Aviation Products from the Localized Aviation MOS Program (LAMP)

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Outline

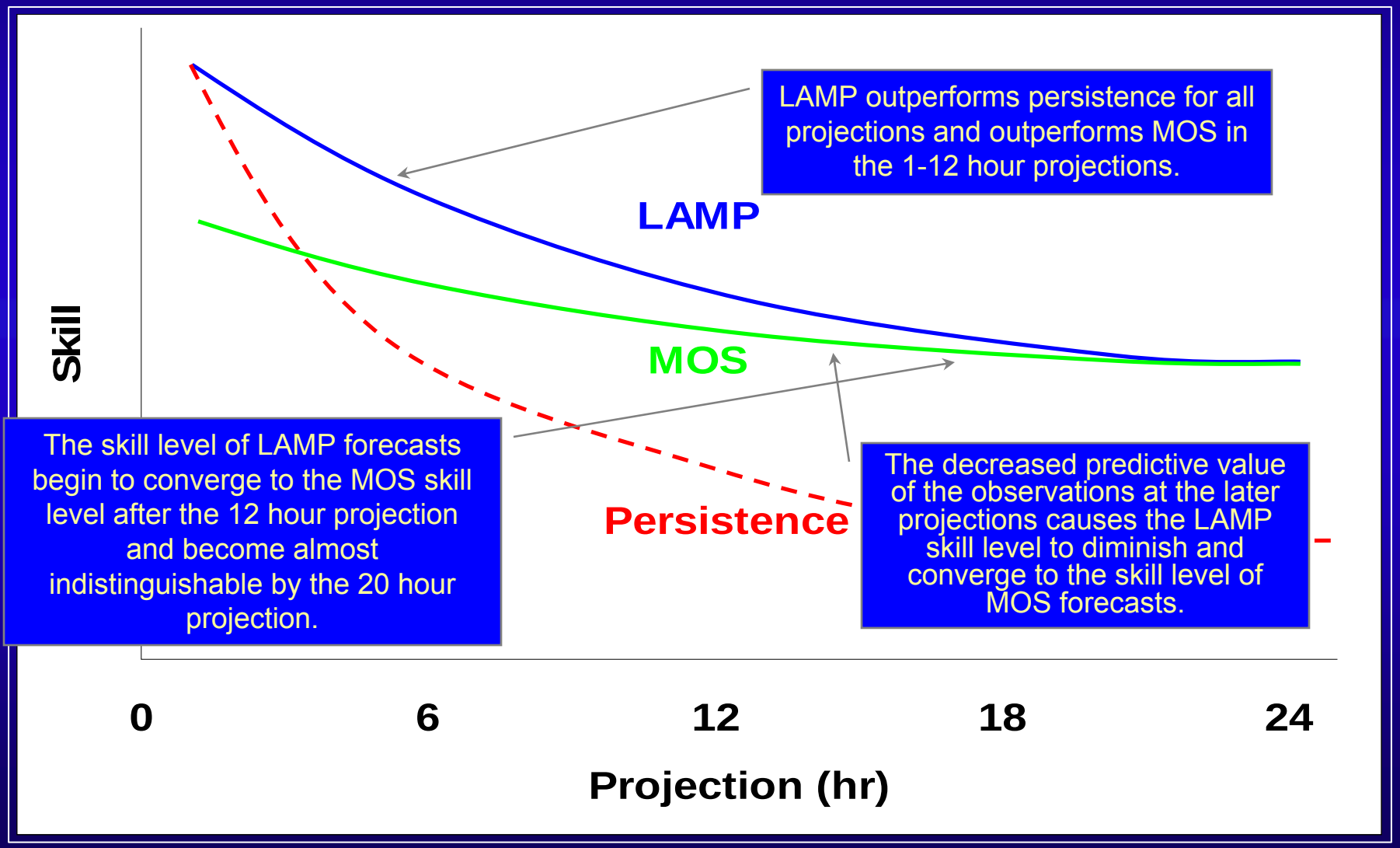
- LAMP Overview
- Brief LAMP Verification
- Current Status and Products
- Future Plans

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



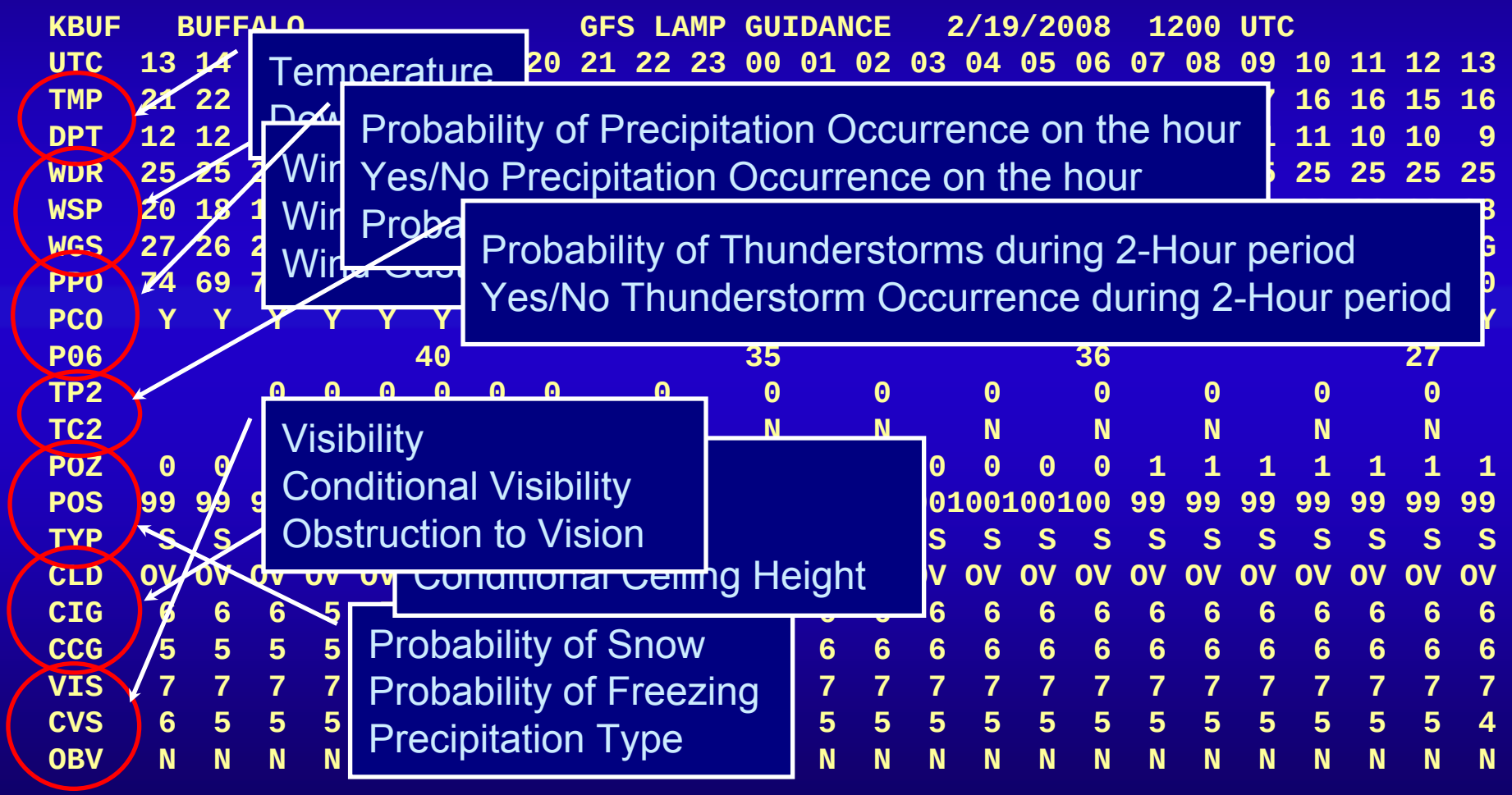
LAMP Guidance Details

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

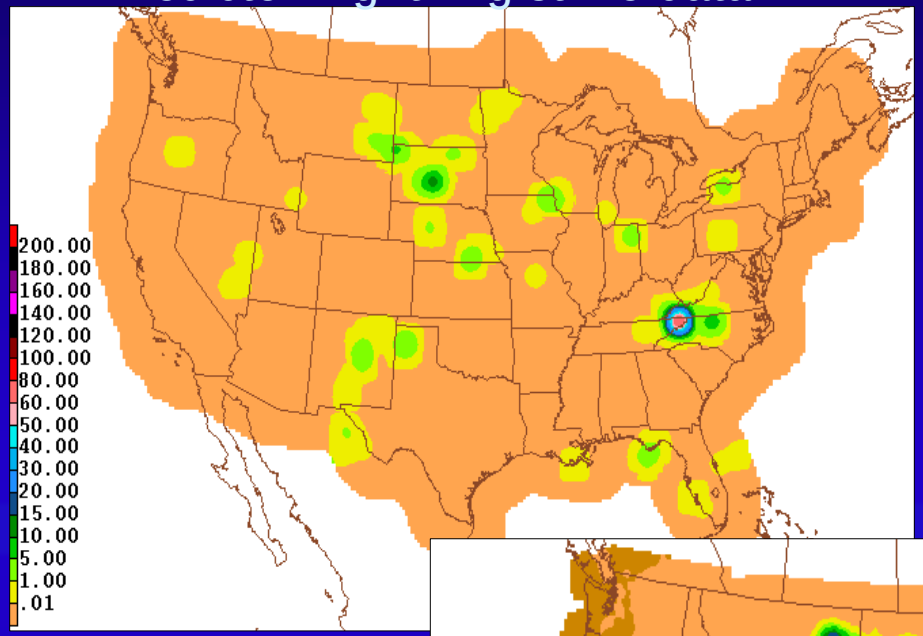
Example of a LAMP Text Bulletin



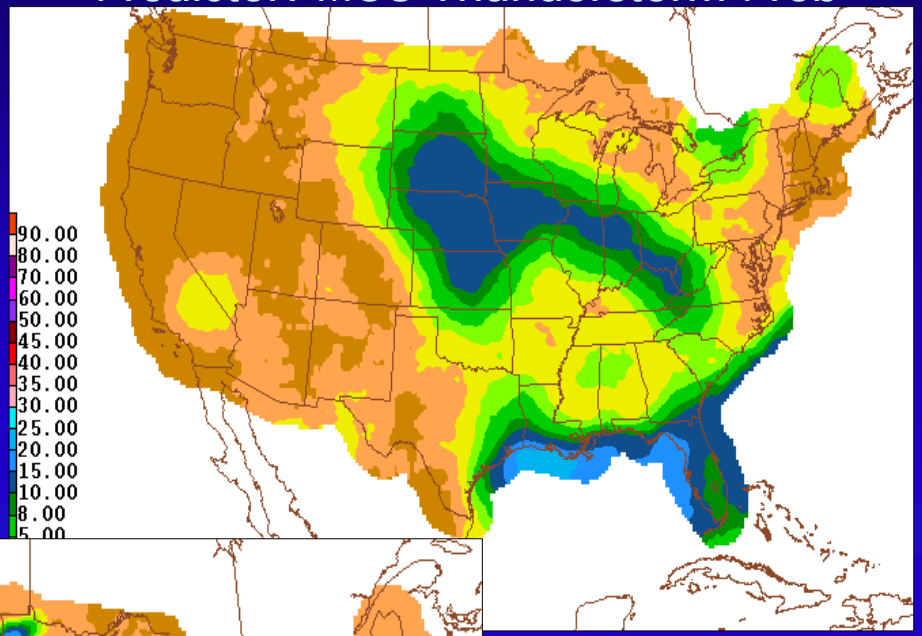
Example of blending Observations and MOS

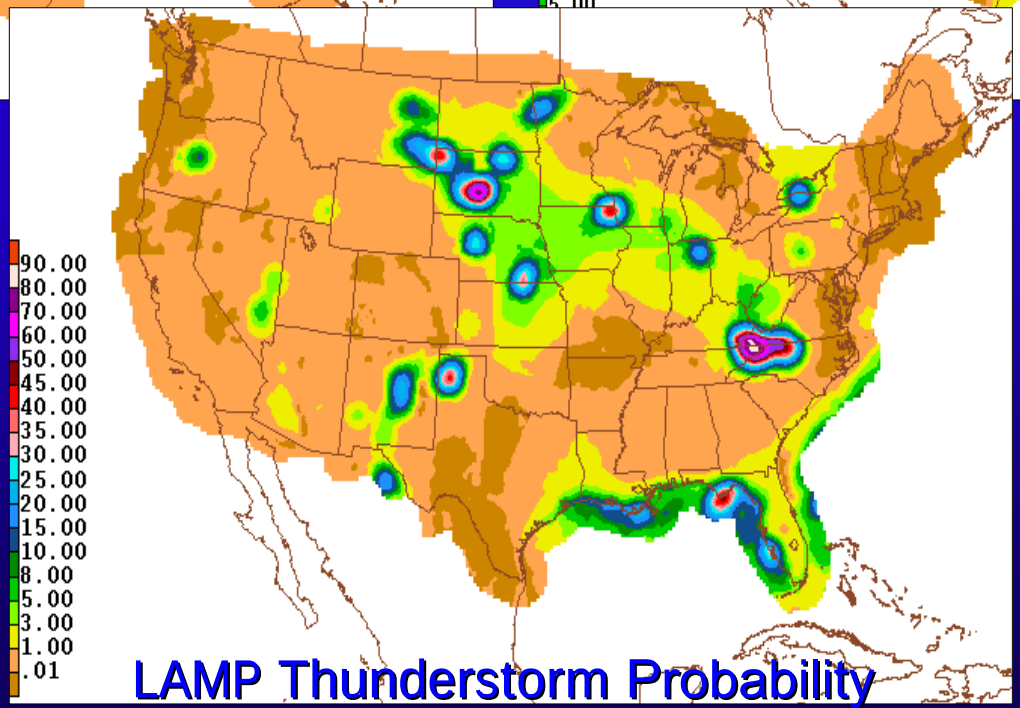
1-3 hr LAMP Thunderstorm forecast

Predictor: lightning strike data



Predictor: MOS Thunderstorm Prob



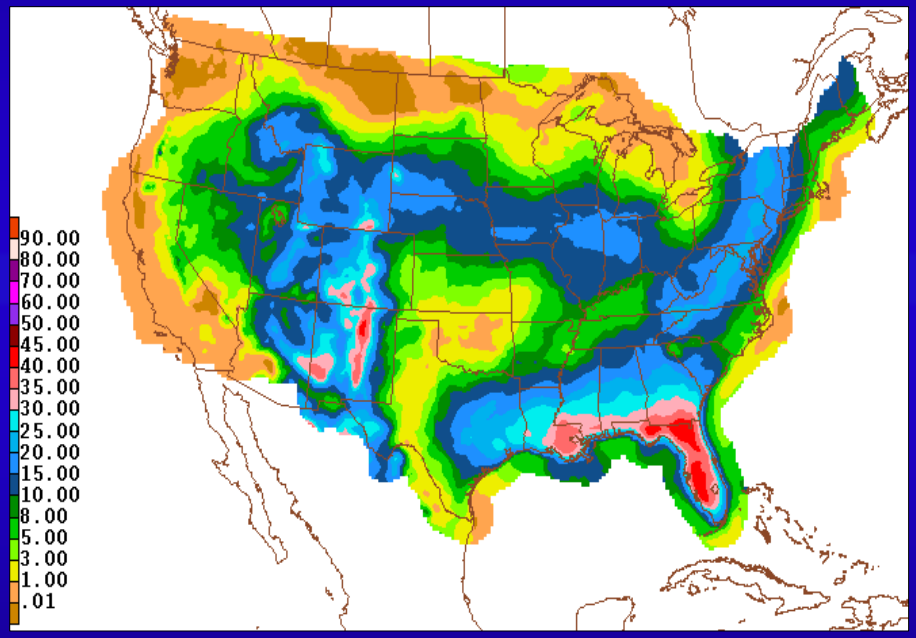


LAMP Thunderstorm Probability

11-13 hr LAMP Thunderstorm forecast

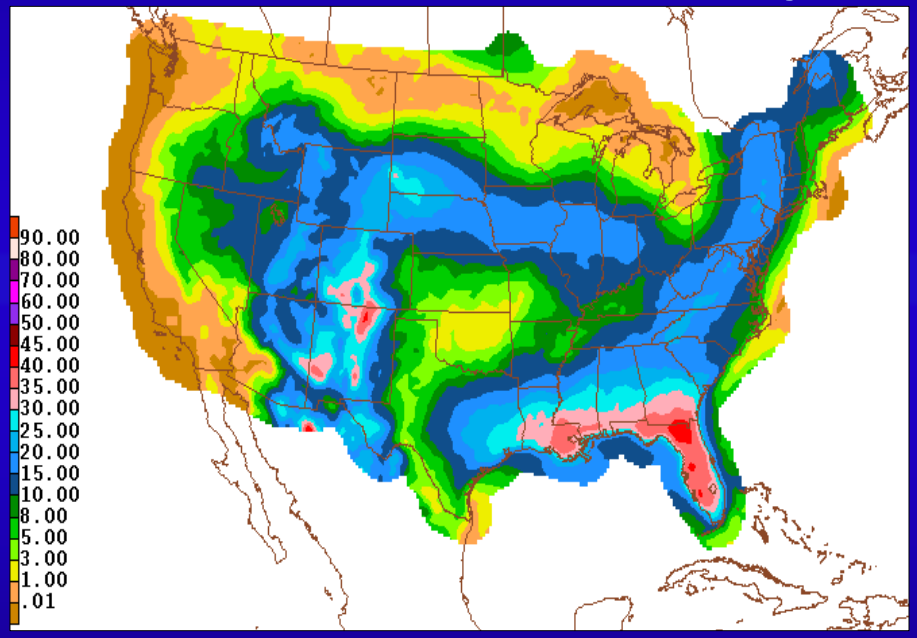
LAMP

Thunderstorm Probability

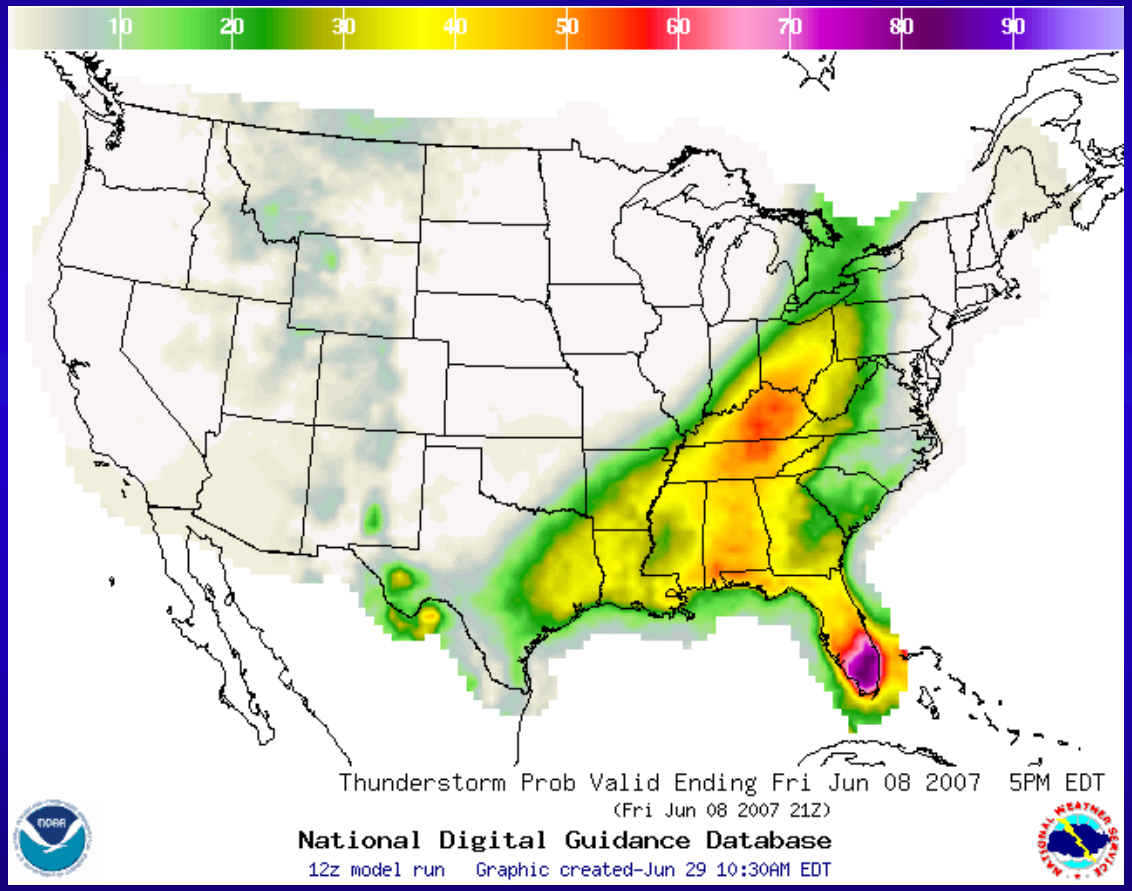


Predictor: MOS

Thunderstorm Probability

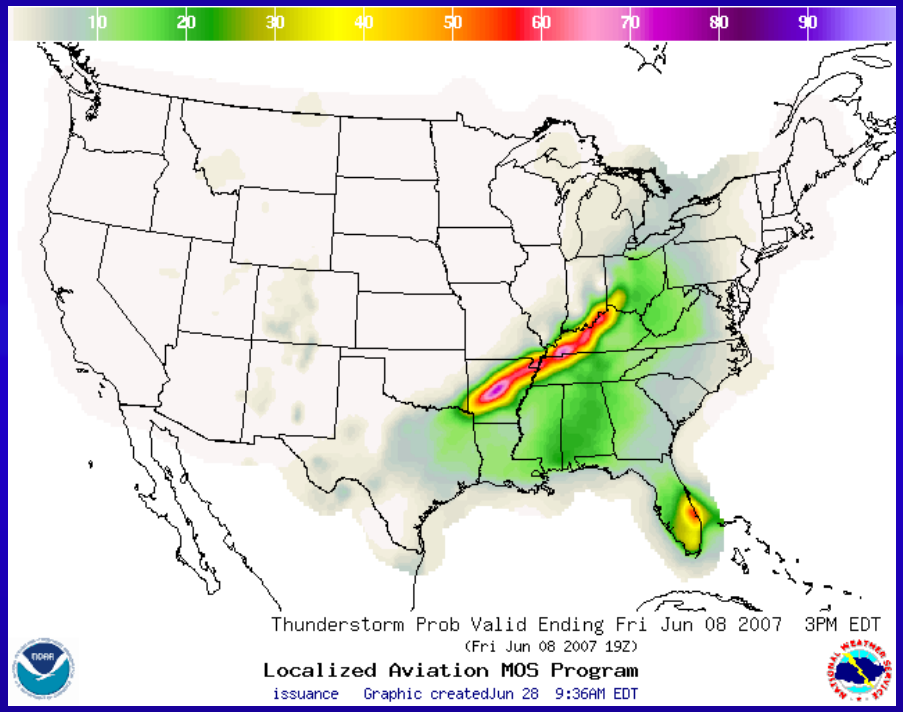


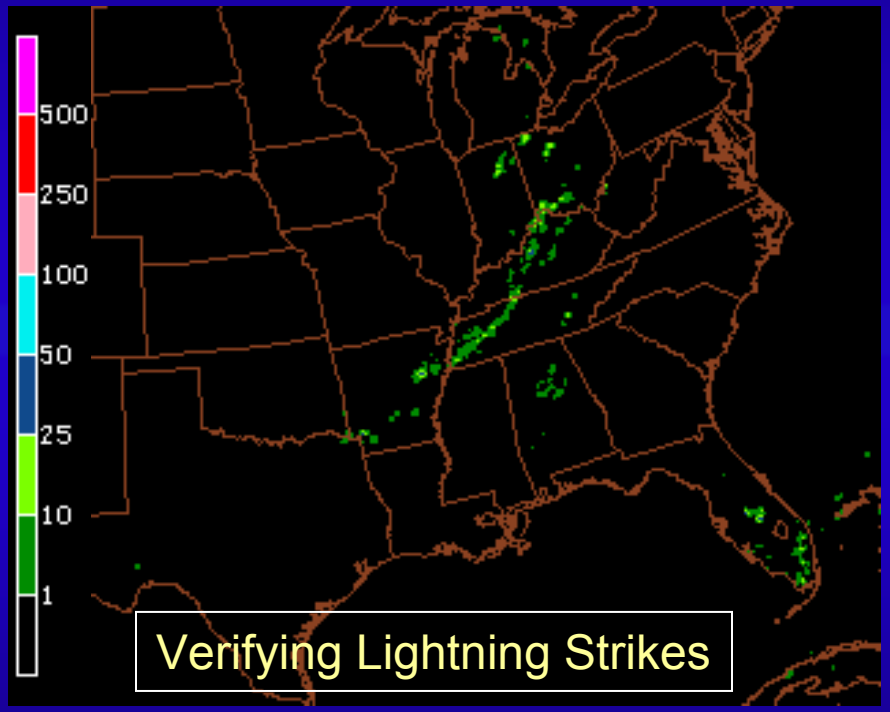
June 8, 2007



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

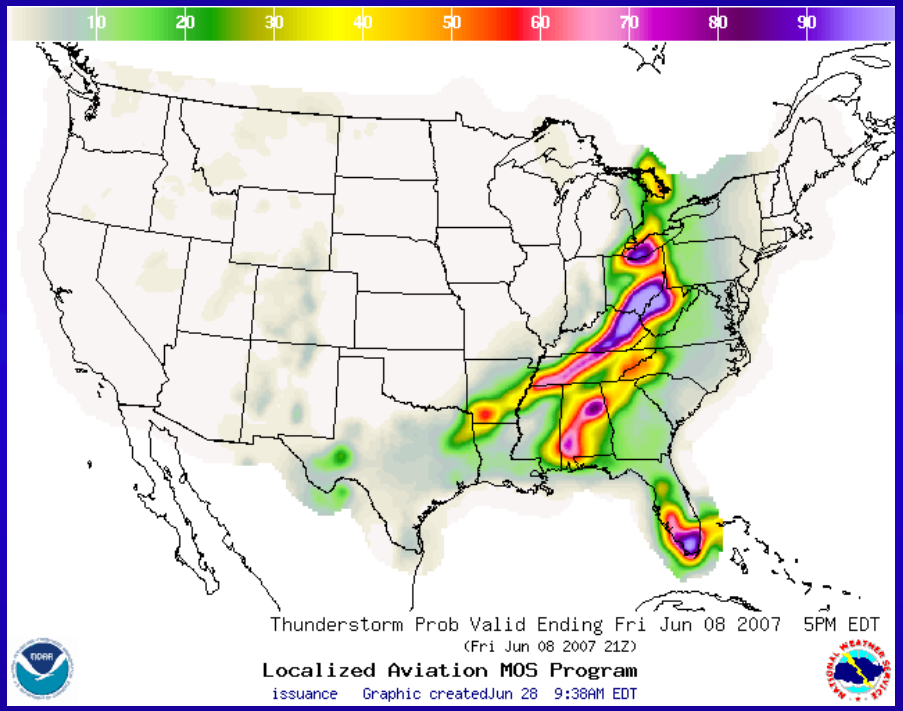
June 8, 2007 1500 UTC LAMP forecast

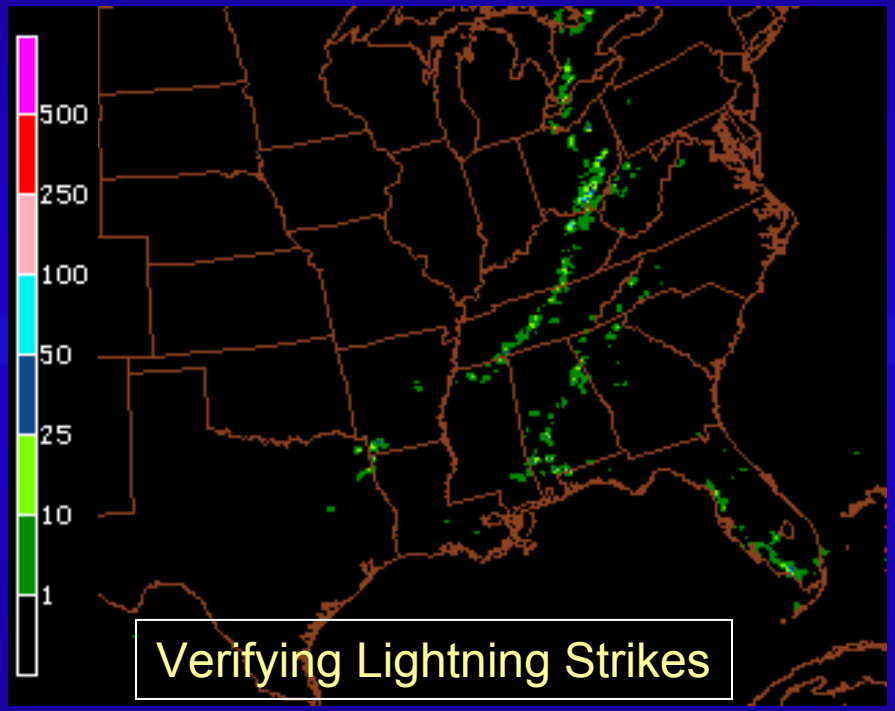




LAMP 02h forecast
Available ~15:45 UTC
Valid 17-19 UTC

June 8, 2007 1800 UTC LAMP forecast

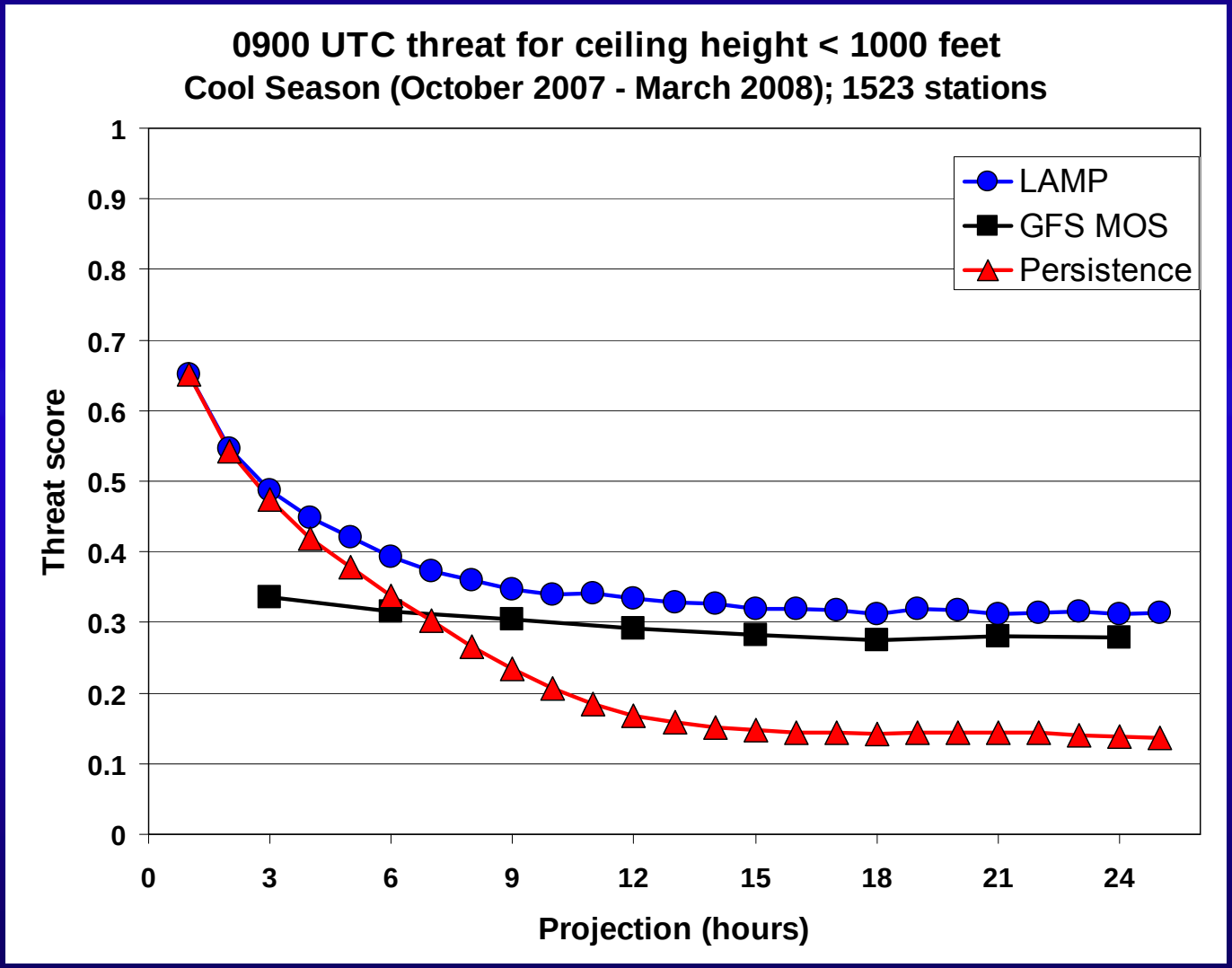




LAMP 02h forecast
Available ~18:45 UTC
Valid 19-21 UTC

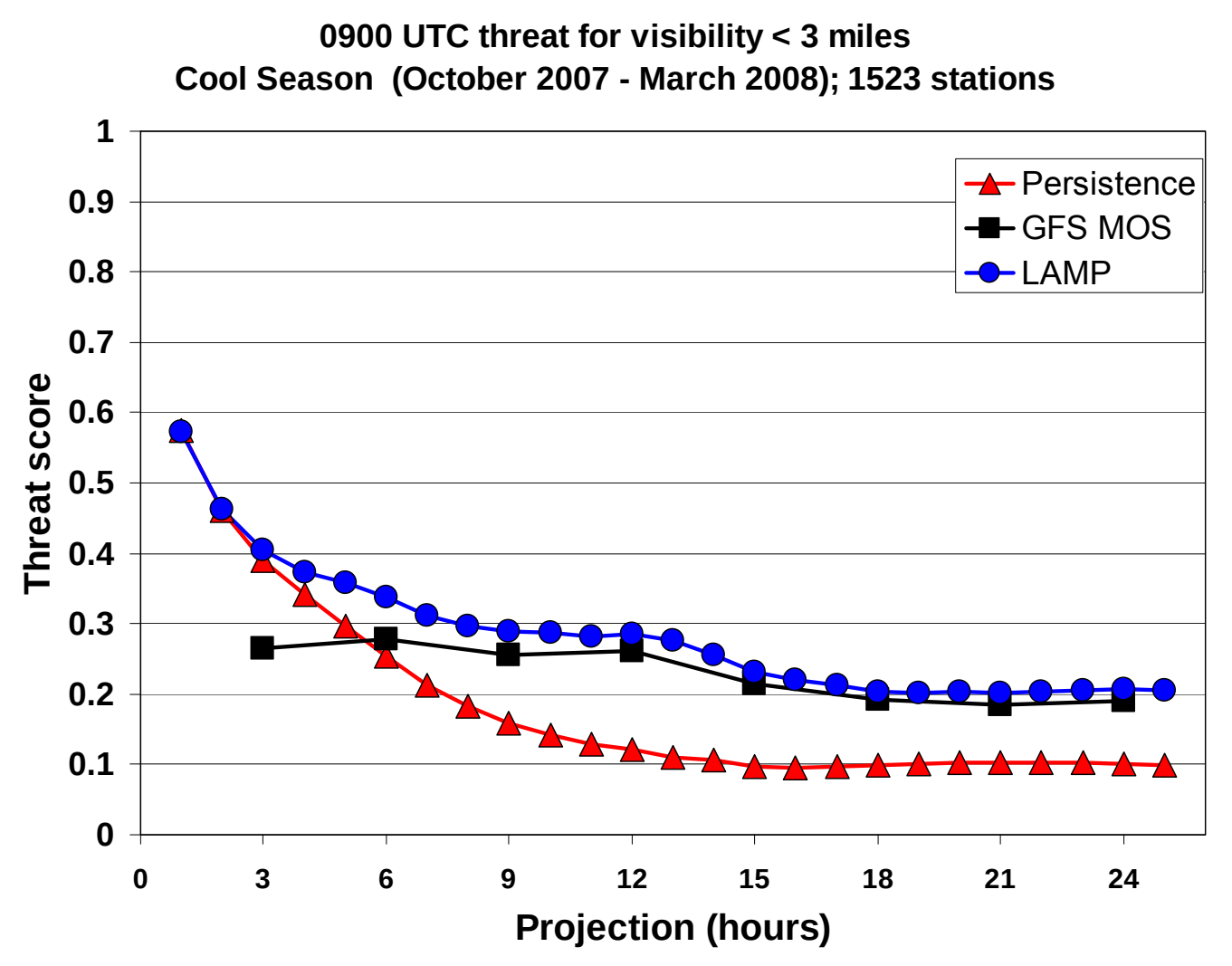
Brief LAMP Verification

0900 UTC LAMP compared to MOS
Categorical Ceiling Height < 1000 feet



0900 UTC LAMP verified against 0000 UTC GFS MOS

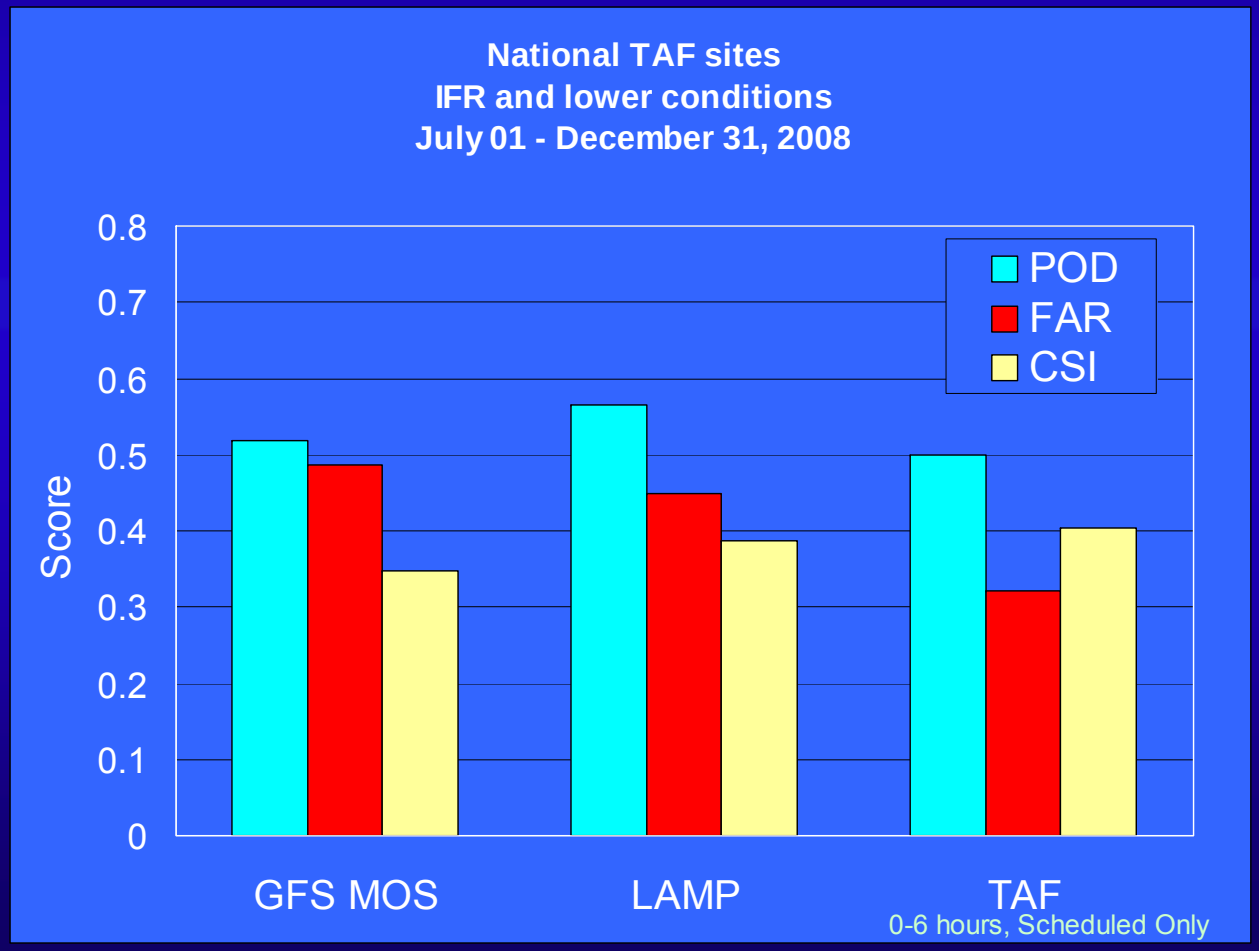
0900 UTC LAMP compared to MOS
Categorical Visibility < 3 miles



0900 UTC LAMP verified against 0000 UTC GFS MOS

Current Results

LAMP in Stats on Demand:



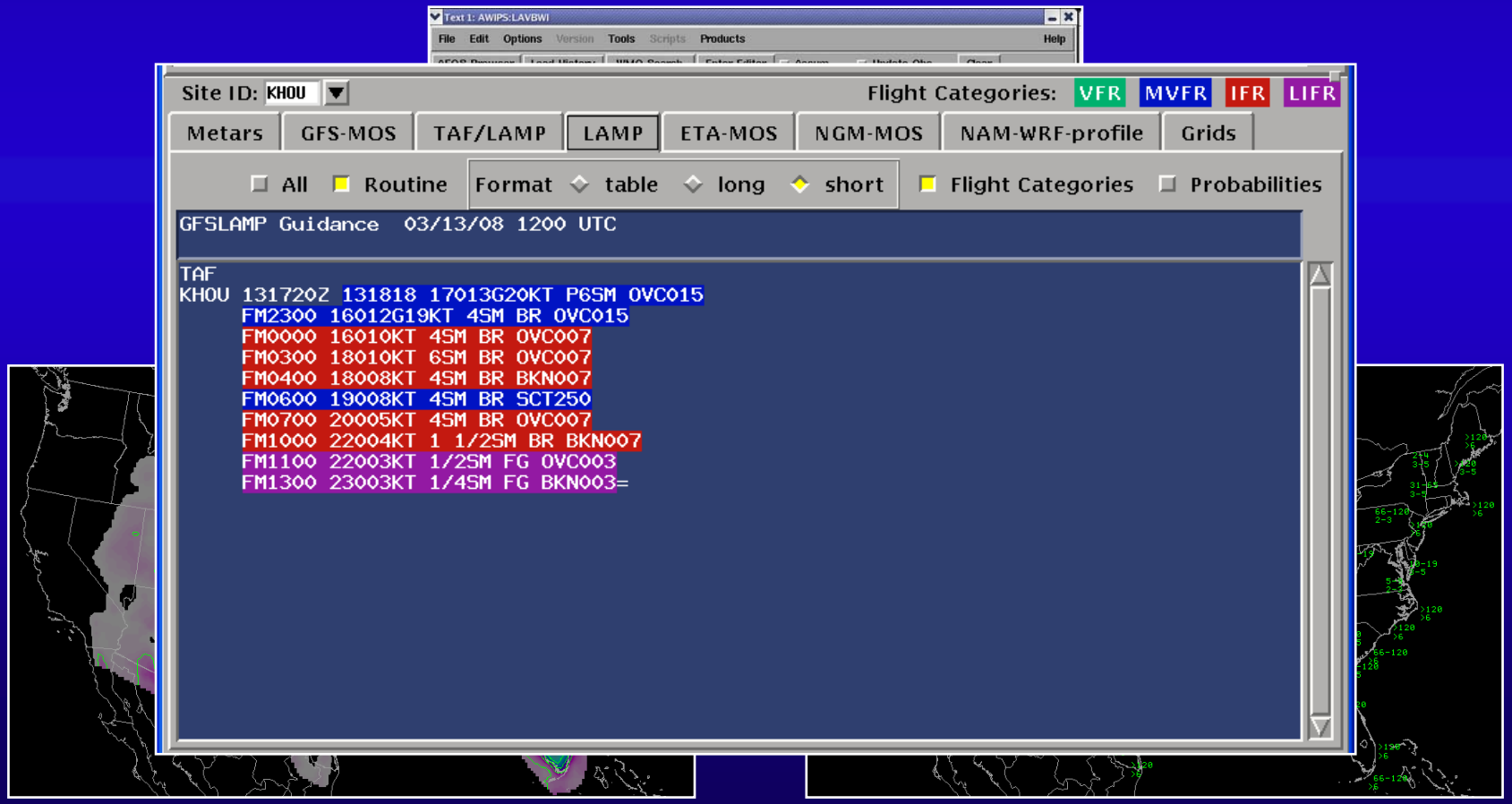
Current Status and Products

Current Status and Products

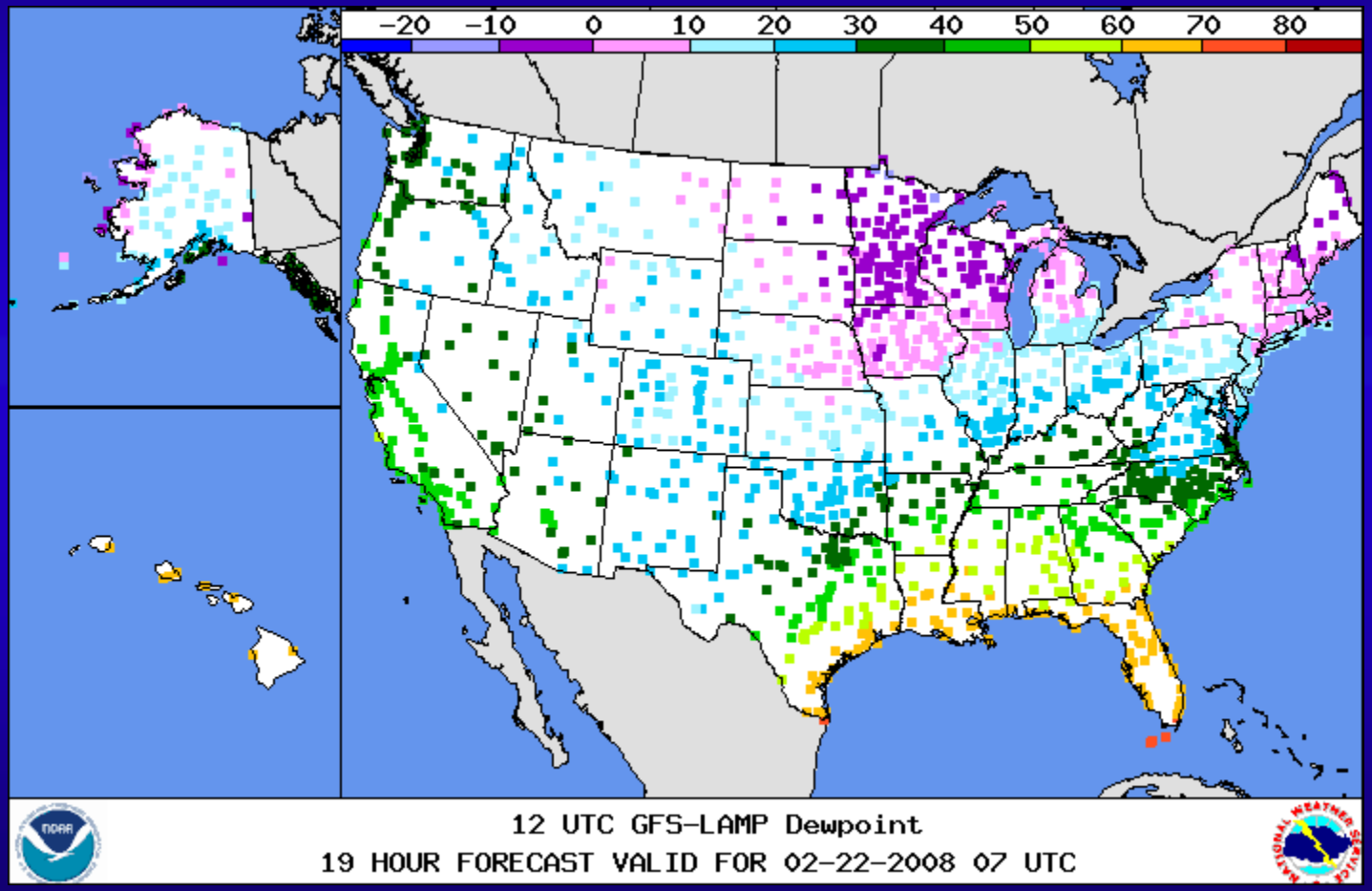
- Guidance sent out from NCEP on SBN/NOAAPort and NWS FTP Server
  - ASCII text bulletin
  - BUFR data
  - GRIB2 thunderstorm data
- Available Products:
  - Guidance viewable in AWIPS D2D and AvnFPS
  - Website products:
    - Text bulletins
    - Station plots
    - Meteograms
    - Probability/Threshold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



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

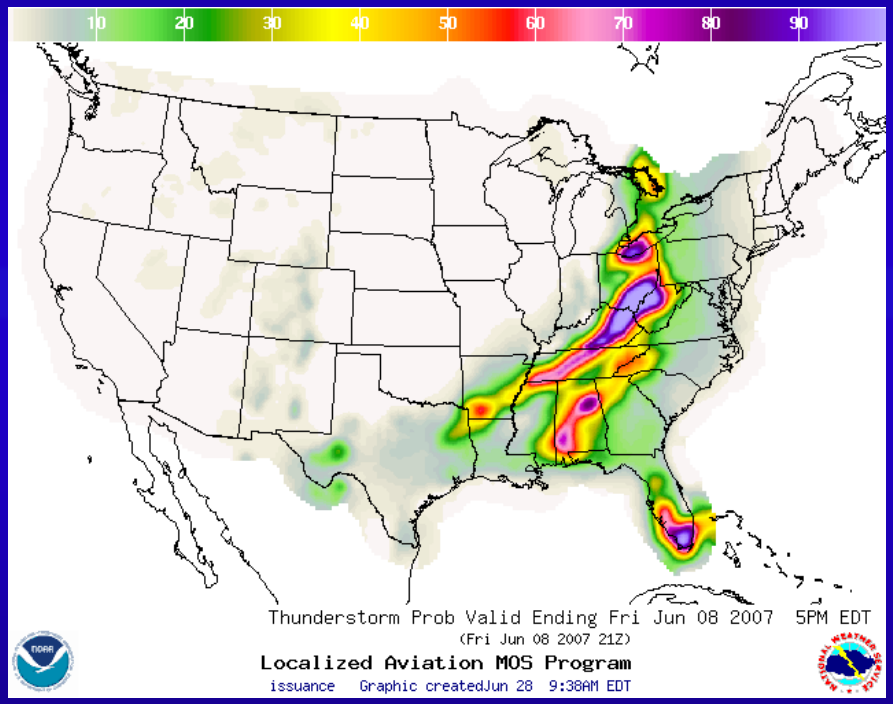
Click an element name on this slide to see its plot

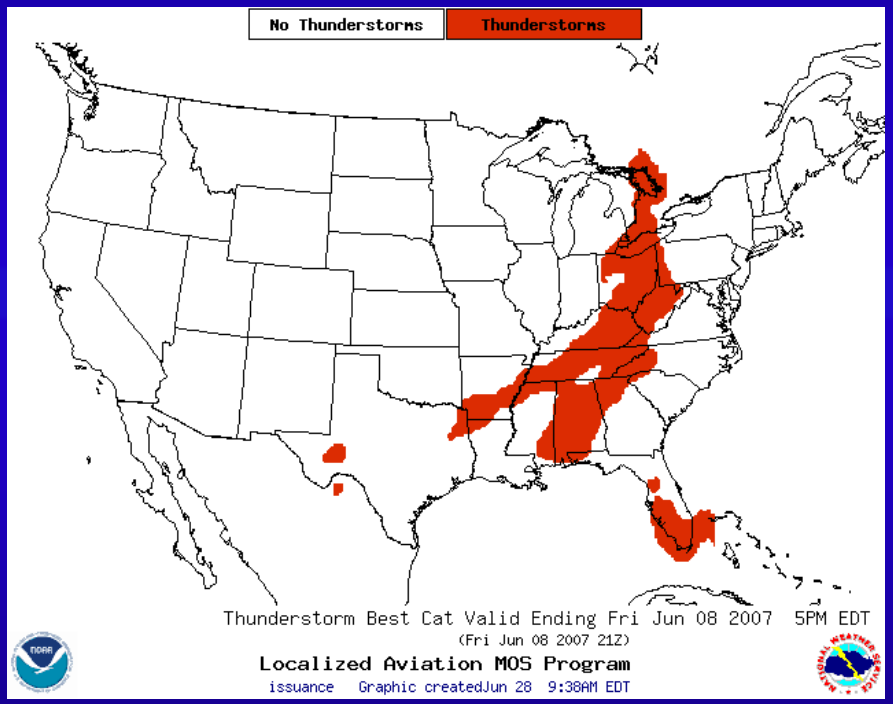
Website: LAMP Station Meteograms

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





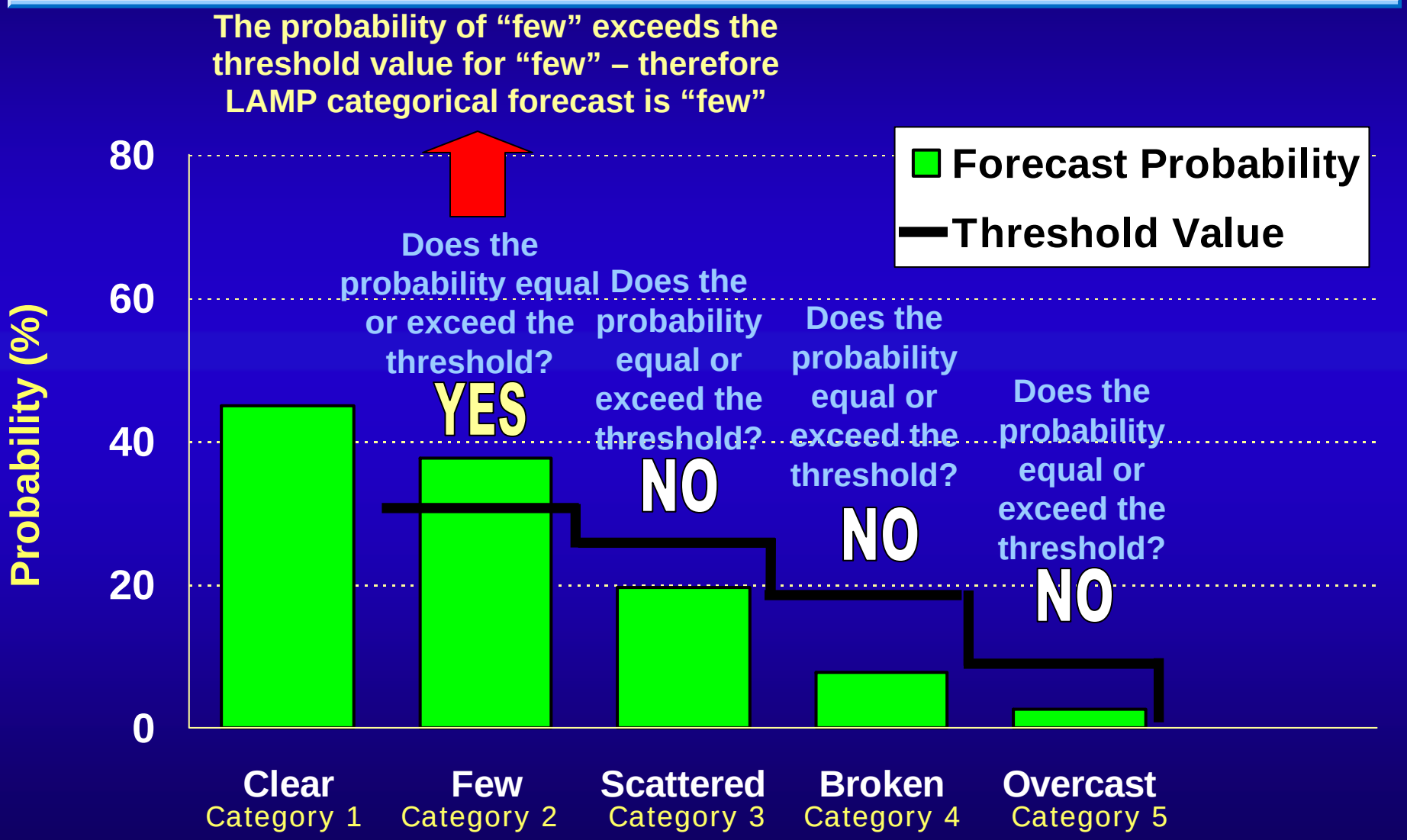
New website graphics

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



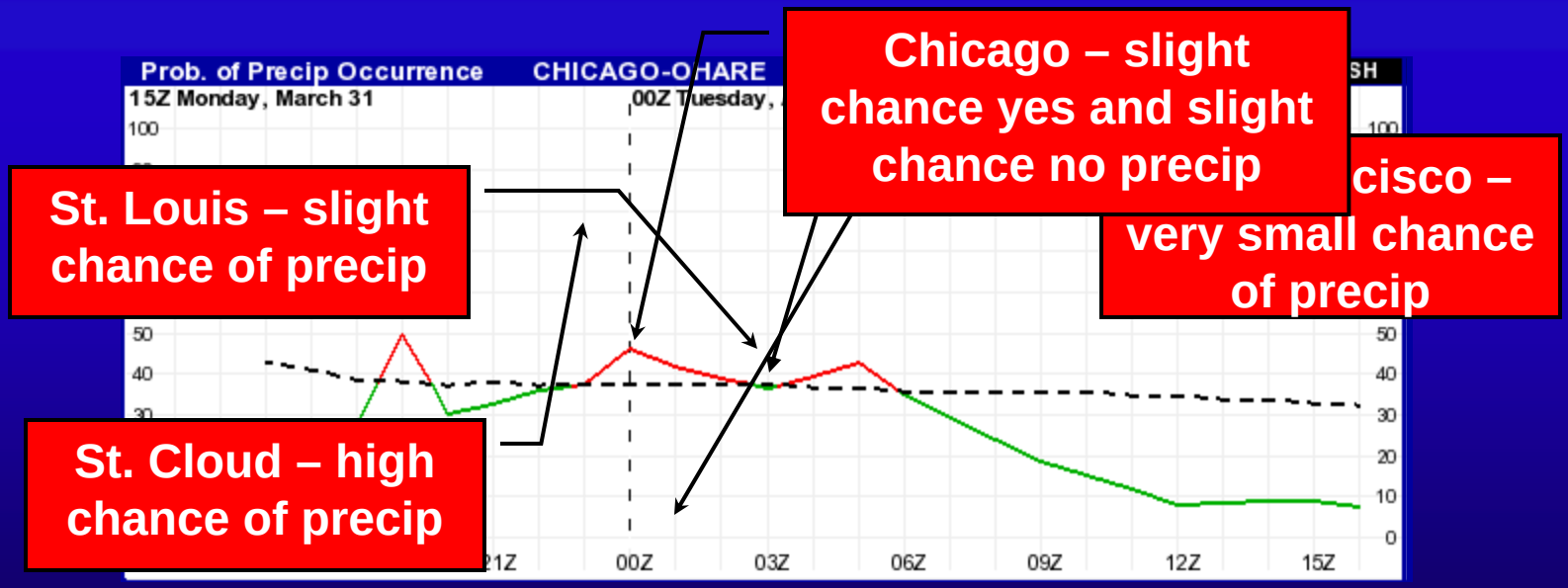
Depicting Probabilistic Information

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

Threshold = dashed black line

Probability < thres = green line

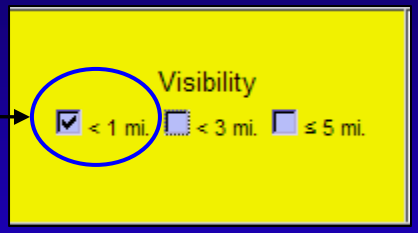
Probability ≥ thres = red line

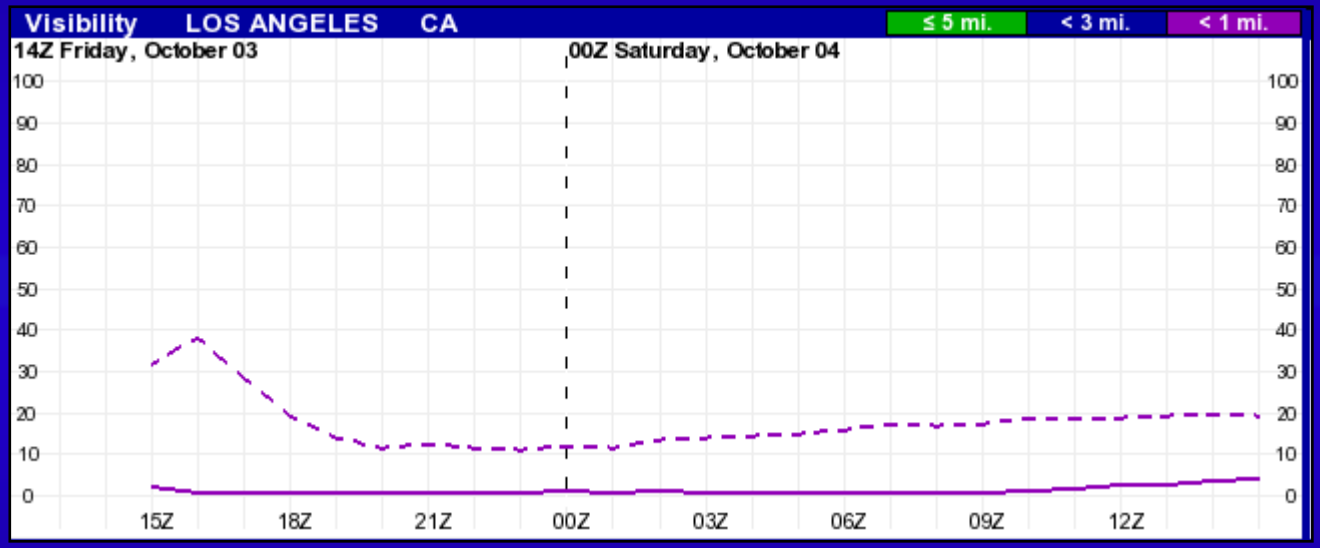


LAMP Probabilities and Thresholds for Flight Categories

Threshold Plot Tab

Look at rarest of these categories first.



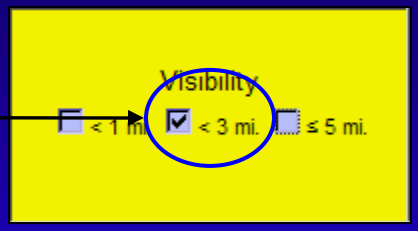


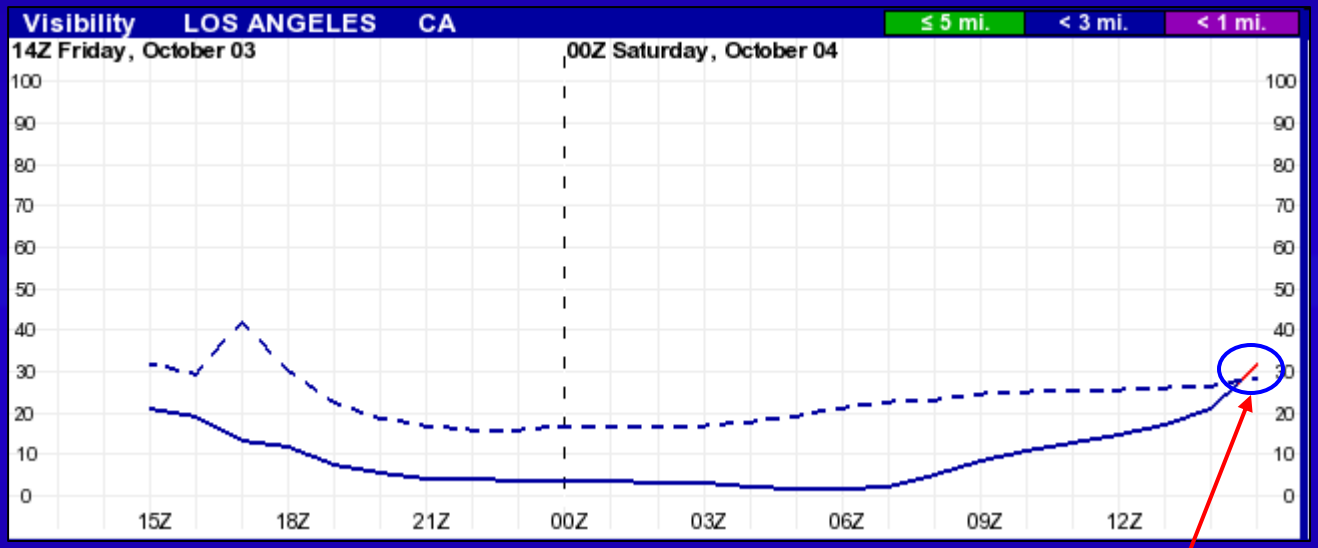
The probability of vis < 1 mile (solid line) does not exceed the threshold (dashed line). Look to next rarest category.

LAMP Probabilities and Thresholds for Flight Categories

Threshold Plot Tab

Look at next rarest of these categories.



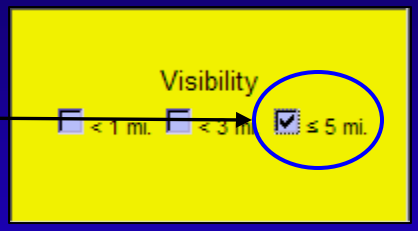


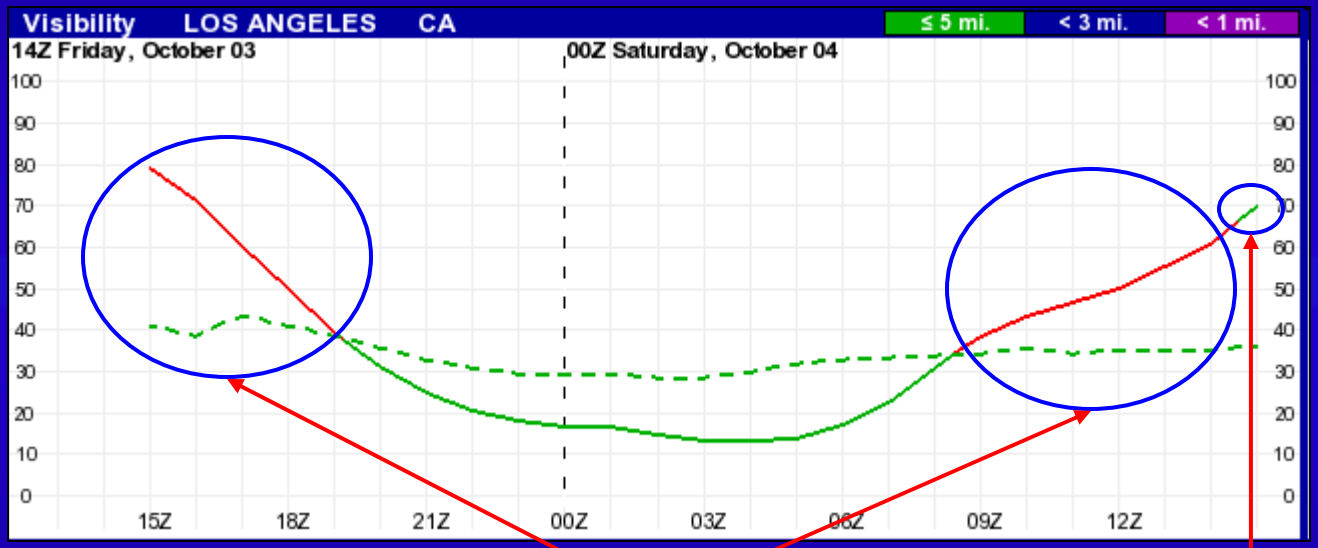
The probability of vis < 3 miles (solid line) exceeds the threshold (dashed line) only for the last hour; therefore this condition is indicated for only that hour. Look to next rarest category to determine the conditions for other hours.

LAMP Probabilities and Thresholds for Flight Categories

Threshold Plot Tab

Look at next rarest of these categories.





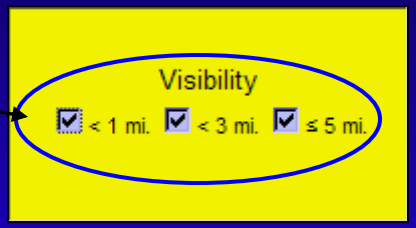
The probability of vis ≤ 5 miles (solid line) DOES exceed the threshold (dashed line) at times; therefore this condition is indicated for those times.

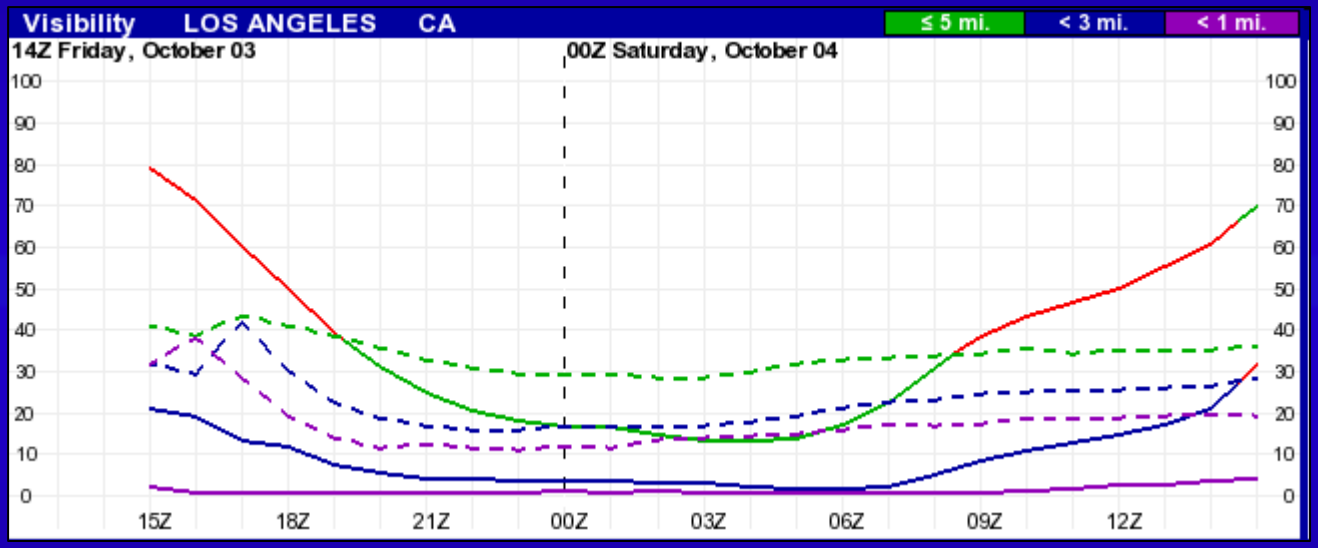
Note that vis ≤ 5 is not chosen for the last hour, because a rarer condition (vis < 3 miles) was already indicated.

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:

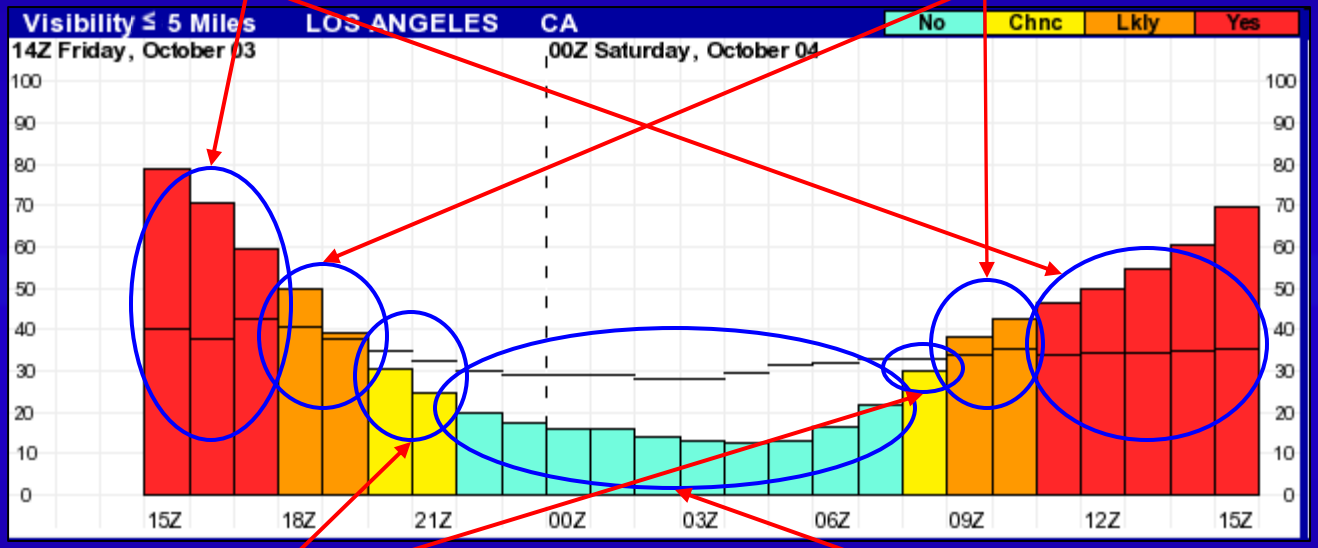
- Color coded graphic indicates the confidence in choosing a category by indicating how close the probability was to the threshold.
- One would have more confidence in a chosen category if the probability exceeded the threshold by a large amount, compared to the probability just barely exceeding the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

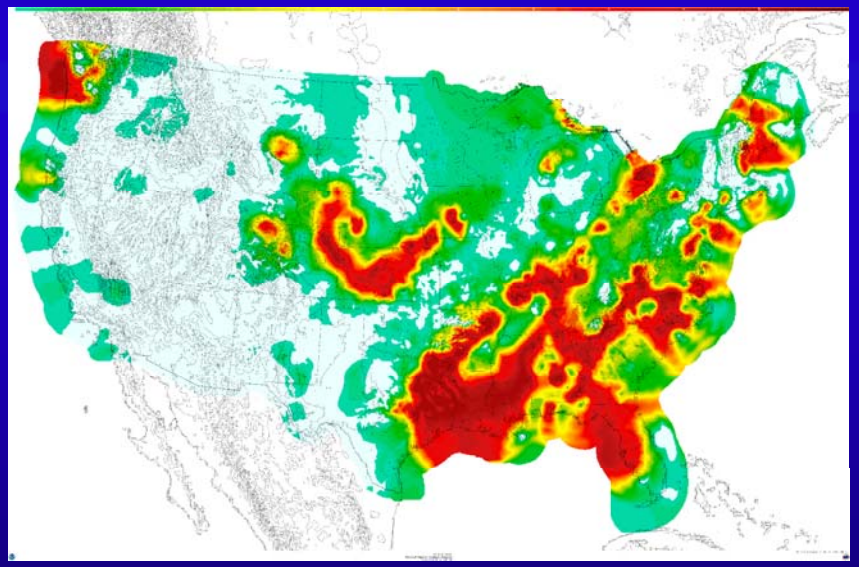
Cyan = No
Probability is less

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