Isolating and Assessing Weather-related Air Traffic Delays

A closer-look at what makes this so difficult.....

Mike Robinson
AvMet Applications, Inc.
What is a Weather Delay?  
(It depends on who you ask....)

Annual % Flights Delayed due to Weather

DOT (BTS)
- Airline (required) reportable delays
- Strict guidelines for what to report, how to assign causality
  - E.g., “late-arriving” aircraft delay

OPSNET
- FAA’s official source of NAS ops and delay data
- Reported delays, with assigned causality, by FAA operations
What is Weather’s Contribution to Delay?
(Also depends.....)

- FAA OPSNET** Delay Analysis (2005-2014):
  % Total Flights Delayed due to Weather
  % Total Delay Minutes due to Weather

2003-2012 OPSNET WX Delays – Individual days with at least one flight whose delay was attributed to weather

01 Feb 2011 Blizzard

** https://aspm.faa.gov/opsnet/sys/

69%
83%
When is a WX Delay Not a WX Delay?  
*(When it’s something else of course)*

When may a WX Delay be MORE than just a WX Delay?

- When it is an airborne delay
- When it is an excessive tarmac delay
- When it is an unanticipated delay
- When it is inequitable delay
- …..
Trending Summer Weather Delays at a Macroscopic Level

![Graph showing weather trends over years]

- **JJA CONUS Mean Precip Departure (inches)**
- **JJA Total OPSNET Weather Delay Minutes * 1M**
- **JJA Airport Operations *1M (OPSNET)**
Weather Events / Periods are Not the Same....so Don’t Treat them as Such......

In 2006, Delta Air Lines Inc. reported losses of $11 M during the month of August, the equivalent of 6 cents per share for company stockholders. In receipt of this news, investments in Delta decreased by 20% (International Business Times, 2006)

www.ncdc.noaa.gov
Divisional Precip Rank

2011

2012

2013

Apr – Sep (6 month)
Remember This............

- JJA CONUS Avg Precip Departure from Avg (inches)
- JJA Total OPSNET Weather Delay Minutes * 1M
- JJA Airport Operations *1M (OPSNET)

Jun - Aug 2010
National Climatic Data Center/NESDIS/NOAA

Precipitation

Record Driest
Much Below Normal
Below Normal
Near Normal
Above Normal
Much Above Normal
Record Wettest
Considering WX Delays / Performance for Only NY “SWAP” Days.....Still Can Mislead

Differences in storm event:
- Location
- Organization
- Evolution

....affecting different resources, requiring different responses, resulting in different impacts
If You’re Keeping Score.....

Several measures for “Weather Delay”

Weather Impact may not be “Delay”

Not all weather is the same

Demand may swamp weather delay ‘signal’

“Isolating and Assessing WX-related Air Traffic Delays”

Ointment
ATL Weather (Volume) Delays due to Haze.....
<table>
<thead>
<tr>
<th>ATL Arrival Event (11-13 UTC)</th>
<th>Morning GS?</th>
<th>Holding Stack(s)?</th>
<th>Number of Arrival Aircraft Holding</th>
</tr>
</thead>
<tbody>
<tr>
<td>15 Jun – Haze</td>
<td>YES</td>
<td>YES</td>
<td>14</td>
</tr>
<tr>
<td>17 Jun – Haze</td>
<td>YES</td>
<td>YES</td>
<td>12</td>
</tr>
<tr>
<td>27 Jun – Haze</td>
<td>YES</td>
<td>YES</td>
<td>20</td>
</tr>
<tr>
<td>07 Jul – Haze</td>
<td>YES</td>
<td>YES</td>
<td>10</td>
</tr>
<tr>
<td>08 Jul – Haze</td>
<td>YES</td>
<td>No</td>
<td>-</td>
</tr>
<tr>
<td>10 Jul – Haze</td>
<td>YES</td>
<td>YES</td>
<td>10</td>
</tr>
<tr>
<td>14 Jul – Haze</td>
<td>No</td>
<td>YES</td>
<td>10</td>
</tr>
<tr>
<td>17 Jul – Haze</td>
<td>YES</td>
<td>YES</td>
<td>5</td>
</tr>
<tr>
<td>30 Aug – Haze</td>
<td>YES</td>
<td>YES</td>
<td>4</td>
</tr>
<tr>
<td>09 Sep – Haze</td>
<td>No</td>
<td>YES</td>
<td>7</td>
</tr>
<tr>
<td>07 Jul – Haze</td>
<td>No</td>
<td>No</td>
<td>-</td>
</tr>
<tr>
<td>23 Jul – Haze</td>
<td>No</td>
<td>No</td>
<td>-</td>
</tr>
<tr>
<td>24 Jul – Haze</td>
<td>No</td>
<td>No</td>
<td>-</td>
</tr>
<tr>
<td>04 Aug – Haze</td>
<td>No</td>
<td>No</td>
<td>-</td>
</tr>
<tr>
<td>05 Aug – Haze</td>
<td>No</td>
<td>No</td>
<td>-</td>
</tr>
<tr>
<td>08 Aug – Haze</td>
<td>No</td>
<td>No</td>
<td>-</td>
</tr>
<tr>
<td>09 Aug – Haze</td>
<td>No</td>
<td>No</td>
<td>-</td>
</tr>
<tr>
<td>24 Aug - Haze</td>
<td>No</td>
<td>No</td>
<td>-</td>
</tr>
</tbody>
</table>

**Mean Number of Holding Aircraft (1145-1300 UTC)**

- 2009 Haze Event: 8.2
- 2009 No-Haze Event: 1.7
- 2010 Haze Event: 0

ATL 2009: Haze = Bad; ATL 2010: Haze = 👍
WX Folks Are Not the Only Ones Trying to Help Address NAS Efficiency Problems.....

**New / Alternative TFM Procedures**

2009 – ATL Metering began at 1500 UTC

2010 – ATL Metering at 1030 UTC controls early morning push (and primary haze impact period)

![TMA TGUI Display](image)

**Airline Schedule Changes**

**ATL Scheduled Arrivals (Daily Average)**

<table>
<thead>
<tr>
<th>Time Period</th>
<th>2009</th>
<th>2010</th>
<th>% Change</th>
</tr>
</thead>
<tbody>
<tr>
<td>1100-1200 UTC</td>
<td>78</td>
<td>66</td>
<td>-15%</td>
</tr>
<tr>
<td>1200-1300 UTC</td>
<td>121</td>
<td>100</td>
<td>-17%</td>
</tr>
<tr>
<td>0000-2359 UTC</td>
<td>1388</td>
<td>1337</td>
<td>-4%</td>
</tr>
</tbody>
</table>

• Delta Air Lines (DAL) “de-peeked” morning ATL arrival schedule in summer 2010 vs. 2009 *

* Schedule information courtesy of Delta Air Lines

**Delta Air Lines (DAL) Scheduled ATL Arrivals, 1100-1400 UTC**

<table>
<thead>
<tr>
<th>Time Period</th>
<th>2010</th>
<th>2009</th>
<th>2009-2010 % change</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jun-Sep</td>
<td>2692</td>
<td>2880</td>
<td>-6.50%</td>
</tr>
<tr>
<td>Jun</td>
<td>631</td>
<td>771</td>
<td>-18.20%</td>
</tr>
<tr>
<td>Jul</td>
<td>542</td>
<td>680</td>
<td>-20.30%</td>
</tr>
<tr>
<td>Aug</td>
<td>685</td>
<td>819</td>
<td>-16.40%</td>
</tr>
<tr>
<td>Sep</td>
<td>834</td>
<td>610</td>
<td>36.70%</td>
</tr>
</tbody>
</table>
NAS / TFM Evolution *
(Significant delay / performance drivers)

- New Runway ATL
- New Runway SEA
- New Runway ORD
- RNAV / RNP Routings & Procedures
- Metroplex Optimization of Airspace & Procedures (OAPM)
- New Runway ORD

2005

- GDP in support of SWAP
- Airspace Flow Programs (AFP)
- Integrated Collaborative Rerouting (ICR)
- Time-Based Flow Management (TBFM)
- Reroute Impact Assessment (RRIA)
- Low-rate / ‘Surgical’ GDP Tactics

Today

- ASDE-X Data & Surface Awareness
- Route Availability Planning Tool (RAPT)
- TFM / ATC Workforce Evolution

Airline Capacity, Load Factor, Schedule Evolution
FAR-117 Crew-time Requirements

* This is a sampling
Takeaways.....

Assessing WX Impacts and Impact Management Performance IS DOABLE, but tread carefully.....

- Know your wx impact metric – what it is and what it is not
- WX impacts are more than delays; When they are delays they can be layered and nuanced
- Be mindful and account for fact that weather periods, events, scenarios are not the same – and these differences alone can drive performance differences
- WX-ATM performance excels (can be derailed), can trend towards improvement (degradation), for many reasons unrelated to weather / forecasts
- Didn’t even get into forecast weather accountability, human factors issues, event unavoidability, etc....