Progress in Aviation Weather Forecasting for ATM Decision Making

FPAW 2010

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Overview

• CoSPA

  (1) Integration with storm avoidance models and ATC route usage models

  (2) 0-8 hour winter precipitation forecasts

• Improved runway winds forecasts
Over Delivery of Traffic During a Severe Weather Event

July 31, 2009 – 2102Z
CIWS products are “blended” with HRRR forecasts.
CoSPa Operational Evaluation Status

- Providing 0-8 hr forecasts of VIL and Echo Tops to select facilities
- Collaboration between MIT LL, NCAR and NOAA
- **Objective:** Evaluate suitability and quantitative benefits of CoSPA for ATM operations
- Duration: June – Oct.

**Benefits Collection**

- 13-14 June
- 16 June
- 6-8 July
- 19-21 July
- 3 Aug.
- 4-5 Aug.
- 1-2 Sept.
- 16 Sept.

- Very positive response from users
- Improves situational awareness and strategic planning coordination
- High resolution is useful in assessing weather impacts
- Observed decisions in:
  - Airspace flow programs (AFP)
  - Ground delay programs (GDP)
  - “Playbook” reroute initiatives
  - Setting staffing needs
CoSPA Offers Straightforward Translation into 2-8 Hour Capacity Constraint Forecasts

CoSPA forecasts can be easily translated into weather avoidance field (WAF) forecasts.

RAPT route blockage algorithms are used to estimate AFP throughput.

AFP = Airspace Flow Program

MIT Lincoln Laboratory

Wolfson 9/28/10
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CoSPA Winter Precipitation Forecast

“Validation” of CoSPA Winter Forecast by Use of Mammoth Mountain Web Cam data (6 Oct 2010)

Winter Precip. Colors With Phase

CoSPA has an 0-8 hour winter precipitation forecast, but a decision has not yet been made to conduct an operational evaluation similar to the 2010 convective weather evaluation.
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An Emerging ATM DST Motivating Improvements in Surface Wind Forecasts

Integrated arrival, surface and departure management decision support tool (ADMT)

TFM Constraints

Integrated Tower Display Suite (TFDM)

Operational Users
ATCT Controllers and TMC
TRACON, ARTCC, TFM
Airline and Dispatch
Airport

Decisions
Pushback control
Taxi control
Departure sequencing
Departure route assurance
Runway configuration and load-balancing

Arrival/Departure Demand

Airport Weather-winds are especially important

Terminal and Surface Surveillance
CoSPA Terminal Winds Forecast Display Concept

09/24/2010 12:00 GMT

Frontal Wind Vectors

Tabular Forecasts and Verification

Other components of improving terminal winds forecasts:

- Improved forecast accuracy and resolution made available by HRRR
- Wake turbulence mitigation for departures (WTMD) statistical ASOS and RUC algorithms
- Mosaic of MIGFA gust front detections (TDWR and NEXRAD)
- ITWS high resolution surface winds gridded analysis
- TAF wind forecasts
Summary

- FAA 0-8 hr CoSPA forecast provides
  - Deterministic forecasts of precipitation and echo tops that are straightforward to translate into forecasts of capacity constraints (e.g., airspace and AFP throughput)
  - Winter precipitation forecasts analogous to CIWS
- CoSPA accuracy characterization research is underway; comparing forecasts at a fixed valid time provides a functional equivalent to time-lagged ensembles
- Improving surface winds forecasts are very important for improving surface traffic management for runway configuration changes as well as forecasting airport capacity
  - Work is underway to take advantage of HRRR wind forecasts and to use technology from a number of other FAA and NOAA programs (e.g., ITWS, WTMD, NEXRAD)