

Strengthening the CDM triad: A view from the cockpit



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***Friends and Partners in
Aviation Weather
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NextGen weather concept

- Current NextGen weather concepts 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, beyond the range of the airborne weather radar
 - 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

Potential uses of graphical weather in the cockpit:

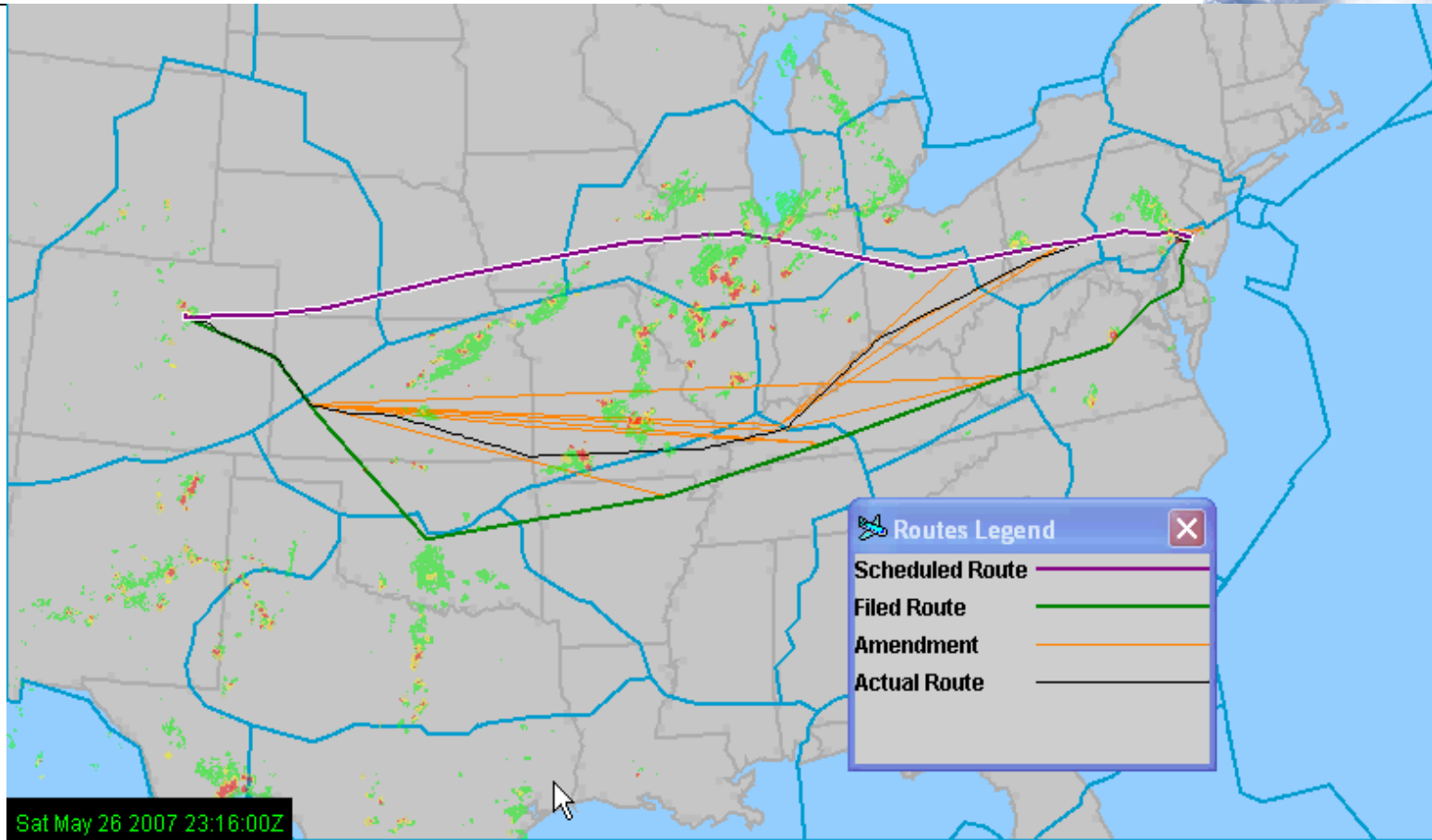


- Better tactical decisions when deviating around convective weather (efficiency):
 - ▶ EFB displays with long range convective weather
 - ▶ Allows for strategic decisions in coordination with dispatchers and ATC
 - ▶ Gives pilots a better tool to advocate for a more efficient solution
- Potential turbulence 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

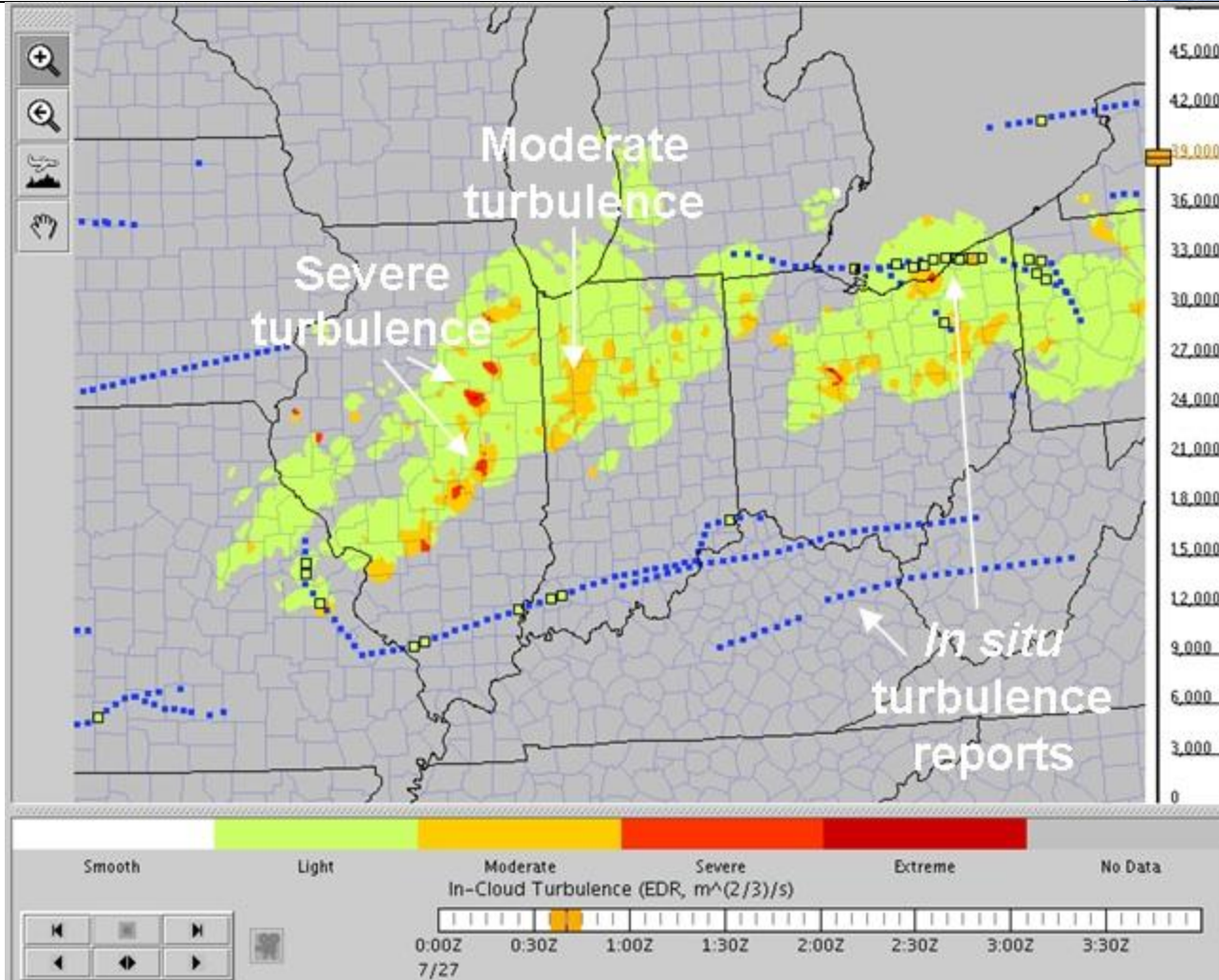


An example of convective weather reroute savings



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

Turbulence remote sensing: in-cloud turbulence

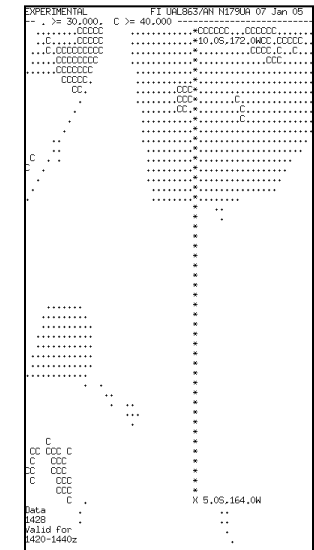
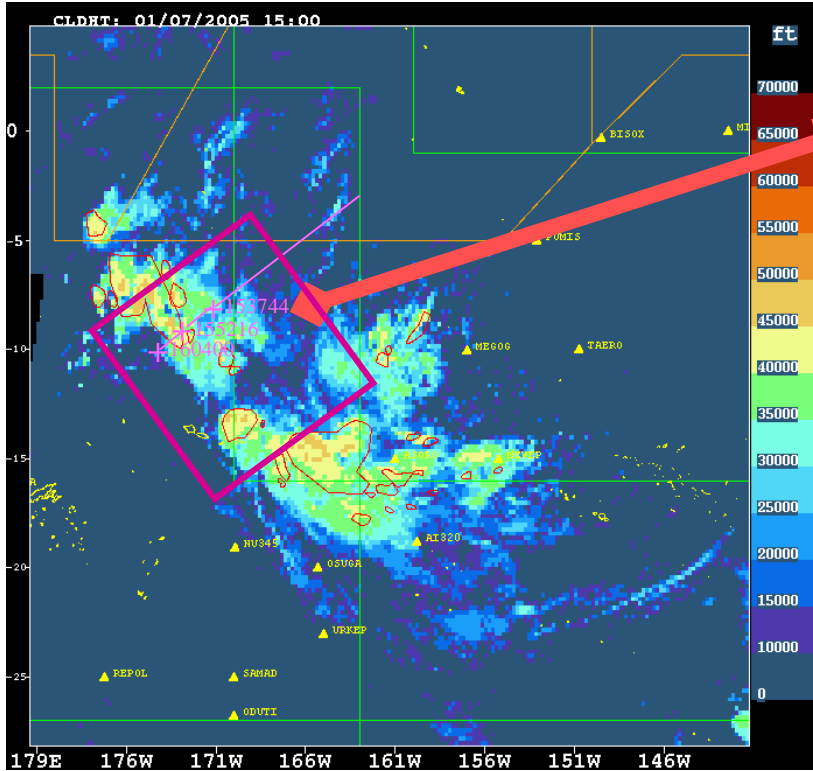


Operating through the inter-tropical convergence zone



- 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)
 - ▶ 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

Weather Data Link Standards – RTCA SC206



- Concept of Use document
 - ▶ What will graphical weather information transmitted to the cockpit via data link be used for?
 - ▶ What will environmental data from the aircraft transmitted to the ground be used for?
 - Capacity increases with wake vortex mitigation
- Data link architecture recommendations
 - ▶ What are the options for transmitting weather data to the cockpit
 - ▶ What are the options for transmitting environmental data from the aircraft
 - 1090 MHz ADS-B (but bandwidth limitations)
 - Other data link options for Meteorological Data Collection and Reporting System (MDCRS) services
- Next meeting at RTCA Headquarters in Washington, DC, December 14-16, 2010

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!



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