Strengthening the CDM triad: A view from the cockpit

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Strengthening the CDM Triad: Weather in the Cockpit

Outline:

- RTCA TF5 excerpts on weather
- Graphical weather displayed in the cockpit – a game changer!
  - Beyond the airborne weather radar
- Example of potential convective weather reroute savings
- Weather over the inter-tropical convergence zone
- United Airlines EFB programs
- Conclusions

RTCA Task Force 5 report: Statements on weather

- With the exception of enroute severe weather, high density operations in major metropolitan areas precipitate the majority of flight delays.
- Multiple airports with high demand suffer throughput reductions when the weather is not good enough for visual approaches to be flown.
- Convective weather and an inability to adapt to rapidly changing conditions are contributing to excess delays, increased flight time and miles flown, increased unpredictability, and increased emissions.

Graphical weather in the cockpit

- A game changer!
  - Graphical updates while airborne via broadband data-link
    - Situational Awareness - no longer limited to the preflight weather briefing
    - 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 will allow for more efficient use of airspace, while improving safety

Use 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):
  - Updated Graphical Turbulence Guidance (GTG)
  - Turbulence Remote Sensing
    - NCAR's NEXRAD Turbulence Detection Algorithm
  - Oceanic convection and cloud top uplinks

Beyond the airborne weather radar

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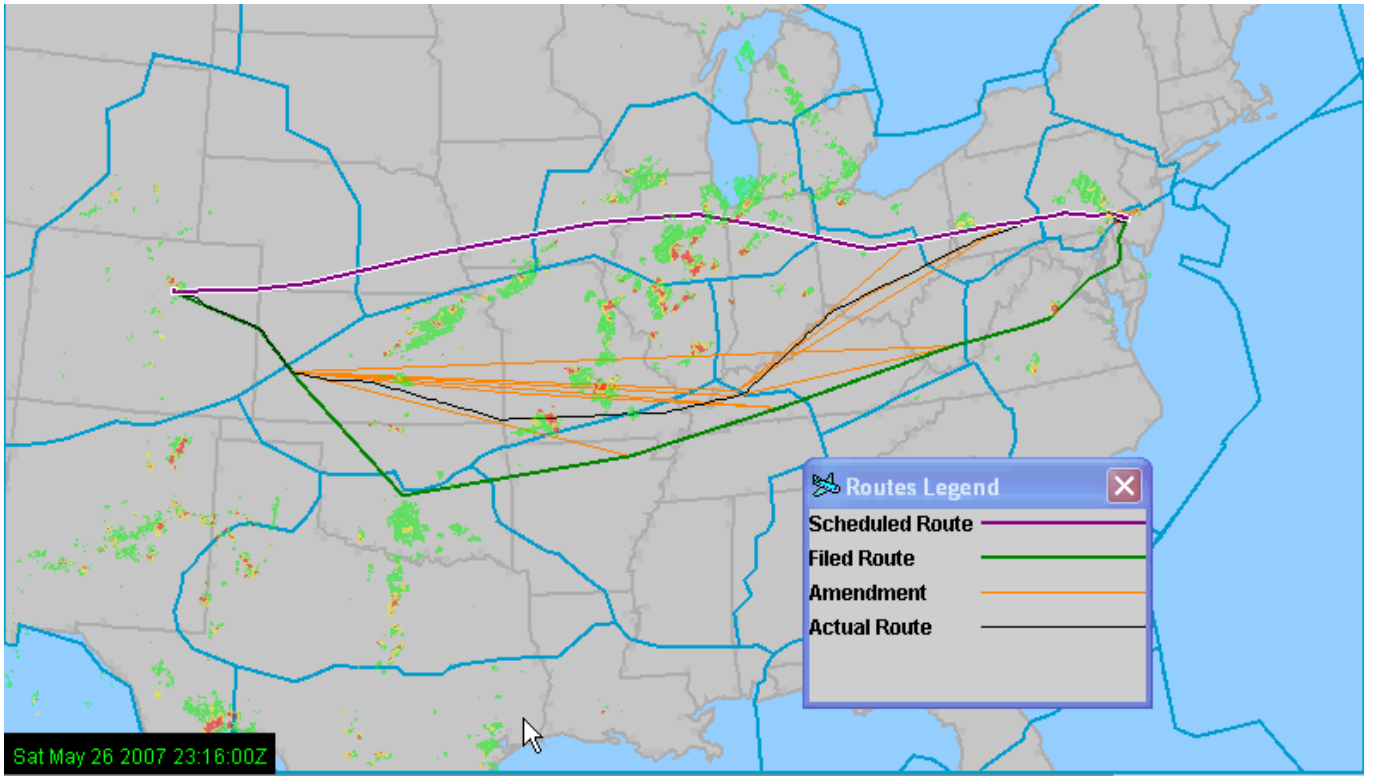
An example of convective weather reroute savings



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

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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

United Airlines EFB programs

- IPad – Class 1 EFB for every pilot
  - Flight Manuals, Charts, Graphical Weather
- Class 2 or 3 EFB for every aircraft
  - Surface Moving Map, In-Trail Procedures, other ADS-B In applications

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Conclusions

- Increasing the “real time” graphical weather information in the cockpit will improve capacity, efficiency, and safety during convective weather events
  - Especially important over the inter tropical convergence zone
- NextGen conops needs to acknowledge the pivotal role of updated graphical weather information in the cockpit to achieve expected NextGen efficiencies involving convective weather events

Thank you!

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