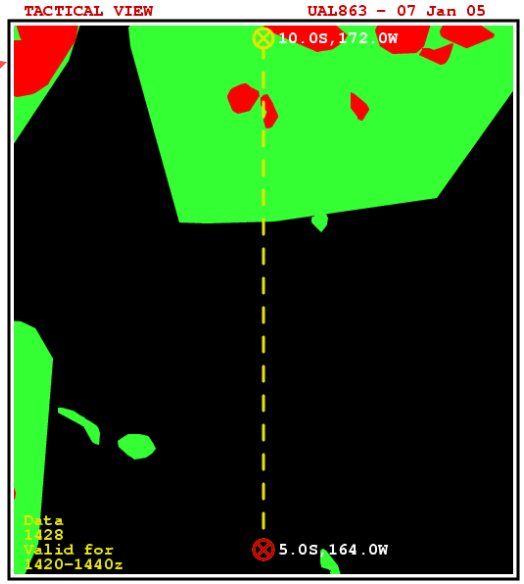


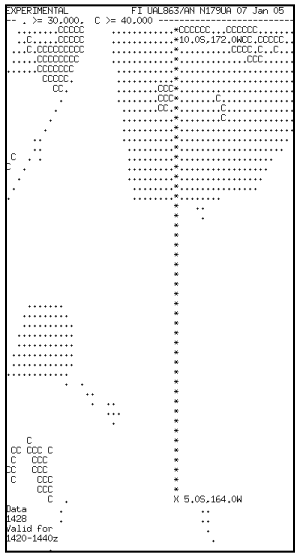
Oceanic graphical weather updates

- Convection in remote areas, especially over the inter-tropical convergence zone, can be difficult to paint with weather radar
  - Low moisture content in the upper stratosphere
  - Current pilot technique:
    - Turn off all cockpit lights, and look out the window! (doesn't work all that well without moon illumination)
  - Oceanic graphical weather updates critical to improving crew situational awareness that there is convective weather ahead

Oceanic cloud top uplinks:







Both Display formats available with EFB

Current ACARS display

Conclusions

- Increasing the “real time” graphical weather information in the cockpit will improve capacity, efficiency, and safety during convective weather events, and is especially important for operations in remote areas
- NextGen conops needs to acknowledge the necessary role of graphical weather information in the cockpit to achieve expected NextGen efficiencies during convective weather events

Thank you!

Contact Information

Captain Rocky Stone
Chief Technical Pilot
United Airlines
Flight Standards and Technology
1200 E. Algonquin Rd.
Elk Grove Village, IL 60007 USA
1 (847) 700-6463

rocky.stone@united.com