

*NWS/FAA Sponsored*  
*Boston Aviation Workshop*  
**‘WSI Global Weather Services’**



WSI Headquarters  
400 Minuteman Road  
Andover, MA 01810

*04 May 2010*



# WSI & The Weather Channel Companies



## The Weather Channel® Companies (TWCC) include:

- *The Weather Channel – television networks and products for radio, newspapers, digital cable, and interactive television*
- *The Weather Channel Interactive – weather.com® and products for broadband and mobile platforms*
- *WSI (Weather Services International) – premiere business-to-business weather services, particularly for the media, aviation and energy sectors*
- *Enterprise Electronics Company (EEC) – the world's leading supplier of weather radar systems*



TWCC are owned by a consortium made up of NBC Universal and the private equity firms of The Blackstone Group and Bain Capital



Bain Capital

The Blackstone Group®

# Why Use A Private Weather Source?



## Deep Understanding of our Customer's businesses

- *Innovation designed to meet specific needs*
- *Information and Tools built to meet mission critical business requirements*
- *Fuse disparate data sets into one platform*

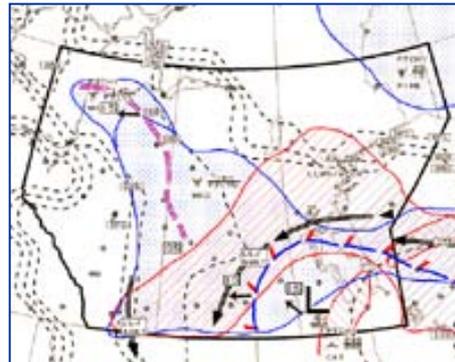
## 'One Stop Shopping'

- *Data, Systems, Customer Support integrated and mutually supported*

## Ability for customers to talk directly with a meteorologist

- *Customers understand their weather but they are not experts*
- *Multi-million dollar business decisions must be made with confidence*

**Private Industry is not limited by National boundaries, budgets, or special interests**



# WSI – Markets Served: ENERGY

- **Trader**

- *Buying & Selling of Energy contracts*
- *Balance of the Day, Short-Range, Medium-Range, Seasonal forecasts*



- **Utilities**

- *Power disruption (Winds, Snow, Ice, Lightning)*
- *Mutual Aid planning*



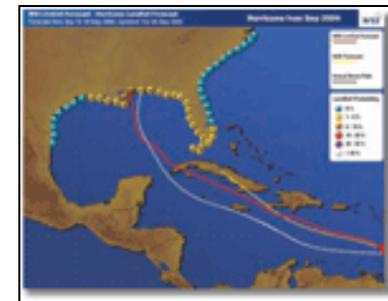
- **Wind Power**

- *Turbine height power forecasts*



- **Insurance**

- *Significant global weather Events*



# Notable WSI Energy Customers



## Energy

Bank of America 



 Constellation Energy

Deutsche Bank 

 Entergy

  
General Electric



GUY CARPENTER

  
Koch Supply & Trading LP

Morgan Stanley



 Progress Energy



# WSI – Markets Served: MEDIA

## Partnered with The Weather Channel

- *Providing systems and data*

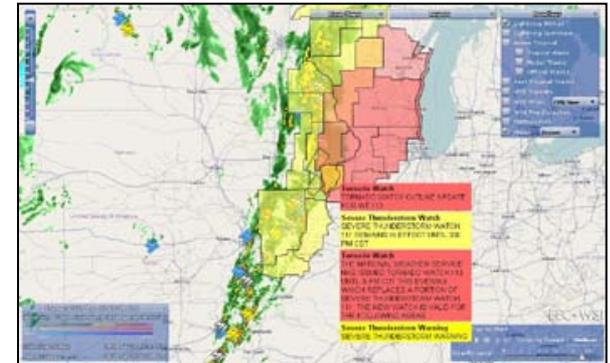
## Television

- *Systems and data for on-air broadcasters*
- *Cable-end services*
- *Radar / NWP package*



## Online

- *Intellicast.com, WeatherActive*
- *Weather.com*



## Mobile

- *Apps built with broadcaster's branding*



# Notable WSI Media Customers



Media



euronews



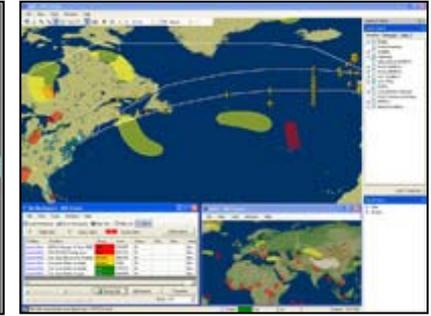
HEARST *television inc*



# WSI – Markets Served: Aviation

## Commercial

- *Forecast Services*
- *Fusion, Hubcast Premium*



## Business and General Aviation

- *Pilotbrief, Inflight*

## Airports/FBOs

- *Hubcast Alert*



# Notable WSI Media Customers



## Aviation

AIR CANADA 

AmericanAirlines<sup>®</sup>

BRITISH AIRWAYS 

  
Cessna  
A Textron Company

Continental  
Airlines 

 DELTA

  
Emirates

  
EUROCONTROL



jetBlue

 LANDMARK  
AVIATION

 Lufthansa

 MILLION AIR

OMNIFLIGHT

RYANAIR

  
SOUTHWEST  
AIRLINES

 UNITED



 U.S AIRWAYS

# WSI Forecast Operations R&D



**Handles the difficult science issues**

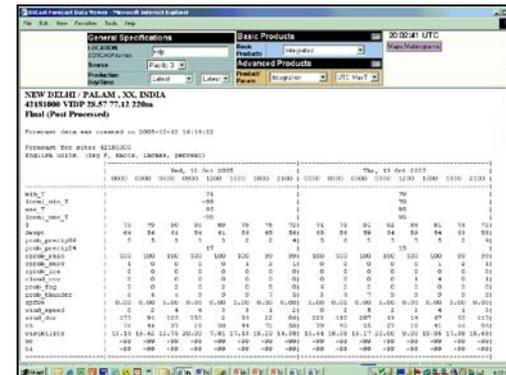
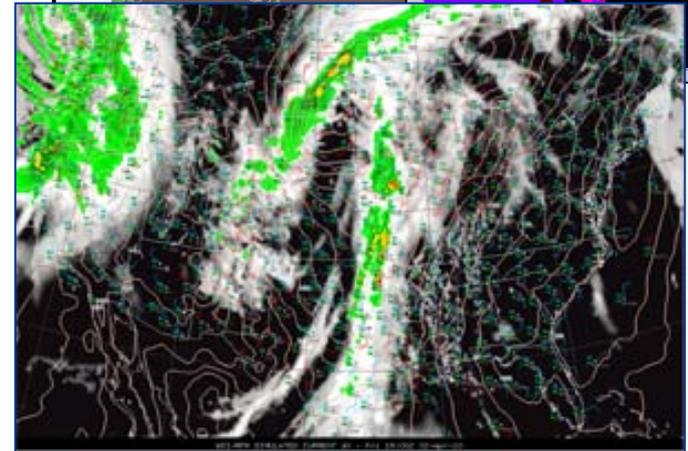
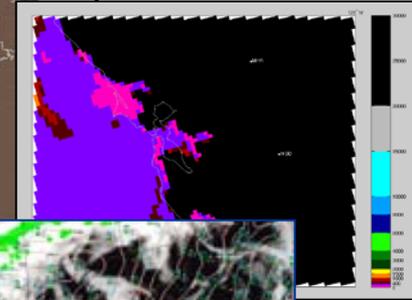
**Identifies promising research and brings it into operations**

## WSI's RPM NWP Model

- *In operations for 6 years*
- *Run globally at 36km resolution, 4 x day*
- *Run 8 x day across the CONUS at 4km res*
- *Control our own post-processing...*

## Dlcast (dynamically integrated forecasts)

- *AI generated forecasts for any point on Earth*
- *Used as initial forecast guidance*
- *Forecasts loaded into DiGIT*

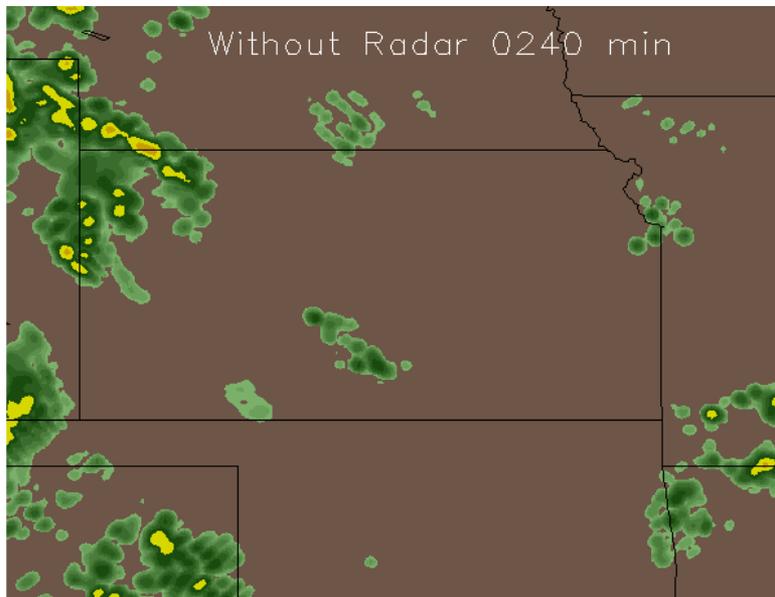


# WSI Forecast Operations R&D



Using radar assimilation to improve RPM accuracy in 0-6 hour forecast range

T+4hr without Radar Assimilation



*+4 Hour Forecast  
with old system*

T+4hr with Radar Assimilation



*+4 Hour Forecast  
with new system*

*Reality*

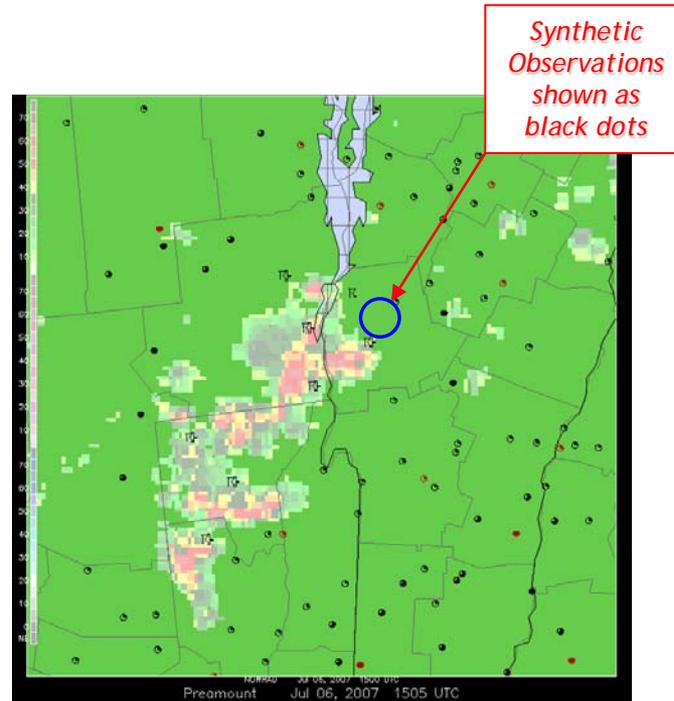
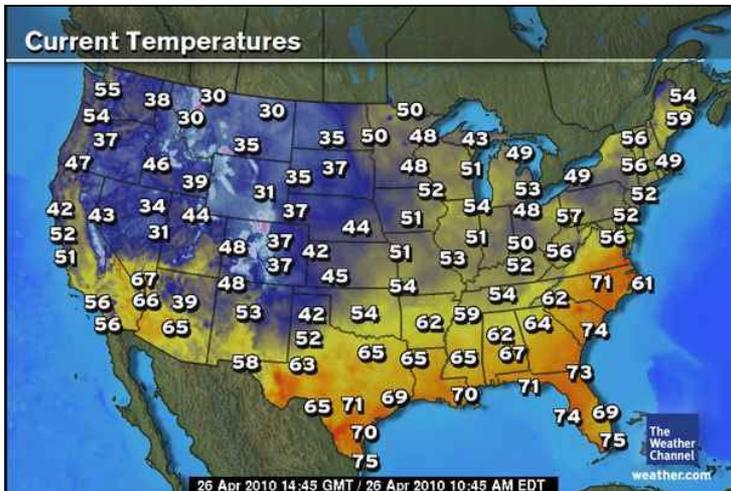


# WSI Forecast Operations R&D



## HiRAD

- *Official Observations are sparse; and people don't live at airports*
- *HiRAD fills in the open spaces between the 1,500 official obs across the CONUS. This creates 1.9 million synthetic obs on a 2.5km grid*
- *Expanding HiRAD to parts of the U.K. and Western Europe*



# WSI Forecast Operations R&D



Nowcast through 1:30pm MDT

*Light to moderate snow will develop by 10am. Cloudy and windy. Temperatures steady near the upper 20s. Winds NW at 15 to 20 mph. Chance of snow 70%. Additional snowfall about half an inch through 1:30pm.*



## Topps Nowcast for Station KCCU

Copper Mountain / Red Cliff Pass, CO, United States [plot on map]  
 Lat 39d 28m 11s N Lon 106d 09m 00s W Elev 3680 m

## HiRAD *FastForward*

Hirad:FF Forecasts (using breakpoints: 9 18 23) [Clusterer link]																			
time	temp	dwpt	rh	wc	hi	clد	wdir	wspd	vis	qpe	sqpe	pop	pfog	cpow	cpoi	pot	icon	extd	wx
Fri 23 0745 MDT 24	19	77	10	24	95	310	19	5	0	0	10	43	97	1	9	26	2600	Cloudy	
Fri 23 0800 MDT 24	19	77	10	24	93	315	18	5	0	0	10	44	97	1	10	26	2600	Cloudy	
Fri 23 0815 MDT 24	19	78	11	24	93	315	17	5	0	0	11	44	97	1	9	26	2600	Cloudy	
Fri 23 0830 MDT 24	20	79	11	24	92	315	17	5	0	0	11	43	97	1	9	26	2600	Cloudy	
Fri 23 0845 MDT 24	20	80	11	24	92	310	17	5	0	0	12	41	97	1	9	26	2600	Cloudy	
Fri 23 0900 MDT 24	20	81	11	24	91	310	17	5	0	0	12	40	97	1	9	26	2600	Cloudy	
Fri 23 0915 MDT 24	20	82	10	24	91	310	17	5	0	0	13	39	97	1	9	26	2600	Cloudy	
Fri 23 0930 MDT 24	20	83	10	24	92	310	18	5	0	0	14	39	100	0	9	26	2600	Cloudy	
Fri 23 0945 MDT 24	20	82	10	24	99	310	18	5	0	0	17	38	100	0	9	26	2600	Cloudy	
Fri 23 1000 MDT 24	20	81	10	24	99	310	18	5	0	0	23	38	100	0	9	26	2600	Cloudy	
Fri 23 1015 MDT 24	20	79	11	24	99	310	18	2	0.01	0.1	31	38	100	0	9	14	4700	Few Snow Showers	
Fri 23 1030 MDT 25	20	76	12	25	99	310	18	0.8	0.01	0.1	39	37	100	0	10	14	1601	Light Snow	
Fri 23 1045 MDT 25	19	72	12	25	99	310	17	0.8	0.02	0.1	46	37	100	0	10	14	1601	Light Snow	
Fri 23 1100 MDT 26	19	70	13	26	99	310	17	0.8	0.02	0.2	52	37	100	0	10	14	1601	Light Snow	
Fri 23 1115 MDT 26	19	68	13	26	99	310	17	0.8	0.02	0.2	54	37	99	0	10	14	1601	Light Snow	
Fri 23 1130 MDT 27	19	67	14	27	99	310	17	0.8	0.02	0.2	55	36	99	0	11	14	1601	Light Snow	
Fri 23 1145 MDT 27	19	66	14	27	100	310	18	0.8	0.02	0.2	55	36	99	0	11	14	1601	Light Snow	
Fri 23 1200 MDT 27	19	66	14	27	100	310	18	0.8	0.02	0.2	56	36	99	0	11	14	1601	Light Snow	
Fri 23 1215 MDT 27	19	66	14	27	100	310	18	0.8	0.02	0.2	60	36	99	0	12	14	1601	Light Snow	
Fri 23 1230 MDT 28	19	66	15	28	100	305	18	0.3	0.03	0.3	67	36	99	0	13	16	1600	Snow	
Fri 23 1245 MDT 28	20	66	15	28	100	305	18	0.3	0.03	0.3	70	36	99	0	13	16	1600	Snow	
Fri 23 1300 MDT 28	20	66	15	28	100	305	18	0.3	0.03	0.3	70	36	99	0	14	16	1600	Snow	
Fri 23 1315 MDT 28	20	67	15	28	100	300	18	0.3	0.02	0.2	67	36	99	0	14	16	1600	Snow	
Fri 23 1330 MDT 28	20	68	15	28	100	300	18	0.8	0.02	0.2	63	36	99	0	15	14	1601	Light Snow	

*15-minute HiRAD:FF forecasts*



# WSI Aviation Forecasting Services

## Developed to meet FAA EWINS guidelines

- *Degreed meteorologists (BSc required, MSc preferred)*
- *Training (initial training program, CME, Records)*

## Leveraging proven WSI delivery solutions

- *Pilotbrief, Fusion, Inflight, Hubcast*
- *MQ Series, VPN, WINDS, SWINDS, Email, FTP, ARINC*

## WSI Interactive Weather Briefing

- *Major Weather Events, MEL, Alternate selection*
- *Scheduled, Ad hoc*
- *Telephone, Web Conferencing, IM, Chat*
- *Internal collaboration between offices*

## Customer Training

- *Operational Planning*
- *Dispatcher, Crew (Train-the-Trainer, Live Presentation)*



# WSI Terminal Aerodrome Forecasts

## TAF

- Traditional terminal forecasts required by FARs; Use standard format rules - ICAO/NWS
- Forecast discussions (why, confidence, winter precip accums, temperatures)

## Hubcast

- Integrated display with hourly resolution
- Real-time validation
- User configurable thresholds that allow users to quickly identify sig wx
- Alerting (including SMS)

## Strategic Risk Assessor

- OCC management tool to assess weather impacts beyond 24 hrs

```

FTUS10 KWSI 281708
TAF KBOS 281818 11012G18KT 2SM -RA BR OVC004
    TEMPO 1800 1/2SM RA BR OVC004
FM0200 04015G25KT 2SM -RA BR OVC006
FM0500 02012G22KT 3SM -RA BR VCTS OVC007
FM1000 01012G20KT 4SM BR OVC009
FM1700 35012G22KT 5SM BR SCT010 BKN025
RMKS VCTS E-S 05Z-08Z
WSI/XX

RAIN/LOW IFR CONDITIONS THROUGHOUT THE AFTERNOON WITH A SLOW MOVING COLD FRONT PASSING NW-SE THROUGH TERMINAL AREA EARLY THIS EVENING. OVERRUNNING PRECIP AND IFR STRATUS BEHIND FRONT. THE UPPER LEVEL DYNAMICS ARE INITIALLY WEAK FOR THUNDERSTORM DEVELOPMENT BUT SCATTERED ACTIVITY SHOULD DEVELOP NOCTURNALLY JUST NORTH OF THE FRONT THIS EVENING BUT ACTIVITY SHOULD REMAIN SOUTH AND EAST OF THE FIELD. PRECIP WILL GRADUALLY TAPER OFF AFTER MIDNIGHT WITH CEILINGS SLOWLY IMPROVING.
    
```

11-Sep 16:57 : Scattered thunderstorms this afternoon will remain west of DFW but have some impact on the western arrival fees.

Latest METAR: KDFW 111621Z 17013KT 10SM FEW020 SCT028 BKN043 OVC140 28/22 A3011 RMK AO2= (SPECI)=

VALIDATION		DFW		NOW	FORECAST Updated: 16:25Z							
13Z	14Z	15Z	UTC	16Z	17Z	18Z	19Z	20Z	21Z	22Z	23Z	00Z
NSC	NSC	1400	ceiling	NSC	3000	4000	4500	4500	4500	4500	NSC	NSC
UNL	UNL	UNL	visibility	UNL	UNL	UNL	UNL	UNL	UNL	UNL	UNL	UNL
150	160	170	Wind Dir	160	170	180	100	100	170	170	170	160
6	6	11	Wind Speed	13	12	12	11	11	11	11	11	11
6	6	11	Gust Speed	13	12	12	20	20	20	18	16	11
NONE	NONE	RA	Wx	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE
NONE	NONE	NONE	TS	NONE	LOW	LOW	LOW	LOW	LOW	LOW	LOW	LOW

96-114 96-114 96-114 AAR 96-114 96-114 96-114 96-114 96-114 96-114 96-114 96-114 96-114 96-114

RUNWAYS: 13R, 17C, 13R TRP

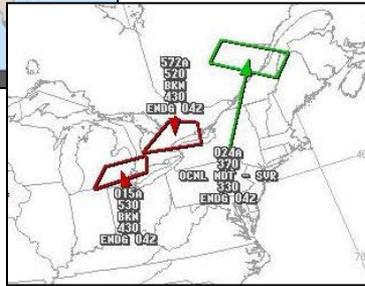
DATE		WEATHER				TEMPS		FORECAST CONCERNS	
ID	WIND	TSM	VIS/CS	SNOW/ICE	LOW	HIGH			
Thursday	SEA				51	72	SEA: Occasional showers, 20% chance of PM thunderstorms.		
6/11	SFO				58	66	SFO: Lower marine stratus but good visibilities. LAX: No significant weather. BOS: Showers likely. Low stratus, especially in the morning. -BK: Showers with a chance of a thunderstorm.		
	LAX				59	70	DCA: Chance of showers and thunderstorms. Some storms may be strong.		
	BOS				57	68			
	JFK				63	73			
	DCA				68	79			
Friday	SEA				51	71	SEA: No significant weather. SFO: Morning marine stratus. LAX: No significant weather. BOS: Chance of showers and thunderstorms. -BK/DCA: Chance of thunderstorms, mainly in the afternoon.		
6/12	SFO				51	66			
	LAX				60	70			
	BOS		AM		59	70			
	JFK				66	78			
	DCA				63	85			

PRODUCT USAGE GUIDE: This Risk Product is designed as a tool to heighten the awareness of SOC managers of future weather events that may impact airports important to American Airlines flight operations. This product is a broad based risk assessment and is not intended to replace the detailed forecasts published by NWS. Once alerted, SOC managers work closely with WSI forecasters as long as there is a viable threat.

IMPACT KEY	WINDS	TSMs	CSGSWS	SNOW	ICE	TEMPS
MODERATE IMPACT	>20KTS	TSRA	M/R	<1" Snow	<1" Ice	<32 or >90
HIGH IMPACT	>30KTS	TSRA or TSR	R/L	>1" Snow	>1" Ice	<28 or >100



# WSI Global En Route Forecasts



Turbulence Intensities	
0	Smooth **
1	Occasional Light **
2	(Continuous) Light
3	Occasional Moderate
4	Moderate
5	occasional Severe
6	Severe
7	Extreme **

```

type = TURBIND
action = NEW
alert = YES
issuing_entity: KWSI
issue_time: 2009-08-10 00:41:16
beg_valid_time: 2009-08-10 00:30:00
end_valid_time: 2009-08-10 04:00:00
turb_lvls
...count = 1
...turb_ind
.....value = 5
.....base: 330
.....top: 370
polygon
...count = 4
...geolocation
.....latitude: 49.271008
.....longitude: -73.21833
...geolocation
.....latitude: 47.378735
.....longitude: -68.69714
    
```

```

TYPE TURBULENCE
ID 10024A
SENT 100041Z AUG 2009
VALID 101500Z - 101800Z
INTST MDT - OCNL SVR
ALT FL370 - FL330
AREA 55ESE YMT - 40NW PQI -
25ENE VLV - 100S YMT -
55ESE YMT
DISC WIND SHEAR AT NOSE OF
110-120KT JET MOVING
ACROSS SRN QUEBEC AND
TOWARD NRN MAINE.
WSI/MC
    
```

## FPG (Flight Plan Guidance)

- For strategic flight planning
- Updated every 3 hours
- Valid to 12 hours in 3 hr time steps

## SIGMETs

- Real-time significant wx hazards
- Dynamically issued

## Covered En Route Hazards

- Turbulence
- Thunderstorms
- Inflight Icing
- Volcanic Ash
- Dust-Sand Storms

# Aviation Forecast Methodology

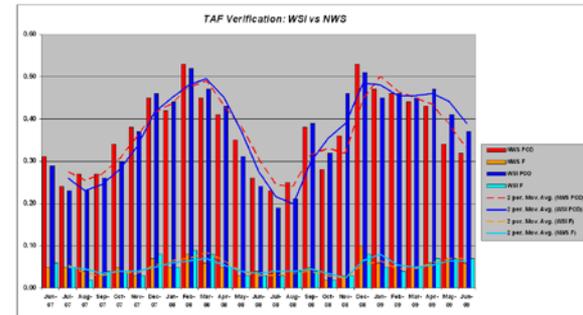
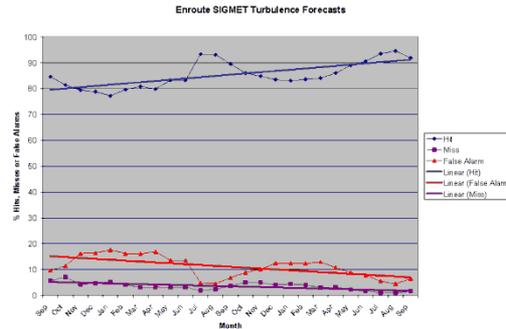
## Real-time monitoring & validation

- Forecast product fidelity
- Instantaneous alerting of:
  - categorical accuracy
  - Arrival of significant information
  - System or communications problems



detection_time	hazard_id	bust_type	bust_parameter	pirep_intensity	data
04/03 23:20		UNDER FORECAST	TURB	LGT-MDT	-AEP 2054/03 STI N380006 W0720221 NEAREST PNT CHAMP FL 320 TEMP
04/03 23:19		UNDER FORECAST	TURB	MDT	LAC UA /OV BTY160040/TM 2312/FL430/TP C750/TB MOD/RM ZLA/CWSU
04/03 23:09	03277	OVER FORECAST	ICING	LGT	BTY UA /OV BTY150020 /TM 2256 /FL 050 /TP B190 /IC LCT RIME 120-050 /R
04/03 23:07	03277	OVER FORECAST	ICING	LGT	BTY UA /OV BTY150020 /TM 2256 /FL 050 /TP B190 /IC LCT RIME
04/03 23:04		UNDER FORECAST	TURB	MDT	HNL UA /OV 4300N 16000W /TM 2230/FL350/TP B747/TB MOD/RM MOD TURB
04/03 23:04		UNDER FORECAST	TURB	MDT	HNL UA /OV 4300N 16000W /TM 2230/FL350/TP B747/TB MOD/RM MOD TURB
04/03 22:58	03277	OVER FORECAST	ICING	LGT	BED UA /OV BED279015 /TM 2250/FL050/TP H258/TA.M05 /IC LCT CLR/LGT MO
04/03 22:50		UNDER FORECAST	TURB	LGT-MDT	-AEP 1780/03 MIA N270654 W0821512 NEAREST PNT SRO FL 204 TEMP M
04/03 22:46		UNDER FORECAST	TURB	MDT	PAP UA /OV RAO 130030/TM 2230/FL390/TP H255/RM MOD MTH WV ZDV
04/03 22:43	03213	OVER FORECAST	TURB	SMTH	PKB UA /OV PKB/TM 2228/FL070/TP B190/TB MOD BLW 070/RM DURD SMTH B
04/03 22:37		UNDER FORECAST	TURB	MDT	BCE UA /OV BCE 035015/TM 2210/FL410/TP F2TH/TB MOD/ZLC

## Validation reports



## Results fed back into AI guidance and meteorologist training

