Graphical Turbulence Guidance & Area Forecast Transition

Aviation Weather Center
Mike Bettwy
Major Upgrades

- All diagnostics mapped to Eddy Dissipation Rate
  - ADDS now displays EDR values
- CAT diagnostic extended down to 1000 feet MSL & forecast hours 15 and 18
- New Mountain Wave diagnostic
  - CAT diagnostics combined with low level winds and terrain characteristics
- Hosted on NCEP Central Operation’s (NCO) Weather and Climate Operational Supercomputing System (WCOSS)
Calculates CAT and MWT diagnostics

Paired down choice of diagnostics (reduce diagnostic redundancy)

Statically weighted for all forecast hours

Improved method of converting diagnostics to EDR (with aircraft type discrimination – light/mod/heavy)
GTG Version 3: CAT

- Reduced diagnostics
  - Focus on unique features
  - Example: Using only a single variant of the Ellrod index
- Vertical levels expanded
  - 010-FL100
  - Explicit calculations to account for boundary layer
GTG Version 3: Mountain Wave

GTG - Max mountain wave (1000 ft MSL to FL500)

00 hr forecast valid 1700 UTC Mon 16 Nov 2015

- Limited domain to focus over regions with more terrain influence
- Modified clear-air diagnostics with terrain features
  - Interpolated to MSL as well
• FAA AWRP tasked NOAA/ESRL/Quality Assessment group to evaluate the performance of GTG3

• Primary findings include:
  • GTG3 improved event discrimination
  • GTG3 improved performance at higher EDR thresholds
  • Mountain wave addition does not degrade performance

• Safety Risk Assessment performed by the FAA
FAA Safety Risk Assessment

• Comprised of FAA standards, requirements, and representatives from multiple airline user groups (Commercial and GA)

• GTG not for tactical use, does not impact the NAS

• User risks identified limited to pilots who might misinterpret the output

• Acceptance of QA results
Categorical display based on thresholds

v2.5: 2-hr forecast valid 21Z 10/8/15

Combined (Max of CAT, MTW) in units of EDR

v3.0: 2-hr forecast valid 21Z 10/8/15

MTW forecast domains in units of EDR

v3.0: 2-hr forecast valid 21Z 10/8/15
• GTG operational NWS product (since 2002)

• Primary enhancements: expansion of diagnostics below 10kft MSL; explicit Mountain Wave diagnostic, addressing the need to discriminate source of turbulence as well as intensity

• Secondary enhancements: optimized EDR conversions; transition to national computing platform (WCOSS), improving performance
Transition to Graphical Forecasts for Aviation

Aviation Weather Center
Mike Bettwy
Current FA:

• Manually-generated text products (no graphical components)

• Forecasts VFR clouds and weather over 16 vast geographical areas: CONUS (6), Hawaii (1), Alaska (7), Gulf of Mexico (1), Caribbean (1)

• Issued 3-4x daily, valid 18hrs (12hr + 6hr categorical outlook)

• Character-limited

• Unchanged since the early 1990s (variations date back to 1930s)
Graphical Forecasts for Aviation (GFA)

Forecasts to 18 hours (CONUS)

Modern graphical layout: Open Layers Display with more details and higher resolution

More timely and consistent with other NWS products
Prototype in development at:
http://new.aviationweather.gov/areafcst

Interface allows users to:

• View data at hourly time increments
• Manipulate level of interest (SFC to FL450 or MAX composite)
• Map configurations & overlays
• Utilize slider controls and legends
Users have expressed the most concern over the availability of cloud information (bases, layers and tops):

- Combination Cloud Fraction (RAP 13km)
- Total Cloud Fraction: Gray Scale (FEW/SCT/BKN/OVC)
- Maximum Cloud Fraction BLW FL180: Color (FEW/SCT/BKN/OVC)

- Click/Mouseover for specifics
- Works at non-station locations
- Example: 12Z FEW025 SCT050 BKN100 (TOP250|LYRD250)
GFA Data Sources

RAP13:
- Clouds
- Winds Aloft

CIP/FIP:
- Icing

GTG:
- Turbulence

NDFD:
- Surface Winds
- Forecast Thunderstorms
- Future Precip/Weather
• Under development, initial Web work to be completed by late December

• Will provide greater detail with finer time scales and areal depictions

• Increased utility and relevance in era of digital products

• Allow forecasters to maximize operational benefit (more time for AIRMETs, SIGMETs, distribution of PIREPs, decision support activities)
Testing will include collaboration with partners and primary users

Monthly Technical Exchange Meetings and other activities

Will build upon and utilize weather elements contained in other products, including:

- Significant Weather (SIGWX) Charts
- Surface Weather Analyses & Prog Charts
- Aviation Forecast Discussions
- Terminal Aerodrome Forecasts (TAFs)
- Airmen’s Meteorological Information (AIRMETs)
- National Digital Forecast Database (NDFD)
GFA Sample Data

Wind data at FL300

GTG and Turbulence AIRMETS
• 15-day archive capability (under development)
• Internet access at Flight Service Stations
  • Partners need a way to regenerate the images and graphics for use within their systems and networks
  • Flight Service providers must be able to access equivalent information through NOAAPORT (concerns with some NDFD data)
• Route of flight capability
• Delivery methods (SBN and NOAAPORT)
• Provide equivalent information that is readily available on ADDS
GFA Summary

• Text Area Forecasts will continue to be produced for at least 3 months after the new GFA product is officially available (mid-2016)

• Modern graphical layout for improved dissemination of weather information to decision-makers in a timely fashion

• GFA will consist of current FA elements along with additional information on a single portal

• Builds upon existing NWS products and data (including NDFD, RAP13, GTG, CIP/FIP)

• Data will also be readily available on current platforms (i.e., NOAAPORT)