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PMTIP: A NEW DIRECTION FOR AVIATION PERFORMANCE METRICS

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Introduction

- MSC/NAV CANADA Agreement
  - Quality assurances
  - Performance measurement initiatives
  - Service guarantees & standards
- Aviation weather forecasts
  - Used by clients, pilots, airline dispatchers
- Previous performance metrics
  - Needed adjustment/specificity for users

Introduction (cont'd)

- Consultations for Improvement
  - Joint initiative between MSC, NAV CANADA, Air Canada and Jazz Aviation
- PMTIP
  - Performance Measurement TAF Improvement Project
  - Funding by NAV CANADA, Environment Canada, Natural Resources Canada

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PMTIP

tafperformance.tor.ec.gc.ca

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Performance Measurement TAF Improvement Project (PMTIP)

Welcome!

Operated and maintained by Environment Canada, this web site is the portal to the NavCanada, PERD, and Environment Canada joint initiative on new Aviation Performance Metrics. The Performance Measurement TAF Improvements Project (PMTIP) is in support of flight-planning operations.

Current Version 1.2

Created on 02/04/2003 10:24 AM by admin
Updated on 10/27/2010 02:25 PM by davida

Development

- GOALS
  - Eliminate unnecessary fuel upload/carriage
  - Lower costs for aviation users
  - Reduce related greenhouse gas emissions

- FOCUS
  - TAF: Aerodrome Forecast

Development (cont'd)

- NAIFR
  - No Alternate Instrument Flight Rules
  - *Ceiling at or above 1500 feet, visibility at or above 6 statute miles*
  - *or ceiling at or above 2500 feet, visibility at or above 3 statute miles*
  - *No forecast (including PROB) of thunderstorms, freezing rain, freezing drizzle, or ice pellets*

Development (cont'd)

- 2002 NAV CANADA study
  - Accuracy of MSC TAFs
  - Improvement to support specific needs of pilots and dispatchers
- Discussion with users
  - Improve accessibility
    - Facilitate flight dispatch
    - Focus on critical operating limits
- In 2004 NAV CANADA proposed a project which became PMTIP

Development (cont'd)

- CLIENT CONSULTATION
  - User benefits
  - Product effectiveness
  - Performance Metrics To Include:
    - Critical Ceiling and Visibility Limits (including NAIFR)
    - Severe Weather
    - Wind
  - Components:
    - Ingest & Database
    - Dashboard
    - Report Generator
    - Website

Implementation

- PMTIP v1.0 – 2007
  - Initial release
  - Invitation to review
  - Provide feedback
- PMTIP v1.1 – 2008
  - New TAF format
  - Validity periods of up to 30 hrs.
- PMTIP v1.2 – 2010
  - Current version

PMTIP Metrics

- Critical Ceiling & Visibility Categories including NAIFR
- Severe Weather
- Wind

PMTIP METRICS

- CRITICAL CEILING & VISIBILITY CATEGORIES INCLUDING NAIFR
  - Temporal & Probabilistic TAF terms
    - BECMG
    - TEMPO
    - PROB30
    - PROB40
  - Minute-by-minute
  - 5 additional ceiling & visibility categories

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Reports

- NAIFR
- TS
- Wind

TAF Performance Measurement System Improvements Project (PMTIP)

Ceiling and Visibility Categories including NAIFR

Aerodrome	Aerodrome2	Hours into TAF	†Months	Years	
YHZ		1-3	Full Year	2008	Go

† For periods that span two years, i.e. Dec-Jan-Feb, the year selected refers to the last month of the period.

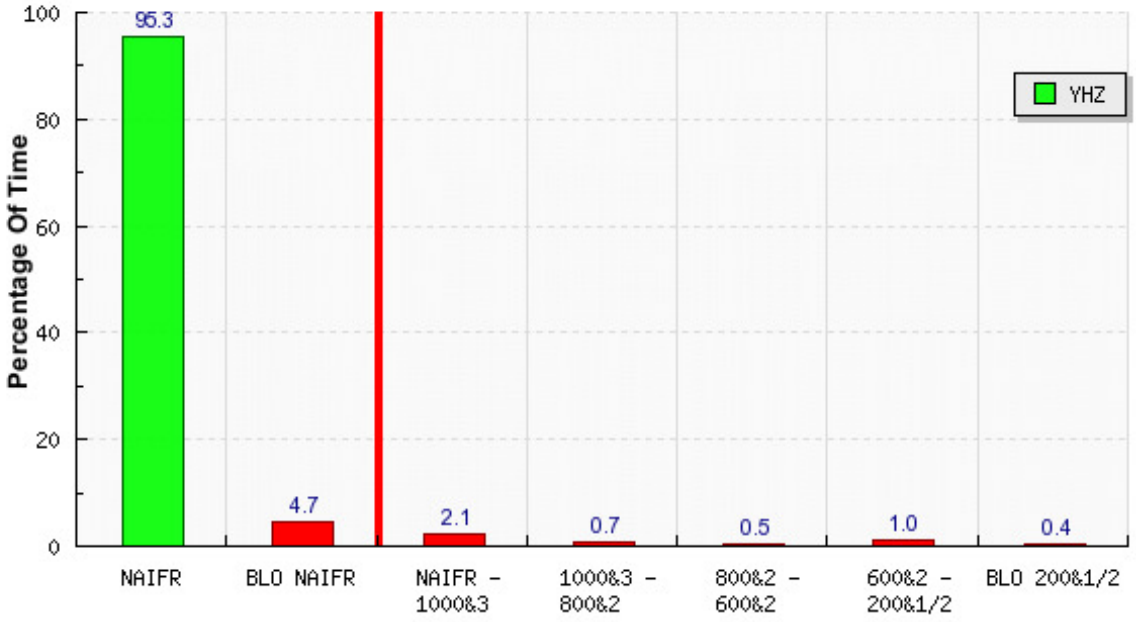
View Map

Forecast Categories

NAIFR | NAIFR-1000&3 | NAIFR-800&2 | NAIFR-600&2 | 1000&3-800&2 | 1000&3-600&2

NAIFR Forecast* Verification Scenarios

Aerodrome: YHZ Hours into TAF:1-3
Months:† Jan-Dec Years: 2008



Observation Categories

Forecast Issue Types: Regular & Amendments
Total YHZ<NAIFR> Forecast Hours: 5358 or category forecast 47% of the time.
*Worst Conditions Forecast Are Verified
†For periods that span two years, i.e. Dec-Jan-Feb, the year selected refers to the last month of the period.

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naifr.stage4.CYHZ.2008.01-12.xml.gz 2010-10-08T21:51:38Z

Version: 1.2

View Report Description

PMTIP METRICS

- SEVERE WEATHER
  - Thunderstorms, freezing drizzle, freezing rain, ice pellets
  - Earliest lead time performance metric
    - Uninterrupted
      - Every TAF issued before the actual event must have thunderstorm in the forecast
  - Onset Time Accuracy
  - End Time Accuracy

TAF Performance Measurement System Improvements Project (PMTIP)

Severe Weather Performance Metrics - TS

Aerodrome	Aerodrome2	†Months	Years	
YYZ		Apr-Sep(6 months)	2010	Go

† For periods that span two years, i.e. Dec-Jan-Feb, the year selected refers to the last month of the period.

View Map

Event Timing

Earliest Lead Time

Average Earliest Lead Time for TS Events				
Months†: Apr - Sep Years: 2010				
ID	Total Number of Events	Number of Events with Zero Lead Time	Percentage of Events with Zero Lead Time	Average Earliest Lead Time
YYZ	17	2	12%	843 min

Forecast Issue Types: Regular & Amendments
For YYZ, the number of TS events in the sample is 17
Always consider the sample size when interpreting statistics.
†For periods that span two years, i.e. Dec-Jan-Feb, the year selected refers to the last month of the period.
The earliest lead time for an event is the uninterrupted earliest lead time.

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severewx.stage4.CYYZ.2010.04-09.TS.xml.gz 2010-10-14T22:03:4
Version: 1.2

View Report Description

PMTIP METRICS

- WIND
  - Airport configuration/active runway
    - Impact on fuel upload/carriage
    - Holding patterns
    - Differing arrival and departure rates
    - Aircraft/runway compatibility

PMTIP METRICS

- WIND (Continued)
  - Performance Metrics for Wind
    - Mean Absolute Error for direction in degrees
    - Mean Absolute Error for speed and a wind speed bias in knots
  - Direction Accuracy and Speed Metric
    - Display
      - All directions
      - 30 degree slices

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TAF Performance Measurement System Improvements Project (PMTIP)

Wind Direction and Speed

Aerodrome	Aerodrome2	†Months	Years	
YVR		Full Year	2001-2009	Go

† For periods that span two years, i.e. Dec-Jan-Feb, the year selected refers to the last month of the period.

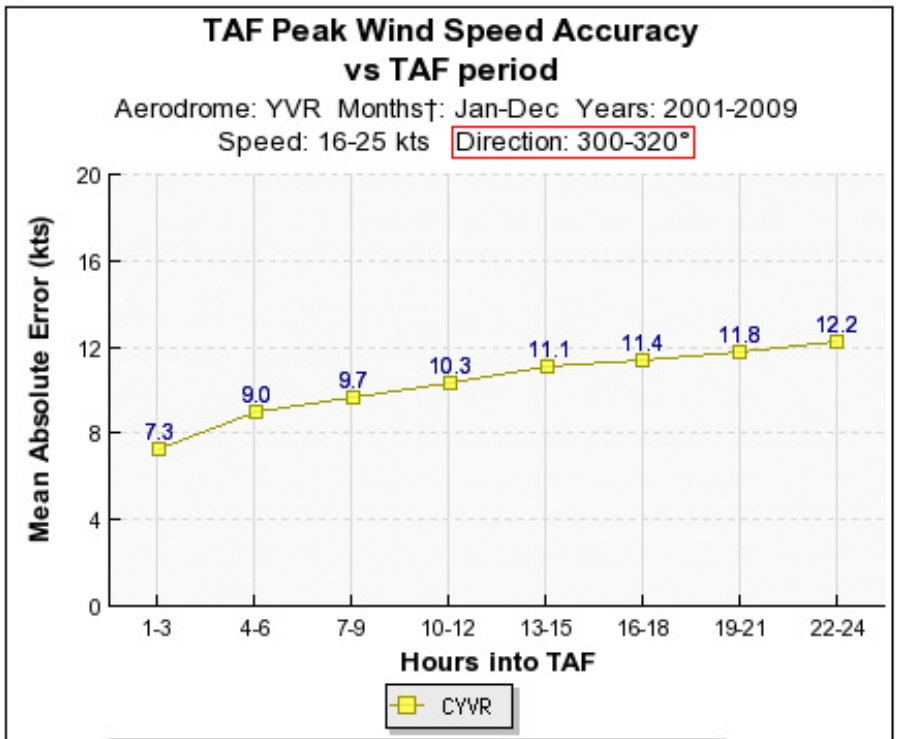
View Map

Forecast Categories (peak wind)

≤ 10 kts | > 10 kts | 11-15 kts | **16-25 kts** | > 25 kts

- ○ Direction Accuracy
- ◉ Speed Accuracy
- ○ Speed BIAS

Select Direction: CYVR



Hours Analyzed								
Months†: Jan-Dec					Years: 2001-2009			
Speed: 16-25 kts					Direction: 300-320°			
ID	1-3	4-6	7-9	10-12	13-15	16-18	19-21	22-24
YVR	671	689	615	559	506	467	423	226

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TAF Performance Measurement System Improvements Project (PMTIP)

Wind Direction and Speed

Aerodrome	Aerodrome2	†Months	Years	
YUL		Oct-Mar(6 months)	2007-2009	Go

† For periods that span two years, i.e. Dec-Jan-Feb, the year selected refers to the last month of the period.

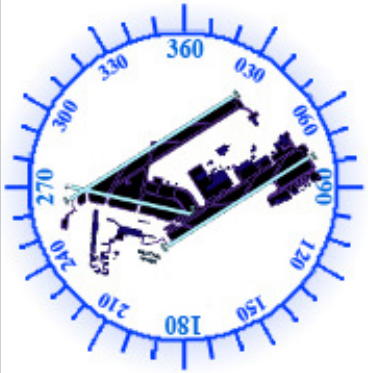
View Map

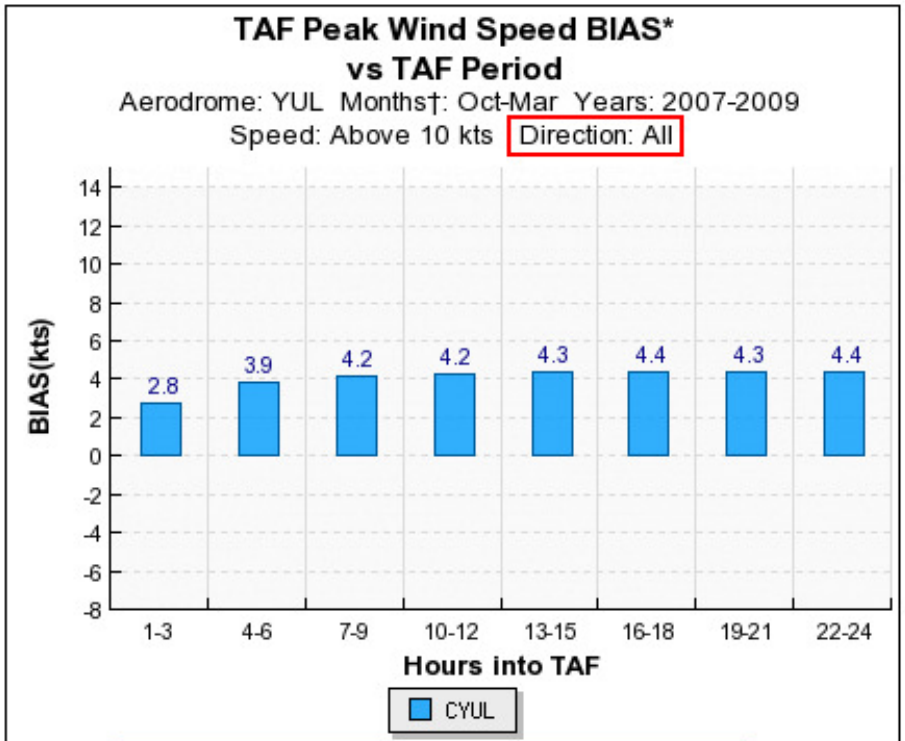
Forecast Categories (peak wind)

≤ 10 kts | > 10 kts | 11-15 kts | 16-25 kts | > 25 kts

- ○ Direction Accuracy
- ○ Speed Accuracy
- ◉ Speed BIAS

Select Direction: CYUL





Hours Analyzed								
Months†: Oct-Mar					Years: 2007-2009			
Speed: Above 10 kts					Direction: All			
ID	1-3	4-6	7-9	10-12	13-15	16-18	19-21	22-24
YUL	5646	6214	6526	6674	6655	6652	6514	3195

CURRENT STATUS

- Over 130 users
  - MSC offices
  - NAV CANADA
  - Airlines
- Monthly updates
- Planned releases
- Bug fixes (if required)

USE

- Input and feedback essential
- Flight planning process
- Forecast verification
- Training sessions
- Reduce fuel burn
- Reduce greenhouse gas emissions

Future Challenges

- Evolution to fit changing needs
- Development of new features

Acknowledgements

- Environment Canada
- NAV Canada
- Air Canada
- Jazz Aviation
- Program of Energy Research and Development (Natural Resources Canada)

References

- Meteorological Service of Canada, 2011: Performance Measurement TAF Improvement Project http://tafperformance.tor.ec.gc.ca

- NAV Canada, 2002: Assessment of Aerodrome Forecast (TAF) Accuracy Improvement – Final Report