Presentation Overview

• AWRP Mission
• Long history of success!
• A sampling of current AWRP research initiatives
• Biggest challenges ahead
AWRP Mission

Applied research to minimize the impact of weather on the National Airspace System (NAS)

- The NextGen Implementation Plan contains specific initiatives to support NextGen weather Operational Improvements
- Collaborative, complementary initiatives with NWS to transition legacy capabilities to meet NextGen requirements
- Focused initiatives to help mitigate safety and/or efficiency issues associated with well-documented weather problems
AWRP 15+ Year History of Success

National Convective Wx Forecast, 2001


Aviation Digital Data Service (ADDS), 2003

Rapid Refresh (RAP), 2012


Helicopter Emergency Medical Services (HEMS): Initial Operation on ExADDS, 2007; Operational transition to ADDS, 2015

Graphical Turbulence Guidance (GTG): original implementation, 2003; GTG2 (Mid-Levels), 2010; GTG3 (Mountain Wave, Low Levels), 2015

CoSPA, 2011
A shout out to our fantastic partners!

NCAR | National Center for Atmospheric Research

MIT Lincoln Laboratory

MITRE

NOAA | Earth System Research Laboratory
Global Systems Division

METRON AVIATION

AvMet

...and many more...
Ceiling and Visibility (C&V)

- Collaboration with NOAA to:
  - Improve C&V analyses in the form of the Real Time Mesoscale Analysis (RTMA)
  - Improve Localized Aviation MOS Product (LAMP) forecasts
  - Test techniques for forecasters to enhance automated products
  - Integrate improvements into the Helicopter Emergency Medical Services (HEMS) tool, TAFs, and TRACON Area Forecasts
Alaska Specific Initiatives

- Even with sophisticated weather applications in the cockpit, NTSB statistics show GA accident rates are not falling. Inadvertent VFR to IMC, especially in AK, still a big problem

- AWRP looking at specific applications to address GA accident issues in AK
  - CONUS specific products such as GTG and CIP/FIP will not perform well over AK due to model resolution and available observational data
  - New products will leverage different data sets and better address forecast uncertainty
  - Critical need to improve first guess and analysis fields for many aviation impact variables
Alaska Specific Initiatives

- Ceiling and Visibility Analysis for Alaska (CVA-AK)—collaboration with NCAR, MIT/LL and Alaskan Aviation Weather Unit (NWS) to:
  - Develop automated C&V analysis product combining surface observations and information from satellites and weather cameras
  - Use as input for numerical model initialization

- Icing Product Alaska
Numerical Modeling

- Supporting NOAA GSD efforts to improve model resolution, accuracy, and refresh rates via advancements in model physics, nested grids, and data assimilation on operational models
- Supporting research and evaluation of new modeling capabilities that have a viable path to NCEP operations including ensembles, global resolution improvements, and more…
- Developed and supported operational implementation of 3km High Resolution Rapid Refresh (HRRR) and RAP v2 at NCEP NCO
- Quantifying benefits of current and future model enhancements to the National Airspace System

Aviation specific research efforts funded at nearly $8 million over the last 5 years
Turbulence

- Graphical Turbulence Guidance (GTG) upgrades include mountain wave turbulence and low level turbulence diagnostics. Operational on aviationweather.gov
- Develop and evaluate additional turbulence forecast capabilities including convectively induced turbulence (CIT), Alaska-specific and Global coverage products
- Research to enhance the operational capability to remotely sense turbulence (i.e., with satellites and radar)
- In collaboration with Delta Air Lines, provided dispatch and flight crew access to turbulence forecasts and EDR data for strategic and tactical decision making
Turbulence

GTG - Max clear air turbulence (1000 ft. MSL to FL500)

00 hr forecast valid 1100 UTC Tue 06 Oct 2015
Convective Storms

- Global-scale probabilistic convection forecast guidance out to 36 hours to support strategic planning of transoceanic flights in coordination with World Area Forecast Centers (WAFC)
- Increasing skill and continuity of 1–4 hour forecasts of VIL and echo tops by using new blending methods combining numerical weather model and extrapolation forecasts
- Refining techniques to improve the 0–6 hour prediction of convective initiation critical for NAS planning and operations
- Identified potential opportunities and key shortfalls associated with improved lightning threat awareness for airport operations
Convective Storms

**Oceanic**
Probabilistic 24-hour forecast of convection for the Pacific. The white contours are actual areas of precipitation at the valid time.

**Lightning**
Mean gate departure and taxi out delays due to ramp closures for which average background delays were subtracted.
Aviation Weather Demonstration and Evaluation Services (AWDE)

- Core capability providing aviation weather demonstration and evaluation services
- Supports program managers with data to reduce programmatic risks, aids in the definition and validation of requirements
- Provides a laboratory capability to perform HITLs and other technical evaluations, often in collaboration with Aviation Weather Center Testbed
- Provides access to SMEs in Human Factors, Engineering, Meteorology, Computer Science and Aviation Users
Challenges

• **Uncertainty**—Complex challenges need to be better clarified regarding not only uncertainty attributes of weather products but also the ability of NAS decision makers to apply uncertainty information.

• **UAS, Commercial space travel, and future capabilities**—How good do forecasts of the future have to be? How good is good enough?

• **Role of Human forecaster versus need for automation**—Improvements to automation changing the role of the human forecaster for aviation (Decision support expertise?)

• **Integration**—translated weather information into decisions and decision support tools
Thanks for your support!

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