## Mike Bardou – NWS WFO Chicago (Romeoville)

Robb Kaczmarek – NWS FAA Chicago Air Route ATC (Aurora)









Chicago Aviation Support



**National Weather Service** 

# **Center Weather Service Units (CWSU)**





#### NTSB WEATHER RELATED ACCIDENTS BY WEATHER CONDITION 1994-2003



#### Figure 5. Wind Accidents by Phase of Flight 2003–2007



Not mutually exclusive. Total number of wind citations = 1,149. Source: NTSB Aviation Accident and Incident Database

Number of Citations





## TAKE A LOOK A SOME AIPPORT SPECIFICS...

### **STARTING WITH SFO – SAN FRANCISCO**



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Real-Time airport arrival demand information as received from FAA facilities. The AADC chart displays the latest arrival demand metrics for selected airports.





Real-Time airport arrival demand information as received from FAA facilities. The AADC chart displays the latest arrival demand metrics for selected airports.

### # OF AIRCRAFT PER HOUR THAT AIRPORT CAN ACCEPT... 60 AT SFO ON SUNNY DAY.

01	5 🔿 30 🖲 60	SEA SFO SJC	Arrivals Alert Arrival Fix			© 1	5 🔿 30 🖲 60	Select Airport ABQ ANC
FO 03/13/20	3 21:02z	Cancelled	Flights: 9	No GDP	No	selection ma	de.	
70 60 50 40 30 20 10						50 40 30 20 10		
0	2300	0200	0500	0800	1100	0	0300	0600



Real-Time airport arrival demand information as received from FAA facilities. The AADC chart displays the latest arrival demand metrics for selected airports.

### ONCE CLOUDS <= 3000' OR VIS <= 5SM ... LOSE VISUAL APPROACHES # QF AIRCRAFT THE AIRPORT CAN LAND DROPS IN HALF FROM <u>60 TO 30</u>....

Airport       Arrival Demand Chart       Width       500       X       Height       390       Resize       Version 2.1         Double click to select an airport and color-scheme!       Version 2.1       Version 2.1       Version 2.1										
C 16	5 <sup>©</sup> 30 <sup>©</sup> 60	SEA SFO SJC	Arrivals Alert Arrival F	ix 🔽		c	○ 15 ○ 30 ⊙ 60	Select Airport ABQ ANC		
SFO 03/13/2013	2 :02z	Cancelled Fligh	nts: 9	No GDP		No selection	made.			
70 60 50 40 30 20 10 2000	2300	0200	0500		1100		0300			
✓ Departing ✓ EDCT Issued ✓ Past Dept Time ✓ Anived ✓ Flight Active ✓ Inequilar       ✓ Departing ✓ EDCT Issued ✓ Past Dept Time         ✓ All       ✓ All										



Real-Time airport arrival demand information as received from FAA facilities. The AADC chart displays the latest arrival demand metrics for selected airports.

### FAA HAS TO DO SOMETHING WITH ALL THE SCHEDULED AIRCRAFT TO LAND THAT EXCEED THE AIRPORT LANDING RATE OF 30.. GROUND STOPS, GROUND DELAY PROGRAM, INCREASED AIRBORNE SPACING – MIT.

Airport / Double click	Arrival Der to select an air	nand Chart port and color-sche	eme!	/idth 500	x	Height	390	Resize	] Versi	ion 2.1
C	) 15 O 30 O 60	SEA A SFO SJC	Arrivals Alert Arrival Fix				O 15	○ 30 ⓒ 60	Select Airport ABQ ANC	
SFO 03/13/20	13 21:02z	Cancelled Flights	319	No GDP		No select	tion made			
70 60 40 30 20 10 20 2000	2300	0200			1100	50 40 30 20 10 0 00			0600	
🔽 Departing	EDCT Issued	I♥ Past Dept Time I♥ I♥ All	Anived 🔽 🛛	Flight Active 🔽		🔽 Dep	arting 🔽 I	IDCT Issued	🔽 Past Dept T	Fime All

## TAKING A LOOK AT THE BIG CHICAGO AIRPORTS



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# **SIMUL 9 TO WEST FLOW AT ORD**



OHARE = WEST or EAST LANDING AIRPORT



<u>OHARE = IF CANNOT LAND WEST or EAST BIG PROBLEMS</u>.



## **A Few ORD Weather Scenarios**

## \*\* FAA NEEDS SEVERAL HOURS LEAD TIME (PLANNING TIME) ON CHANGING CEILINGS/VISIBILITY and WINDS





## http://www.fly.faa.gov/Products/AADC/aadc.html



## **Airport Arrival Demand Chart**

Double click to select an airport and color-scheme!



500

Х

Height

Width

390

Resize

Version 2.1

## \*\*\*\* NOW ORD HAS SIGNIFICANT SURPLUS AC 56-64 Arrival rate due to DUE TO STRONG GUSTY SOUTH WINDS

## A QUICK LOOK AT MDW



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FOUR POSSIBLE CONFIGURATIONS . MDW MAY ONLY LAND ONE ARRIVAL RUNWAY AT A TIME! AC PER HOUR 28-32



Real-Time airport arrival demand information as received from FAA facilities. The AADC chart displays the latest arrival demand metrics for selected airports.







\*\* IF LANDING SOUTH . CEILINGS drop BELOW 1500' or VIS below 5SM MDW unable to make this circle approach .





09:55:07

ORD Landers MDW Landers

12/30/2010 1000z-0300z X250



# WEATHER DAY WHY THUNDERSTORM AVOIDANCE HAZARDS!

1

### Figure 25. Thunderstorm Citations by Phase of Flight 2003–2007



Source: NTSB Aviation Accident and Incident Database

Downburst (Prescott Valley, AZ) 1999—Photo by Jacob Neider MA.

27

0.00

Downburst (Prescott Valley, AZ) 1999—Photo by Jacob Neider ATTAL

27

0.....

160



1999—Photo by Jacob Neider

Downburst (Prescott Valley, AZ) 1999—Photo by Jacob Neider TAILWIND

FORCE

ATTA

0.....

46.8

& DOWNWARD

hn

# <u> Thunderstorm Hazards – Hail</u>

Hailstones grow by collision with supercooled water drops with ice nuclei.



\*\*\* UPDRAFT STRENGTH OF APPROX. 55MPH IS NEEDED TO SUSPEND 1" HAIL ALOFT. (SPEEDS CAN APPROACH/EXCEED 100MPH!)

HAIL CAN BE LOFTED UP AND OUTSIDE, AWAY FROM THUNDERSTORM AS IN THE FOLLOWING PHOTO.



# **JET ROUTES FIXED**









ZAU 50116





November 2009



ZAU 50116

Arrivals and departures



Federal Aviation Administration

November 2009













#### Impacted Area or Flow: ORD JVL/BDF STARS

Facilities Included: ZAU/ZMP/ZDV/ZLC/ZSE/ZOA/ZLA/ZAB/ZFW/ZHU/ZME/ZID/ZKC

Instructions: REROUTE ANY AIRBORNE TRAFFIC AND INTERNAL DEPARTURES VIA THE FOLLOWING ROUTES.

Remarks: ROUTE NON-RNAV AIRCRAFT OVER MZZ VIA: MZZ MZZ344033 OXI OXI STAR

![](_page_47_Figure_4.jpeg)

![](_page_48_Figure_0.jpeg)

## ... <u>"SUNNY DAY" SYNDROME... CHICAGO AIRPORTS & WEST</u>

![](_page_49_Picture_1.jpeg)

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![](_page_49_Picture_3.jpeg)

![](_page_50_Figure_0.jpeg)

![](_page_51_Figure_0.jpeg)

#### **CAN 1 WEST**

Impacted Area or Flow: XXXXXXX

Facilities Included: ZBW/ZNY/CZY/ZMP

Remarks: THIS ROUTING REQUIRES AREA NAVIGATION CAPABILITY.

![](_page_52_Figure_4.jpeg)

![](_page_53_Picture_0.jpeg)

# SUPERBOWL 2012

![](_page_54_Picture_1.jpeg)

55

![](_page_55_Picture_0.jpeg)

110011 G-11 IMG 01 28 JUL 00210 145500 03626 15967 01.00

### Figure 13. Turbulence Citations by Phase of Flight 2003–2007

![](_page_56_Figure_1.jpeg)

Not mutually exclusive. Total number of turbulence citations = 114. Source: NTSB Aviation Accident and Incident Database TURBULENCE: "NOT" A FUNCTION OF STRENGTH OF JET STREAM, BUT RATHER A FUNCTION OF THE STRENGTH OF THE SPEED AND DIRECTIONAL SHEARS ASSOCIATED.

![](_page_57_Figure_1.jpeg)

![](_page_57_Picture_3.jpeg)

![](_page_58_Figure_0.jpeg)

16-Nov-2011 18:00:00 -- 16-Nov-2011 21:49:52 (65561 obs loaded, 4350 in range, 499 shown)

NOAA (ESRI (GSD) Altitude: -1000 ft to 45000 ft.

ateh IIA

![](_page_59_Figure_0.jpeg)

![](_page_60_Figure_0.jpeg)

175 Kts

NOAA / ESRL / GSD Altitude: -1000 ft. to 45000 ft.

125 Kts

75 Kts

25 <u>k</u>

![](_page_60_Figure_2.jpeg)

![](_page_61_Figure_0.jpeg)

![](_page_62_Picture_0.jpeg)

![](_page_62_Picture_1.jpeg)

- 1) What percent of aircraft accidents are weather related?
  - a) 10%
  - b) 20%
  - c) 60%
  - d) 80%
- 2) What phase of flight do most aircraft accidents or injuries occur?
  - a) Takeoff-climb
  - b) Cruise
  - c) Final approach-landing
- 3) What is the most important Impact to aircraft travel?
  - a) Surface winds
  - b) Aircraft Icing
  - c) Thunderstorms
  - d) All the above
- 4) What causes aircraft turbulence?
  - a) Jet stream
  - b) Contrails
  - c) Mountains
  - d) I don't know
- 5) What causes aircraft icing?
  - a) Thunderstorms
  - b) Snow accumulation on aircraft
  - c) Super-cooled liquid freezing on aircraft

![](_page_64_Picture_1.jpeg)

- , d) 80%
- 2) What phase of flight do most aircraft accidents or injuries occur?
  - a) Takeoff-climb
  - b) Cruise
  - c) Final approach-landing
- 3) What is the most important Impact to aircraft travel?
  - a) Surface winds
  - b) Aircraft Icing
  - c) Thunderstorms
  - d) All the above
- 4) What causes aircraft turbulence?
  - a) Jet stream
  - b) Contrails
  - c) Mountains
  - d) I don't know
- 5) What causes aircraft icing?
  - a) Thunderstorms
  - b) Snow accumulation on aircraft
  - c) Super-cooled liquid freezing on aircraft

![](_page_65_Picture_1.jpeg)

- d) 80%
- 2) What phase of flight do most aircraft accidents or injuries occur?
  - a) Takeoff-climb

b) Cruise

c) Final approach-landing

- 3) What is the most important Impact to aircraft travel?
  - a) Surface winds
  - b) Aircraft Icing
  - c) Thunderstorms
  - d) All the above
- 4) What causes aircraft turbulence?
  - a) Jet stream
  - b) Contrails
  - c) Mountains
  - d) I don't know
- 5) What causes aircraft icing?
  - a) Thunderstorms
  - b) Snow accumulation on aircraft
  - c) Super-cooled liquid freezing on aircraft

![](_page_66_Picture_1.jpeg)

- d) 80%
- 2) What phase of flight do most aircraft accidents or injuries occur?
  - a) Takeoff-climb

b) Cruise

c) Final approach-landing

3) What is the most important Impact to aircraft travel?

a) Surface winds
b) Aircraft Icing
c) Thunderstorms
d) All the above

- 4) What causes aircraft turbulence?
  - a) Jet stream
  - b) Contrails
  - c) Mountains
  - d) I don't know
- 5) What causes aircraft icing?
  - a) Thunderstorms
  - b) Snow accumulation on aircraft
  - c) Super-cooled liquid freezing on aircraft

![](_page_67_Picture_1.jpeg)

- d) 80%
- 2) What phase of flight do most aircraft accidents or injuries occur?
  - a) Takeoff-climb

b) Cruise

c) Final approach-landing

3) What is the most important Impact to aircraft travel?

![](_page_67_Figure_8.jpeg)

4) What causes aircraft turbulence?

![](_page_67_Figure_10.jpeg)

- 5) What causes aircraft icing?
  - a) Thunderstorms
  - b) Snow accumulation on aircraft
  - c) Super-cooled liquid freezing on aircraft

![](_page_68_Picture_1.jpeg)

- d) 80%
- 2) What phase of flight do most aircraft accidents or injuries occur?
  - a) Takeoff-climb

b) Cruise

c) Final approach-landing

3) What is the most important Impact to aircraft travel?

![](_page_68_Figure_8.jpeg)

4) What causes aircraft turbulence?

![](_page_68_Figure_10.jpeg)

- 5) What causes aircraft icing?
  - a) Thunderstorms
  - b) Snow accumulation on aircraft
  - C) Super-cooled liquid freezing on aircraft

#### Figure 22. Icing Citations by Phase of Flight 2003–2007

![](_page_69_Figure_1.jpeg)

Not mutually exclusive. Total number of icing citations = 64. Source: NTSB Aviation Accident and Incident Database