Delta Air Lines Meteorology

Forecasts - Decisions and Impacts

DELTA

Department Information

12 Meteorologists..soon to be 30!

At Delta:

- 2-3 Meteorologists on-shift
  - 1 Surface Forecaster
  - 1-2 Upper Air Forecasters

At Northwest:

- 3-4 Meteorologists on-shift
  - 1 Surface Forecaster
  - 2-3 Upper Air Forecasters

Primary Customers

Internal –

- Flight Control and OCC
- Flight Operations
- In-Flight
- Stations
- De-Icing Operators

External (soon to be) –

- NWA Meteorology Contract Customers

Why do these areas need us?

Purpose

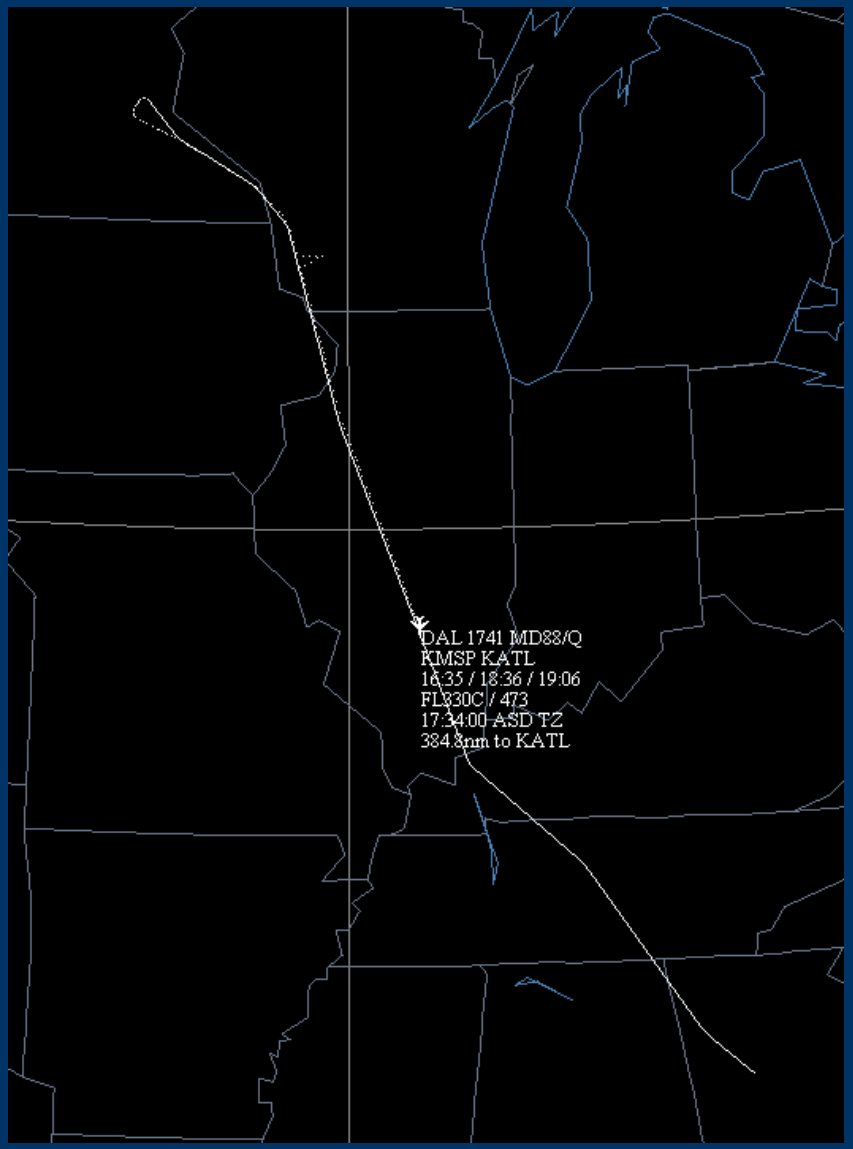
Meteorology supports the airline in two key areas:

- Safety
- Efficiency

Safety in Federal Regulations

Before beginning a flight, the aircraft dispatcher shall provide the pilot in command with all available weather reports and forecasts of weather phenomena that may affect the safety of flight, including adverse weather phenomena, such as clear air turbulence, thunderstorms, and low altitude wind shear, for each route to be flown and each airport to be used.

During a flight, the aircraft dispatcher shall provide the pilot in command any additional available information of meteorological conditions (including adverse weather phenomena, such as clear air turbulence, thunderstorms, and low altitude wind shear), and irregularities of facilities and services that may affect the safety of the flight.

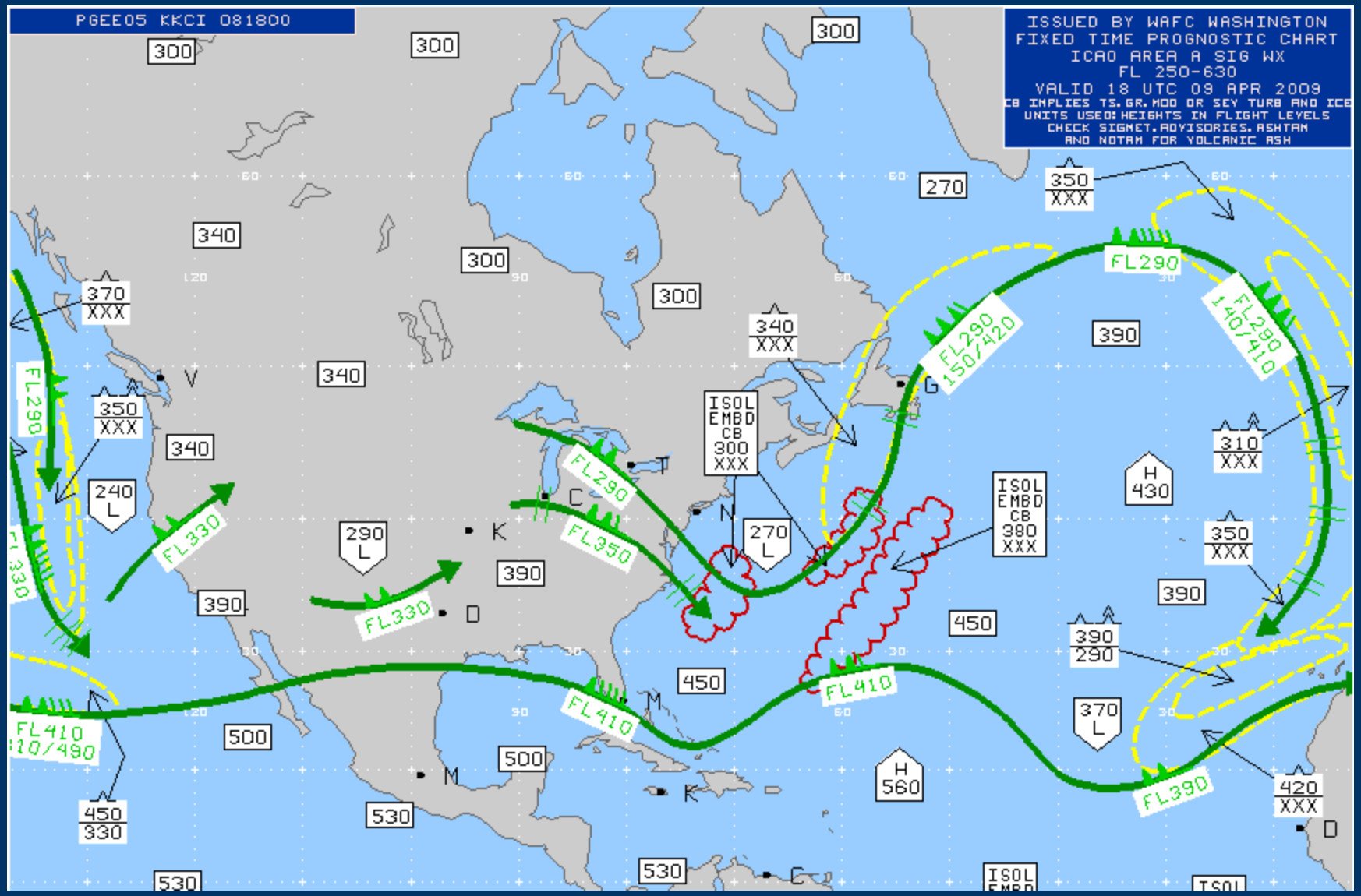


Adverse Weather Conditions

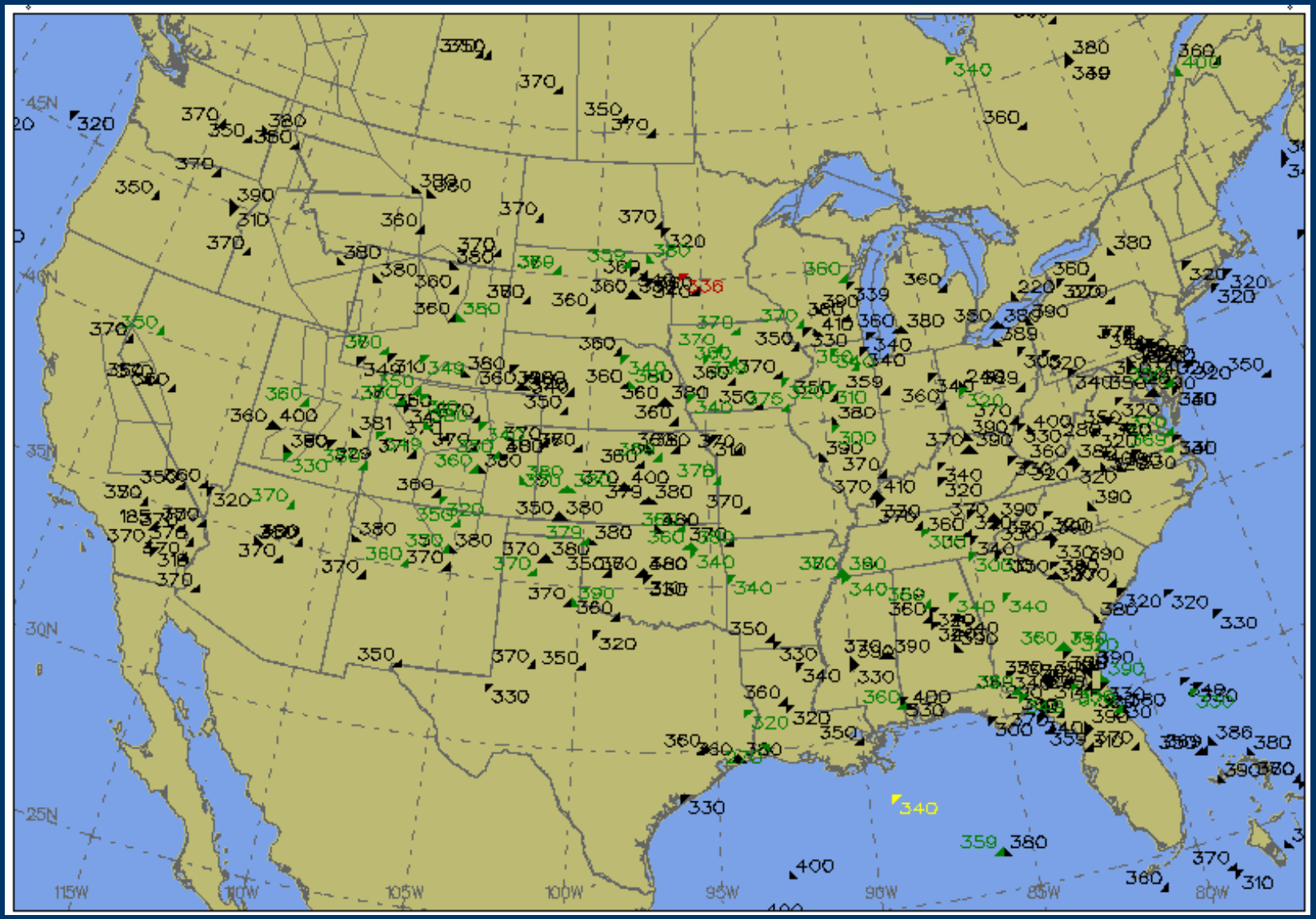
- Turbulence
- Mountain Waves
- Thunderstorms
- Low Level Turbulence/Wind Shear
- Tropical Systems
- Volcanic Ash
- Icing
- Ozone
- Space Weather

Delta and Northwest have FAA approved systems to use their meteorology department for primary forecasts for these hazards

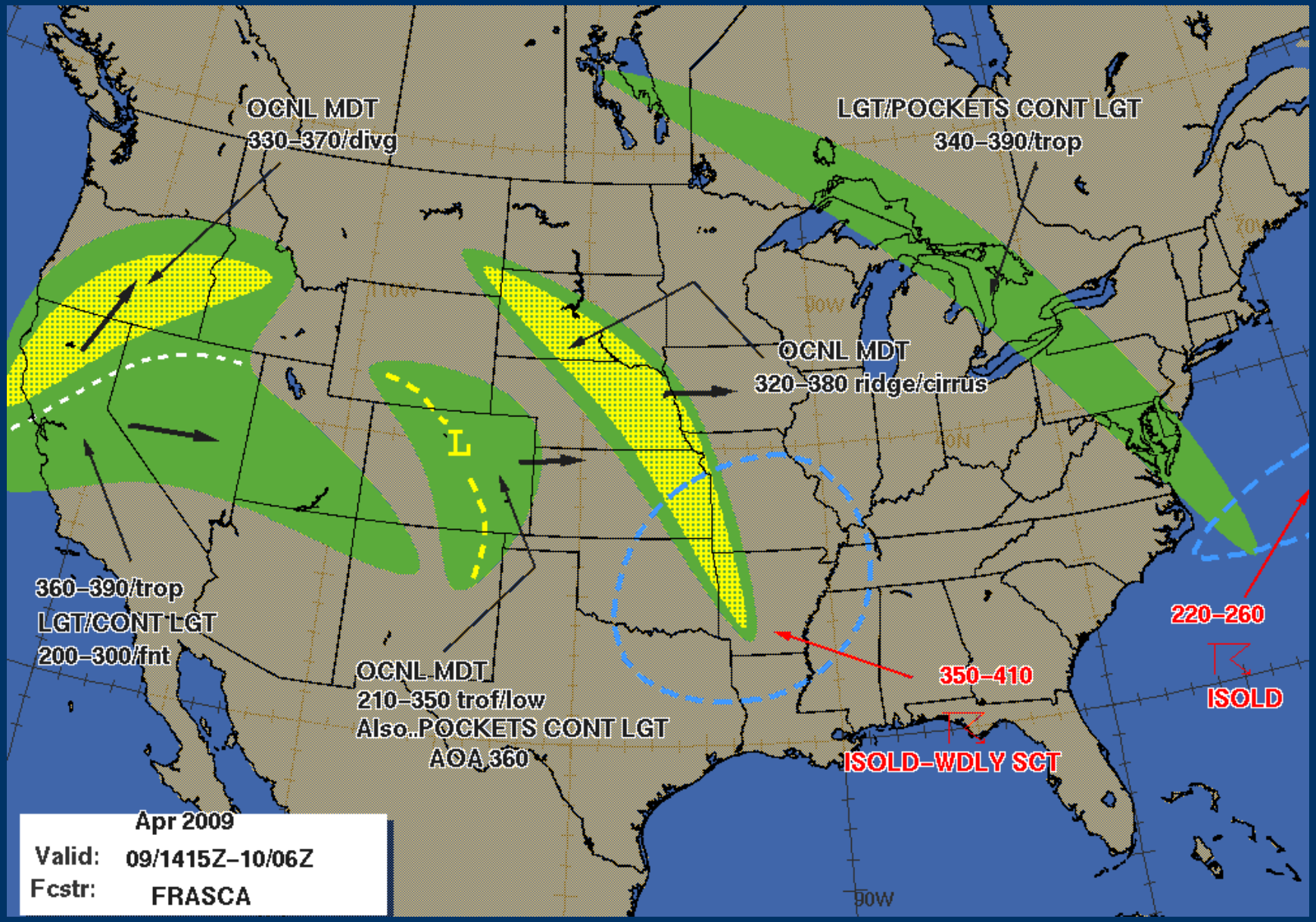
WAFC – Hazards Forecasts



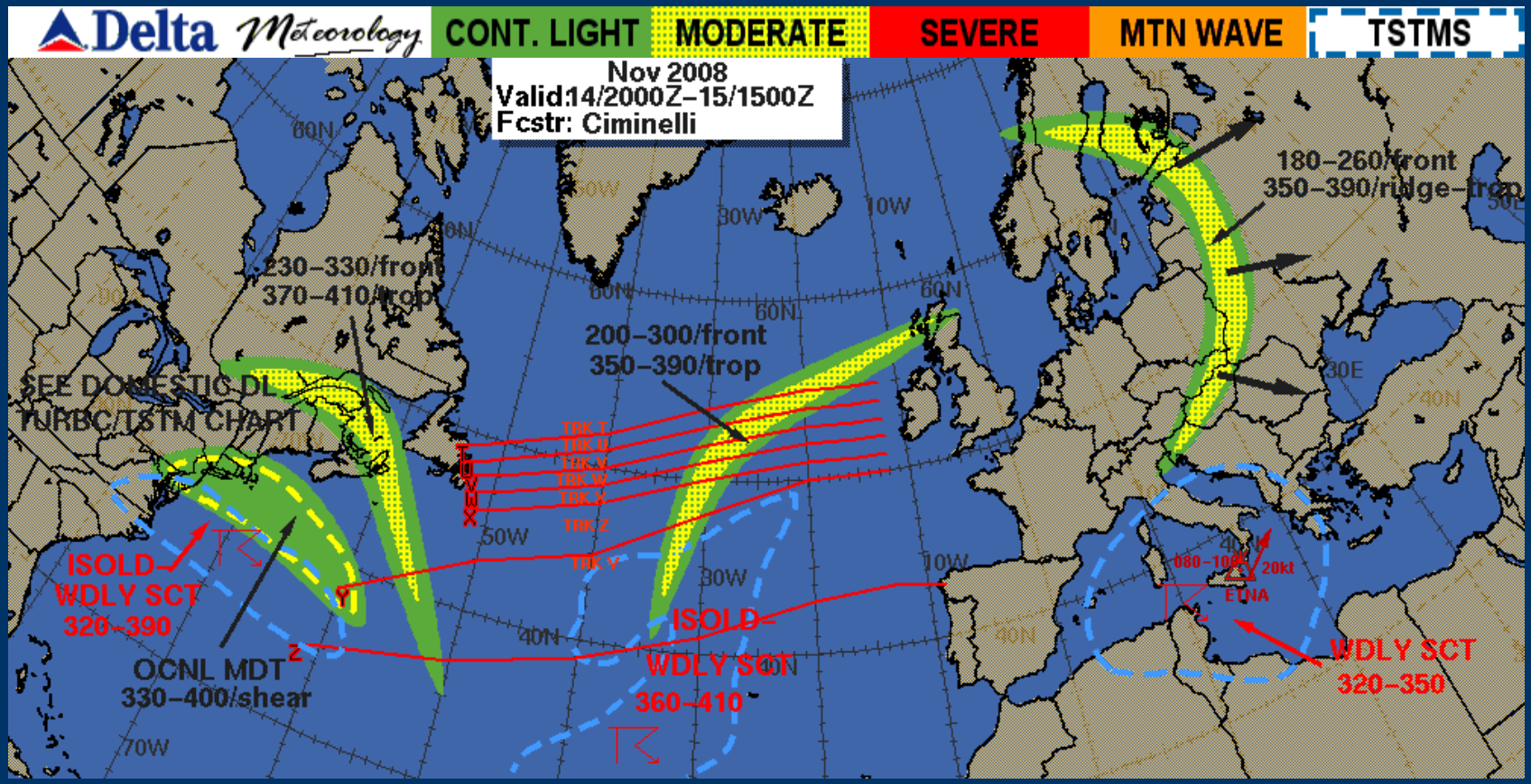
Delta and Northwest – Pilot Reports



Delta – Hazards Forecasts



International Hazards Forecasts



Delta Metro Alert

```
SE1 031908-041500
      ******* SOUTH CENTRAL REGION ******
OVR MS-GA-SC-NC..FM SJI-MCN-CAE-RDU..
100NM WIDE LINE OF LGT-MDT TURBC AT FL340-390/TROP
MOVG SE 10KTS.
```

Adopting NW TP in May:

NWA

```
SE34 022103-030500
1.LA AL MS GA SC NC
2.* ADVISORY *
VOR:SJI RDU
HAZ:TURBC-TROPOPAUSE
SOURCE:PIREPS
LINE:30N087W 36N079W
WIDTH:100NM
TIME:POSN AT 02/2130Z
ALTS:FL340-390 LGT-MDT
MVG:33010
3.VALID 022103/030500Z
4.CANCEL SE31
```

Flight Planning Message Example

```
** NORTH ATLANTIC EBND FLT PLANNING MSG - 14 NOV 08 **
/
1. COLD TEMPS..ERN TRACKS-EUROPE (FL370-390)..SEE MAP
/
2. RTES/FLS..
   COASTAL NEW ENGLAND: SUGG AOB FL320..NBFL LOWER.
   OVR SERN CANADA: SUGG FL340-360..NBFL HIGHER.
   TRACKS/SRN RANDOMS (32-20W): SUGG FL310-340..NBFL HIGHER.
   OVR WRN EUR: MIN COST..NBFL HIGHER.
   SCANDINAVIA/ERN EUROPE/WRN RUSSIA: SUGG 270-340..NBFL HIGHER.
/
3. ETPS..
   YYT/YQX/YJT/YYR..USEABLE. KEF/TER..USEABLE.
   DUB/GLA..USEABLE. TRD/OSL..USEABLE.
   LIS..USEABLE.
```

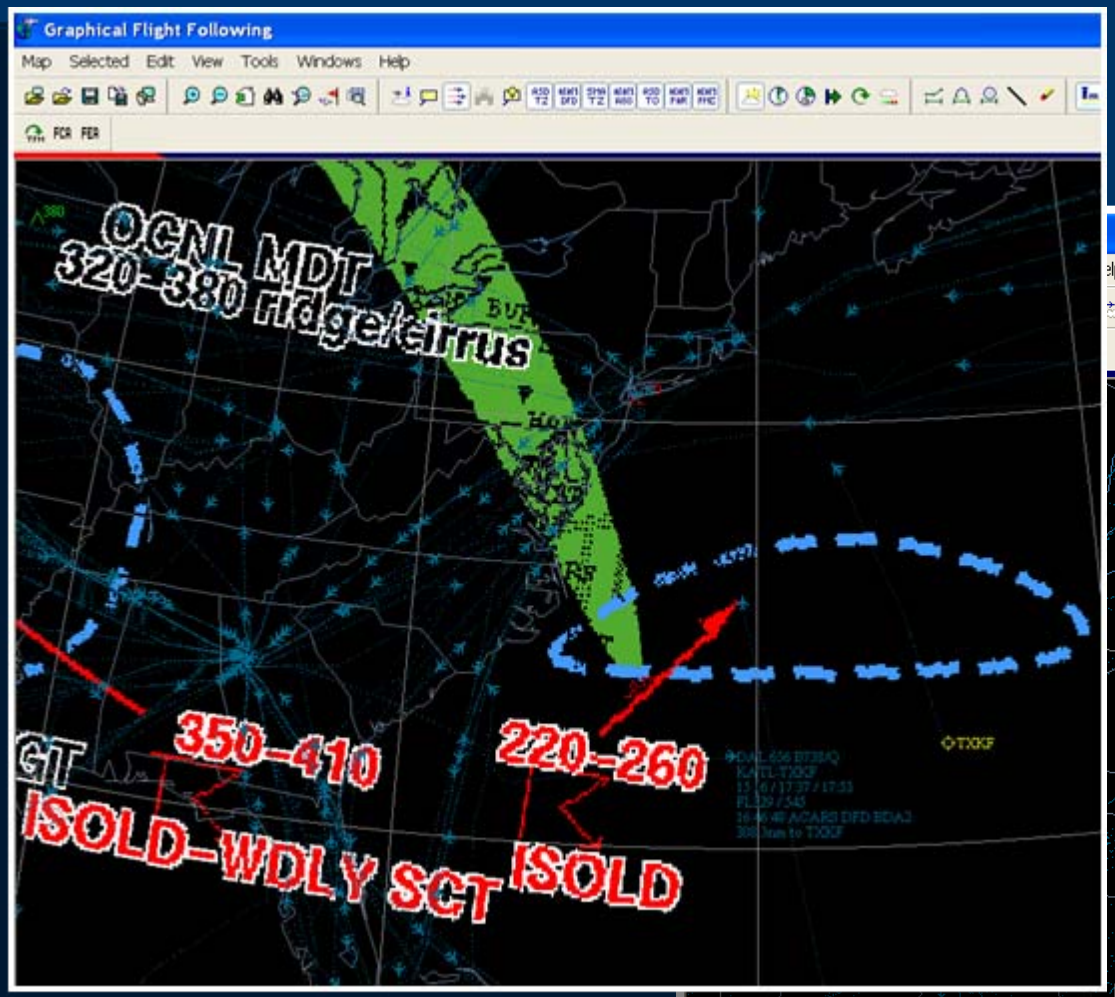
Sigmets

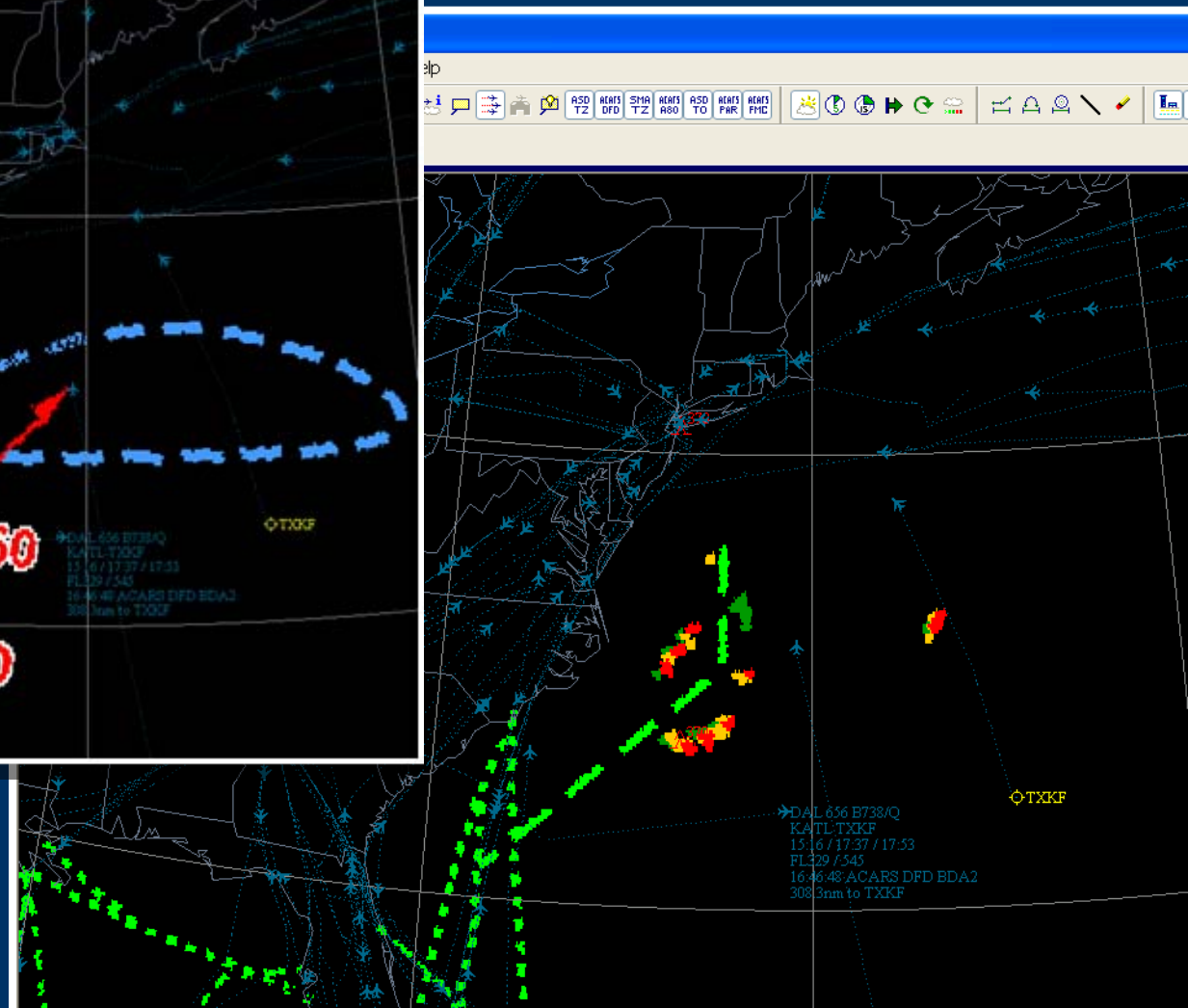
BICC 071315 BIRD SIGMET 02 VALID 071315/071615 BIRK- BIRD
REYKJAVIK CTA MOD OCNL SEV TURB OBS AT 1300Z AND FCST WI N61
W026 - N61 W018 - N6230 W018 - N6230 W026 FL290/350 MOV E 25KT
NC

RESPONSE

METR-3
REFERENCE BIRD SIGMET 02
/
PIREPS: NO REPORTS OF SEVERE TURBC RCVD..
/
BASED ON LATEST DATA..SEVERE TURBC NOT FCST W/I SIGMET AREA
..OCNL MDT PSBL W/I FLS 290-340 THIS AREA THRU THE PERIOD
/
(FRASCA/1328Z)..
M33 9EE020 071350 FRASCA

Decisions Made from Turbulence Charts





Decisions Made from Hazards Chart

Dispatcher Decisions - Preflight

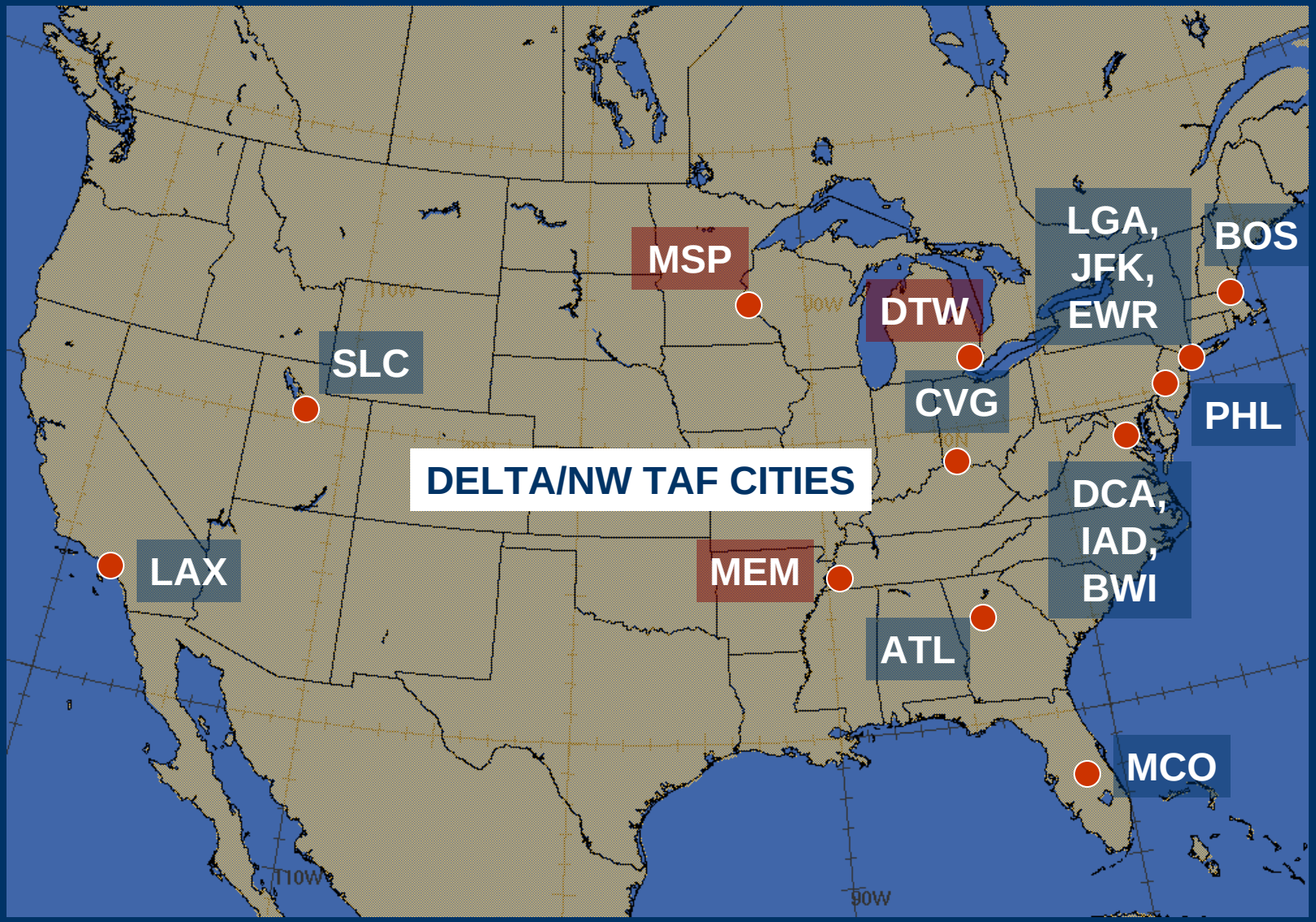
- Route Selection
- Altitude Selection
- Extra Fuel for Deviations
- Avoid Severe Turbulence/Mountain Waves
- Avoid Volcanic Ash
- Avoid Ozone Restrictions
- Avoid Severe Icing

Then relay information to pilots to stay on planned course.

Dispatcher Decisions – En Route

Monitor for any changes and communicate with pilot any amendments to the original flight plan.

TAF Cities


DELTA/NW TAF CITIES
MSP
DTW
LGA,
JFK,
EWR
BOS
SLC
CVG
PHL
DCA,
IAD,
BWI
LAX
MEM
ATL
MCO
110W
90W

Terminal Aerodrome Forecasts

Safety -- Dispatchers

- Alternate City
- Extra Fuel for Holding
- Crosswinds

Efficiency – Sector Managers/Ops Planners

- Arrival Rate vs Schedule
- Runway Configuration Changes
- Deicing Considerations
- Forecast what ATC will do

Delta TAF Example

TERMINAL FORECAST
ATL DL 231405 AMD 02 VALID 231405-240400 UTC
FM231400 09010KT 2SM -RA FG OVC003 TEMPO 1SM -RA FG
FM232000 17010KT 2SM -RA FG OVC008
FM232200 29010KT 5SM -RA OVC010
FM240000 31012KT 7SM OVC015
DISCUSSION – LOW CIGS WILL IMPROVE AFTER FRONT MOVES THRU AND WINDS BECOME WESTERLY.

Alternate is needed if visibility is below 3SM and cigs are below 2000 feet.

DL and NW have an exemption to reduce to 2SM and 1000 feet with no thunderstorms.

Crosswinds - DCA

Runway 04/22: 4911 feet

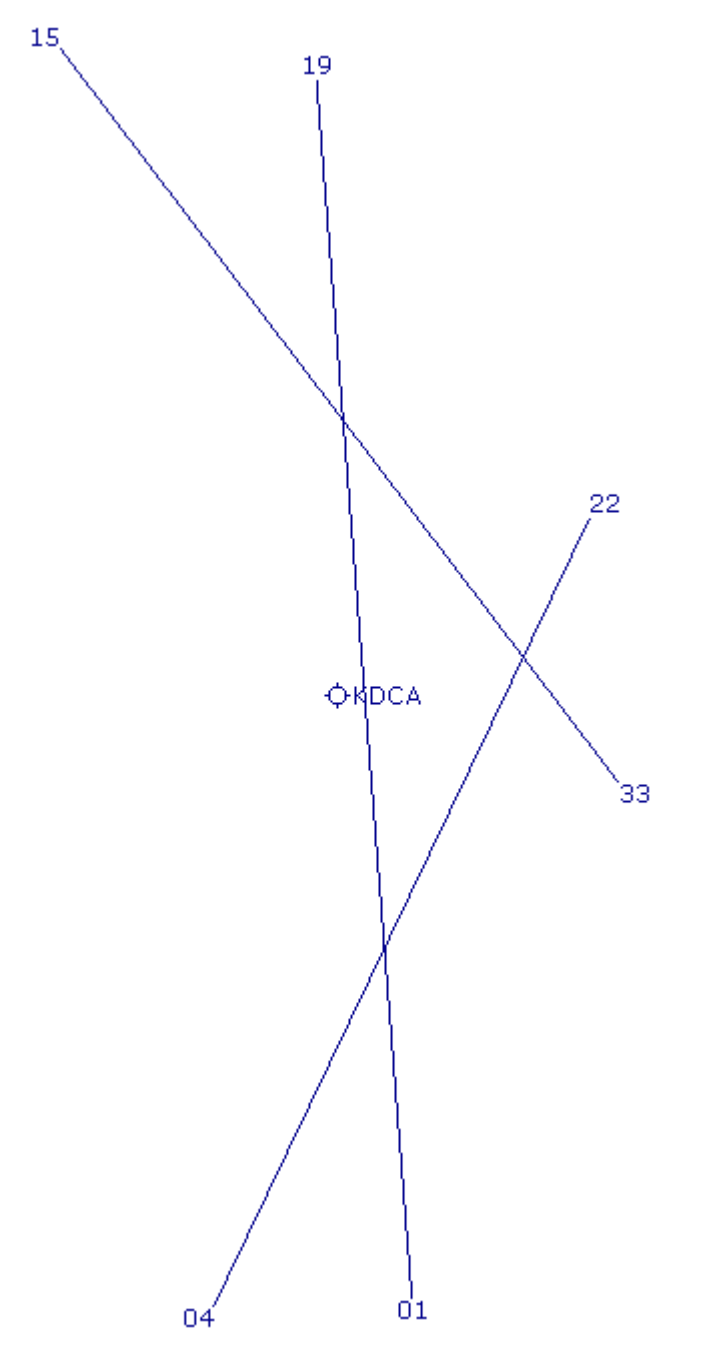
Runway 15/33: 5204 feet

Runway 01/19: 6869 feet

Our aircraft fleet generally prefers 5500ft.

Leaves operation on Runway 01/19

Strong winds from the west or east cause crosswind issues.



DCA

	Max Cross Wind
MD88/90	30
B737-800	36
B737-800 W	33
B757-200	29
B767	29
B777	38

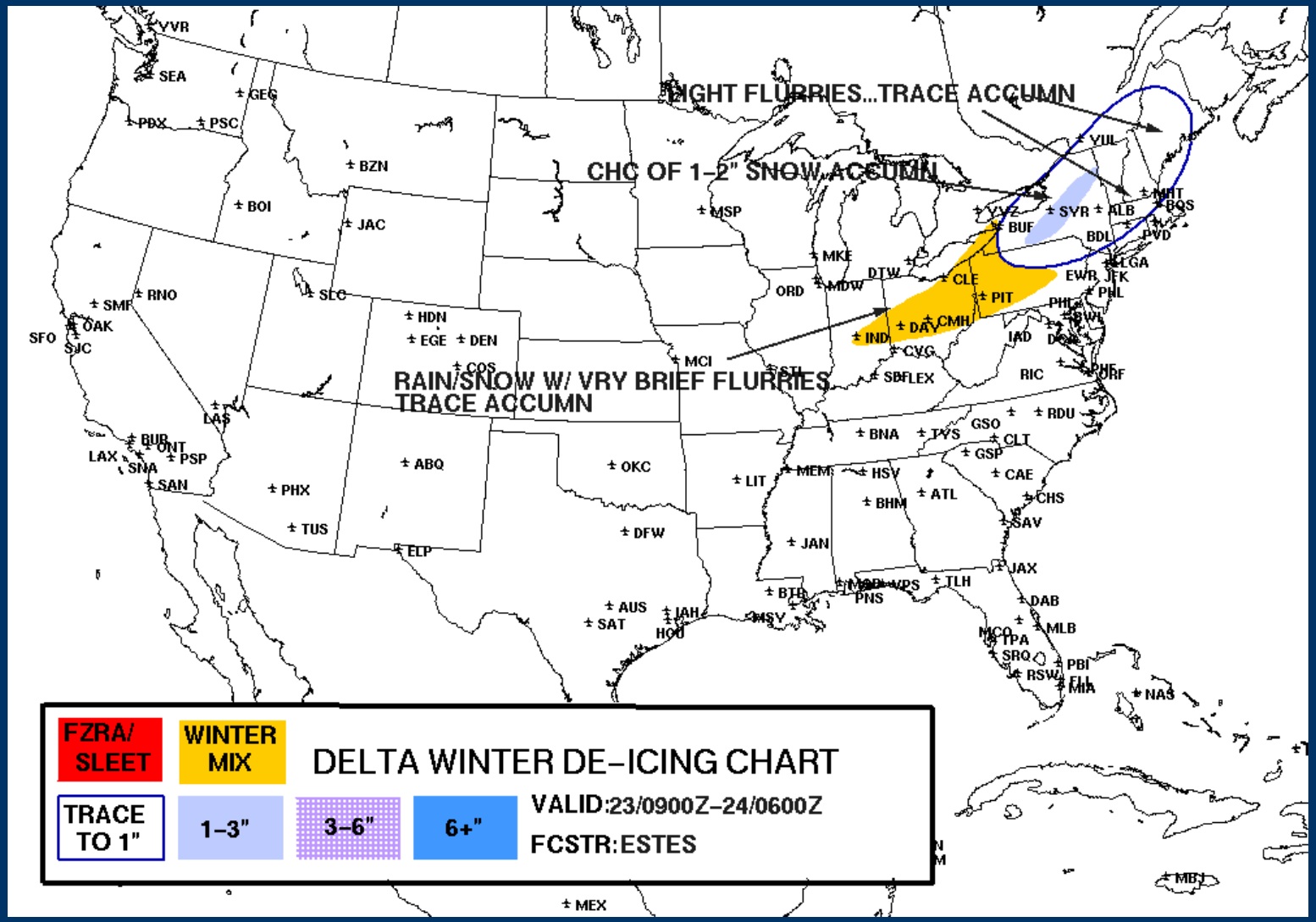
KDCA
130539Z 1306/1406 30015G30KT P6SM SKC
FM131200 30014G25KT P6SM SKC
FM131500 31016G30KT P6SM FEW050
FM132100 32014G22KT P6SM SCT050 SCT090
FM140000 34010KT P6SM SCT090

Irregular Operations (IROPS)

Provide additional products for

- Tropical activity
- Major snow storms

Deicing Chart



IROP Forecast - Snowstorm

Microsoft Excel - Book1 - blank

File Edit View Insert Format Tools Data Window Help Adobe PDF

Date:

DELTA

Forecast by: Forecaster | Time: Update Time | Op Update:

City			Forecast																						Operations
ATL	Start Date:		12	12	12	12	12	12	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	Operational Plan/Response
	Start Time (zulu):		18	19	20	21	22	23	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14		
	WIND Direction		E ←	E ←	E ←	E ←	E ←	E ←	E ←	E ←															
	WIND Sustained		12	12	12	12	12	12	12	12															
	WIND Gusts		20	20	20	20	20	20	20	20															
	PRECIP Rain	ACCUM	L	L	L																				
	PRECIP Freezing Rain																								
	PRECIP Sleet																								
	PRECIP Snow	1"	L	L	L	L	M	M	M	M															
	Temperature		32	32	32	31	30	30	30	30															
	Event Category		B	B	B	B	C	C	C	C															Daily Flight Statistics:
	Deicing Capability		14-16	14-16	14-16	14-16	12	12	12	12															DL Arrivals
	DAL Ops																								OH Arrivals
	New # Depts:																								DC Arrivals
	# of RONS																								
	OH Ops																								
	Other DC																								
CHA	Start Date:		12	12	12	12	12	12	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13		Operational Plan/Response
	Start Time (zulu):		18	19	20	21	22	23	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14		
	WIND Direction		NE ↙	NE ↙	NE ↙	NE ↙	NE ↙	NE ↙	N ↓	N ↓	NW ↘	NW ↘													
	WIND Sustained		12	12	12	12	12	12	12	12	12	12													
	WIND Gusts		20	20	20	20	20	20	20	20	20	20													
	PRECIP Rain	ACCUM																							Deicing Temperatures
	PRECIP Freezing Rain																								Start of Winter Precip: F
	PRECIP Sleet																								End of Winter Precip: F
	PRECIP Snow	3"	L	L	L	L	L	L	L	L	L	L													
TYS	Start Date:		12	12	12	12	12	12	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13		Operational Plan/Response
	Start Time (zulu):		18	19	20	21	22	23	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14		
	WIND Direction		NE ↙	NE ↙	NE ↙	NE ↙	NE ↙	NE ↙	N ↓	N ↓	NW ↘														
	WIND Sustained		12	12	12	12	12	12	12	12	12														

IROP Forecast - Snowstorm

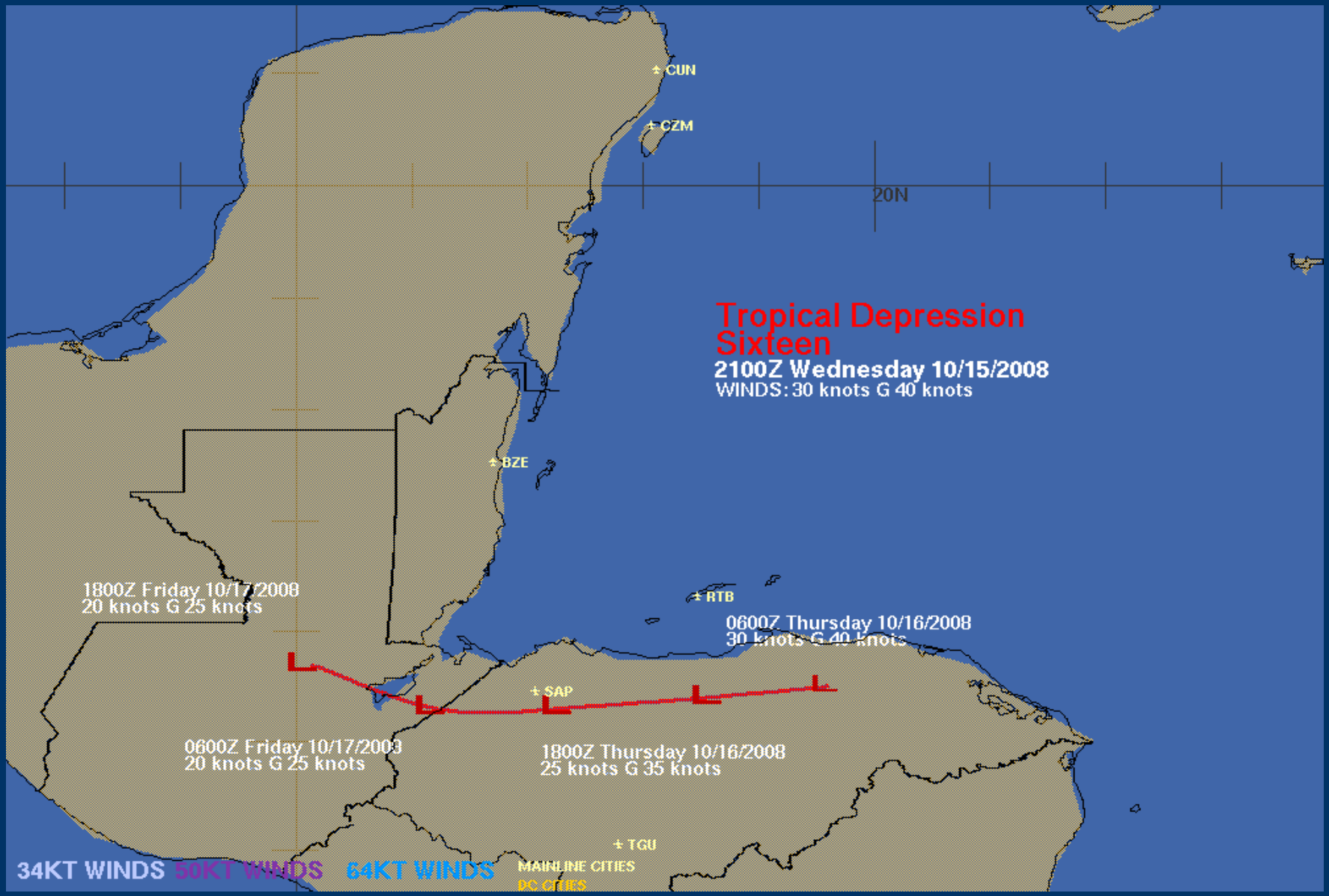
Deicing Operations:

- 1 Step (De-Ice Only) or 2 Step (De-Ice and Anti-Ice)
- Outside Temperature: Water/Fluid Mix
- Timing of Set-Up
- Extra Staffing

Sector Managers:

- Deicing Capability vs Schedule
- Timing and Duration of Event
- Delay vs Cancellation
- Load Factors
- Connections
- Extra Flights before/after event

Hurricane Chart



IROP Forecasts - Hurricane

Microsoft Excel - Book1 - IKE

Storm: IKE

Forecast by: Stewart Time: 13/0815

DELTA Op Update: 11-Sep-08

City			Forecast												Operations	Time (LCL)	Flight	Passenger Impact
HOU		Start Date:	12	12	13	13	13	13	13	13	13	13	14	14				
		Start Time (zulu):	18	21	00	03	06	09	12	15	18	21	00	03				
	WIND	Direction	NE	NE	NE	NE	N	NW	W	SW	SW	SW	SW	W	Last Arrival:	0848/12	2016	
			↙	↙	↙	↙	↓	↘	→	↗	↗	↗	↗	→	Last Departure:	0920/12	2016	
		Sustained (>15KT)	18	18	22	25	45	55	50	40	35	22	18	15	Planned Restart:	TBD	TBD	
		Gusts (>30kt)	30	35	40	45	50	75	75	65	50	40	30	25				
IAH		Start Date:	12	12	13	13	13	13	13	13	13	13	14	14				
		Start Time (zulu):	18	21	00	03	06	09	12	15	18	21	00	03				
	WIND	Direction	NE	NE	NE	NE	NW	W	W	SW	SW	SW	SW	W	Last Arrival:	1344/12	3687	
			↙	↙	↙	↙	↘		→	↗	↗	↗	↗	→	Last Departure:	1415/12	3687	
		Sustained (>15KT)	18	18	22	30	40	50	45	40	35	22	18	15	Planned Restart:	TBD	TBD	
		Gusts (>30kt)	30	35	40	55	60	75	65	60	55	40	30	25				
LFT		Start Date:	12	12	12	13	13	13	13	13								
		Start Time (zulu):	15	18	21	00	03	06	09	12								
	WIND	Direction	NE	E	E	E	E	SE	S	S					Last Arrival:			
			↙	←	←	←	←	↖	↑	↑					Last Departure:			
		Sustained (>15KT)	15	15	15	15	15	15	15	15					Planned Restart:			
		Gusts (>30kt)	30	30	30	35	35	35	30	25								
SAT		Start Date:	13	13	13	13	13	13	14									
		Start Time (zulu):	06	09	12	15	18	21	00									
	WIND	Direction	N	N	N	N	NW	W	SW						Last Arrival:			
			↓	↓	↓	↓	↘								Last Departure:			
		Sustained (>15KT)	15	15	18	18	15	18	20						Planned Restart:			
		Gusts (>30kt)	25	25	30	30	25	30	34									
AUS		Start Date:	13	13	13	13	13	13	14									
		Start Time (zulu):	06	09	12	15	18	21	00									
	WIND	Direction	N	N	N	N	NW	NW	SW						Last Arrival:			
			↓	↓	↓	↓	↘	↘							Last Departure:			
		Sustained (>15KT)	15	16	22	30	34	26	20						Planned Restart:			
		Gusts (>30kt)	25	30	38	40	44	40	33									
		Start Date:	13	13	13	13	13	13	14									
		Start Time (zulu):	06	09	12	15	18	21	00									

IROP Forecast - Hurricane

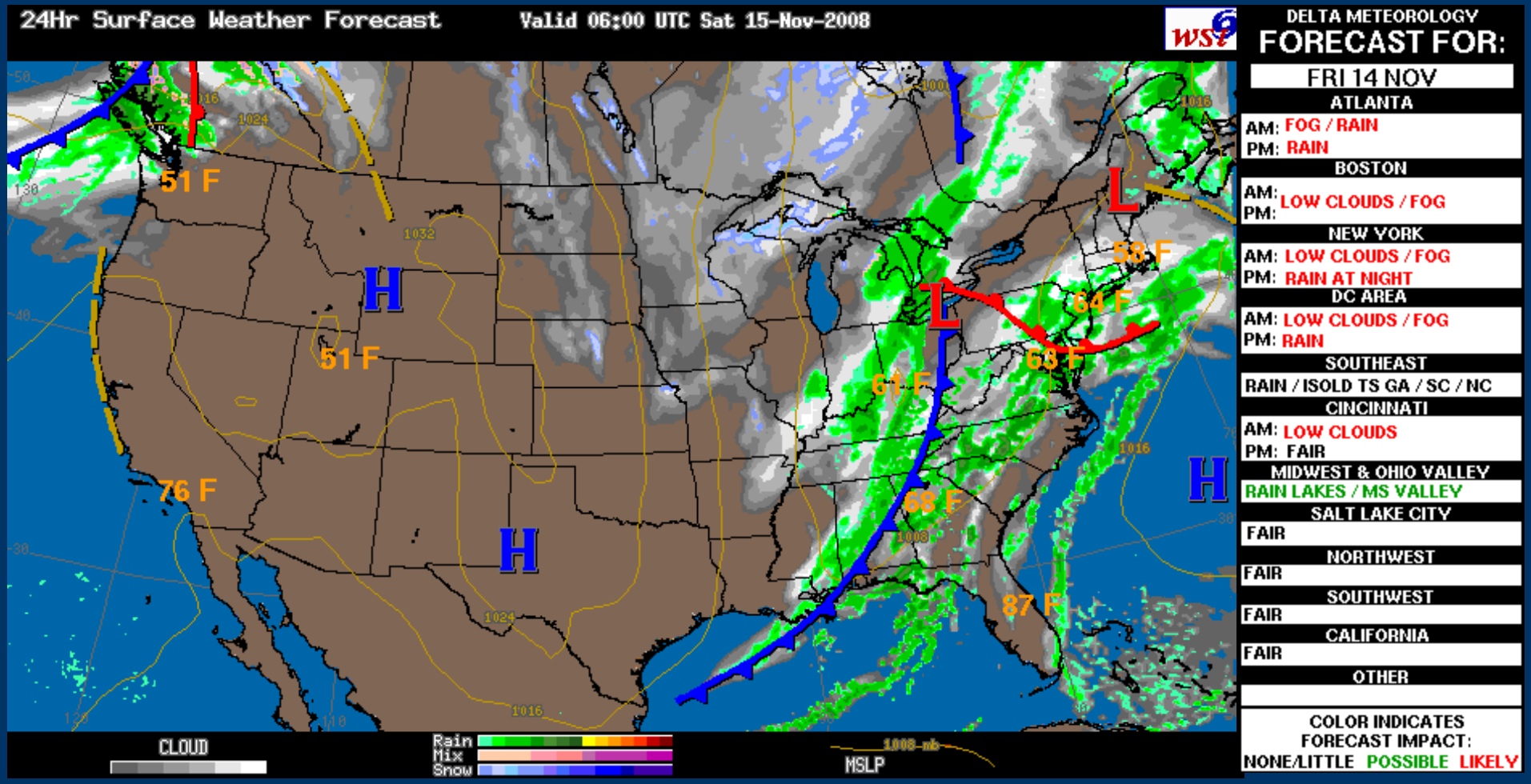
Stations:

- Mandatory Evacuations
  - Customers
  - Employee
- Airport Authority and Airport Infrastructure
- Civil Authority (bridges, roads, etc)

Sector Managers:

- Timing and Duration of Event
- Delay vs Cancellation
- Load Factors
- Connections
- Extra Flights before/After Event
- Crosswinds

Long Range Planning Forecast – Day 1- 5



Weather Experts

My weather radar/de-icing equipment broke. Can I continue to my destination?

Will that broken line of thunderstorms become solid?

What does that unusual code in the TAF/METAR mean?

What is the best alternate?

What do you think about the SIGMET?