Aviation Forecast Verification Tool (AFVT)

Virtual Lab Forum
November 16, 2016

Tabitha Huntemann
Dana Strom
Steve Lanciani
Motivation

Create capabilities to provide near real-time verification results for national-scale gridded forecasts of importance to aviation operations.

Stats on Demand: verification of alphanumeric products, TAF, watches, warnings

BOIVerify: verifies gridded forecasts

NDFD Verification: verification of gridded forecasts

Limitation: locally maintained

Limitation: does not contain gridded verification

Limitation: non-operational; not real-time
Aviation Forecast Verification Tool

- MDL is developing AFVT to:
  - store forecasts and observations
  - compute verification metrics
  - depict the verification results via a web-based graphical user interface

- This work is funded by STI and the Aviation and Space Weather Services Branch (ASWSB)
Benefits of AFVT

- **Digital Aviation Services**
  - NWS provides quality management system data to the FAA
  - ASWSB and STI use for planning and evaluation of improvement to Aviation Services

- **Verification**
  - NWS managers use for performance management and resource planning
  - NWS forecasters use for continual improvement to their forecast process
  - Guidance product developers use for continual improvement
Initial AFVT Functionality

- Users access through a web-based GUI
  - Allows user to select element, time, and location of interest
  - Displays results as graphs, text, and maps
  - Results available in near real time
- Grid-to-point and grid-to-grid capabilities
- 4+ years of data (2012 - present)

- Prototype access is open to all NOAA users
# Data Status

<table>
<thead>
<tr>
<th>Grid-to-Point</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>Observations</td>
<td>METAR / SPECI (MADIS)</td>
</tr>
<tr>
<td>NDFD forecasts</td>
<td>ceiling height, visibility, flight category, sky cover, temperature, dew point, relative humidity, wind speed, wind direction, wind gust</td>
</tr>
<tr>
<td>NDFD issuances</td>
<td>00Z-23Z</td>
</tr>
<tr>
<td>NDFD projections</td>
<td>1-36 hours</td>
</tr>
<tr>
<td>Grid resolution</td>
<td>2.5 km (CONUS)</td>
</tr>
<tr>
<td>Guidance/models</td>
<td>GLMP, GMOS</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Grid-to-Grid</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>Analysis</td>
<td>RTMA</td>
</tr>
<tr>
<td>NDFD forecasts</td>
<td>temperature, dew point, wind speed, wind direction, visibility, sky cover</td>
</tr>
<tr>
<td>NDFD issuances</td>
<td>00Z-23Z</td>
</tr>
<tr>
<td>NDFD projections</td>
<td>1-36 hours</td>
</tr>
<tr>
<td>Grid resolution</td>
<td>2.5 km (CONUS)</td>
</tr>
<tr>
<td>Guidance/models</td>
<td>GLMP, GMOS</td>
</tr>
</tbody>
</table>
Verifiable Areas in AFVT

<table>
<thead>
<tr>
<th>National or by Region</th>
<th>By WFO</th>
<th>At airport or point</th>
</tr>
</thead>
</table>

Optional Time Breakdowns

- Annual
- Seasonal
- Monthly
- Daily
- Hourly
Accessing AFVT

https://veritas.nws.noaa.gov/afvt

Login with NOAA LDAP credentials
Graphical User Interface
Aviation Forecast Verification Tool

Grid-to-Point Verification

Grid-to-Grid Verification

Weather Elements
- Ceiling Height
- Visibility
- Flight Category
- Sky Cover
- Wind Speed
- Wind Direction
- Wind Gust
- Temperature
- Dew Point
Grid-to-point interface
Select element
Optional: select customizable element thresholds
AFVT provides 2 station-based verification techniques:

- **Top-of-the-hour observation (default)**
- **Highest-impact observation within the hour (to account for SPECIs)**

<table>
<thead>
<tr>
<th>Element(s)</th>
<th>High Impact</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ceiling height, visibility, flight category</td>
<td>Lowest value over hour</td>
</tr>
<tr>
<td>Wind speed, wind gust, dew point*, relative humidity* (*=dependent on location/season)</td>
<td>Highest value over hour</td>
</tr>
<tr>
<td>Temperature</td>
<td>Warm season: highest value Cool season: lowest value</td>
</tr>
<tr>
<td>Wind direction</td>
<td>Top of hour verification only - to be revisited</td>
</tr>
</tbody>
</table>
Select date range
Choose forecast date range.

The “base” forecast that other data sources (if any) are compared to (usually NDFD).

The forecast issuance(s) of the “Base” forecast. Any combination of issuances may be selected.

Check boxes for comparable forecast(s) and time offset(s) (i.e., lead time).

Multiple forecast projections can be selected.

Choose forecast date range.
These tabs select areas/locations. The options differ for grid-to-point (shown) and grid-to-grid.
Select station type

Pre-defined station lists contain commonly used subsets such as the Core 30 Airports, LAMP forecast sites, stations used in monthly NDFD verification, Stats-on-Demand public (PFM) sites, and TAF sites.
Optional selections: Scores can be grouped by cycles, projections, valid times, date periods, and/or locations.
Results can be shown as text or graphics
Grid-to-grid interface
Future Plans

- Additional statistics and tools for gridded map product
  - Monthly grid point by grid point statistics
  - Error distribution charts
  - Time graphs from selections
- Additional weather elements
- Expanding to OCONUS
- Adding National Blend of Models (NBM)
- Transitioning to NWS operations in IDP
Providing Feedback

● Feedback is important!
  ■ Ask questions and report issues
  ■ Make recommendations for future development
  ■ Ensure AFVT provides the key capabilities needed for aviation verification

● How to provide feedback
  ■ Join the [AFVT VLab community](#)
  ■ Join the AFVT mailing list
  ■ Contact [Tabitha.Huntemann@noaa.gov](mailto:Tabitha.Huntemann@noaa.gov) for information
Questions?

Tabitha.Huntemann@noaa.gov