Aviation Grids: Why, How, and What Happens

Chris Leonardi, WFO RLX

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Why are we doing this???

Glorified TAF editor???

Automate forecasters out of the process???

Because we are being ordered to???

RLX being RLX???

Who will use this information?

- Marine (surface visibility)
- Meteorologists (ceiling and surface visibility)
- Surface Transportation (surface visibility)
- Aviation (ceiling and surface visibility)

Aviation Users

- Aviation Weather Center
- General Aviation
- Medevac
- Other Emergency Responders
- Airlines
- Airports
- Air Traffic Controllers
- TRACONs

Aviation Weather Center

- FAA continually states “weather information consistency is favored over accuracy”
- Collaboration Opportunities
  - Use NDFD grids for FA and TAF
  - Provide guidance for NDFD ceiling and surface visibility elements

General Aviation

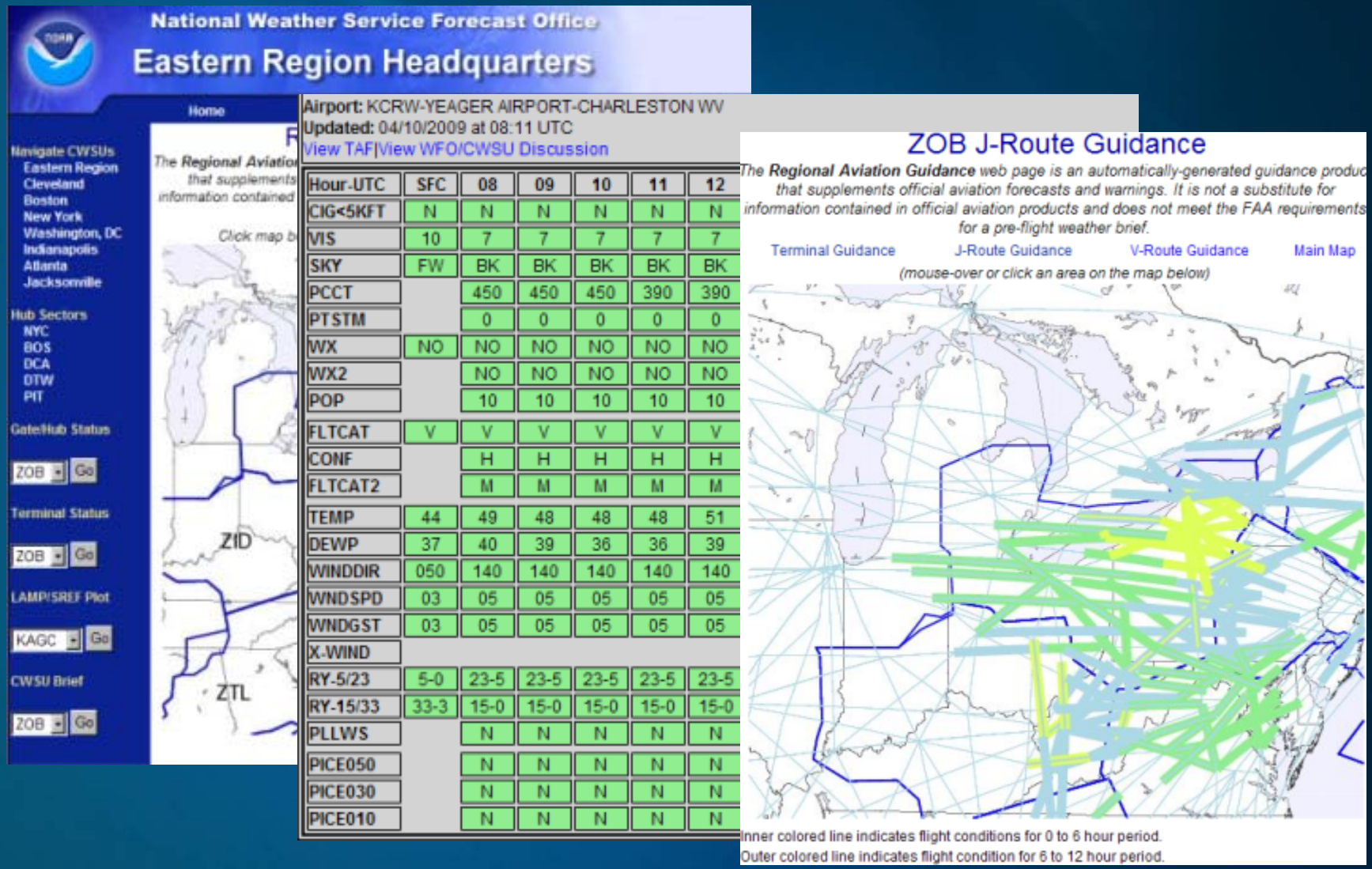
- Flight Planning
- Mouseover function
- Hourly
- Viewed on meteogram

Proposed CWSU Requirement

- Gridded TRACON forecasts
  - Ceiling
  - Visibility
  - Hourly
  - Updated every 2 hours

With only 2 CWSUs…our grids become that much more valuable!

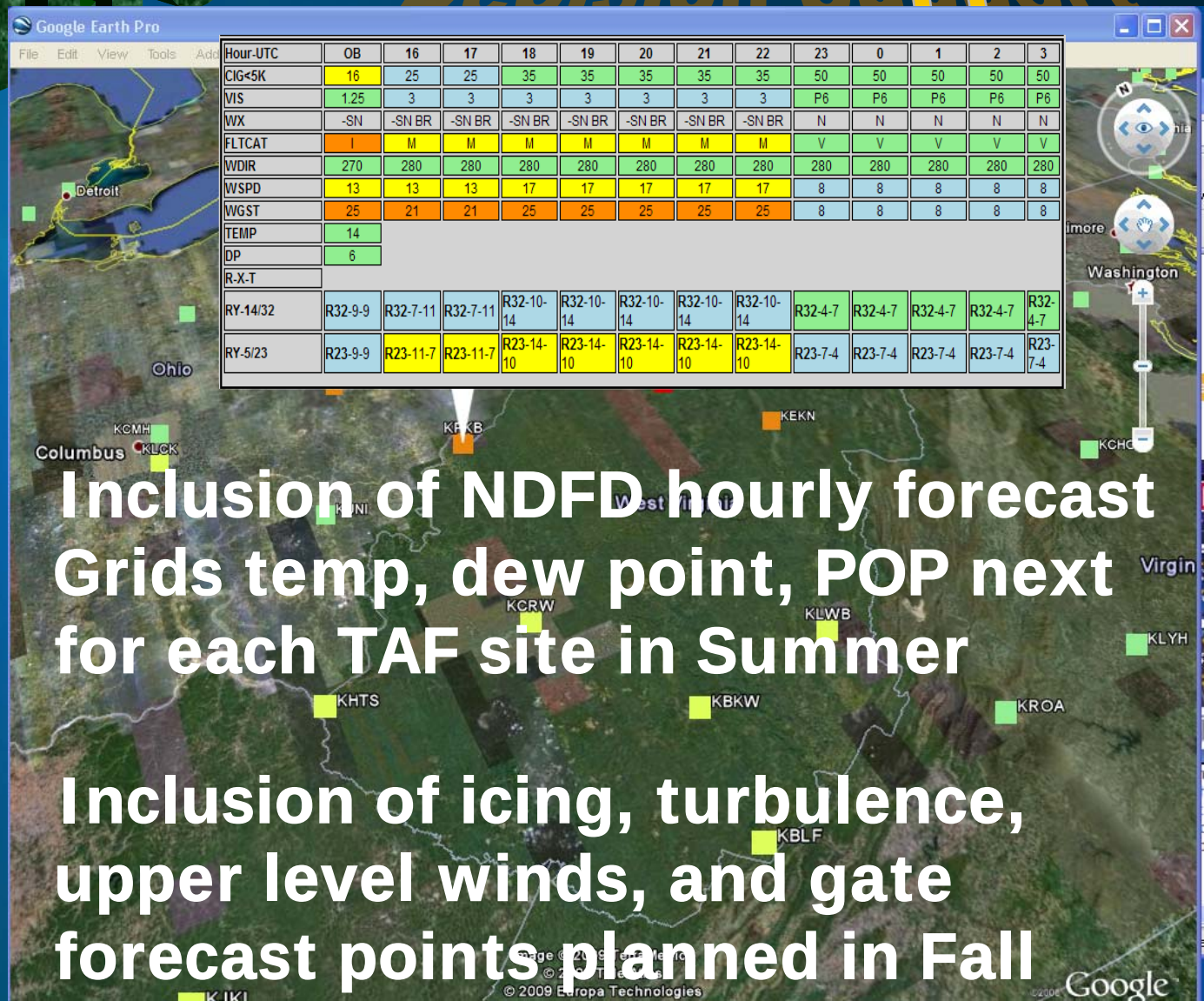
CWSU Support



Hour-UTC	SFC	08	09	10	11	12
CIG<5KFT	N	N	N	N	N	N
VIS	10	7	7	7	7	7
SKY	FW	BK	BK	BK	BK	BK
PCCT		450	450	450	390	390
PTSTM		0	0	0	0	0
WX	NO	NO	NO	NO	NO	NO
WX2		NO	NO	NO	NO	NO
POP		10	10	10	10	10
FLTCAT	V	V	V	V	V	V
CONF		H	H	H	H	H
FLTCAT2		M	M	M	M	M
TEMP	44	49	48	48	48	51
DEWP	37	40	39	36	36	39
WINDDIR	050	140	140	140	140	140
WNDSPD	03	05	05	05	05	05
WNDGST	03	05	05	05	05	05
X-WIND						
RY-5/23	5-0	23-5	23-5	23-5	23-5	23-5
RY-15/33	33-3	15-0	15-0	15-0	15-0	15-0
PLLWS		N	N	N	N	N
PICE050		N	N	N	N	N
PICE030		N	N	N	N	N
PICE010		N	N	N	N	N

Aviation Decision Support

AWC Test Bed development for national 2nd generation guidance page



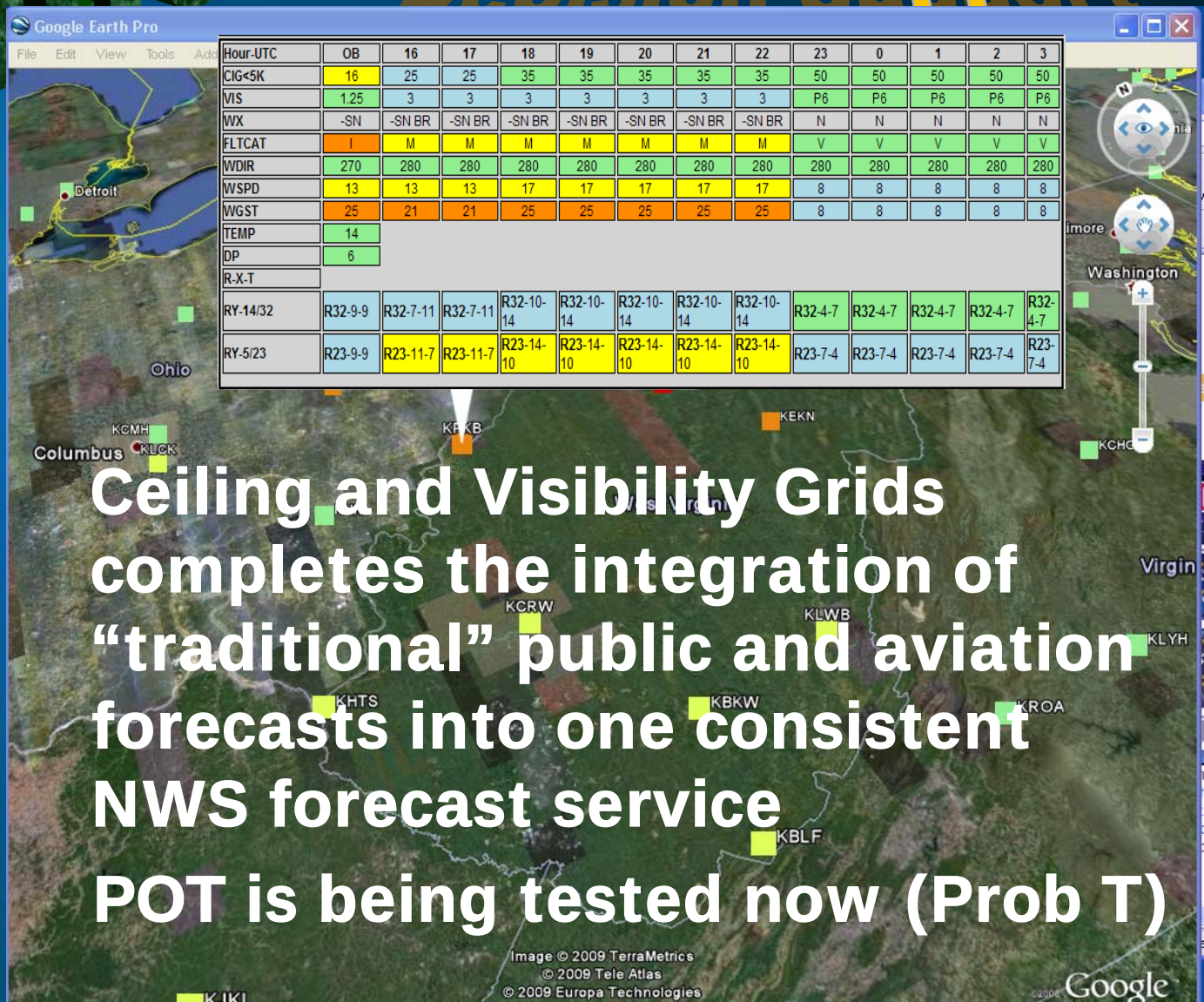
Hour-UTC	OB	16	17	18	19	20	21	22	23	0	1	2	3
CIG<5K	16	25	25	35	35	35	35	35	50	50	50	50	50
VIS	1.25	3	3	3	3	3	3	3	P6	P6	P6	P6	P6
WX	-SN	-SN BR	-SN BR	-SN BR	-SN BR	-SN BR	-SN BR	-SN BR	N	N	N	N	N
FLTCAT	I	M	M	M	M	M	M	M	V	V	V	V	V
WDIR	270	280	280	280	280	280	280	280	280	280	280	280	280
WSPD	13	13	13	17	17	17	17	17	8	8	8	8	8
WGST	25	21	21	25	25	25	25	25	8	8	8	8	8
TEMP	14												
DP	6												
R-X-T													
RY-14/32	R32-9-9	R32-7-11	R32-7-11	R32-10-14	R32-10-14	R32-10-14	R32-10-14	R32-10-14	R32-4-7	R32-4-7	R32-4-7	R32-4-7	R32-4-7
RY-5/23	R23-9-9	R23-11-7	R23-11-7	R23-14-10	R23-14-10	R23-14-10	R23-14-10	R23-14-10	R23-7-4	R23-7-4	R23-7-4	R23-7-4	R23-7-4

Inclusion of NDFD hourly forecast Grids temp, dew point, POP next for each TAF site in Summer

Inclusion of icing, turbulence, upper level winds, and gate forecast points planned in Fall

Aviation Decision Support

AWC Test Bed development for national 2nd generation guidance page



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FLTCAT	I	M	M	M	M	M	M	M	V	V	V	V	V
WDIR	270	280	280	280	280	280	280	280	280	280	280	280	280
WSPD	13	13	13	17	17	17	17	17	8	8	8	8	8
WGST	25	21	21	25	25	25	25	25	8	8	8	8	8
TEMP	14												
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RY-14/32	R32-9-9	R32-7-11	R32-7-11	R32-10-14	R32-10-14	R32-10-14	R32-10-14	R32-10-14	R32-4-7	R32-4-7	R32-4-7	R32-4-7	R32-4-7
RY-5/23	R23-9-9	R23-11-7	R23-11-7	R23-14-10	R23-14-10	R23-14-10	R23-14-10	R23-14-10	R23-7-4	R23-7-4	R23-7-4	R23-7-4	R23-7-4

Ceiling and Visibility Grids completes the integration of "traditional" public and aviation forecasts into one consistent NWS forecast service

POT is being tested now (Prob T)

Medevac

- NTSB has determined that poor weather is the greatest hazard to EMS helicopters
- 75% of all weather-related accidents resulted in fatalities with 2/3 having no survivors at all.

Medevac

- Most helicopters are single pilot, VFR
- Majority of helicopters have no
  - Flight stability systems
  - Autopilots
  - Onboard weather detection/avoidance devices
  - Graphic weather displays
- Little or no weather information available near accident scenes
  - *…grids can fill this void!*

NextGen

- IOC – 2013
  - "…Weather Information DataBase (WIDB) will include at least the elements of TB, IC, C/V, convection, and winds…"
    - Building a WIDB for NextGen, OSIP project 07-042

Okay, I see the need…

How do we do it?

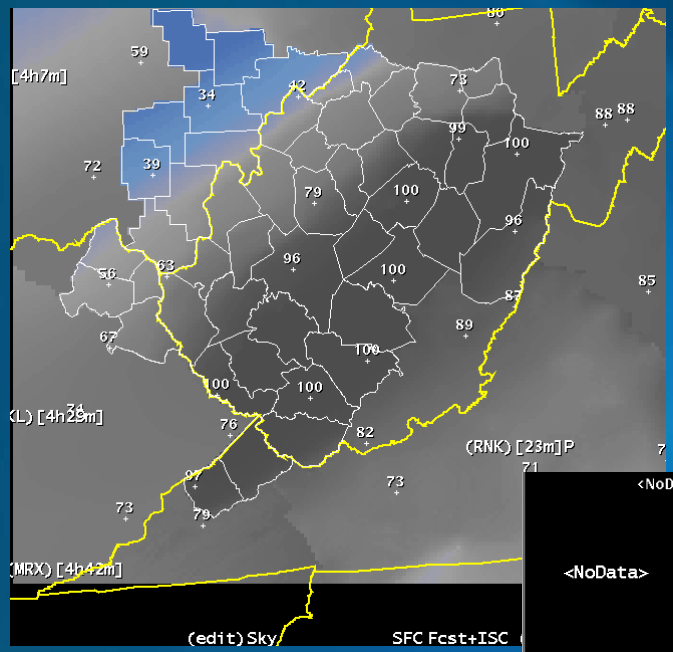
The new grids

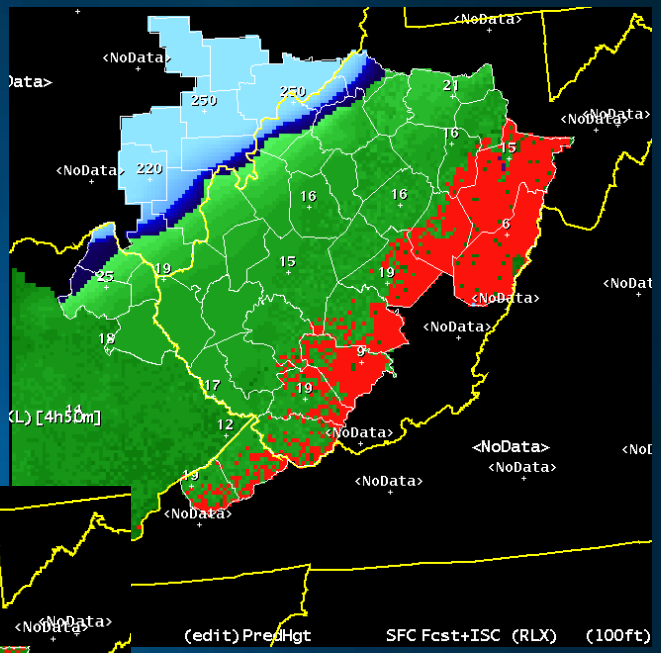
In addition to relevant NDFD parameters (Sky, Wx, Wind, PoP), we have added the following:

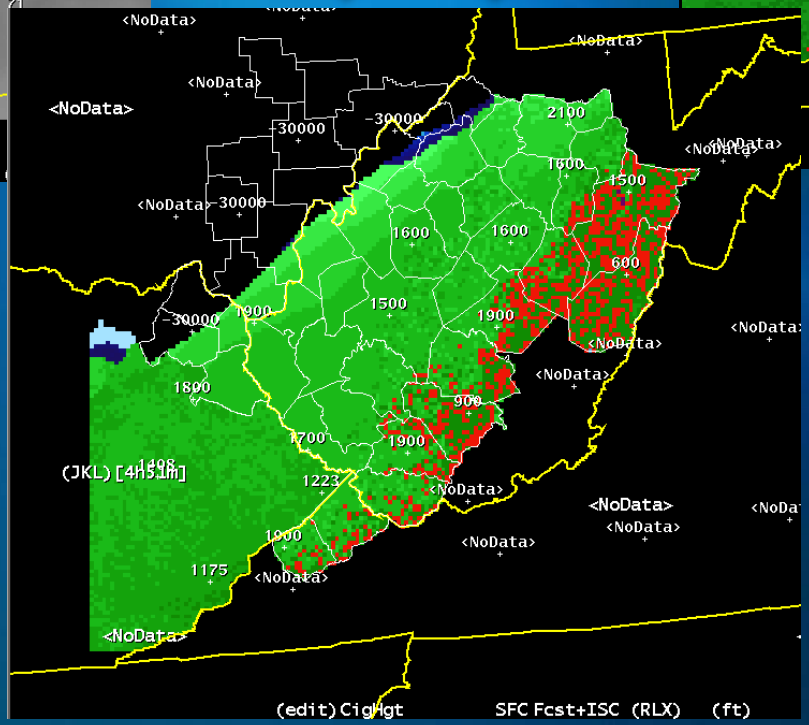
- PredHgt – "conditional ceiling height" in hundreds of feet (0-250)
  - Ceiling if Sky ≥ 57%, height of predominant cloud layer otherwise
  - *Internal* Collaboration grid…also used with Sky to construct CigHgt grid for web display
- CigHgt – ceiling height in feet (0-25000)
  - Ceiling height if sky >57%, otherwise no ceiling
  - Generated as last step (totally dependent on Sky/PredHgt)
  - Transmitted with NDFD - used for web graphics, CWSU displays, etc.
- Vsby – visibility in miles (0-10)

- PoT – probability of thunder (testing now)

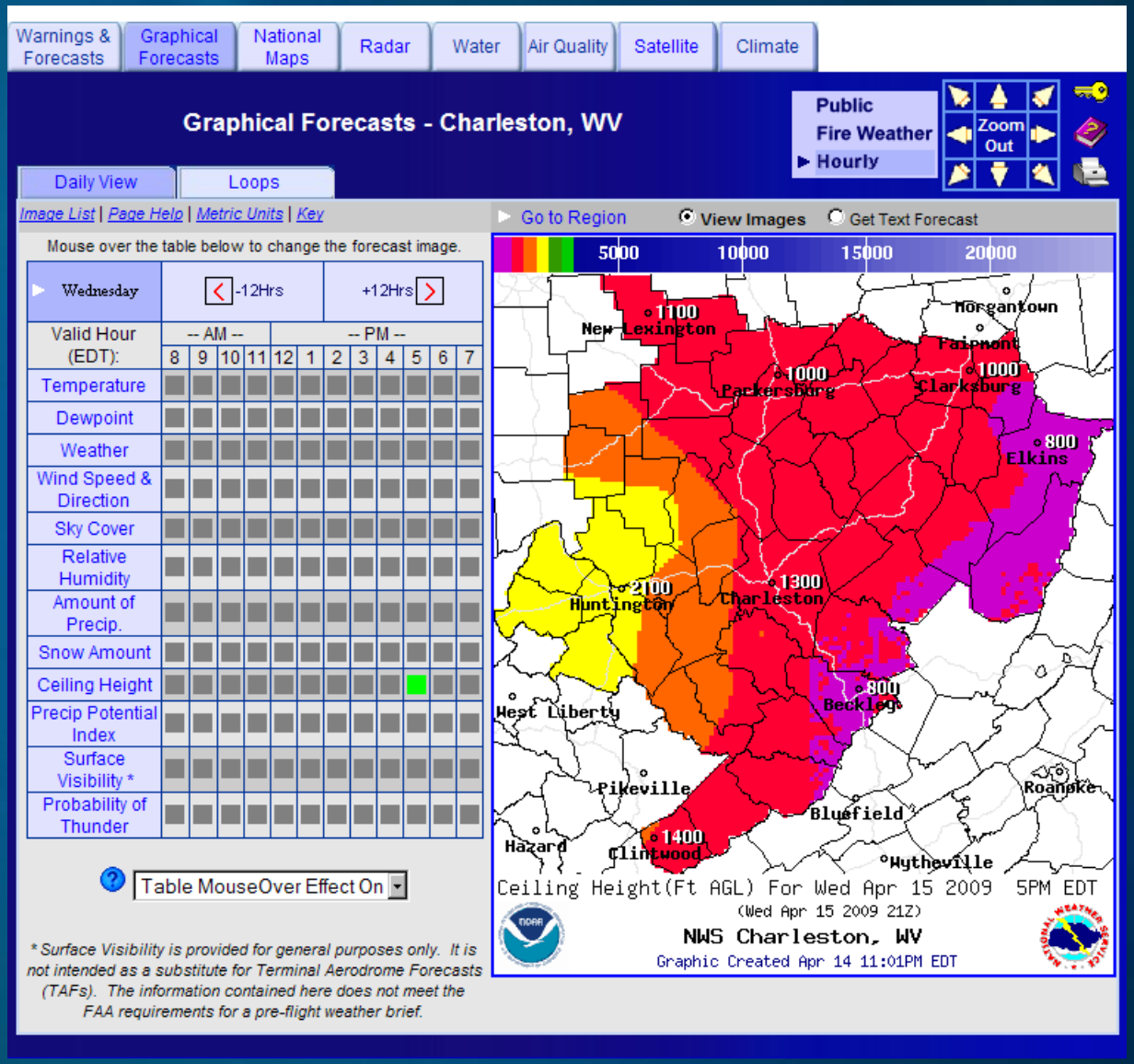
Sky + PredHgt = CigHgt







CigHgt/Vsby graphics on the web



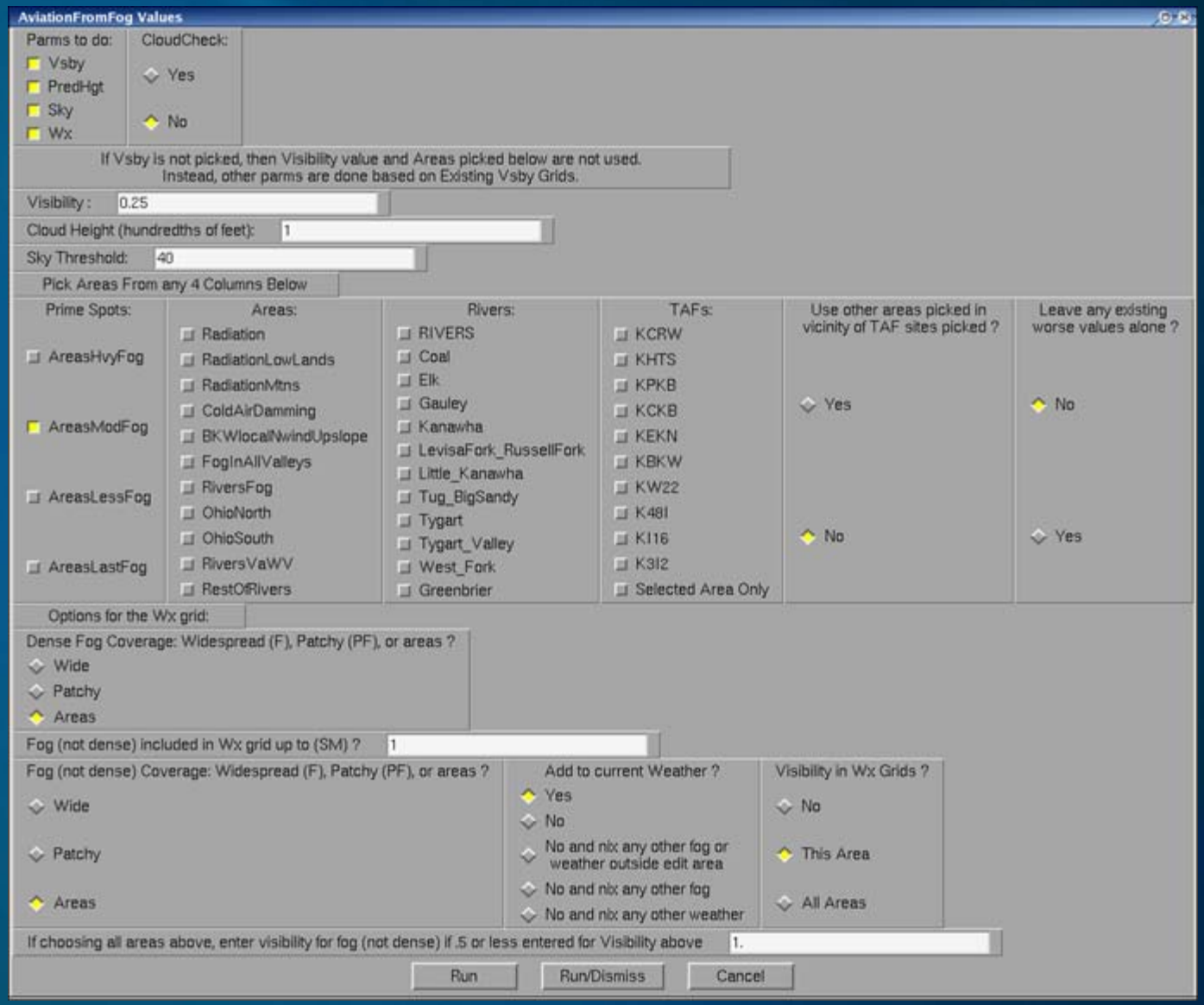
More on grids

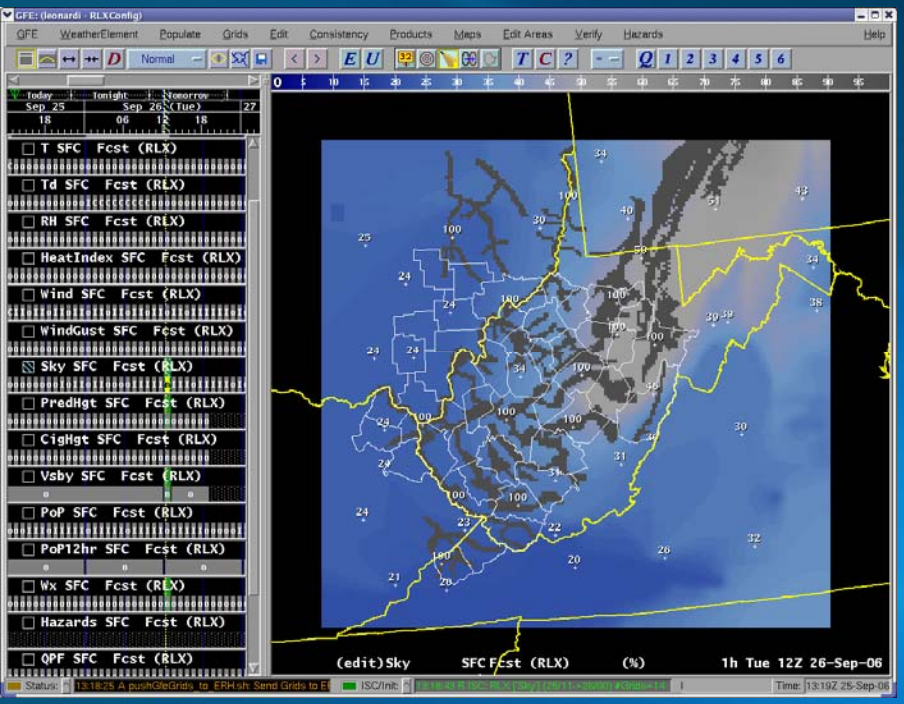
- Updated 4 times a day at main issuance times (00Z, 06Z, 12Z, 18Z)
  - NOT for 3-hourly TAF updates (for now)
- Generated on an hourly basis out to 30 hours
- Represent prevailing conditions only (ie. no TEMPOs)
- Loose collaboration with JKL

How to initialize them?

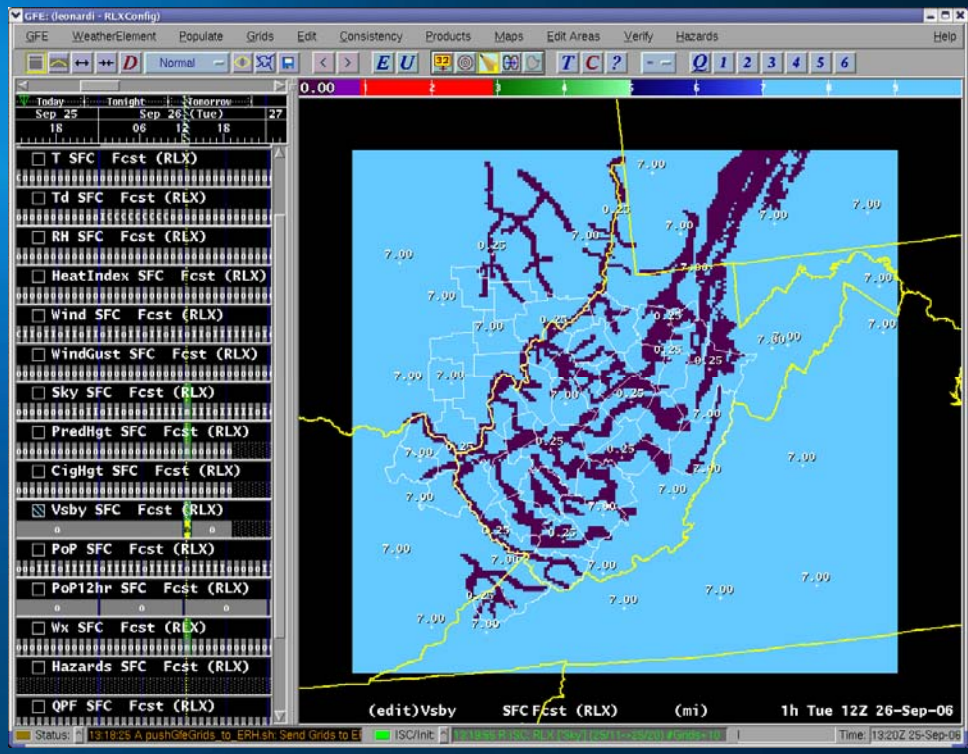
- Use model data
  - MatchGuidance – MAV, MET, LAV
  - LAMP probabilities
  - Raw data – PredHgtFmModelRH
- Use empirical tools
  - PredHgtLayers
  - VsbyPopPairs
- Use one of the “monster” procedures for total control!

Aviation tool example – AviationFromFog





- Here are examples of the grids that are created.



Note the level of detail that these tools allow us to work with!

More available tools

- PredHgt/CigHgt
  - PredHgtFmModelRH – use RH in column to determine cloud height
  - PredHgtLayers – cloud height based on Sky grids (more clouds = lower cigs)
  - PredHgtFmMixHgt – set clouds at mixing height (good for Cu days!)

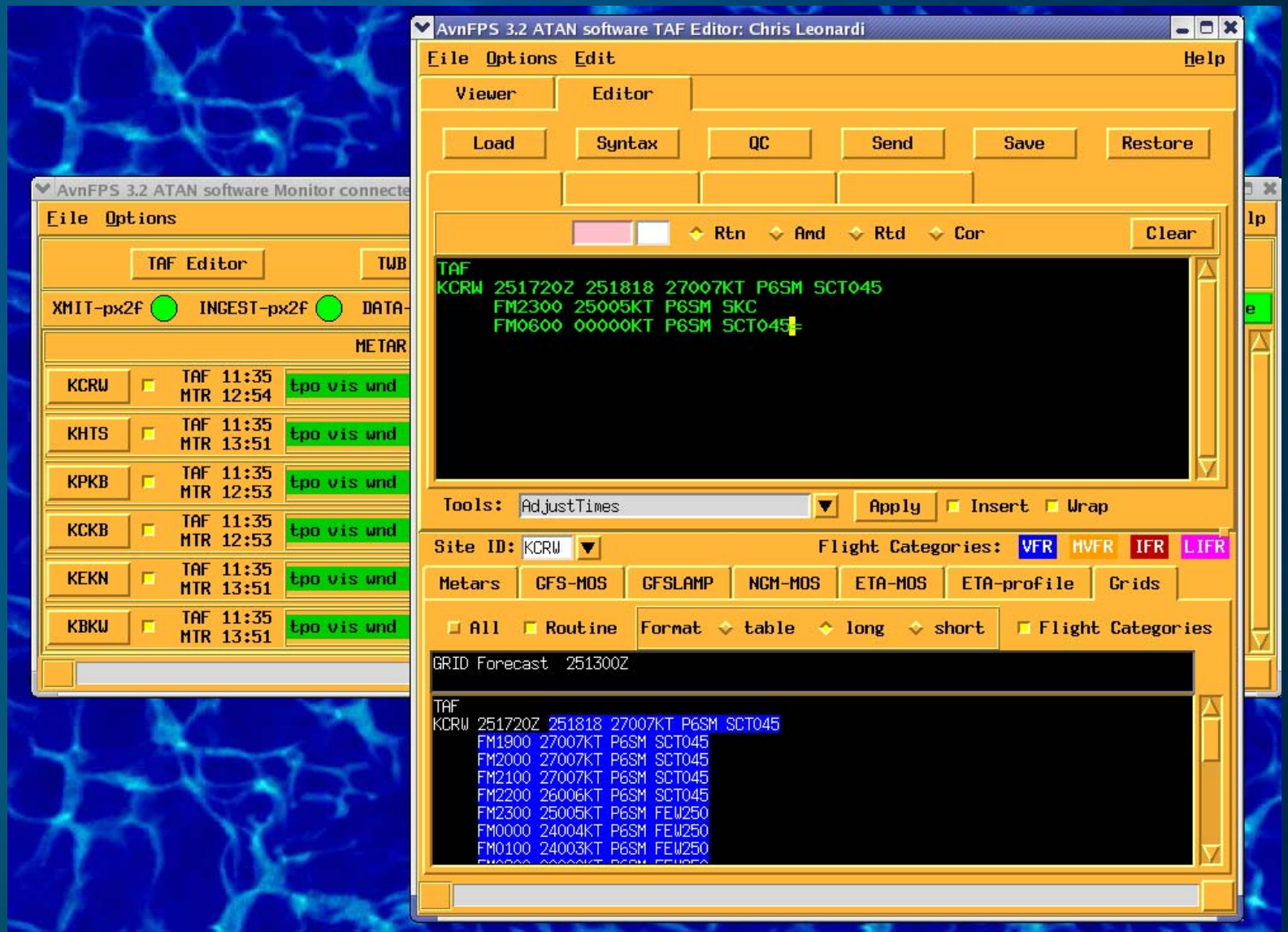
- Vsby
  - VsbyPoPpairs – higher Pop, lower vis
  - VsbyFmWx – vsby based on Wx type/intensity
  - VsbyFmDewPtDep – vsby from dew point depression (for fog)

- Procedures
  - AviationFogTimer – set up grids for a typical radiation fog night!
  - FinalizeAVN – create CigHgt and round values in one tool
  - AviationFmProb – use SREF/LAMP probs/RUC13 for grids

…with more being created all the time!

First Guess TAFs

We can import the grids into AvnFPS to create first-guess TAFs.



Potential pitfalls

- Smoothing out of local effects in a gridded database
  - Can be mitigated by improved smart tools, e.g. AviationFmFog, elevation-dependent tools
  - Creation of new edit areas (rivers, individual TAF locations, topographic)
- Interpolation problems with PredHgt/Vsby
  - Creative solutions can be found (NoBasesBetween, Extrapolate, use of edit area query)
  - Tools that work over a time range (AviationFogTimer)

Lessons Learned

- New paradigm tough to adjust to
  - Areal thinking instead of point thinking
  - Editing/interpolating grids can be frustrating
  - Some resistance from forecasting staff
- Gridded guidance tools slowly improving
  - RUC/NAM grids for cig/vsby are available
  - LAMP probability grids
- Verification performance may initially drop

TAF Verification

How have we been doing?

The numbers

	Charleston			Eastern Region		
	POD	FAR		POD	FAR	
FY06	.58	.39		.63	.40	
FY07	.53	.40		.63	.36	
FY08	.57	.41		.65	.36	
FY09	.58	.40		.69	.32	

The numbers

	Charleston			Eastern Region		
	POD	FAR	% CSI imp over GFS MOS	POD	FAR	% CSI imp over GFS MOS
FY06	.58	.39	26.4	.63	.40	22.9
FY07	.53	.40	34.5	.63	.36	27.0
FY08	.57	.41	29.9	.65	.36	23.4
FY09	.58	.40	27.6	.69	.32	25.5

Verfication summary

- Stats lag the ER average, but improvement over MOS is usually better than ER average
  - We are holding our own, but need to do better
  - We are at least consistent…ie. no degradation of service
- FAR is decent, but POD is low. Why?
  - Weather/human factors
  - Too few TEMPO groups due to no auto-generation?
  - Loss of some local effects due to grids?

Wrapup

- There is a clear need for gridded aviation information that:
  - Is high resolution in space and time
  - Is frequently updated
  - Presents a consistent message
- Methods and tools are available…but they are not necessarily the best way to do this. Can you help improve them?
- No argument…gridded aviation forecasting is a challenging way of doing business

Need help?

If you need help with aviation grids…who you gonna call?!?

- Chris Leonardi – the "Voice," Aviation Focal Point
- Tom Mazza – the "Tool Man," GFE Focal Point
- Alan Rezek – the "Mastermind," MIC

…and all the other friendly, helpful people at RLX!!!

The End

"I'm telling you Jay…aviation grids are GREAT! LIFE IS GOOD!!!"