Terminal Weather Forecasts and Traffic Flow Management (TFM) Decisions

National Weather Service Activities

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Terminal Weather Forecasts and Traffic Flow Management (TFM) Decisions

- Weather Requirements for TFM

- Current Capabilities and New Initiatives

- New Verification Procedures

- Summary

Weather Requirements for TFM

- Joint FAA-NWS TFM Weather Requirements Working Group (TRWG)
  - Developed performance-based requirements linked to Traffic Management Initiative decisions
  - Accuracy of weather forecast information at key decision points (lead time) prior to onset/cessation of high impact weather events affecting the NAS

Example:

- Forecast Time of Onset of IFR Conditions
  - With a 4-hour lead time with an accuracy of $\pm$ 30 minutes
- Verify Forecast of Time of Onset of IFR Conditions
  - Probability of detection $\geq$ 75 percent
  - False alarm ration $\leq$ 25 percent
  - Timing error $\leq$ 30 minutes

New Lead Time Accuracy Assessment Tools

- ## TAF – NWSH Performance Branch
  - Completed Cig/Vis Assessment Capability
  - Wind Direction Change Assessment Ongoing

- ## NDFD – ESRL/GSD
  - Completed Thunderstorm Probability Forecast Study
  - Follow-on Assessment Tool Development Ongoing
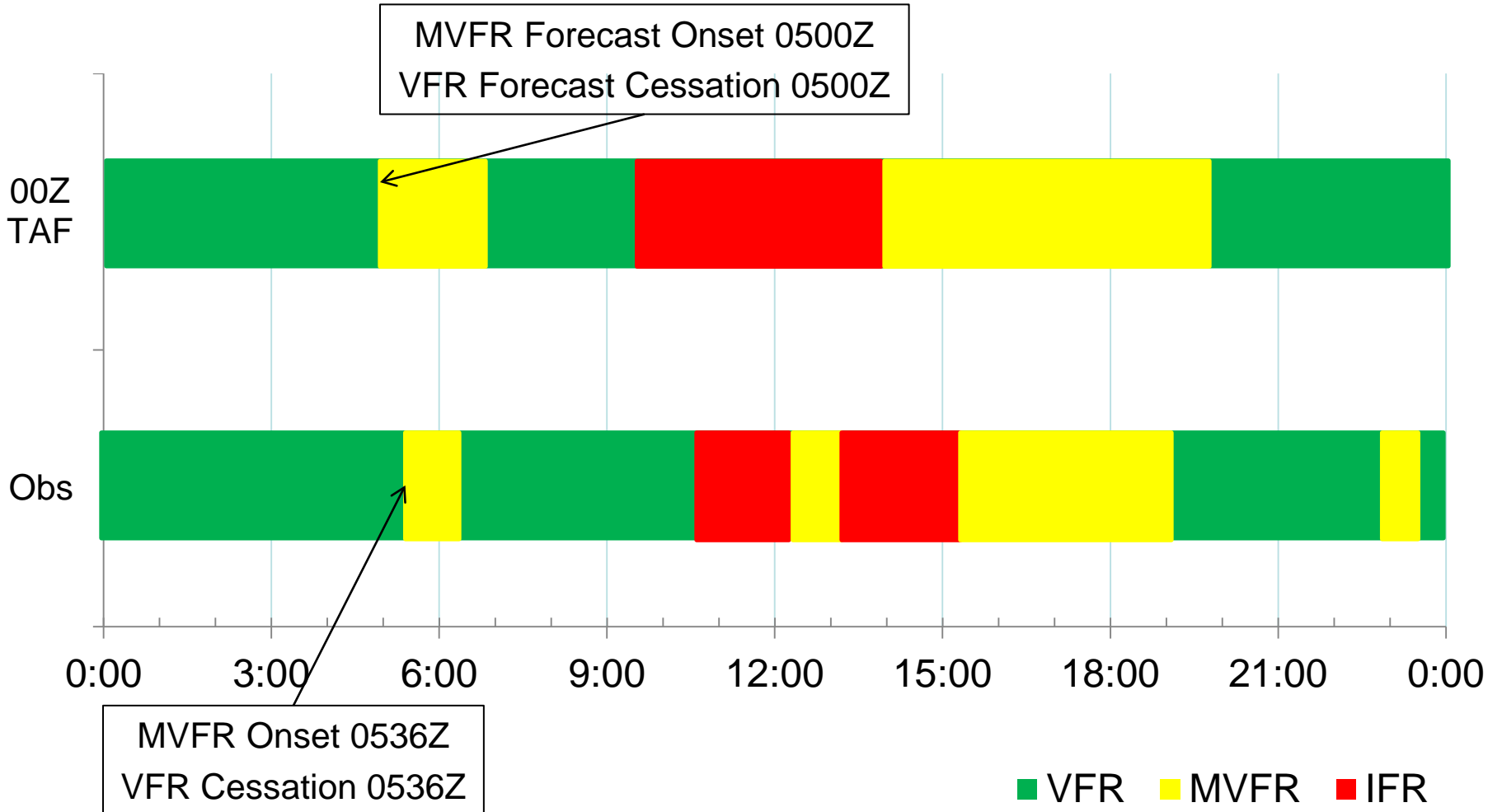
Paradigm shift on forecast assessment

- Traditional POD, FAR metrics – compare forecast to observation every 5 minutes, if match, forecast hit
  - During 24-hour TAF period, 288 opportunities

- New lead time accuracy assessment, if forecast the correct time of onset/cessation, forecast hit, if missed the time, missed the event
  - Typically, very few opportunities during TAF period

Example: Cig/Vis Event 4-Hour Lead Time

MVFR Forecast Onset 0500Z
VFR Forecast Cessation 0500Z

MVFR Onset 0536Z
VFR Cessation 0536Z

■ VFR ■ MVFR ■ IFR

New Verification Procedures

TAF Cig/Vis Lead Time Accuracy Preliminary Results

Element	Flight Category
Date Range	01/01/2012 00:00 TO 10/15/2012 23:59
Area	National
Projection (TEW)	1 Hour(15 Min), 2 Hours(15 Min), 4 Hours(30 Min), 6 Hours(45 Min), 8 Hours(60 Min)

POD

Condition	1 Hour (± 15 Min)	2 Hours (± 15 Min)	4 Hours (± 30 Min)	6 Hours (± 45 Min)	8 Hours (± 60 Min)	Event Counts
IFR onset	0.030	0.025	0.038	0.055	0.071	4,566
IFR cessation	0.063	0.046	0.053	0.065	0.085	4,572

False Alarm Ration (FAR)

Condition	<= 1 Hour (± 15 Min)	> 1 to <= 2 Hours (± 15 Min)	> 2 to <= 4 Hours (± 30 Min)	> 4 to <= 6 Hours (± 45 Min)	> 6 to <= 8 Hours (± 60 Min)
IFR onset	0.796	0.888	0.839	0.803	0.783
IFR cessation	0.797	0.867	0.816	0.775	0.691

Summary

- TFM Weather Lead Time Accuracy Requirements
  - New way of thinking for forecast assessment
  - Current hour-scale product suite not well-suited to meet the minute-scale accuracy needs
  - Guidance tools, training on new assessment logic will only get us so far, not likely to bridge the significant gap
  - Raises question on use of probabilistic forecasts with range of potential outcomes and confidence factors

- FAA and NWS leadership recently agreed to expand TRWG weather requirements activity beyond TFM
  - Address requirements for all weather forecast information NWS provides in support of air traffic operations
  - Improve and prioritize products/services to meet FAA's weather information needs