Criteria for Successful Research to Operations

Operations to Research means keeping these in focus:

- Demonstrated Benefits
- Efficiency
- Sustainability
- IT compatibility
Necessary Conditions

Must work with AWIPS II

Use operational data sets
R⇌O Priorities

New Science for Meteorologists

Enabling Data for NextGen Weather

Transition Meteorologists to NextGen Decision Support

Human Factors – Does Presentation Improve Decision Making
Historically, the NOAA/NWS Aviation Weather Testbed (AWT) focused primarily on implementing Research-to-Operations developed under the FAA Aviation Weather Research Program (AWRP)

- Aviation Digital Data Services (ADDS)
- Graphical Turbulence Guidance (GTG)
- Current/Forecast Icing Potential (CIP/FIP)
- National Convective Weather Forecast (NCWF)
- Ceiling and Visibility Analysis (CVA)
2009 UCAR Review of NCEP

• Recommended formalizing and expanding AWT to engage directly in science infusion and grow external collaborations.

• Recognized the need to modernize operations, gain operational efficiencies (HOTL/HITL), enhance products, and decision support services.
AWT Mission

• Explore and develop science and technology innovations
• Assesses results relative to existing operations
• Accelerates transition of promising technologies into NWS operations
• Is a key player in developing aviation weather services for NextGen
• Focus on support and enhancement of AWC’s mission and its customers and partners.
Recent Activities: Visualization into AWC Ops

ASDI available to forecasters in NMAP2

ASDI Animation:
Start: ~17 UTC June 29
End: ~05 UTC June 30
Recent Activity: Winter Weather Experiment

Ran 11-22 February 2013 with focus on:

- Increasing efficiency of Area Forecast production
- Increasing efficiency of AIRMET and SIGMET production
- Use of higher resolution tools
- Use of ensembles and their tools
- Virtual component with HMT winter experiment during week 1
<table>
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<th>GOES-R Product</th>
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Simulated imagery provides not only an aesthetically pleasing forecast tool, but also familiarizes the forecasters with the potential capabilities of the Advanced Baseline Imager.

The first image is simulated WV from the NSSL-WRF and the second is the real GOES-13 WV imagery for the same time.
GOES Fog and Low Stratus

- Uses both model and satellite data to estimate probability of IFR conditions.
- Provides a good diagnostic tool for forecasters, providing additional information on current low ceiling extent.
- In AWC operations since July 2012
Winter Weather Experiment: Ensembles

- Collaboration with AFWA 10 member ensemble (~4 km)
- SREF 22 member (~32 km)
- Winter Weather Dashboard (from SREF) verification
Ensembles: Ceiling & Visibility

AFWA Probability of MVFR (blue), IFR (red), and LIFR (yellow)
Ensembles: Ceiling & Visibility

SREF Probability of MVFR (blue), IFR (red), and LIFR (yellow)
Ensembles: Mountain Obscuration

SREF Probability of Mountain Obscuration
Ensembles: Icing

SREF Probability of Icing

20130212/0600F021
Ensembles: Turbulence

AFWA Probability of Moderate or Greater Turbulence

AFWA 130213/2100V021 Probability of Moderate Turbulence FL 250-300
Ensembles: Low Level Wind Shear

AFWA Probability of Low Level Wind Shear
Ensembles: Low Level Wind Shear

SREF Probability of Low Level Wind Shear
Winter Weather Dashboard Verification

The Aviation Winter Weather Dashboard is an experimental product hosted at the Aviation Weather Testbed, located at the NOAA Aviation Weather Center. Its purpose is to provide a decision support tool to alert operational weather briefers and air traffic managers to potential winter weather impacts at major airports.

[1] Impacts due to visibility are only displayed when 24-hour temperature is 28°F.
SREF performs well in general for timing and intensity of snowfall events.

There are some notable misses but the majority of cases have skill to aid in decision support.

SREF does not perform well with respect to visibility (but you have some improvement when limiting to visibility when it is snowing).

SREF performs worse for ceiling than visibility, especially during snow.
Moving R→O

Phase 1

- Product not yet at 80% reliable, so only available on testbed network. Keep stats on reliability.
- Prepare training documentation specific to the forecast desk.
- If product not able to be 80% reliable, poll forecast staff on if they’ll use it.
- Feedback from SOO and support staff.
Phase 2

Product reliable for two weeks and training provided, so product is now available to forecasters on ops network. Keep stats on reliability.

SOO or focal point polls forecasters, checks trouble tickets, e-mails, or shift log for comments and forwards no less than weekly to provider.
Acknowledgements

→ David Bright, Chief, Aviation Support Branch
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→ Ben Schwedler (NextGen, dashboard)
→ Amanda Terborg (GOES-R)
→ Steven Lack and Brian Pettegrew (verification)
→ Ryan Solomon (experiment manager, feedback)
→ Dan Vietor (ADSI visualization)
Back up slides
NMM and ARW lowest RMSE errors, errors increase with rainfall intensity.
NMM slightly better than the rest when FCST=SNOV
General trend is underforecasting precipitation (>=0.1") at all AWWD stations.

Less underforecasting in NE US (esp when FCST=SNOW, not shown)
Very little skill in resolving flight conditions from visibility, most visibility forecasts go to LIFR.
Feedback – Ceiling & Visibility

Positive remarks for simulated GOES-R imagery

Some of the models did not resolve the western CONUS very well

High resolution models did not discriminate between LIFR, IFR, MVFR very well

NSSL 4 km was a bit better and could be used to tweak C&V polygons
Feedback – Ceiling & Visibility

- SREF mountain obscuration seen as a move in the right direction and a potentially useful product for forecasters
- NCVA can be useful especially if overlaid and compared to satellite imagery
Feedback – Turbulence

- GTG composites (FL180-FL450) are too broad
  - but smaller layers (FL350-FL400, FL300-FL350, etc) are more useful
- GTG tops and bottoms are too noisy with the labeling
  - but the labeling used on the SREF TKE was well received
- AFWA turbulence product labels too noisy
- AFWA over forecasted low level turbulence
  - but it captured the pattern
Feedback – Turbulence

- SREF TKE below FL180 did poor over mountainous terrain (only one case, though)
- In-situ EDR is well received (‘it’s the bomb’)
Feedback – Icing

→ SREF RAP Icing algo did well locating regions of icing
   → but tended to over forecast
→ FIP did well in short-term (out to 6 hours)
   → Worsened at 9 and 12 hours
→ Generally positive remarks about global FIP. Seen as a potentially useful tool.
→ RAP Icing AB algo too “blocky” to gain much information.
→ RAP Icing -20C/-22C/-25C height products need better contour resolution.
Feedback – Icing

- RAP Icing -20°C product with subsidence suppression seemed to be most useful
- RAP Icing 10-18 kft composite layer used the most
  - but too thick – forecasters would like 10-14 kft and 14-18 kft