

Aviation Products from the Localized Aviation MOS Program (LAMP)

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Outline

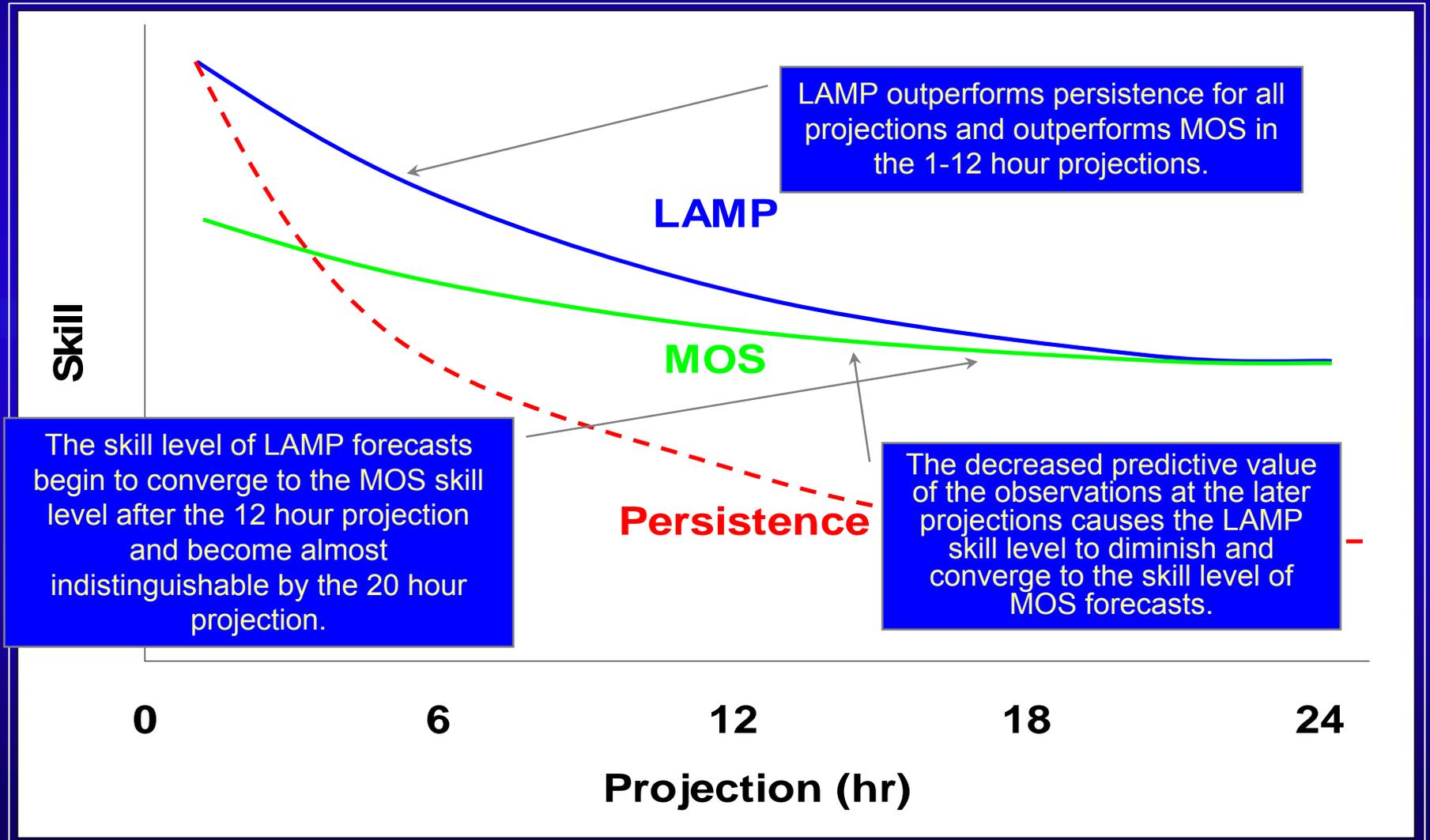
- LAMP Overview
- Brief LAMP Verification
- Current Status and Products
- Future Plans

LAMP Overview

Localized Aviation MOS Program (LAMP) Background

- LAMP is a system of objective analyses, simple models, regression equations, and related thresholds which together provide guidance for sensible weather forecasts
- LAMP acts as an update to GFS MOS guidance
- Guidance is both probabilistic and non-probabilistic
- LAMP provides guidance for aviation elements
- LAMP bridges the gap between the observations and the MOS forecast

Theoretical Model Forecast Performance of LAMP, MOS, and Persistence



LAMP Guidance Details

LAMP guidance is in the range of 1- 25 hours in 1 hour projections

- LAMP provides station-oriented guidance for:
 - all LAMP forecast elements ←
 - ~1600 stations
 - CONUS, Alaska, Hawaii, Puerto Rico
- LAMP provides grid-oriented guidance for:
 - Thunderstorms:
 - Probability of thunderstorm occurrence in a 2 hour period in a 20-km grid box
 - Best Category Yes/No of thunderstorm occurrence in a 2 hour period in a 20-km grid box
 - CONUS only
- As of November 13, 2008, LAMP is running 24 times a day (every hour) in NWS operations

- Temperature and dewpoint
- Wind speed, direction, and gusts
- Probability of precipitation (on hr)
- Probability of measurable precipitation (6- and 12-h)
- Precipitation type
- Precipitation characteristics
- Thunderstorms
- Ceiling height
- Conditional ceiling height
- Total sky cover
- Visibility
- Conditional visibility
- Obstruction to vision

Example of a LAMP Text Bulletin

KBUF	BUFFALO	GFS LAMP GUIDANCE											2/19/2008				1200 UTC								
UTC	13	14	15	16	17	18	19	20	21	22	23	00	01	02	03	04	05	06	07	08	09	10	11	12	13
TMP	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45
DPT	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12
WDR	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25
WSP	20	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18
WCS	27	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26
PPO	74	69	69	69	69	69	69	69	69	69	69	69	69	69	69	69	69	69	69	69	69	69	69	69	69
PCO	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
P06																									
TP2																									
TC2																									
POZ	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
POS	99	99	99	99	99	99	99	99	99	99	99	99	99	99	99	99	99	99	99	99	99	99	99	99	99
TYP	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S
CLD	OV	OV	OV	OV	OV	OV	OV	OV	OV	OV	OV	OV	OV	OV	OV	OV	OV	OV	OV	OV	OV	OV	OV	OV	OV
CIG	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6
CCG	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
VIS	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7
CVS	6	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	4
OBV	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N

Temperature

Probability of Precipitation Occurrence on the hour

Wind

Yes/No Precipitation Occurrence on the hour

Wind

Probability of Thunderstorms during 2-Hour period

Wind

Yes/No Thunderstorm Occurrence during 2-Hour period

Visibility

Conditional Visibility

Obstruction to Vision

Conditional Ceiling Height

Probability of Snow

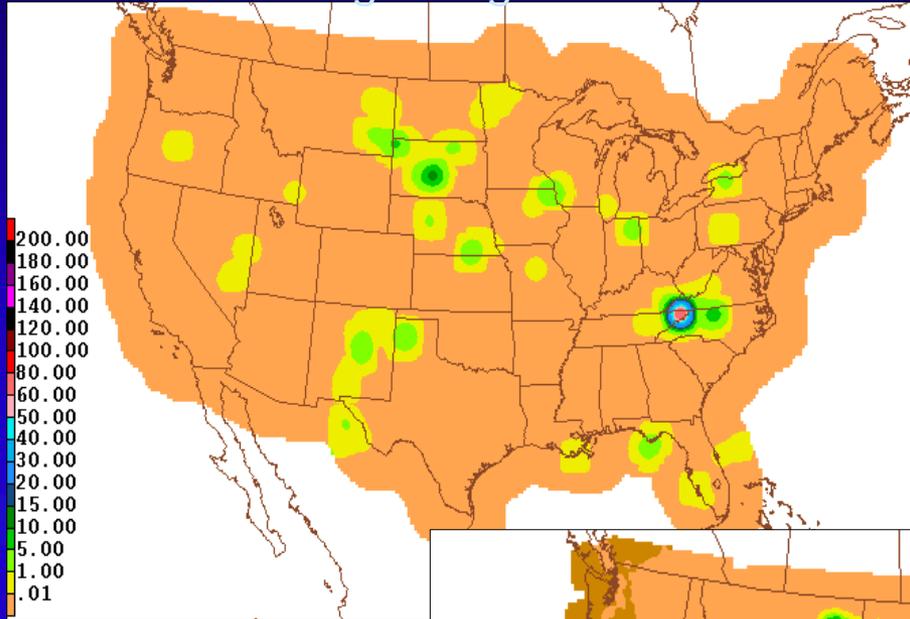
Probability of Freezing

Precipitation Type

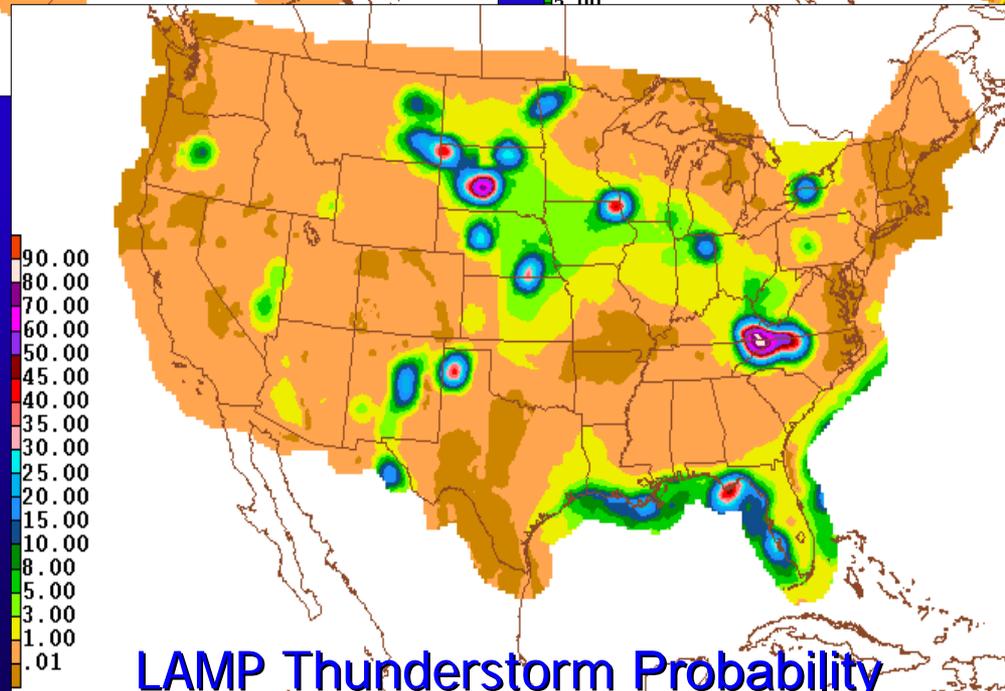
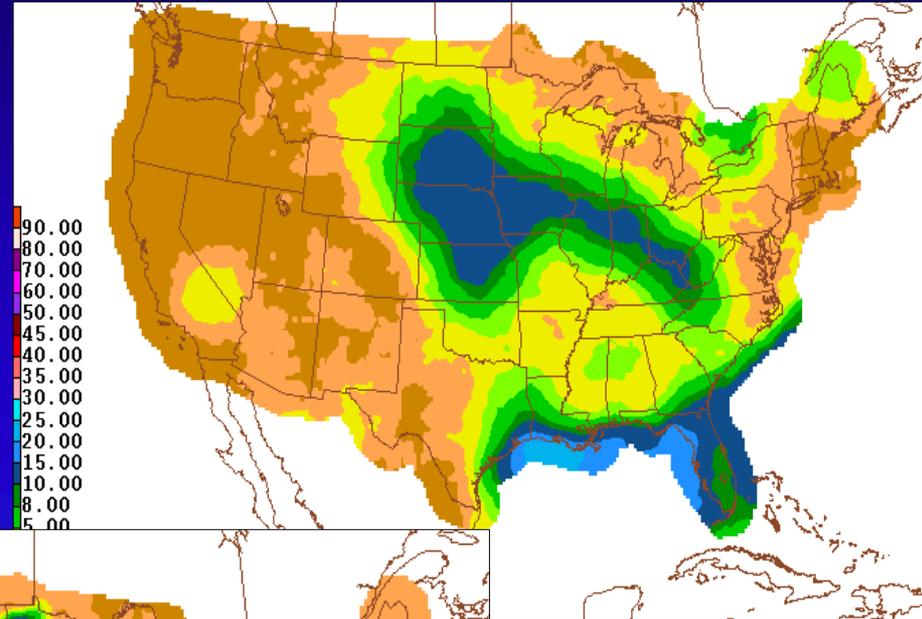
Example of blending Observations and MOS

1-3 hr LAMP Thunderstorm forecast

Predictor: lightning strike data



Predictor: MOS Thunderstorm Prob

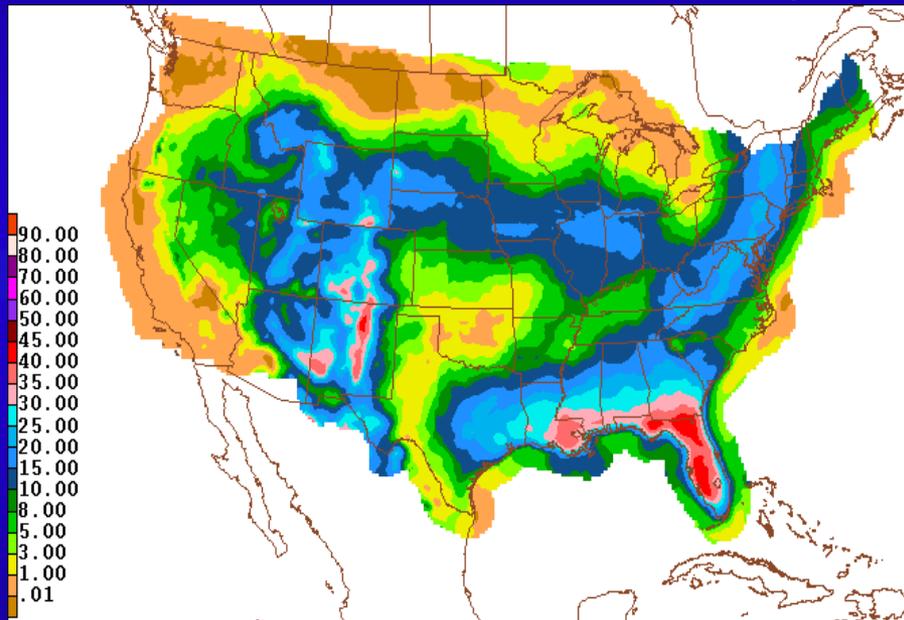


LAMP Thunderstorm Probability

11-13 hr LAMP Thunderstorm forecast

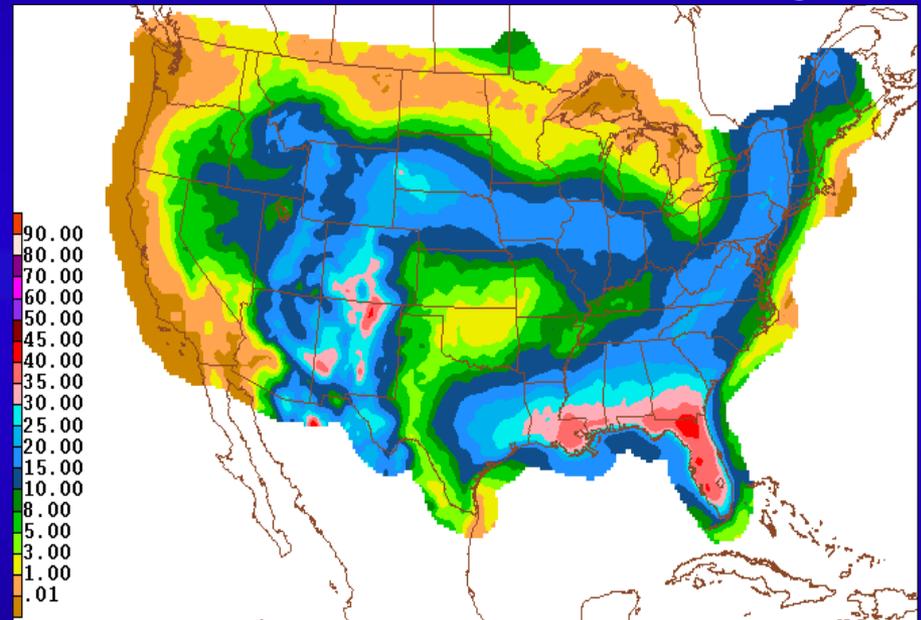
LAMP

Thunderstorm Probability

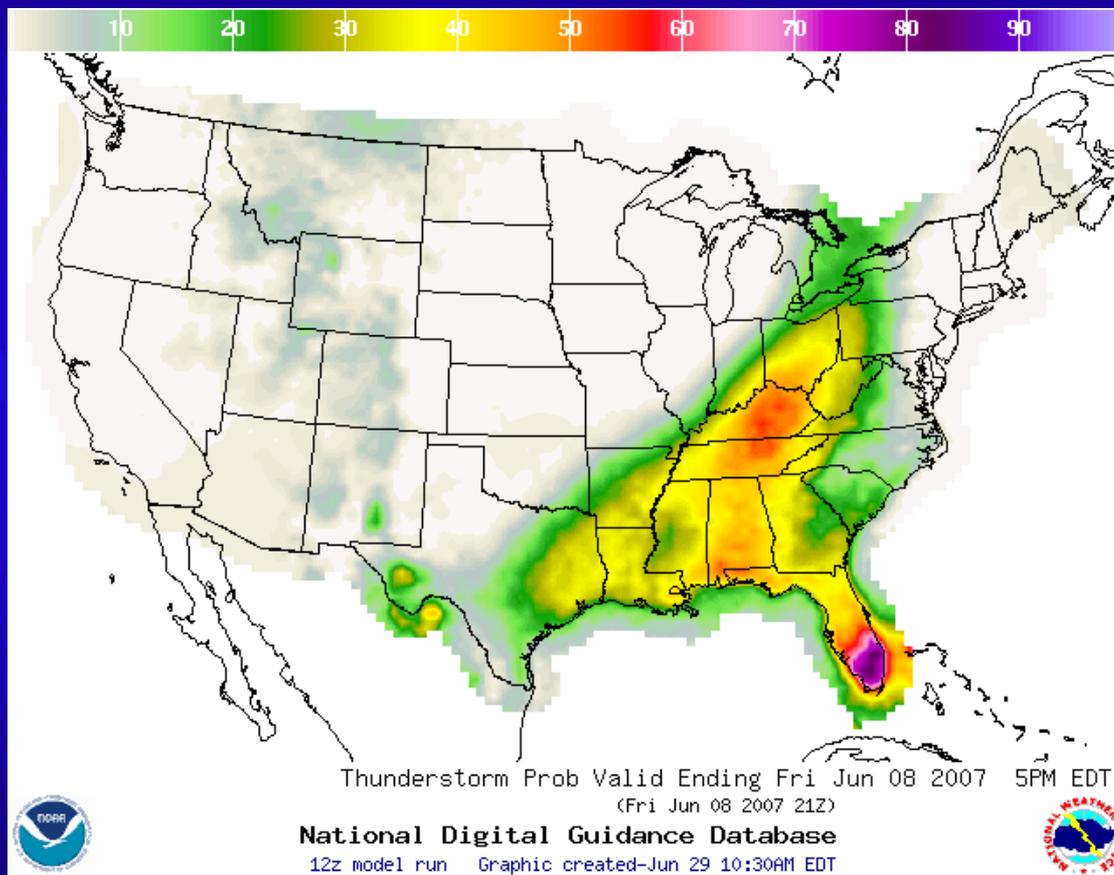


Predictor: MOS

Thunderstorm Probability

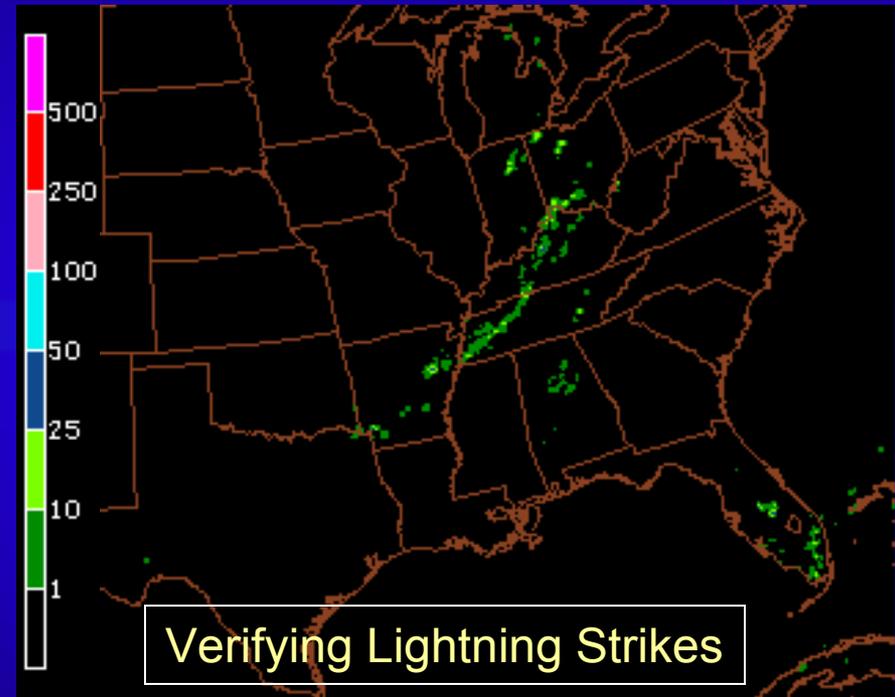
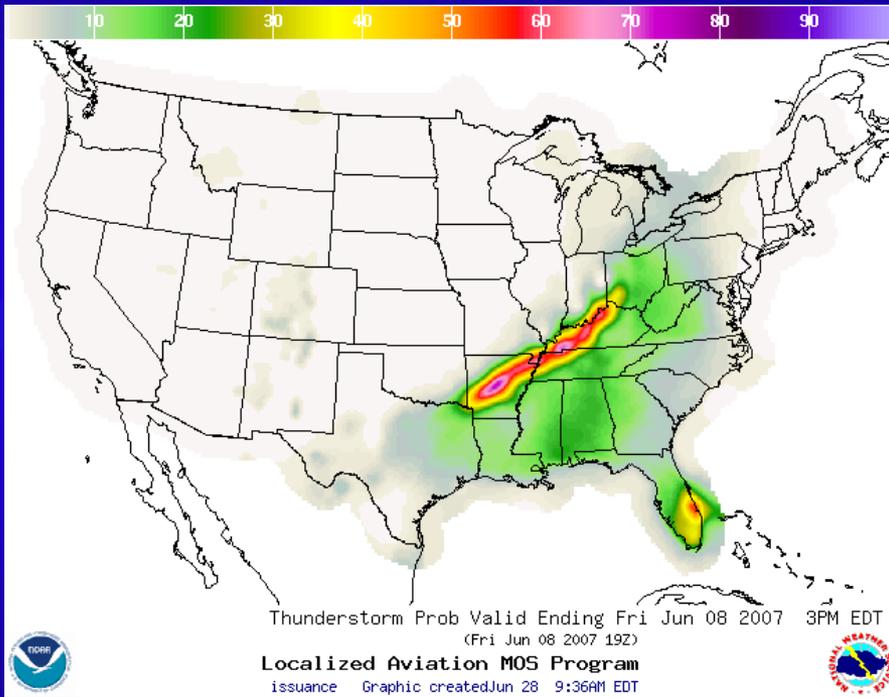


June 8, 2007



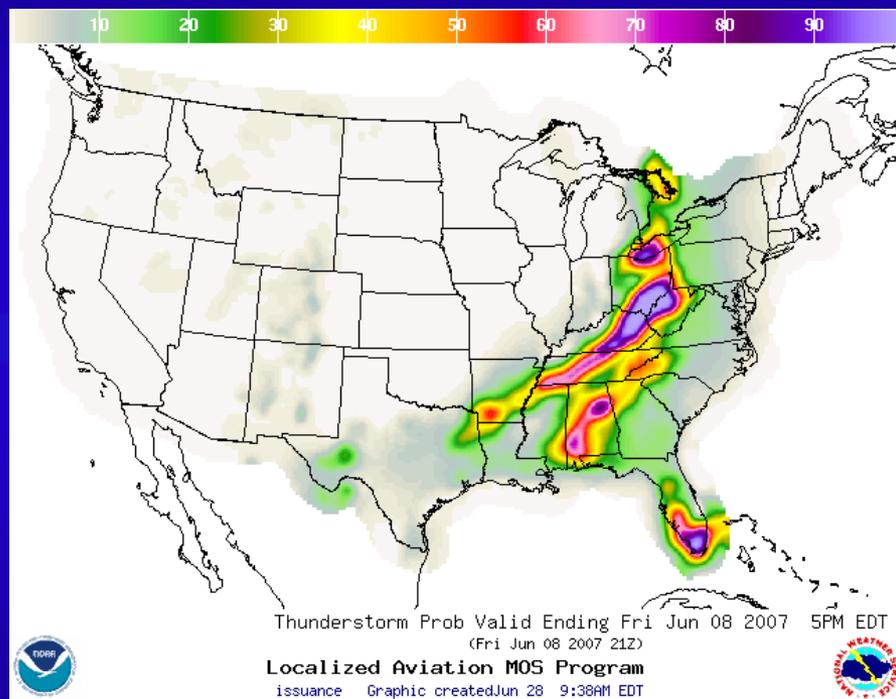
GMOS 03h forecast
Available ~16:45 UTC
Valid 18-21 UTC

June 8, 2007 1500 UTC LAMP forecast



LAMP 02h forecast
Available ~15:45 UTC
Valid 17-19 UTC

June 8, 2007 1800 UTC LAMP forecast

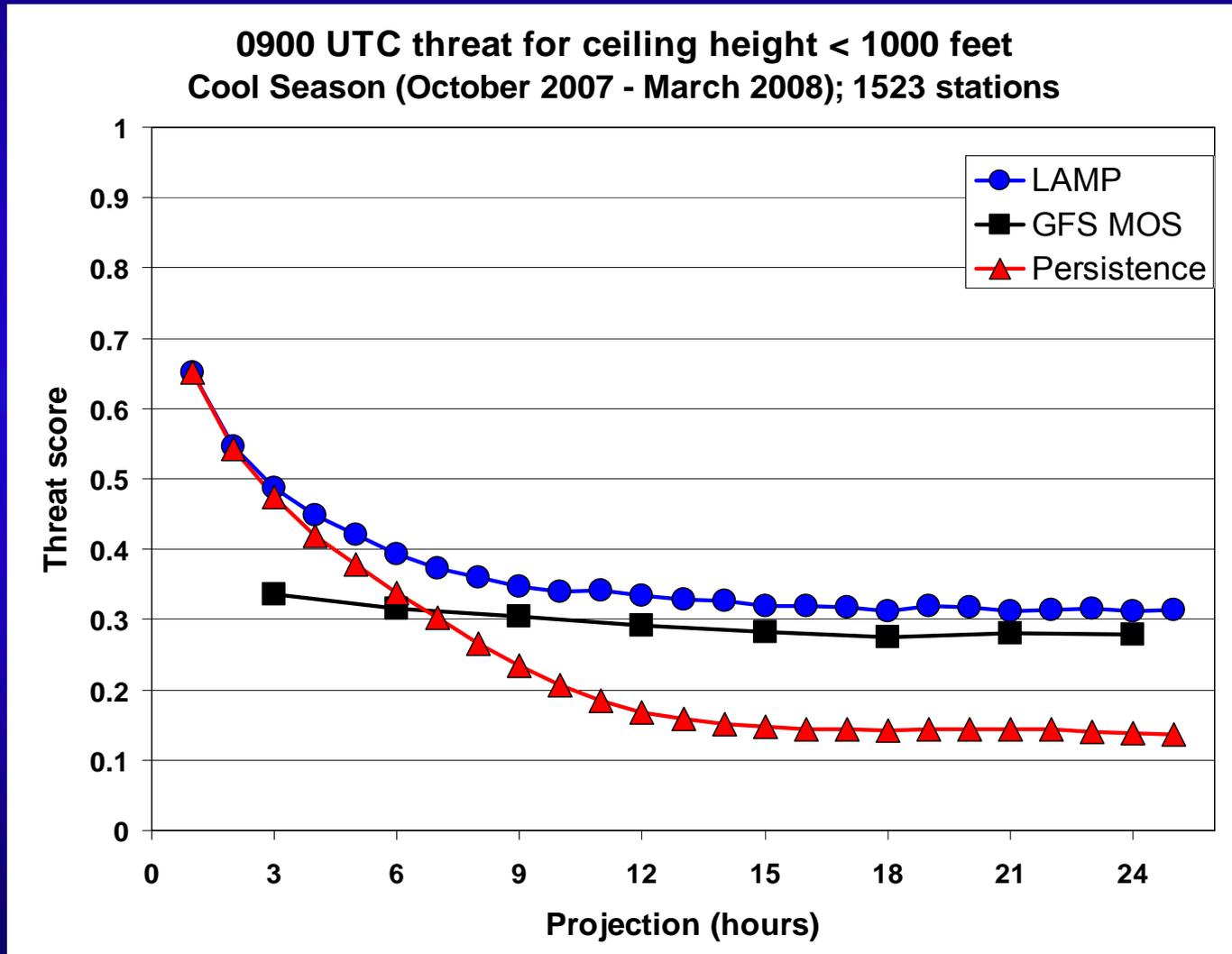


LAMP 02h forecast
Available ~18:45 UTC
Valid 19-21 UTC

Brief LAMP Verification

0900 UTC LAMP compared to MOS

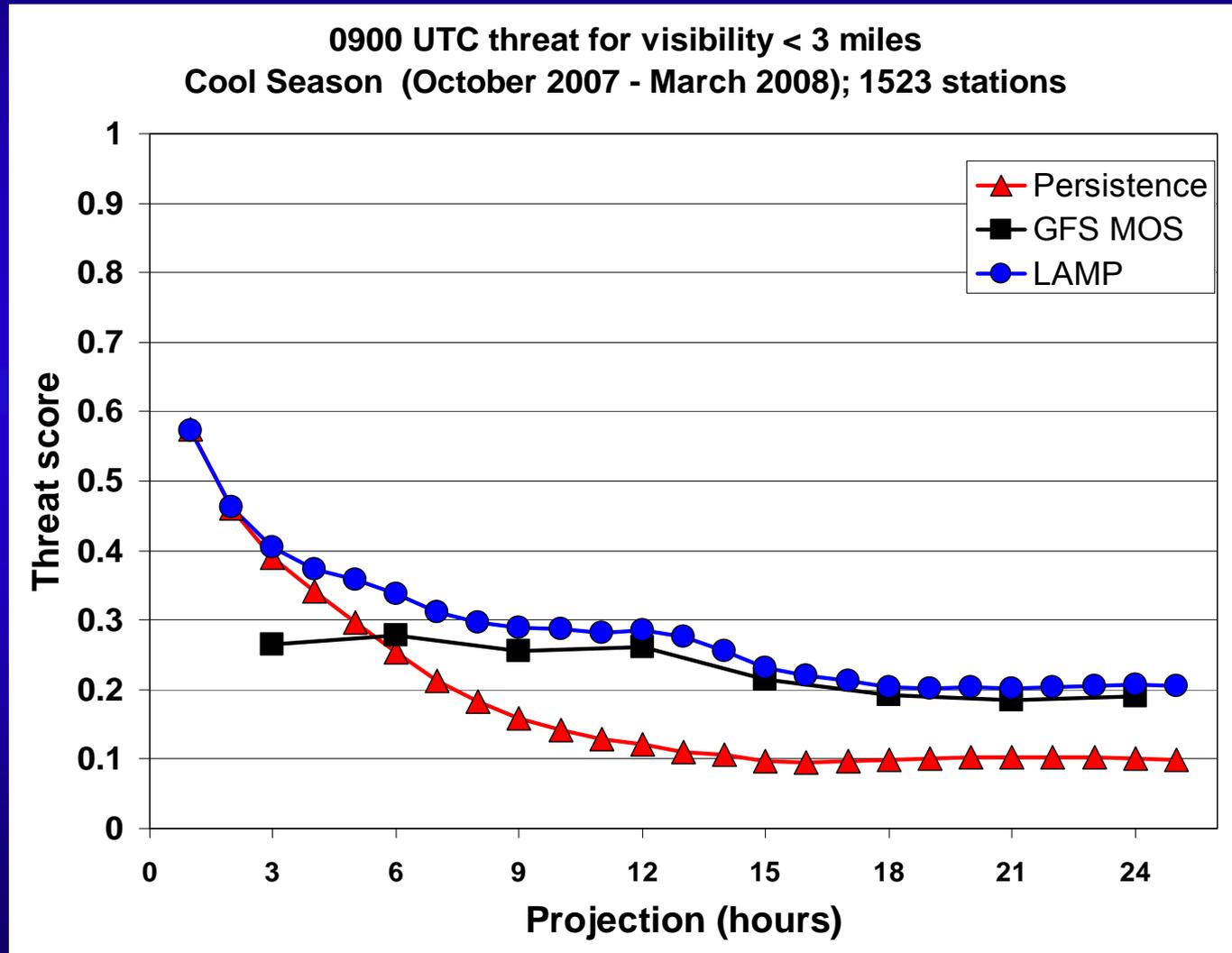
Categorical Ceiling Height < 1000 feet



0900 UTC LAMP verified against 0000 UTC GFS MOS

0900 UTC LAMP compared to MOS

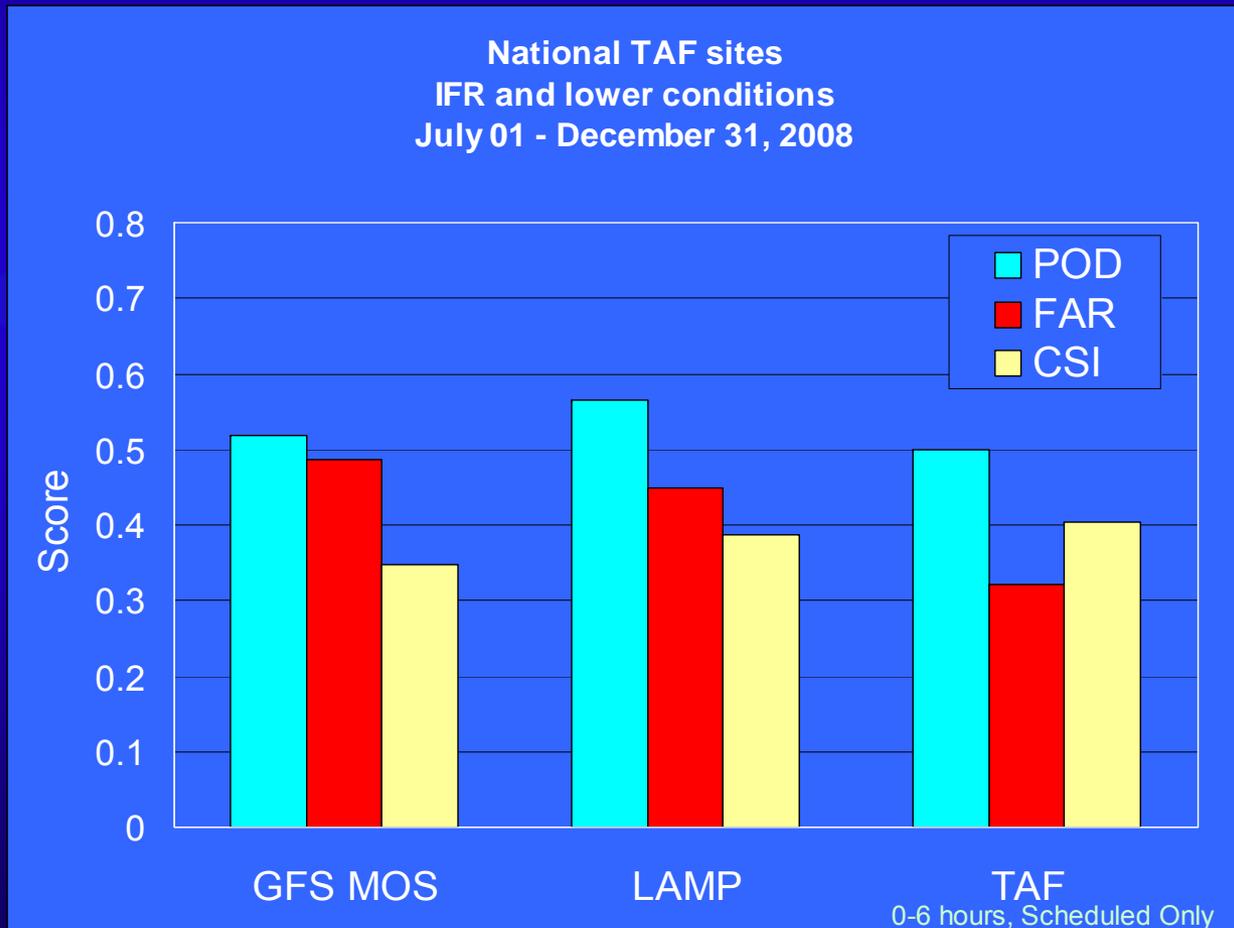
Categorical Visibility < 3 miles



0900 UTC LAMP verified against 0000 UTC GFS MOS

Current Results

LAMP in Stats on Demand:



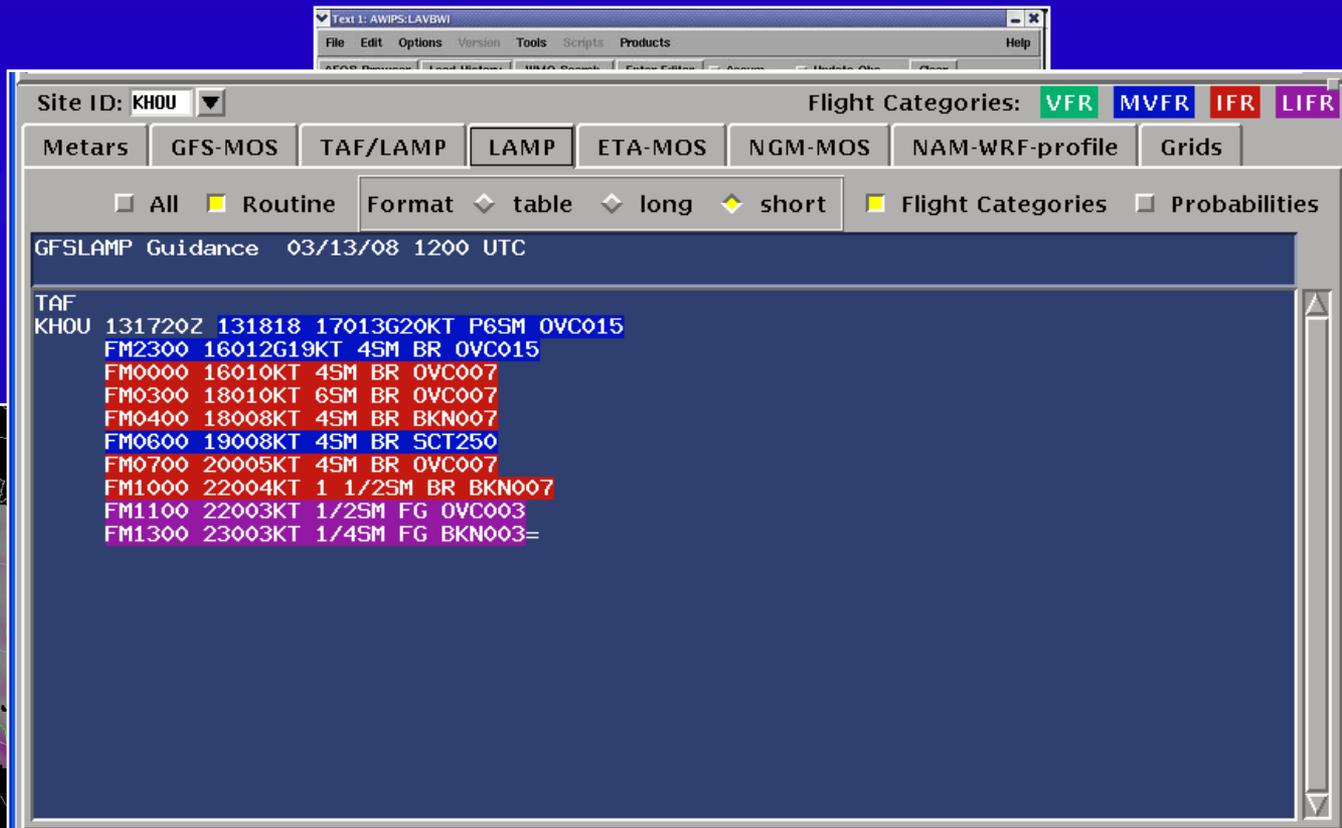
Current Status and Products

Current Status and Products

- Guidance sent out from NCEP on SBN/NOAAPort and NWS FTP Server
 - ASCII text bulletin
 - BUFR data
 - GRIB2 thunderstorm data
- Available Products:
 - Guidance viewable in AWIPS D2D and AvnFPS
 - Website products:
 - Text bulletins
 - Station plots
 - Meteograms
 - Probability/Threshold images
 - Gridded Thunderstorm images

Overview of Available AWIPS Products

- Available to NWS forecasters via AWIPS
 - Guidance is viewed as text or graphically by forecasters
 - Guidance is input into software for preparing TAFs



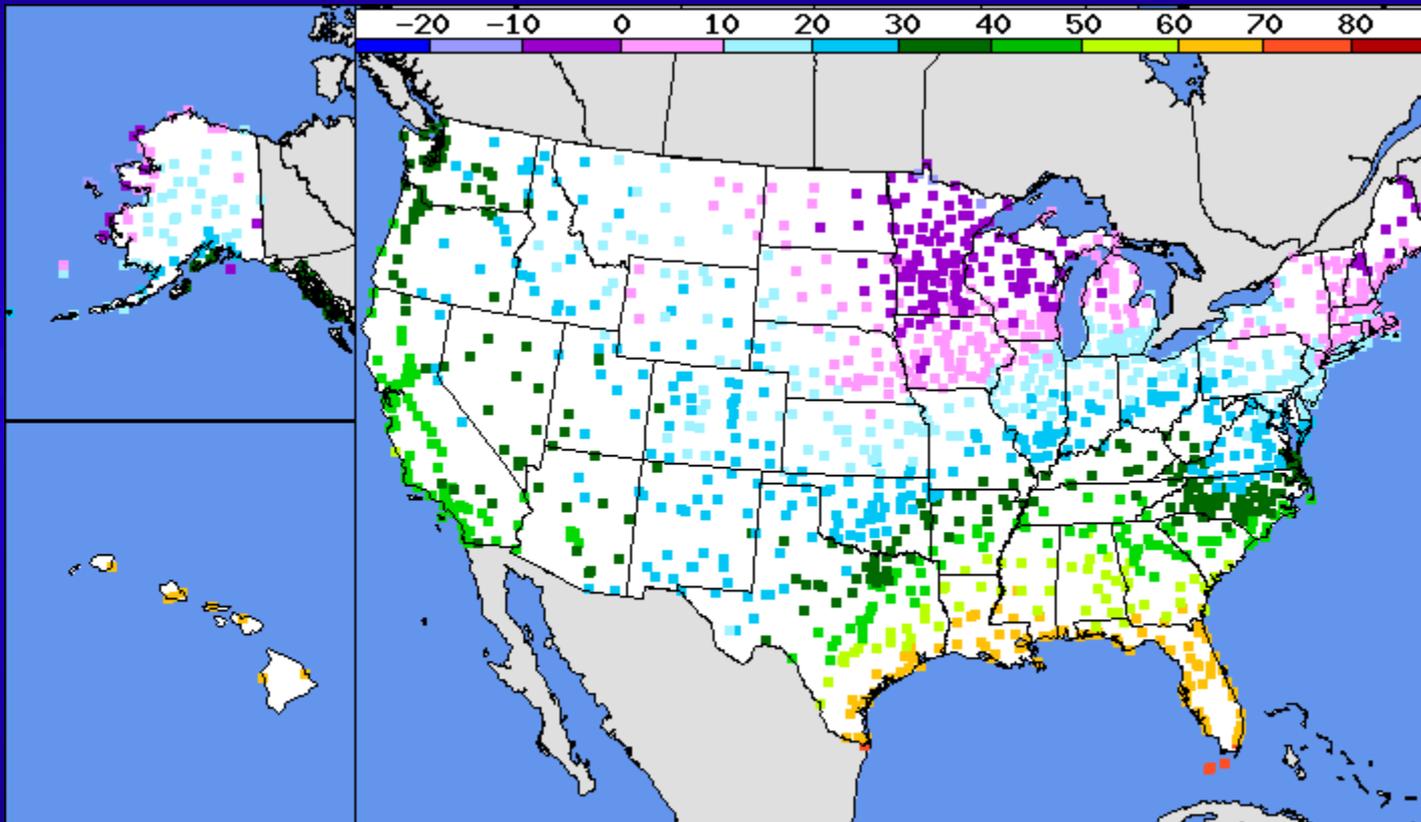
The screenshot displays the AWIPS software interface. At the top, the window title is "Text 1: AWIPS:LAVBWI". Below the title bar is a menu bar with "File", "Edit", "Options", "Version", "Tools", "Scripts", "Products", and "Help". The main interface features a "Site ID:" dropdown menu set to "KHOU" and "Flight Categories:" buttons for "VFR", "MVFR", "IFR", and "LIFR". Below these are tabs for "Metars", "GFS-MOS", "TAF/LAMP", "LAMP", "ETA-MOS", "NGM-MOS", "NAM-WRF-profile", and "Grids". A toolbar contains checkboxes for "All", "Routine", "Format" (with options for "table", "long", "short"), "Flight Categories", and "Probabilities". The main display area shows "GFSLAMP Guidance 03/13/08 1200 UTC" and a TAF forecast for KHOU:

```
TAF
KHOU 131720Z 131818 17013G20KT P6SM OVC015
FM2300 16012G19KT 4SM BR OVC015
FM0000 16010KT 4SM BR OVC007
FM0300 18010KT 6SM BR OVC007
FM0400 18008KT 4SM BR BKN007
FM0600 19008KT 4SM BR SCT250
FM0700 20005KT 4SM BR OVC007
FM1000 22004KT 1 1/2SM BR BKN007
FM1100 22003KT 1/2SM FG OVC003
FM1300 23003KT 1/4SM FG BKN003=
```

Website: LAMP Station Plots

Elements

- Flight Category
- Ceiling Height
- Visibility
- Obstruction to Vision
- Total Sky Cover
- Precipitation Type
- Probability of Precipitation
- Wind Speed
- Wind Gust
- Wind Direction
- Temperature
- Dewpoint



12 UTC GFS-LAMP Dewpoint
19 HOUR FORECAST VALID FOR 02-22-2008 07 UTC



[Click an element name on this slide to see its plot](#)



Website: LAMP Station Meteograms



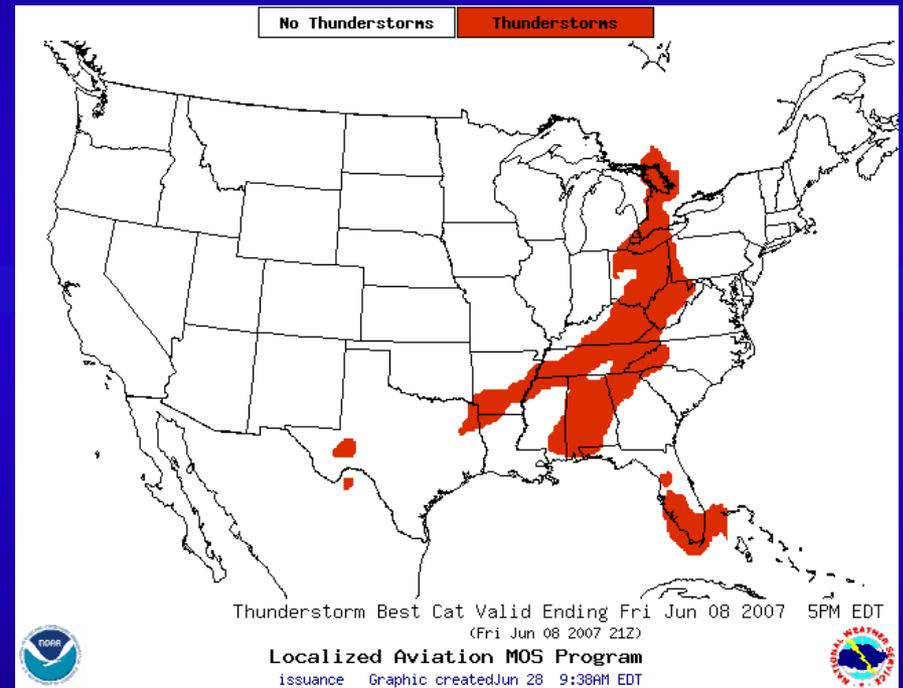
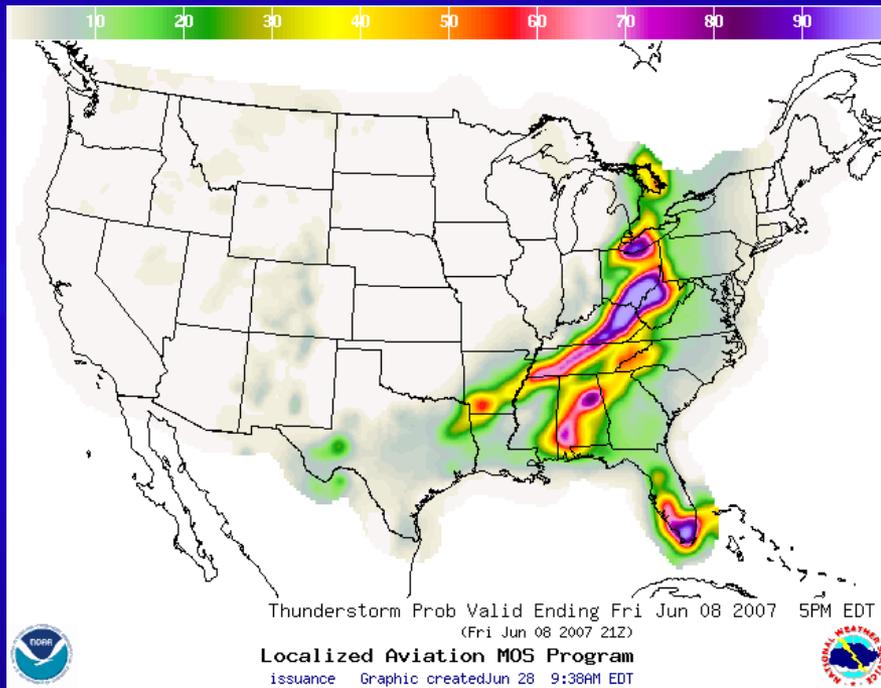
Features

- Up to 12 displayable LAMP forecast elements
- Real-time verification of current and past cycles
- Verification of completed past cycles including the corresponding GFS MOS forecast

Website: LAMP Thunderstorms

Probabilities and Best Category (Y/N)

All Projections



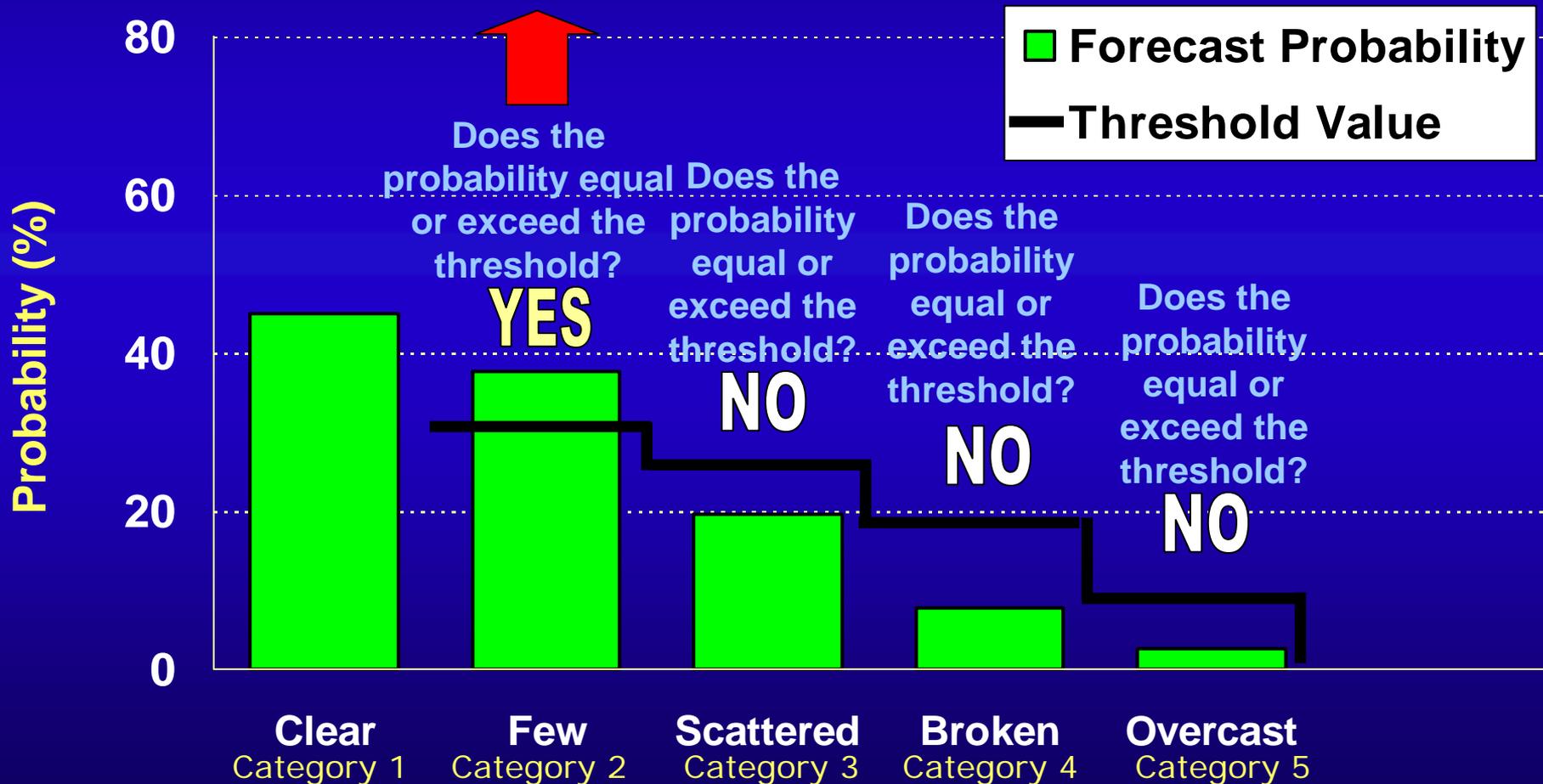
New website graphics

New LAMP probability/threshold graphics available on LAMP website:

- Goal is to depict the LAMP probabilities and information about the related thresholds so that users can have more information about the probabilities underlying the best category forecasts from LAMP
- Aviation probabilities and associated thresholds easily viewable for all LAMP stations and cycles

LAMP Categorical Forecast Selection Process

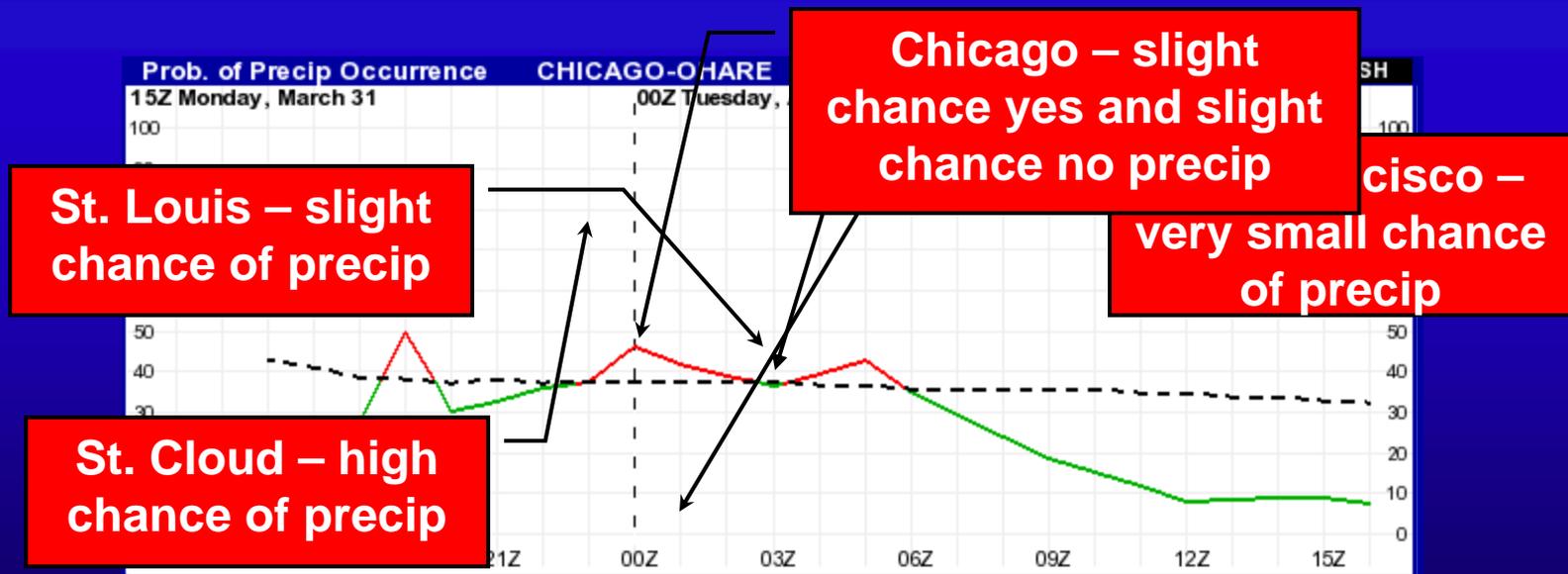
The probability of “few” exceeds the threshold value for “few” – therefore LAMP categorical forecast is “few”



Depicting Probabilistic Information

Purpose: indicate to user the uncertainty associated with the Best Category forecasts given the probabilistic information

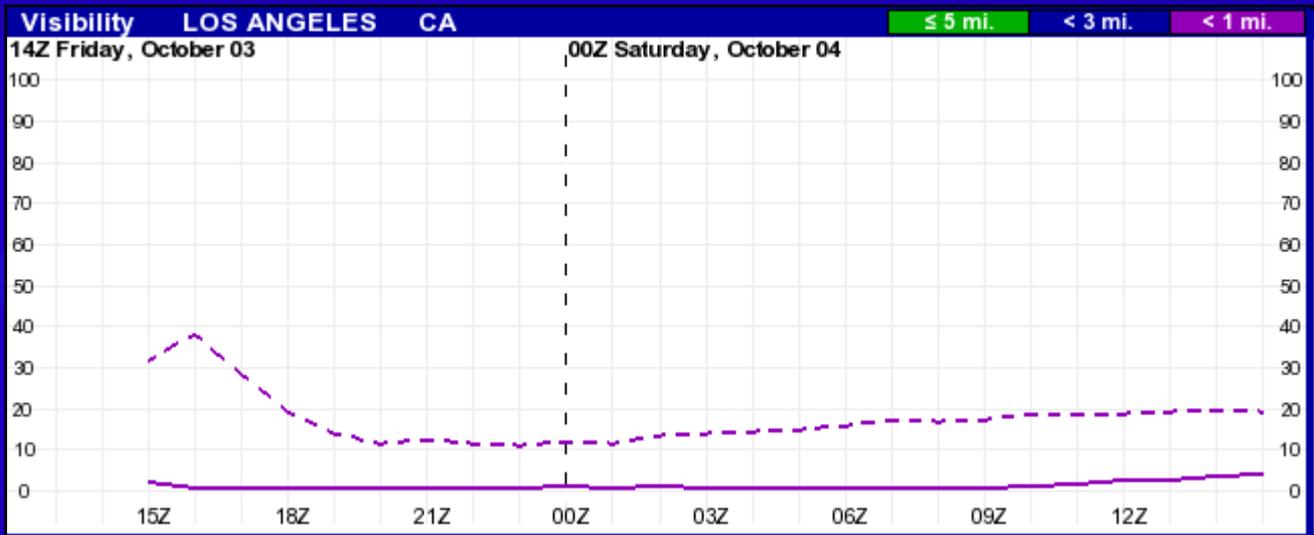
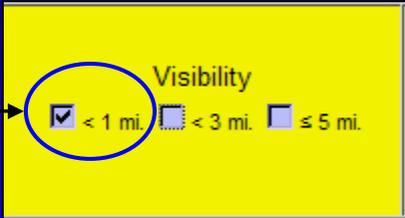
Threshold = dashed black line
Probability < thres = green line
Probability \geq thres = red line



LAMP Probabilities and Thresholds for Flight Categories

Threshold Plot Tab

Look at rarest of these categories first.

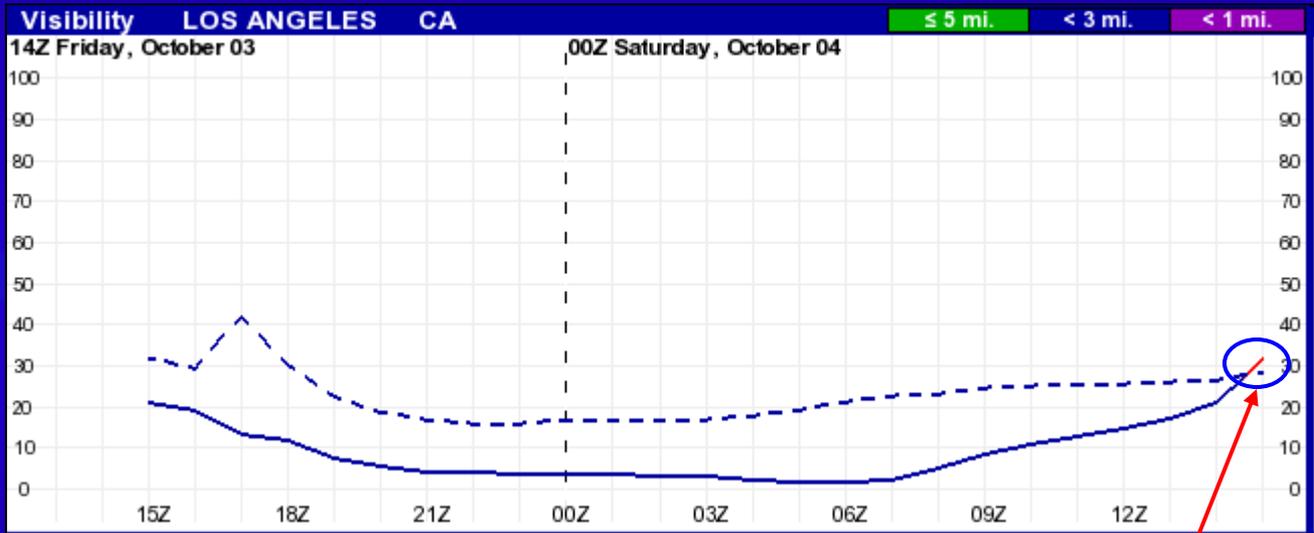
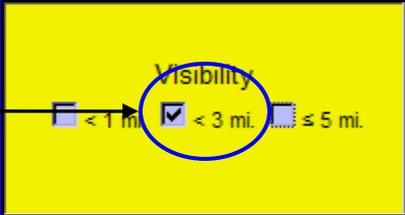


The probability of vis < 1 mile (solid line) does not exceed the threshold (dashed line). Look to next rarest category.

LAMP Probabilities and Thresholds for Flight Categories

Threshold Plot Tab

Look at next rarest of these categories.

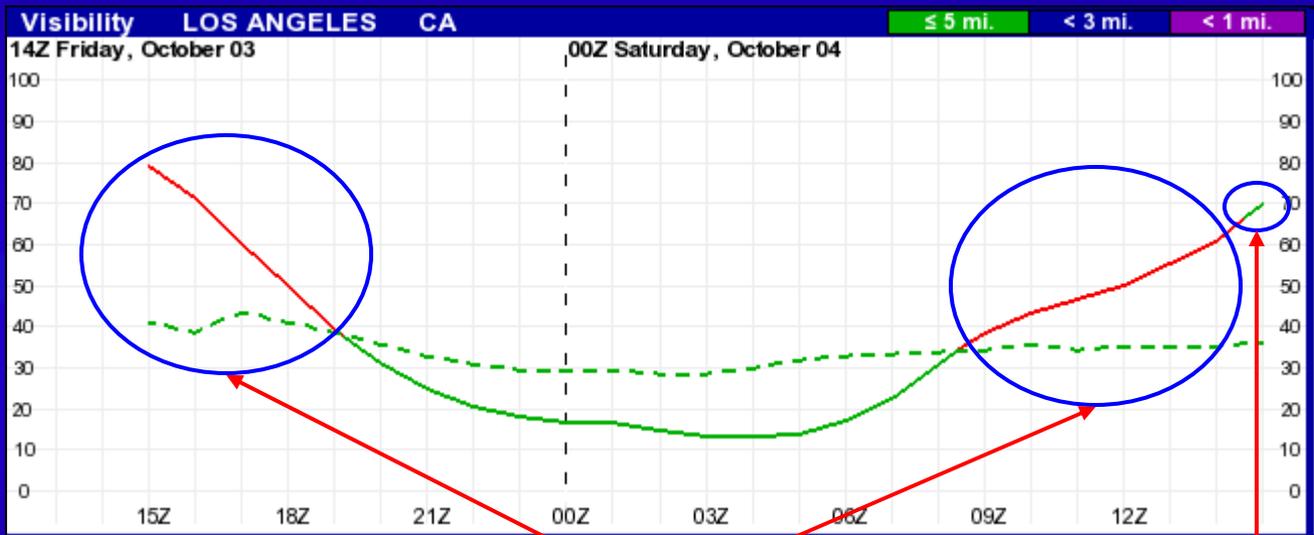
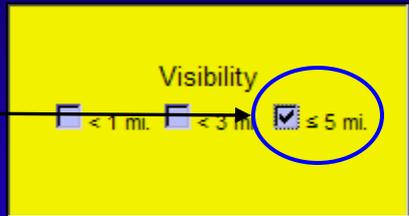


The probability of vis < 3 miles (solid line) exceeds the threshold (dashed line) only for the last hour; therefore this condition is indicated for only that hour. Look to next rarest category to determine the conditions for other hours.

LAMP Probabilities and Thresholds for Flight Categories

Threshold Plot Tab

Look at next rarest of these categories.



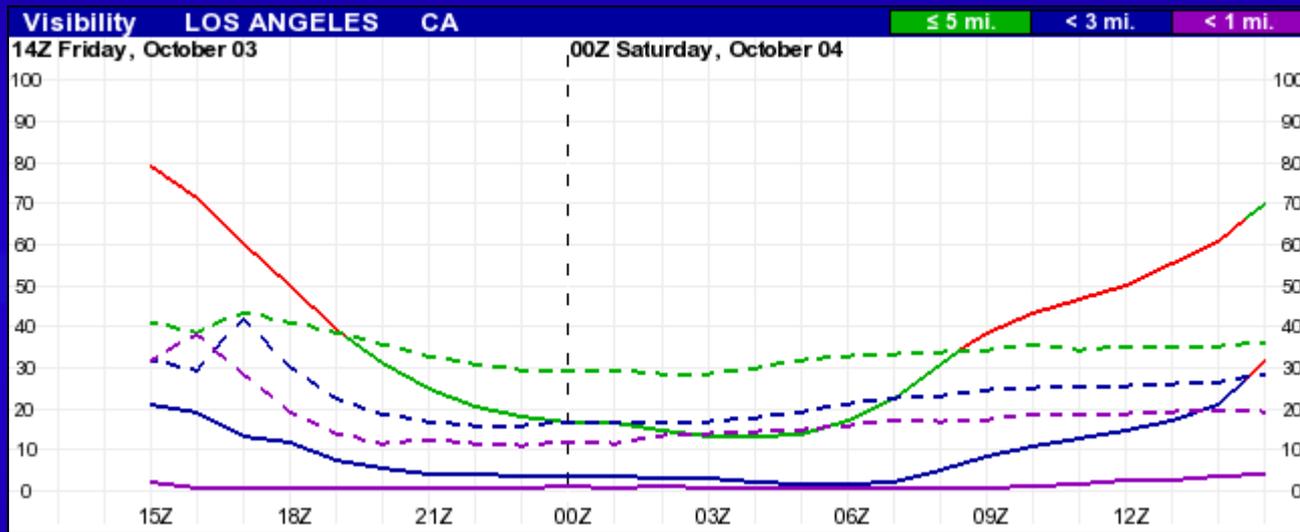
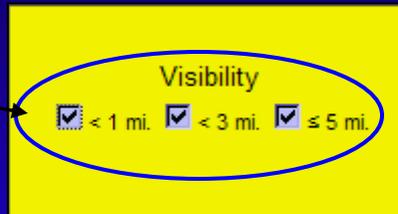
The probability of vis ≤ 5 miles (solid line) DOES exceed the threshold (dashed line) at times; therefore this condition is indicated for those times.

Note that vis ≤ 5 is not chosen for the last hour, because a rarer condition (vis < 3 miles) was already indicated.

LAMP Probabilities and Thresholds for Flight Categories

Threshold Plot Tab

Show all together.



Looking at these categories, look at the rarest first, then the next rarest, etc. The condition indicated is the rarest probability which exceeds its threshold. This is indicated by the red probability line.

New website graphics

New LAMP probability/threshold graphic available on LAMP website:

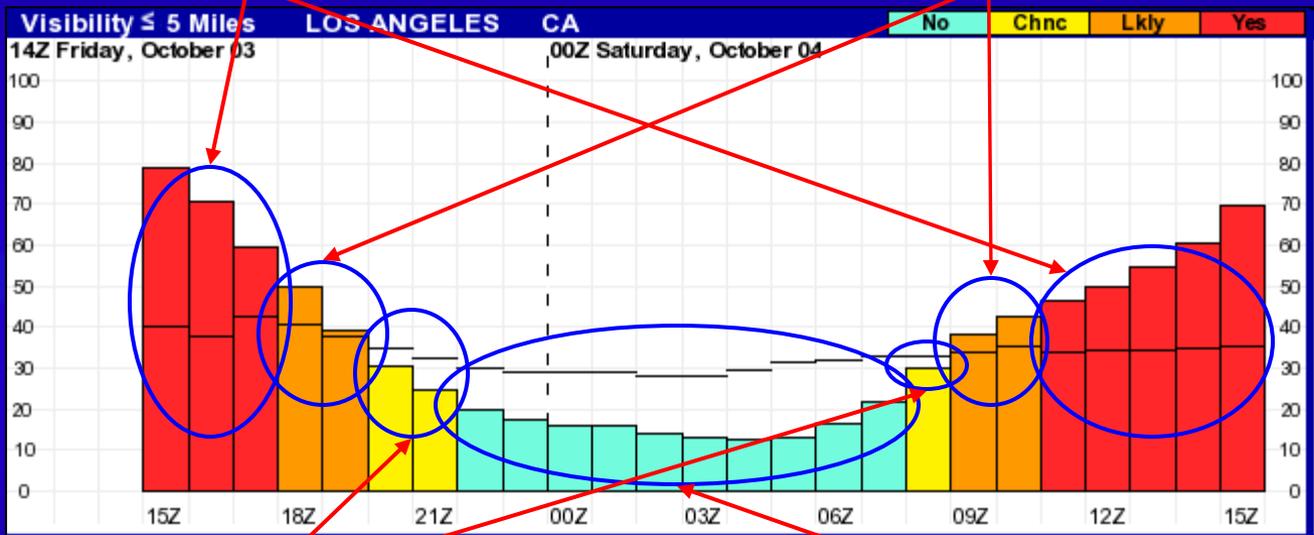
- Color coded graphic indicates the confidence in choosing a category by indicating how close the probability was to the threshold.
- One would have more confidence in a chosen category if the probability exceeded the threshold by a large amount, compared to the probability just barely exceeding the threshold.

LAMP Probabilities and Thresholds for Flight Categories

Uncertainty Plot Tab – looking at vis ≤ 5 miles

Red=Yes
Probability exceeds threshold by more than 10%

Orange=Likely
Probability exceeds threshold but NOT by more than 10%



Yellow = Chance
Probability is less than threshold

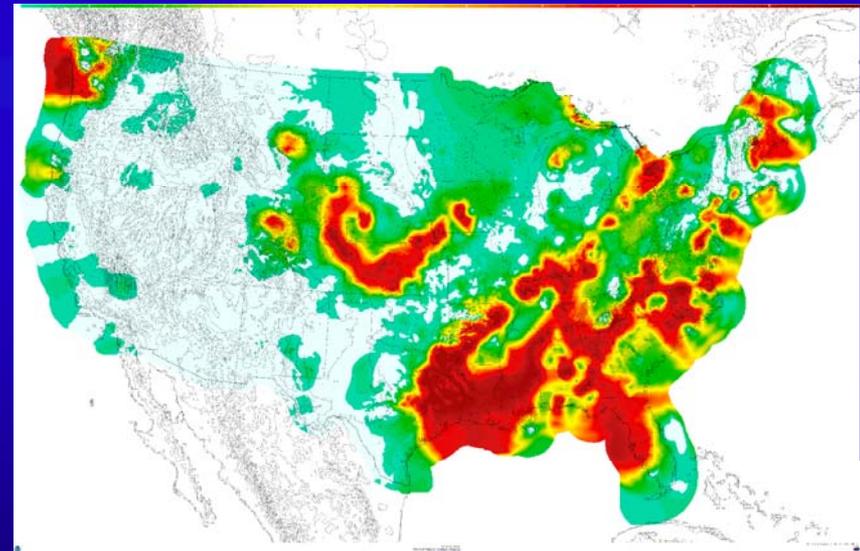
Cyan = No
Probability is less than threshold

Note that this shows you one condition (e.g., vis ≤ 5 miles). To determine the most likely condition, you should consider the rarest conditions first.

Future Plans

Future Plans

- Minimize inter-element inconsistencies in anticipation of gridding forecasts
- Gridded LAMP forecasts of:
 - Temperature and dewpoint
 - Winds
 - Probabilities of Ceiling Height
 - Ceiling Height
 - Probabilities of Visibility
 - Visibility



Future Plans

- Redevelop LAMP station guidance of ceiling height and opaque sky cover
- Inter-hour station-based LAMP using SPECI observations
- Convective cloud tops?

Questions?

- LAMP Website:
 - <http://www.nws.noaa.gov/mdl/gfslamp/gfslamp.shtml>
- Training Materials:
 - Powerpoint Presentations, each one should take less than 1 hour to complete
 - <http://www.nws.noaa.gov/mdl/gfslamp/docs/presentations.shtml>
 - Training on LAMP Background: “An Introduction to The Localized Aviation MOS Program (LAMP)” by David Rudack.
 - Training on LAMP Products: “Accessing and Using GFS LAMP Products” by Scott Scallion.
- Contact:
 - Judy.Ghirardelli@noaa.gov