

Southwest Airlines Meteorology Use of NWS Products and Services

**Hawaii-Pacific Aviation Weather Safety Workshop
Honolulu, HI – June 9th, 2023**



Jared Beard
Meteorologist
Jared.Beard@wnco.com

SWA Facts

- **Pre-COVID:**

- Largest domestic carrier with up to 4,000 daily flights
- >4000 flights with over ½ million passengers/day at peak travel times
- Carried >134 million revenue passengers in 2019
- 730 Boeing 737 aircraft (-700, -800, MAX 8)

- **Current state:**

- Added 18 new destinations since early 2020
- 120+ destinations across the US (including Hawaii), Caribbean, Mexico and Central America
- Average flight length is approx. 755 mi
- Shortest: 63 nm (DEN-COS)
- Longest: 2,589 nm (PHX-LIH)
- 47 consecutive years of annual profitability until 2020

Southwest Presence

LIH

HNL

OGG

KOA

ITO



Updated - 03:00 AM CT May 31 2023



General Information

- ~730 Boeing 737 aircraft (-700, -800, MAX 8)
- Nearly all Southwest 737 aircraft are Category IIIA capable
 - Heads up guidance system equipped (no autoland at SWA)
 - All pilots are trained for landing to Category IIIA minimums
 - These minimums assume the runway equipage is able to support CAT IIIA

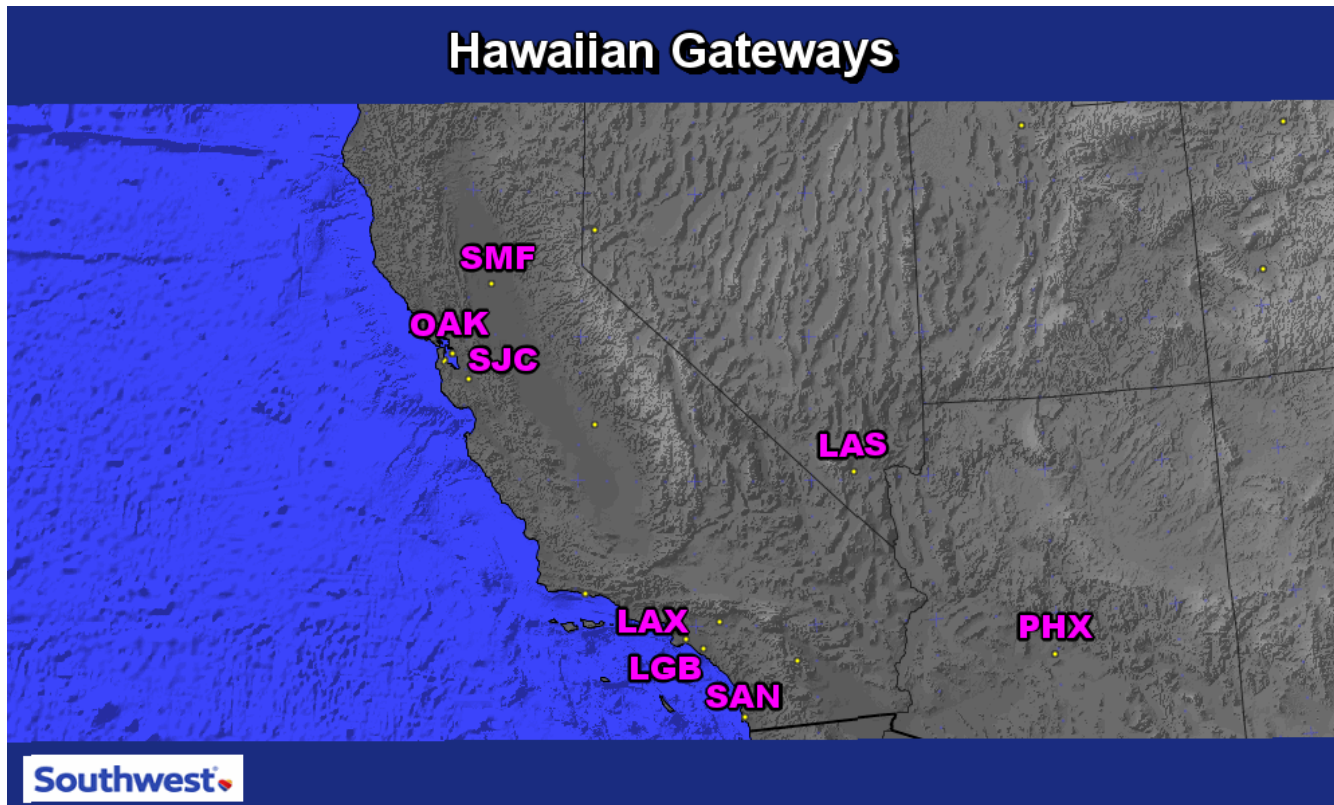


Busiest Airports (June 2023)

City	Max Daily Departures	# of Gates	Nonstop Cities Served
Denver	310	33	94
Las Vegas	284	21	68
Chicago (MDW)	260	37	78
Baltimore	234	29	70
Dallas (DAL)	208	18	69
Phoenix	200	32	59
Houston (HOU)	173	20	69
Orlando	169	20	56
Nashville	167	16	57
St. Louis	129	17	57
Oakland	126	11	35
San Diego	122	6	29
Atlanta	120	18	42
San Jose (SJC)	113	18	27
Sacramento	103	11	25
Los Angeles	102	12	28

Operational Sensitivity in the Southwest

- Serving Hawaiian Islands since 2019
- Gateways susceptible to Heatwaves

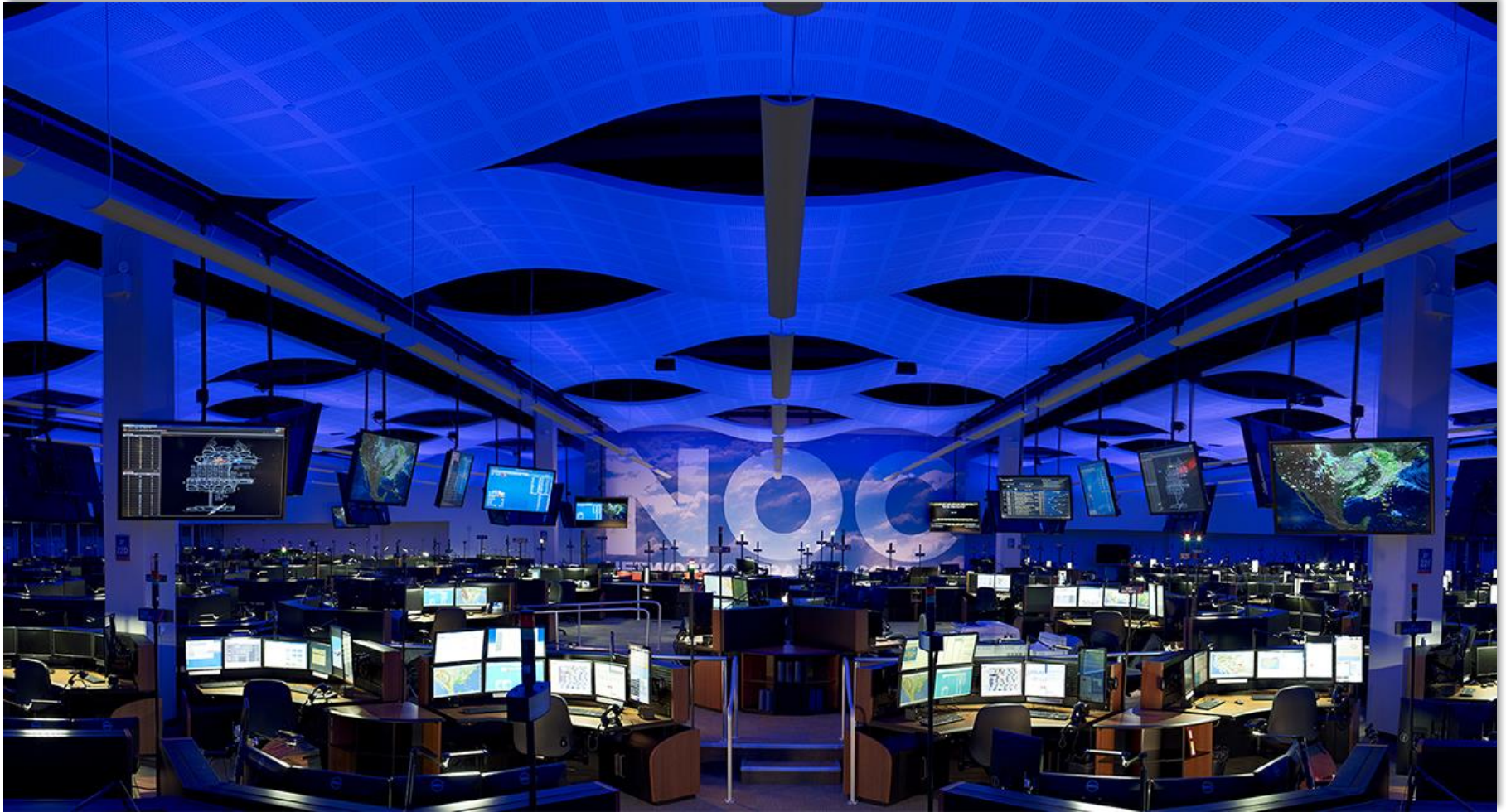


City	Average Daily Departures
HNL	40
OGG	24
LIH	11
KOA	12
ITO	5



Total = 92

Network Operations Control



NOC Overview

- This is considered the decision maker for the airline
- 24/7/365 coverage
- Comprised of Employees from various groups

Primary



Secondary

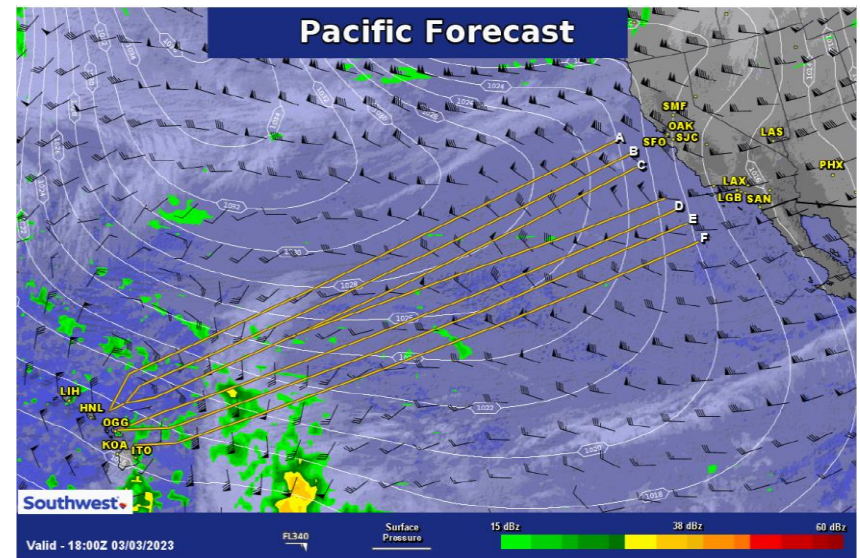
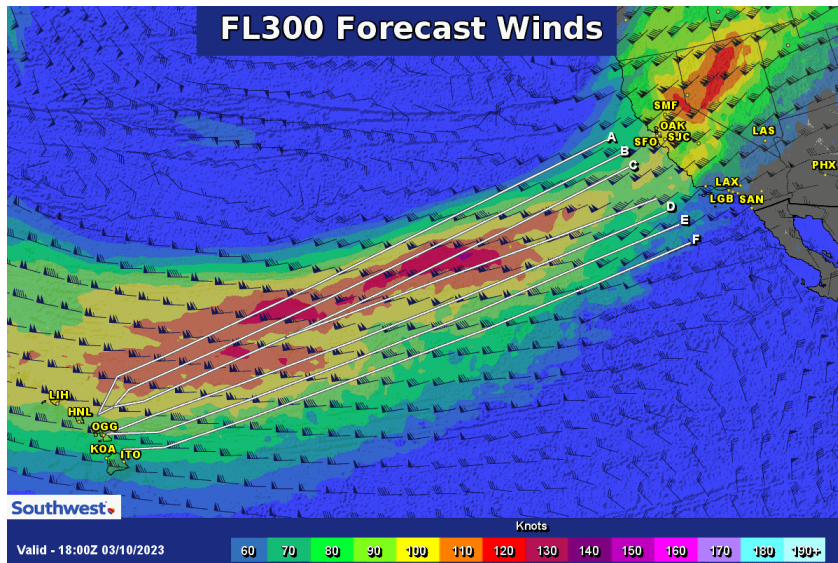


SWA Meteorology – What we do

- Focus on big picture
 - Involved in strategic and tactical decision-making processes
 - Decision support, NOT Decision-makers
- 3x daily briefings to operational decision-makers
 - Additional meetings for major events like hurricanes, winter storms
- Ground Operations Support
 - Station Forecast
 - Weather Watch
- Tactical focus as well
 - Issue TAFs (when there is no NWS TAF issued)
 - ETOPS/Hawaii Forecasts
- Past weather events (turbulence, hail reports, wet bag complaints, etc) and special projects
- Participation in industry workgroups

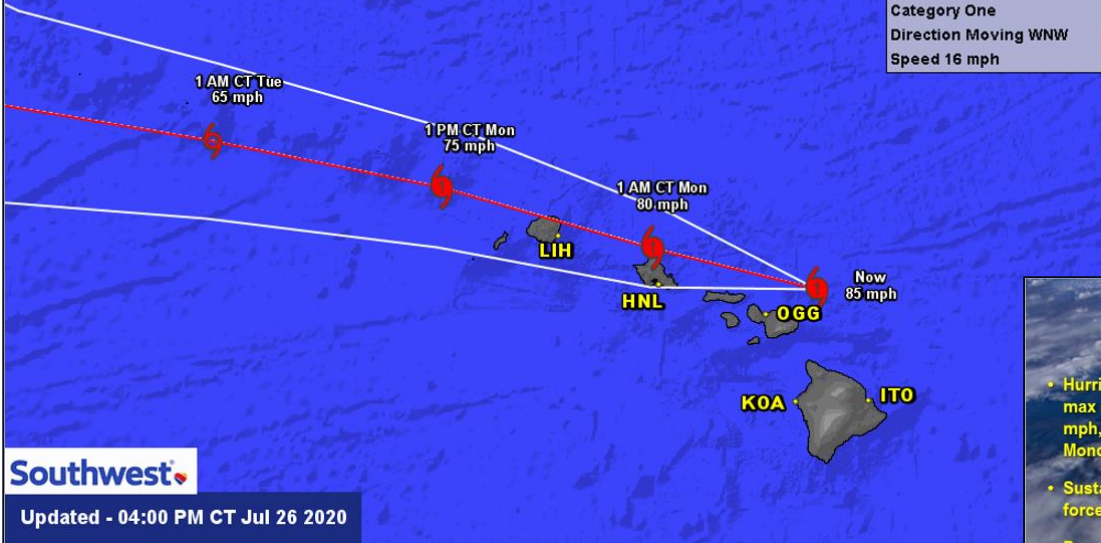
ETOPS Forecasts

- Enroute Winds
 - Stronger headwinds = increase in necessary fuel and/or restricted pax loads
- Enroute Convection
 - Convection along route could lead to altered routes to islands



Hurricane Douglas

Hurricane DOUGLAS
 04:00 PM CT Sun 07/26/2020
 21-12.0N/155-42.0W
 Max Winds 85 mph
 Gusts 104 mph
 Category One
 Direction Moving WNW
 Speed 16 mph



Hurricane Douglas Headlines

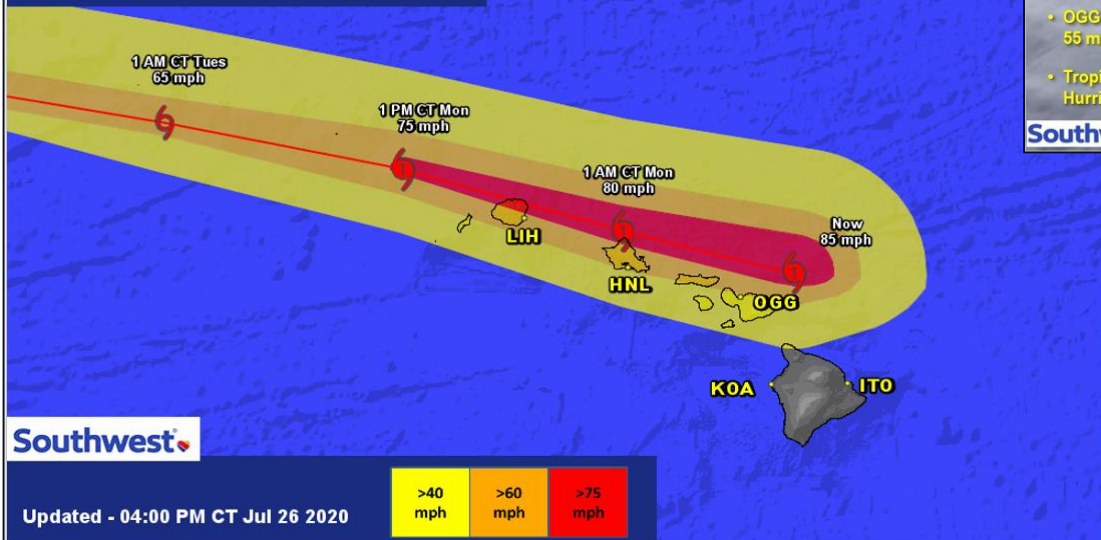
WDTF Phase: 3

- Hurricane Douglas continues to slowly weaken, but remains strong category 1 hurricane with max sustained winds of 85 mph. Douglas is centered 55 mi ENE of OGG, moving WNW at 16 mph, and will continue in this manner as it passes by our Hawaii stations, pulling away on Monday.
- Sustained hurricane force winds extend outward up to 35mi from the center and tropical storm force winds extend outward up to 115mi, primarily on the north side.
- Douglas will continue to gradually weaken over the next 24 hours as it interacts with cooler waters, unfavorable wind environment and the mountainous Hawaiian Islands, likely maintaining its Category 1 intensity as it passes all SWA stations.
- Strong winds and heavy rainfall will affect portions of the state Sunday into Monday, with terrain likely causing localized augmentation of rainfall and wind gusts.
- OGG and LIH will see the greatest impact, with periods of heavy rain and peak gusts up to 50-55 mph possible.
- Tropical Storm Warning – ITO, KOA
 Hurricane Warning – HNL, LIH, OGG

Southwest

5:00 PM CT
 July 26, 2020

Hurricane Douglas Sustained Wind Forecast



Tropical Outlooks

Southwest

Turbulence Reviews

Weather Summary

- AMDAR from the flight shows some speed shear but ultimately is too coarse in data to paint a clear picture of this event:
 - At 23,564ft, winds were 30kts and at 29,926ft, winds were 48kts.
 - This is a change of 18kts over 6,362ft, a change of roughly 3kts/1000ft.
- EDR analysis (slide 23):
 - At 23,242ft, winds were 32kts
 - At 24,555ft, winds were 14kts
 - At 26,123ft, winds were 53kts
 - At 27,558ft, winds were 38kts

Change of -18kts/1300ft

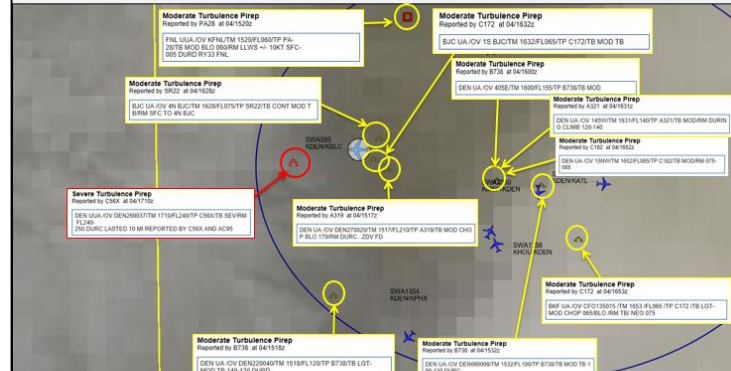
Change of +39kts/1600ft

Change of -15kts/1400ft

This shows several rapidly changing wind speeds over smaller distances that are obscured by the broad data points in AMDAR.

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PIREPS at 1713z



AMDAR from Flight

DEN(Up) 1704 4Feb23
 Ascent sounding toward 275' from Denver (DIA), CO (DEN)
 Lasting 27 min, and covering 162 nautical miles (Aircraft #22649)

P_alt (Ft)	mb	t/t (C)	w_dir/w_spd (kts)	Time (UTC)	Ang/Rng (nm)
15700	556	-13.0	303/038	1709	282/020
16450	539	-14.5	317/036	1709	281/021
17350	520	-17.0	310/034	1710	280/023
18120	503	-19.8	309/032	1710	280/025
18288	500	-20.2	309/032		
18960	486	-22.0	311/031	1710	279/027
19750	471	-24.5	314/033	1711	279/029
20510	456	-26.8	319/031	1711	279/031
21300	441	-27.8	324/032	1711	279/033
21880	430	-30.3	307/029	1712	279/035
22670	416	-32.8	305/029	1712	278/037
23360	404	-33.3	311/029	1712	278/039
23564	400	-33.7	311/030		
24926	300	-46.5	301/048		
33958	230	-54.6	294/060		
34880	240	-56.5	293/063	1731	275/162

Approximate location of event

EDR Analysis

measurement_observationTime	measurenwind_speed	wind_direction	
2023-02-04T17:05:00Z	7398	25	306
2023-02-04T17:06:00Z	9503	27	272
2023-02-04T17:07:00Z	11954	42	274
2023-02-04T17:08:00Z	13822	38	285
2023-02-04T17:09:00Z	16342	35	316
2023-02-04T17:10:00Z	18836	31	311
2023-02-04T17:11:00Z	21200	32	324
2023-02-04T17:12:00Z	23242	32	307
2023-02-04T17:13:00Z	24555	14	285
2023-02-04T17:14:00Z	26123	53	295
2023-02-04T17:15:00Z	27558	38	303
2023-02-04T17:16:00Z	28170	38	306
2023-02-04T17:17:00Z	29505	42	306
2023-02-04T17:18:00Z	30768	39	294
2023-02-04T17:19:00Z	32228	45	288
2023-02-04T17:23:00Z	35997	39	290

SWA Partnership with the NWS

- Concentrated effort to build relationship with NWS
 - WFO/CWSU/National Centers



- Collaboration delivered through:
 - Workshops
 - Ad Hoc Meetings
 - Research Projects

SWA Partnership with the NWS

- Communicate via phone and NWSChat
- Use a vast array of WFO/CWSU products:
 - Forecast discussions
 - Point forecasts
 - Graphiccasts
 - PNS
 - Dedicated Aviation Websites
 - McCarran Airport Weather
 - San Francisco Marine Stratus Forecast System
- TAFs
 - Used for long and short term operational decision making
 - Most used NWS product
- National Centers are also crucial
 - AWC's TCF
 - SPC's Convective Outlook
 - NHC's Forecast Tracks

Miscellaneous Topics

- Please invite us to any storm calls you have with Emergency Management or the Media
- Familiarity with your airports operating criteria and local minimums
- Help us where you can with ASOS/AWOS outages

Thank you!

