Aviation Products from the Localized Aviation MOS Program (LAMP)

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Meteorological Development Laboratory

Presented at

New England Aviation Workshop

Gray, ME

May 12, 2009

Outline

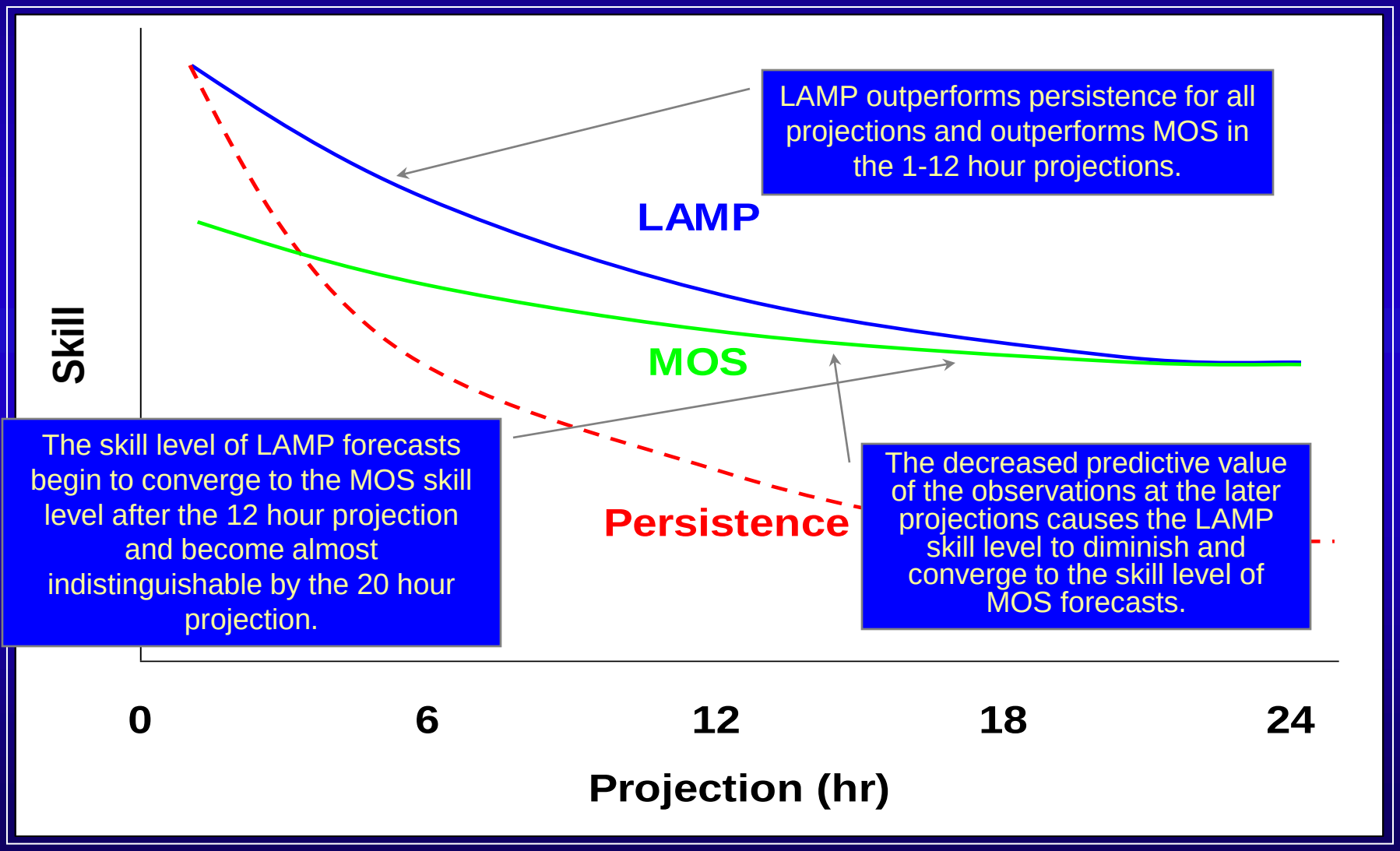
- LAMP Overview
- Brief LAMP Verification
- Current Status and Products
- Example of LAMP Application
- Future Plans

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

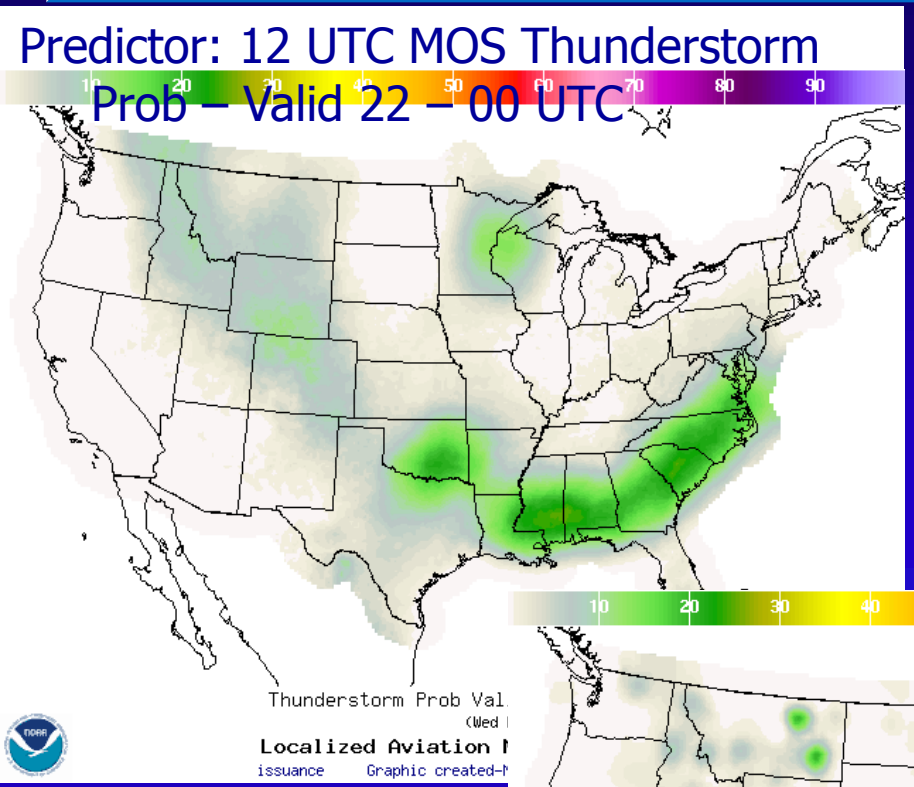
- As of November 13, 2008, LAMP is running 24 times a day (every hour) in NWS operations

- 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

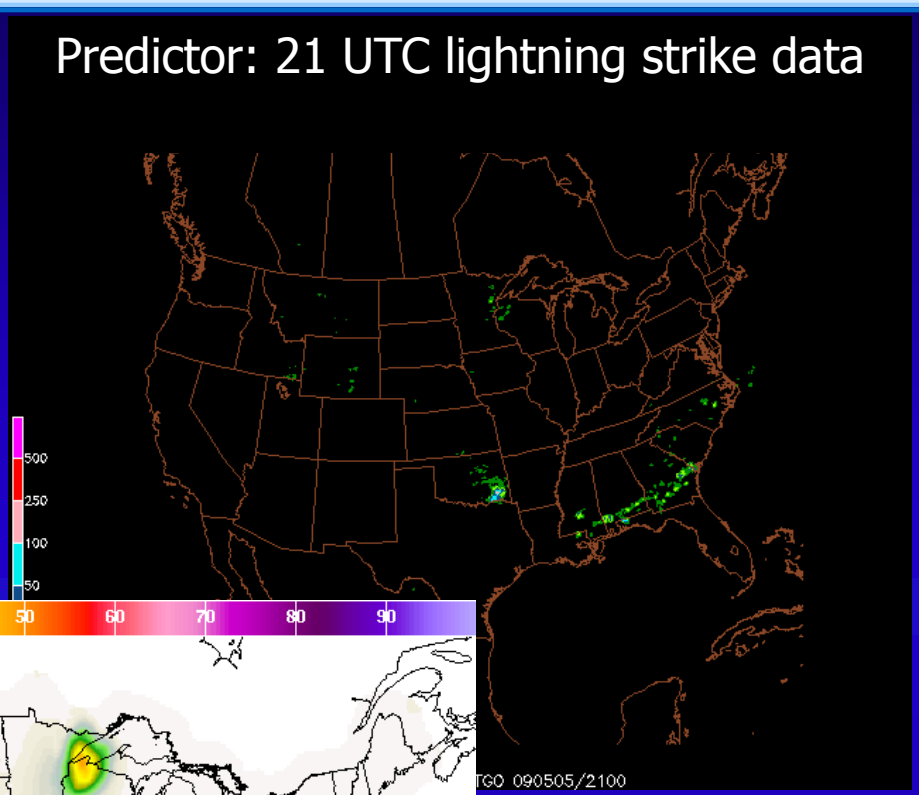
Example of blending Observations and MOS

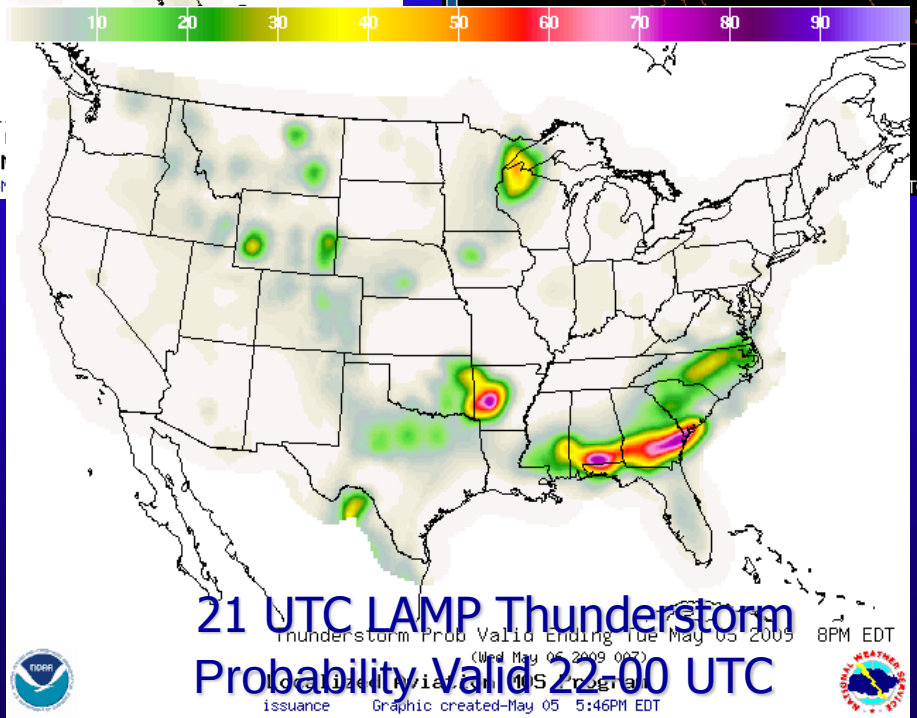
1-3 hr LAMP Thunderstorm forecast

Predictor: 12 UTC MOS Thunderstorm Prob – Valid 22 – 00 UTC



Predictor: 21 UTC lightning strike data

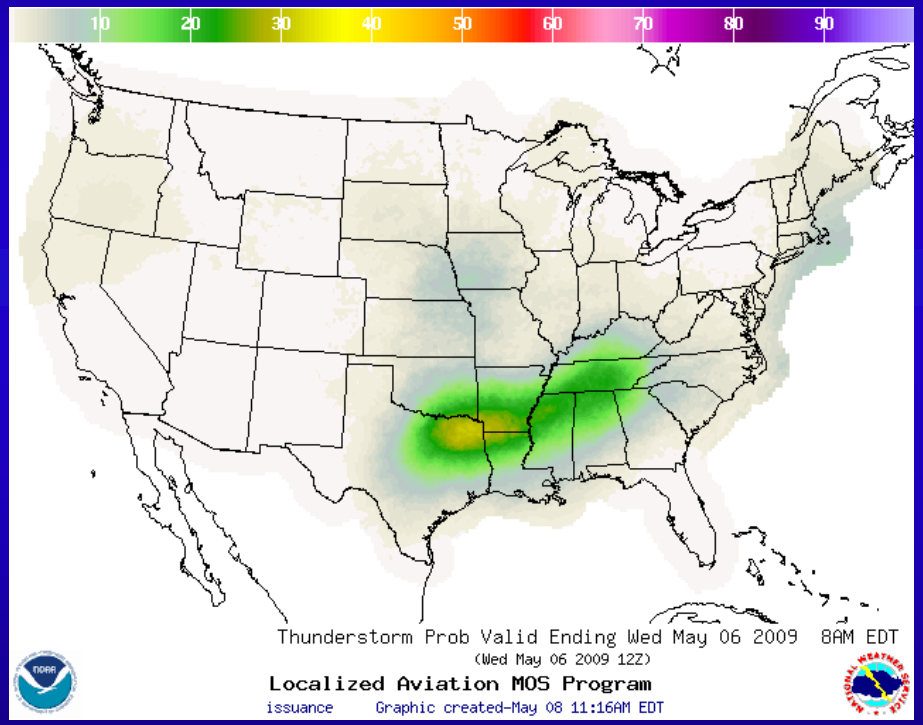




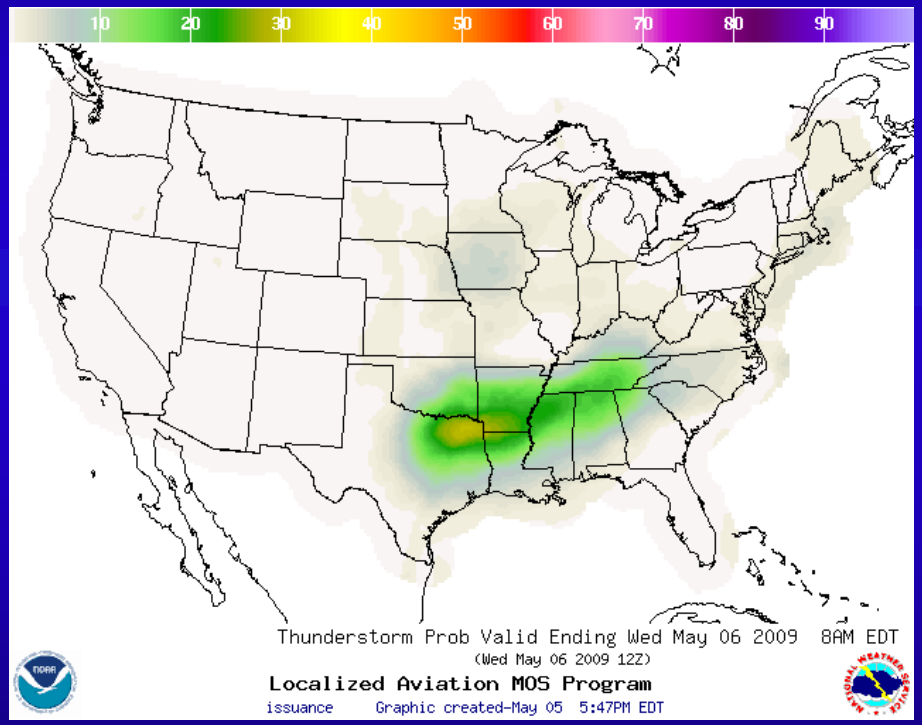
21 UTC LAMP Thunderstorm Probability Valid 22-00 UTC

13-15 hr LAMP Thunderstorm forecast

12 UTC MOS Thunderstorm Probability – Valid 10 – 12 UTC (next day)

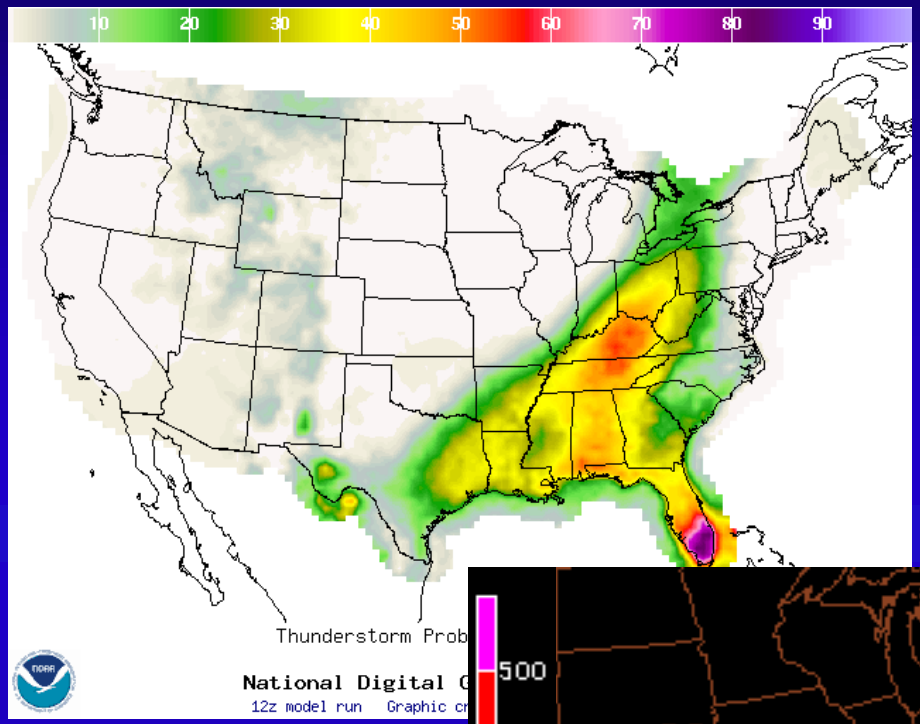


21 UTC LAMP Thunderstorm Probability – Valid 10 – 12 UTC (next day)

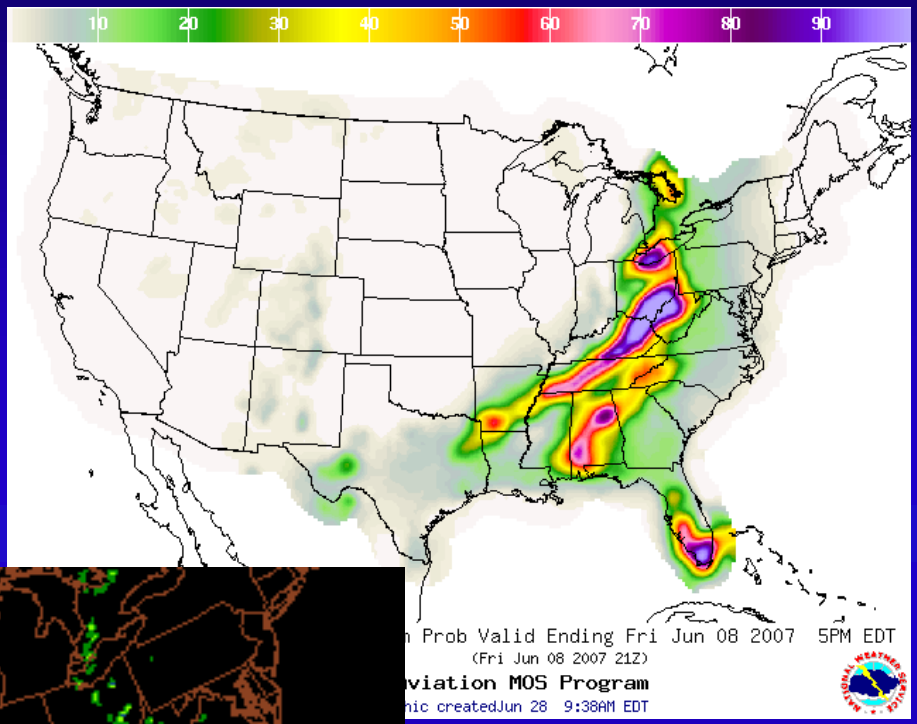


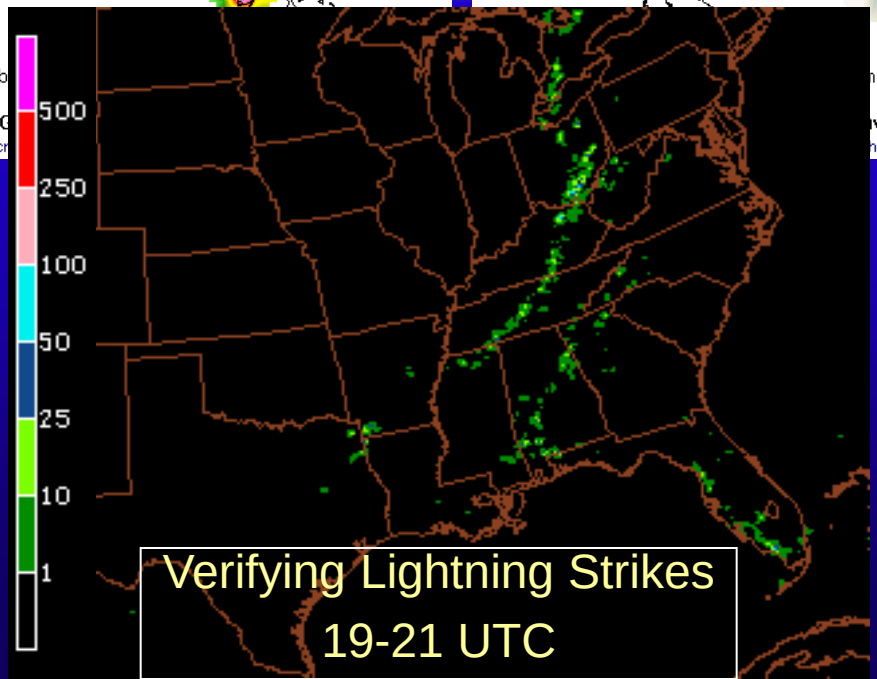
June 8, 2007

12 UTC GMOS - Valid 18-21 UTC



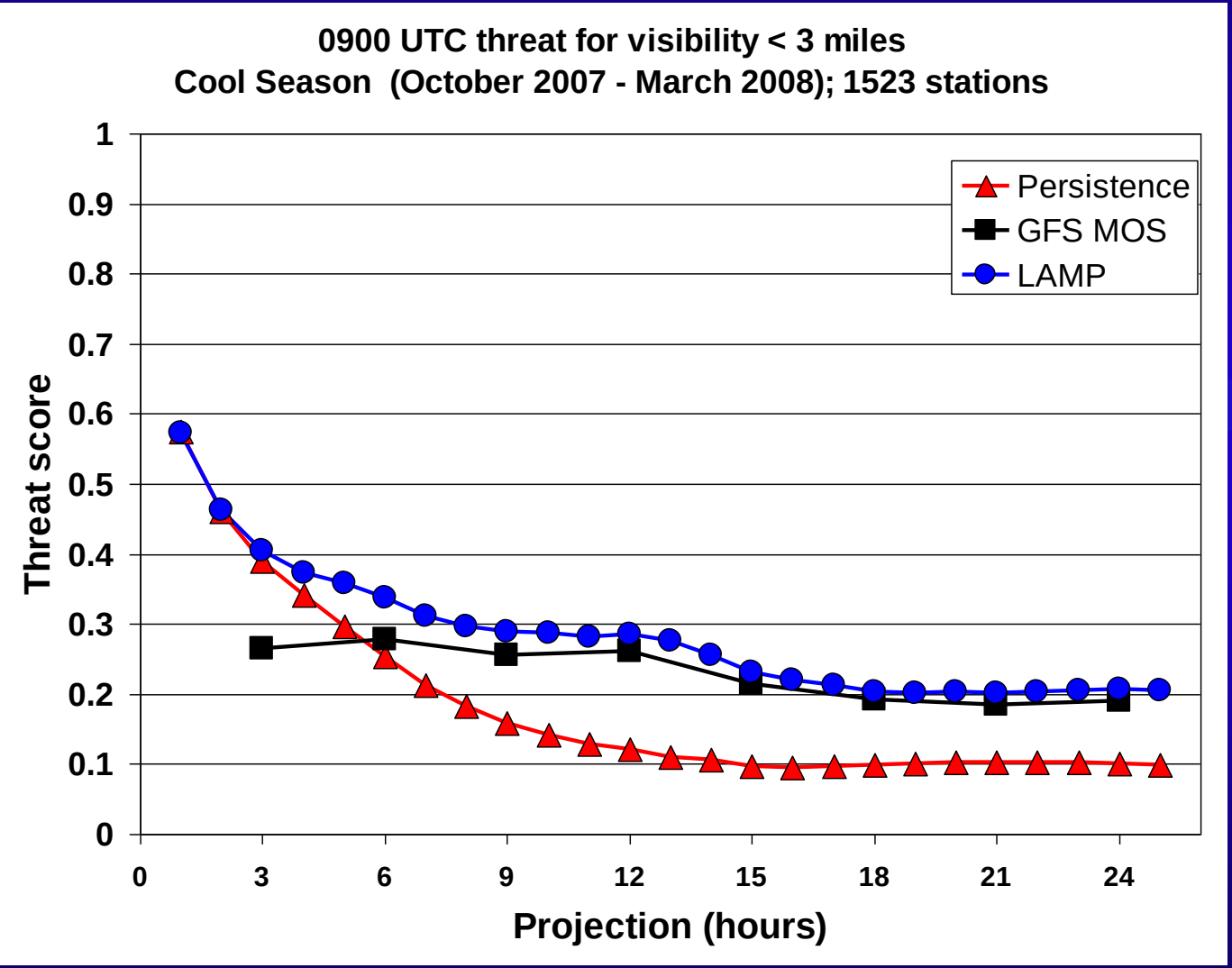
18 UTC LAMP - Valid 19-21 UTC





Brief LAMP Verification

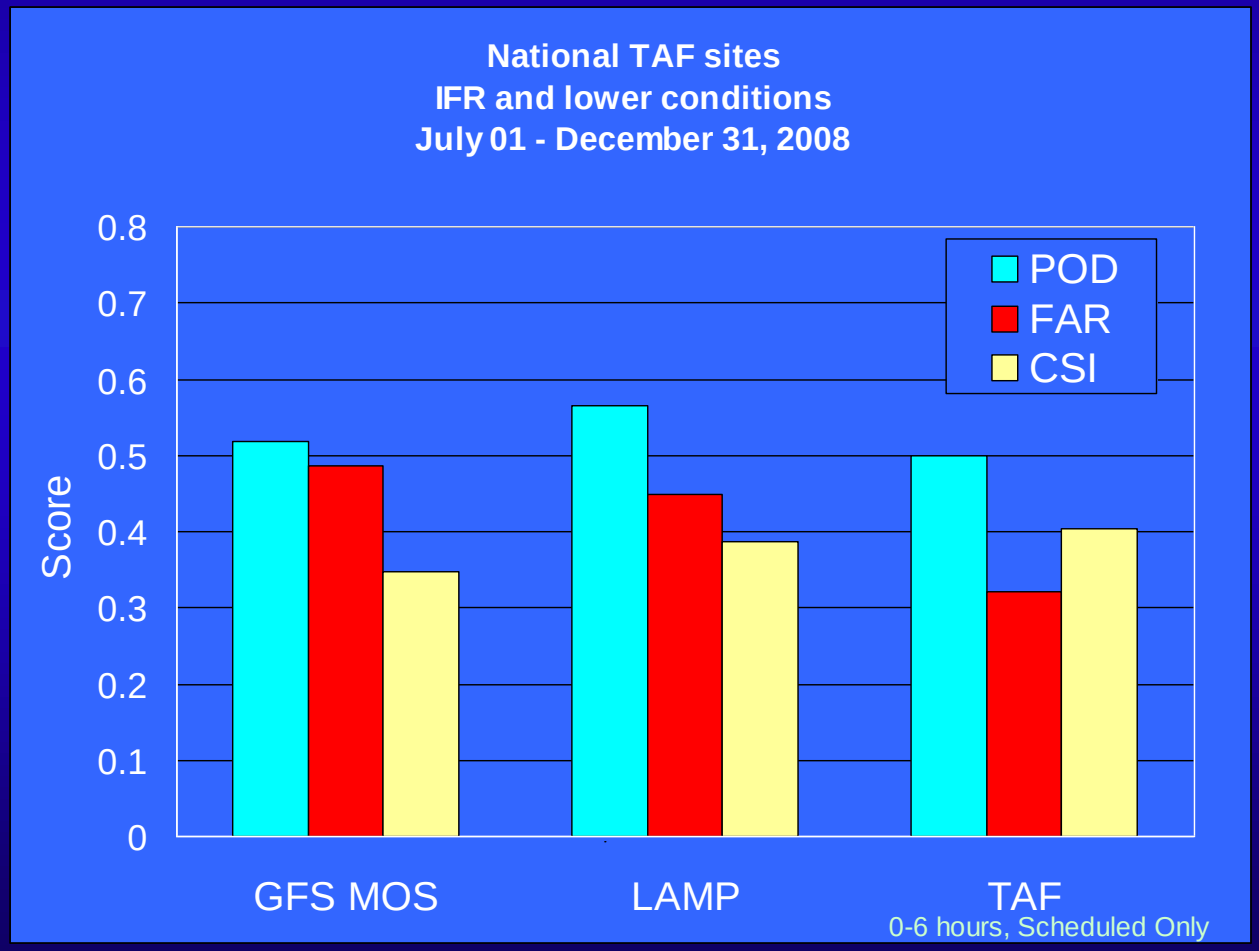
0900 UTC LAMP compared to MOS
Categorical Visibility < 3 miles



0900 UTC LAMP verified against 0000 UTC GFS MOS

Current Results

LAMP in Stats on Demand:



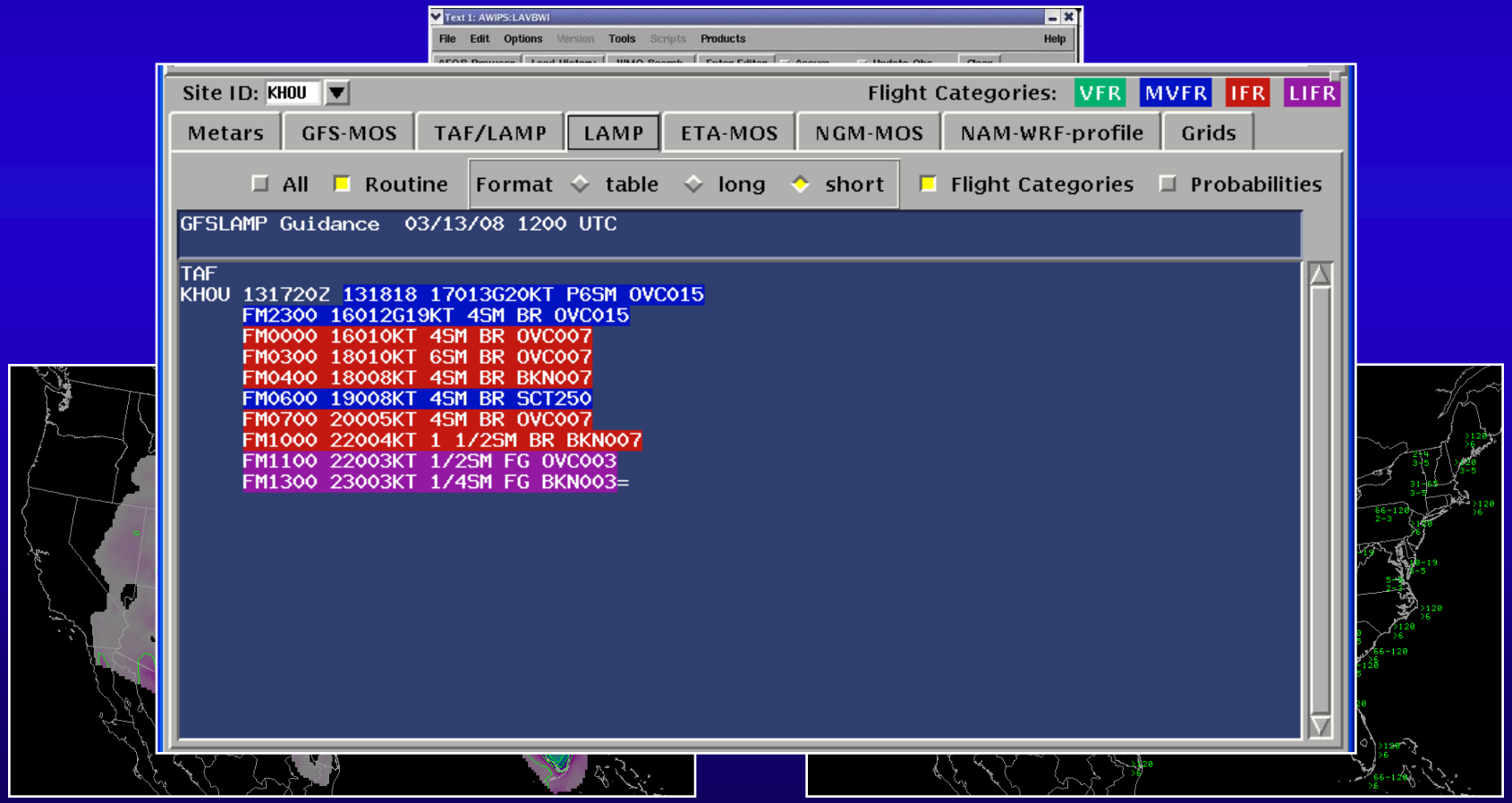
Current Status and Products

Current Status and Products

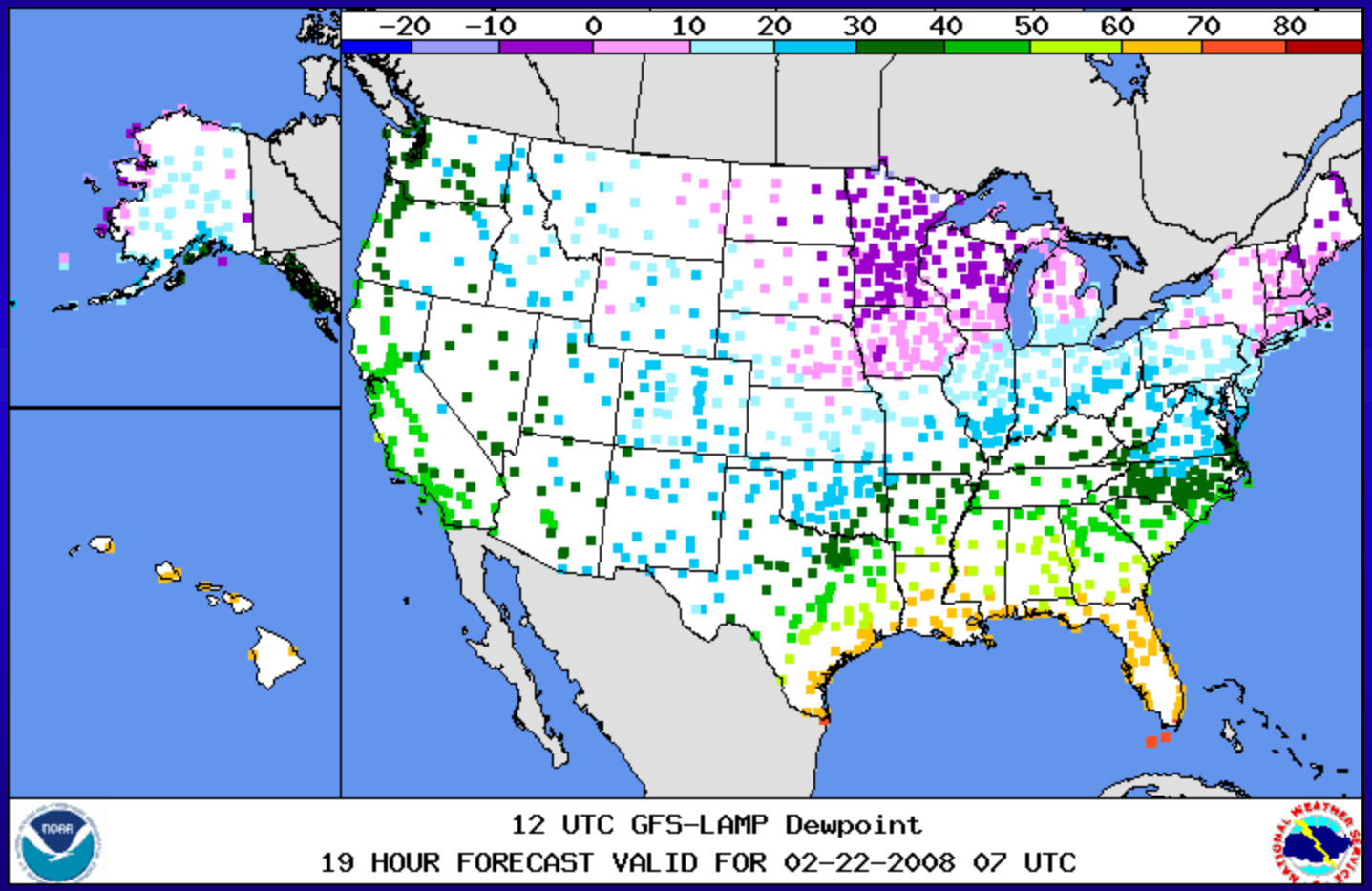
- Guidance sent out from NCEP on SBN/NOAAPort and NWS FTP Server
  - ASCII text bulletin
  - BUFR data
  - GRIB2 thunderstorm data
- Available Products:
  - Guidance viewable in AWIPS D2D and AvnFPS
  - Website products:
    - Text bulletins
    - Station plots
    - Meteograms
    - Probability/Threshold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

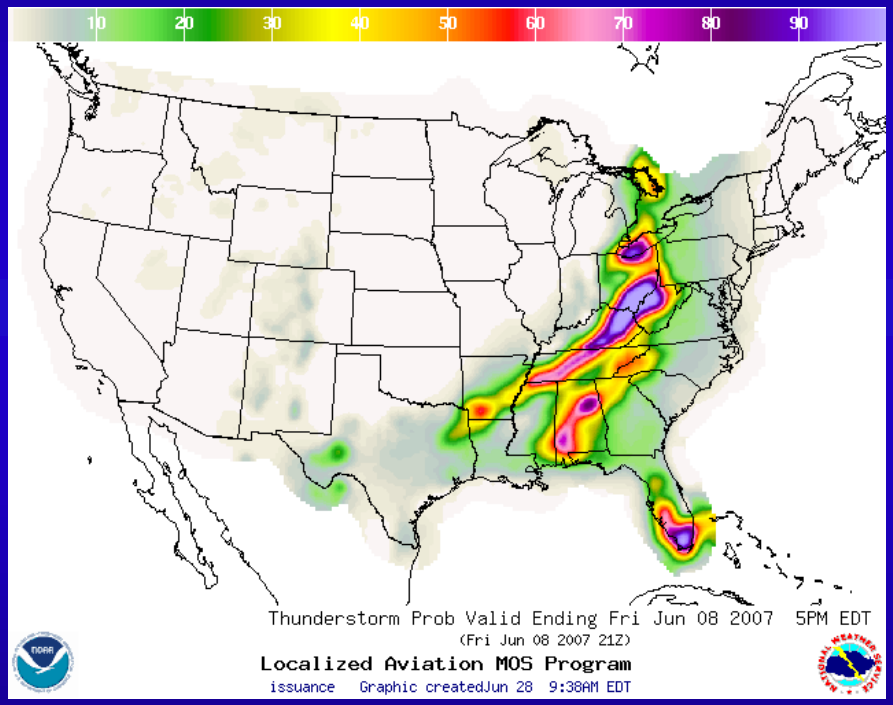
Click an element name on this slide to see its plot

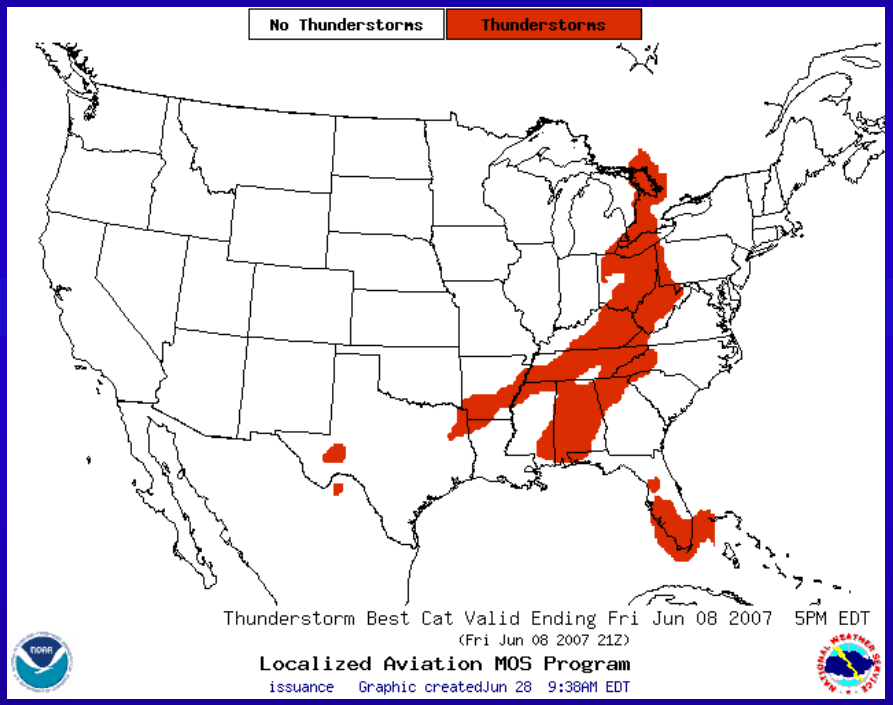
Website: LAMP Station Meteograms

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



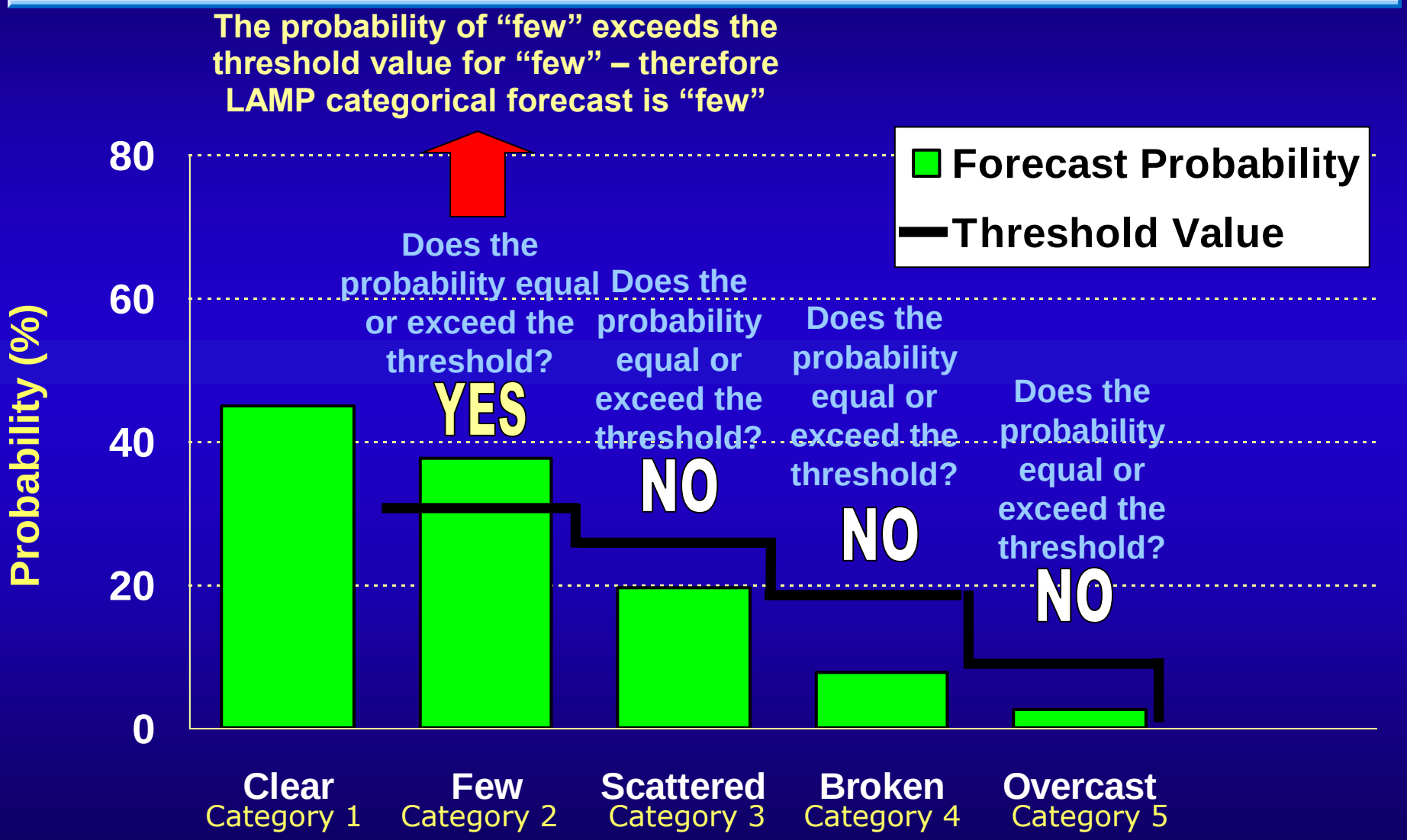


New website graphics

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
- 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.
- Graphics for stations:
  - Line plots show probabilities and thresholds by element
  - Color coded bar charts indicate the confidence in choosing a category by indicating how close the probability was to the threshold
- Aviation probabilities and associated thresholds easily viewable for all LAMP stations and cycles

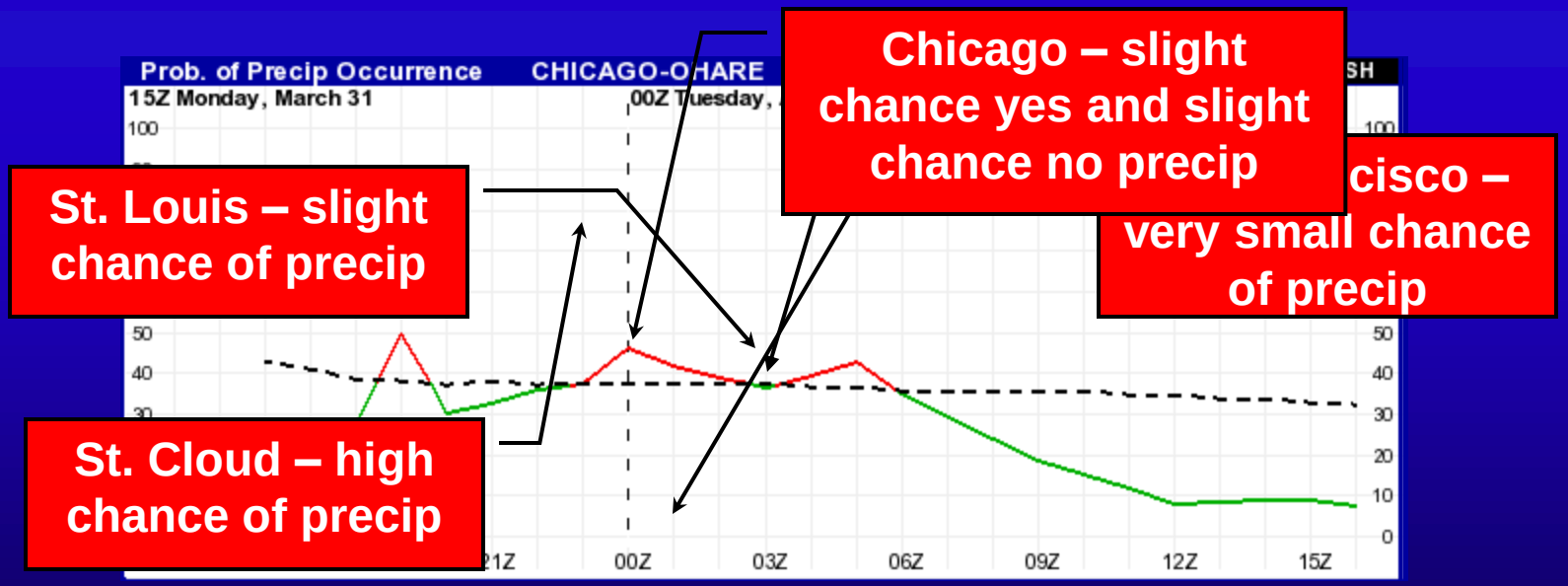
LAMP Categorical Forecast Selection Process



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

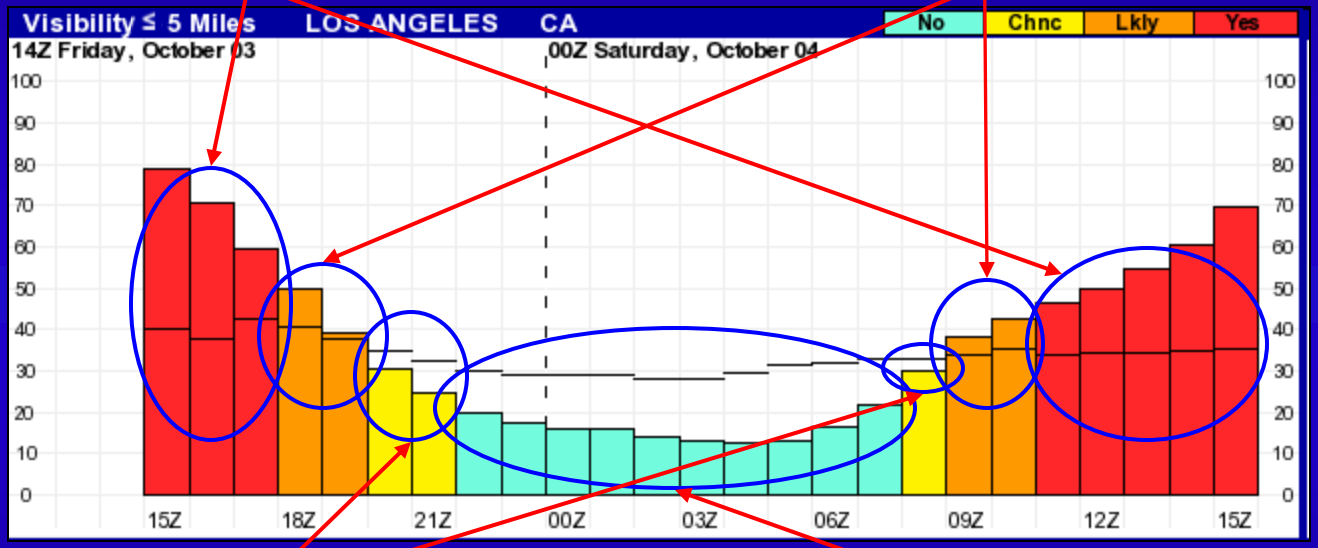


LAMP Probabilities and Thresholds for Flight Categories

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 rarer conditions first.

Example of LAMP Application

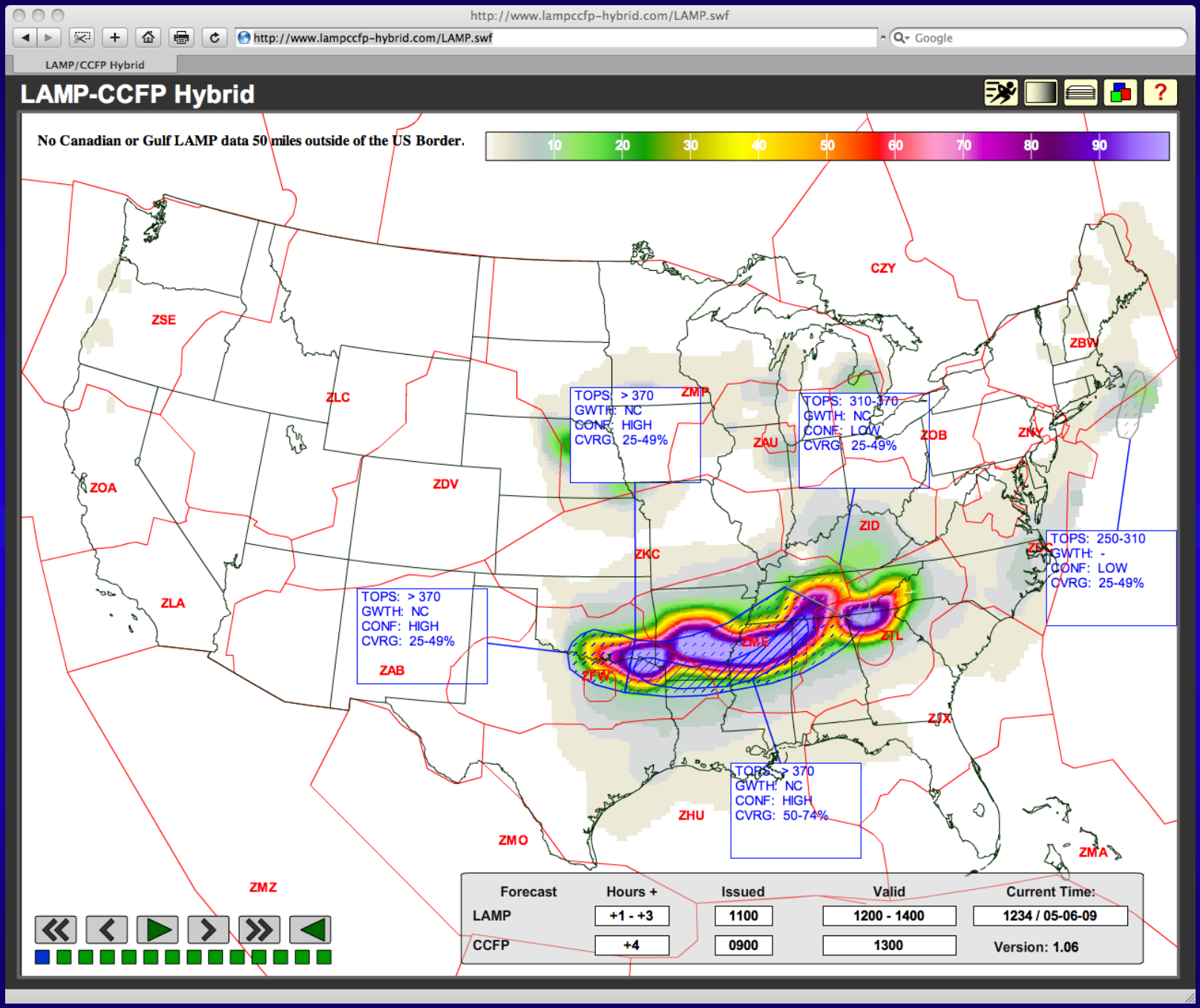
LAMP/CCFP Hybrid

- Customers can access LAMP guidance and develop products from it.
- Example: Customers are retrieving LAMP thunderstorm grids from NDGD and producing a LAMP/CCFP Hybrid thunderstorm product:

  http://www.lampccfp-hybrid.com/LAMP.swf

- **Background (**http://www.avmet.com/LCH/**):**

"The Collaborative Decision Making (CDM) stakeholders chartered the Weather Evaluation Team (WET) to evaluate and recommend an 8-24 hour convective forecast product to be used for operational planning. For the 2009 convective season, the WET proposed to evaluate the use of LAMP as a complement to the CCFP for convective forecasting. The LAMP-CCFP Hybrid webpage is the outcome of this proposal and is currently a prototype product."


http://www.lampccfp-hybrid.com/LAMP.swf
LAMP/CCFP Hybrid
LAMP-CCFP Hybrid
No Canadian or Gulf LAMP data 50 miles outside of the US Border.
10 20 30 40 50 60 70 80 90
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GWTH: NC
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GWTH: NC
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CVRG: 25-49%
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TOPS: > 370
GWTH: NC
CONF: HIGH
CVRG: 50-74%
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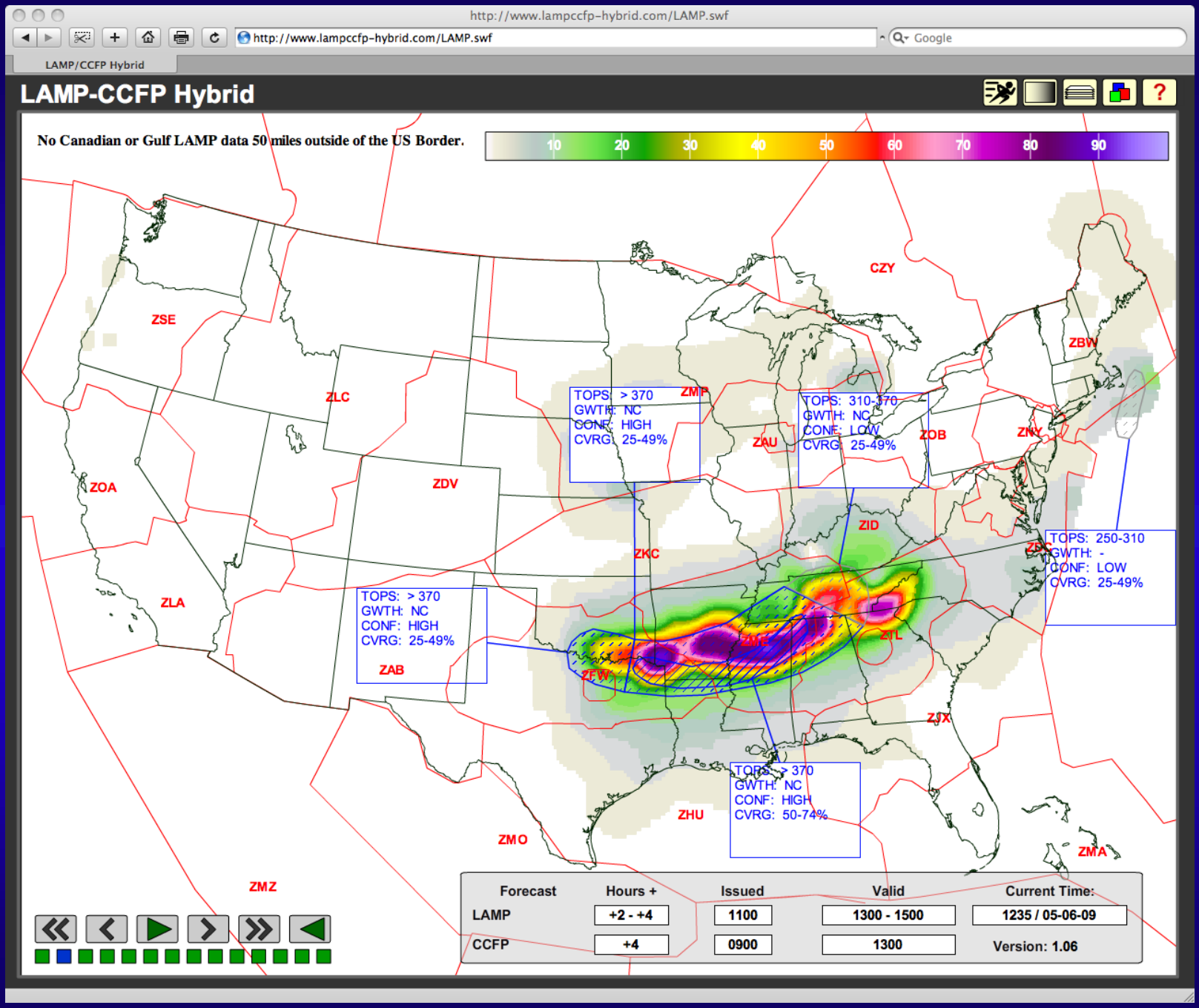
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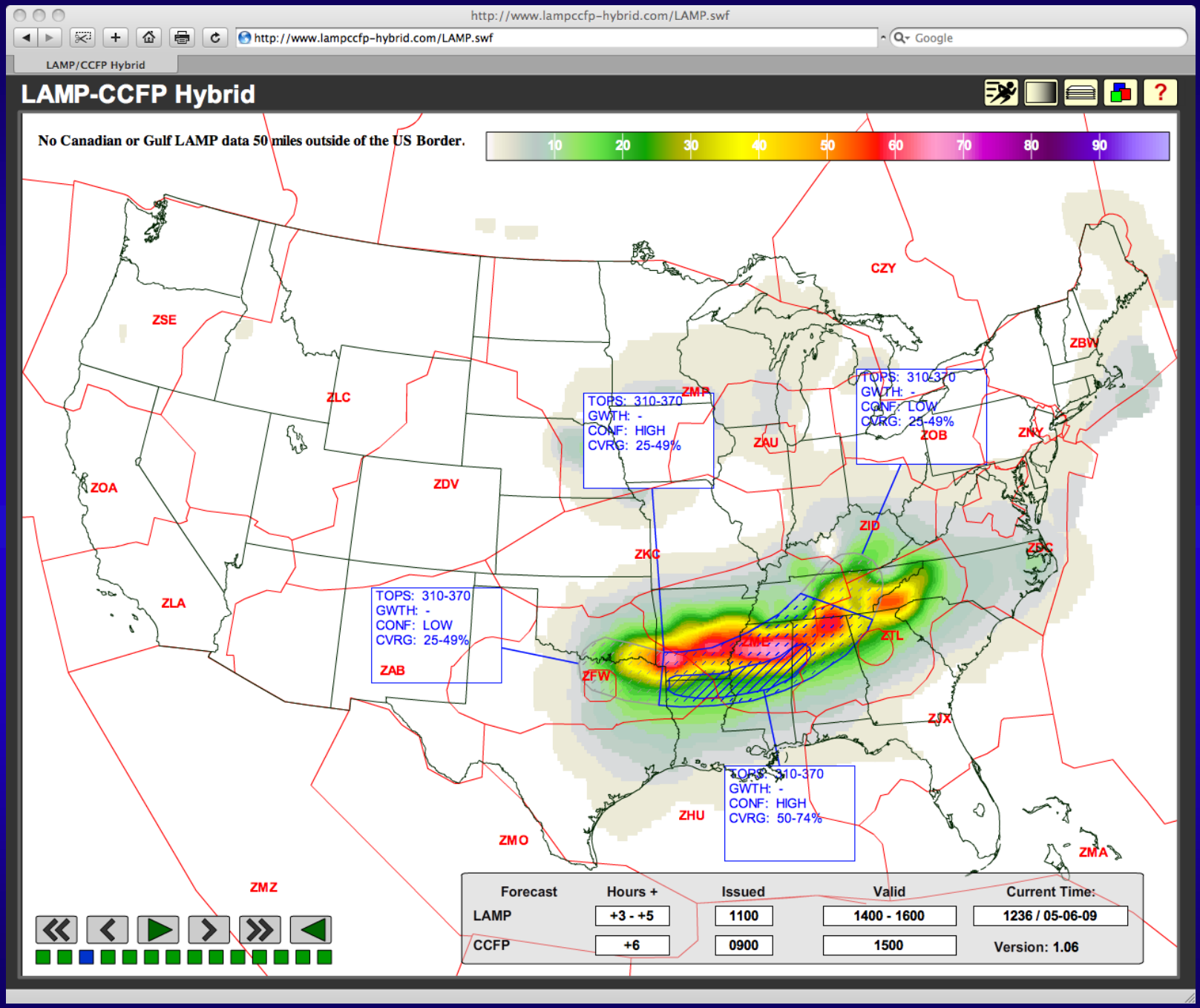
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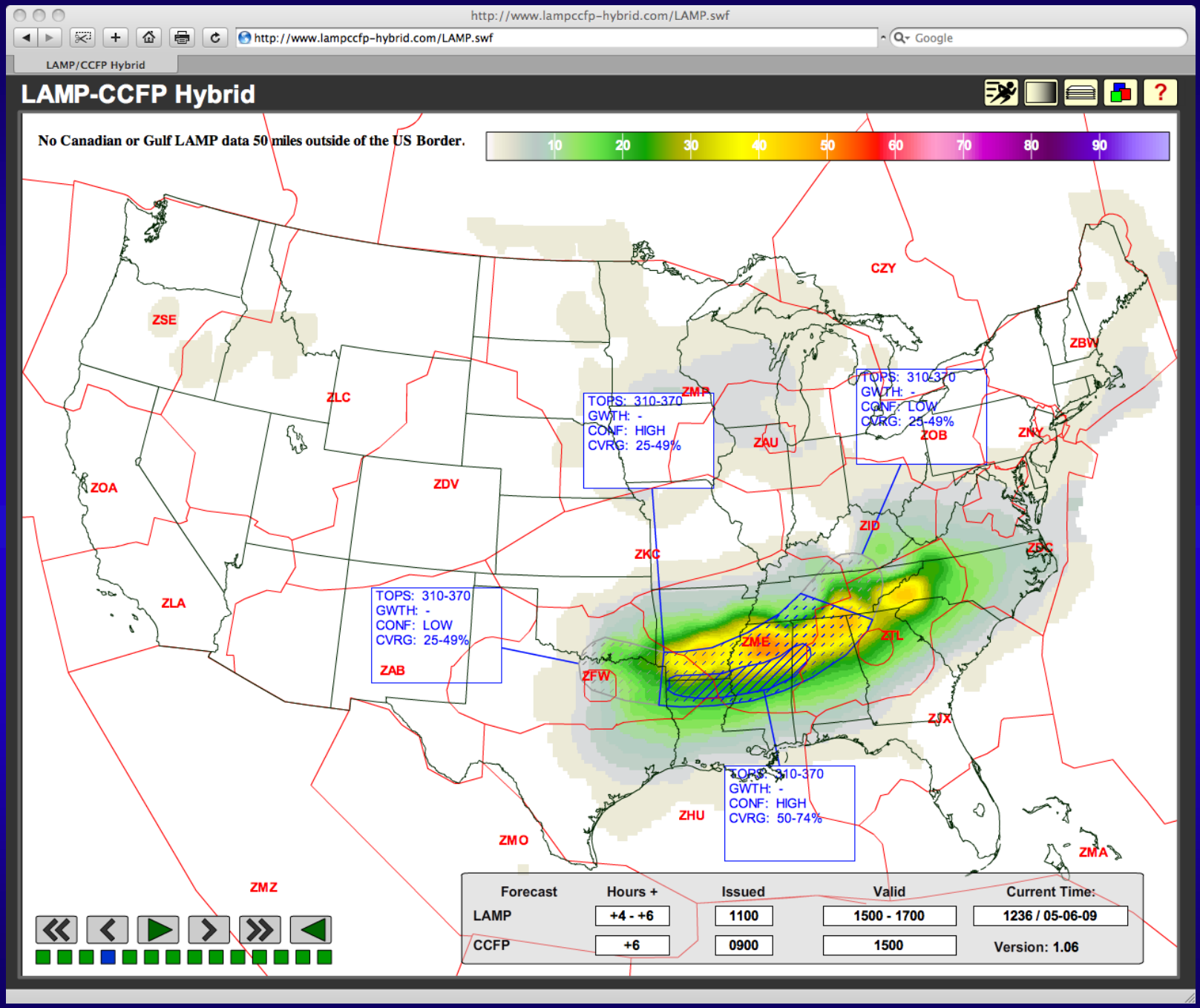
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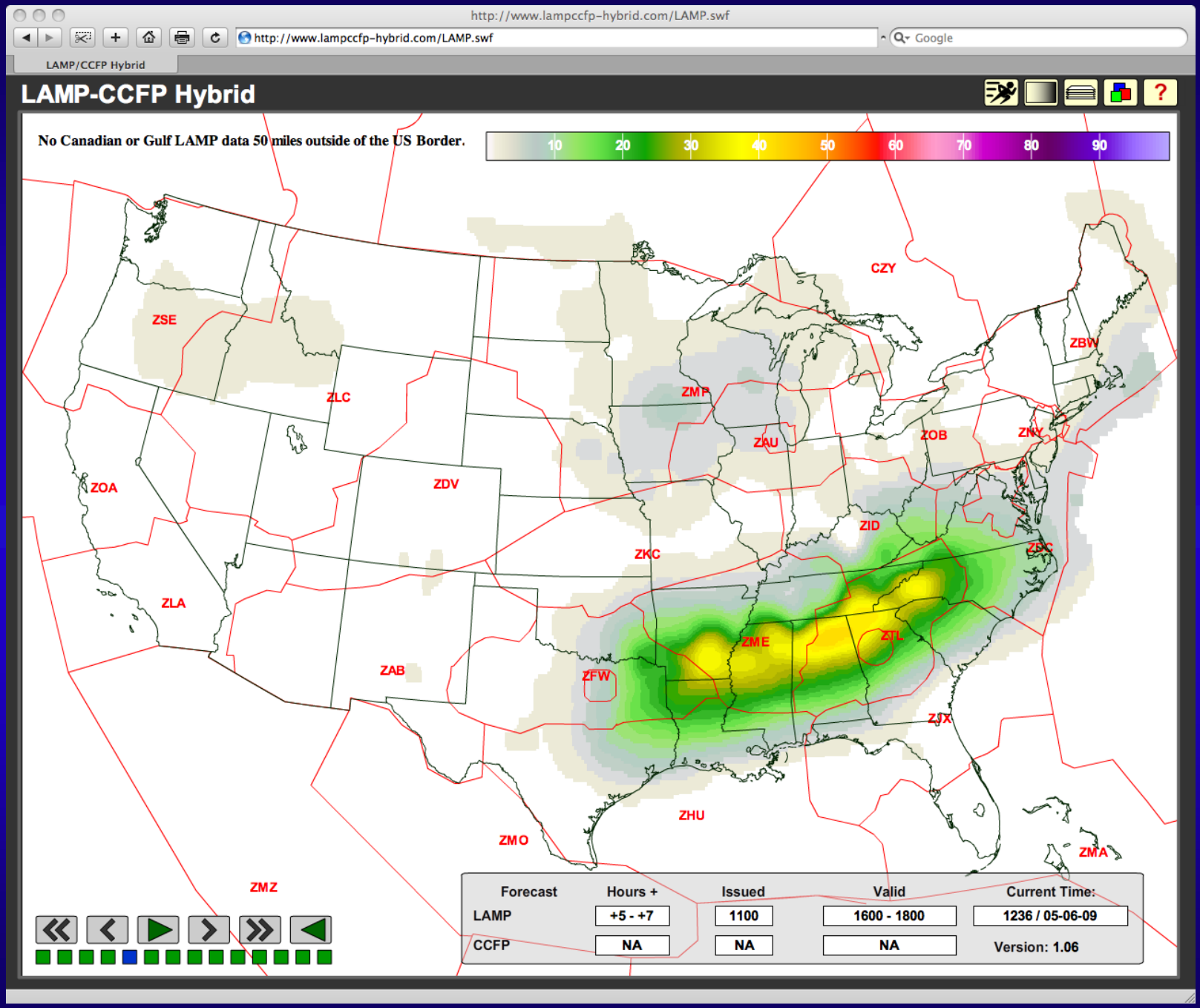
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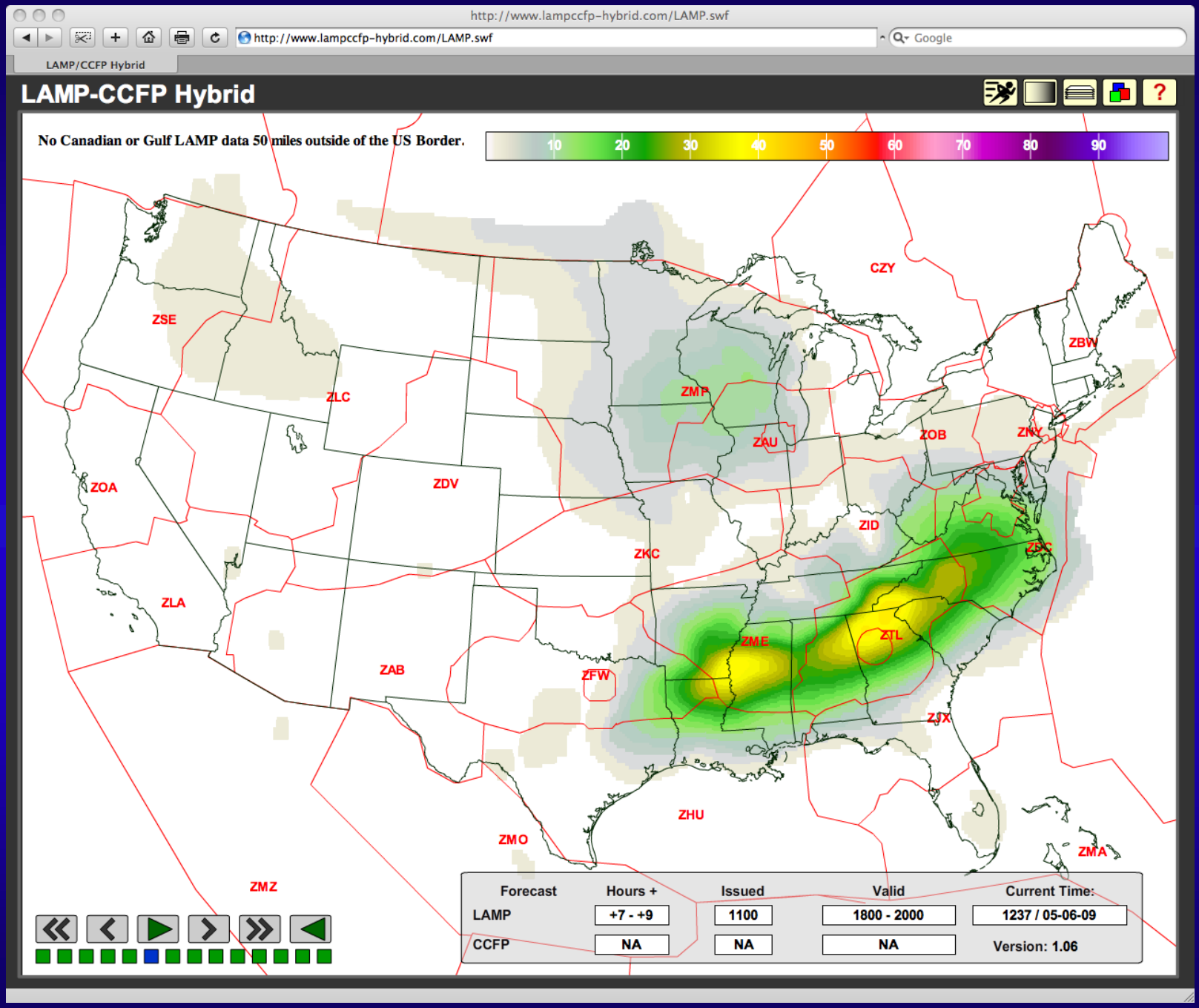
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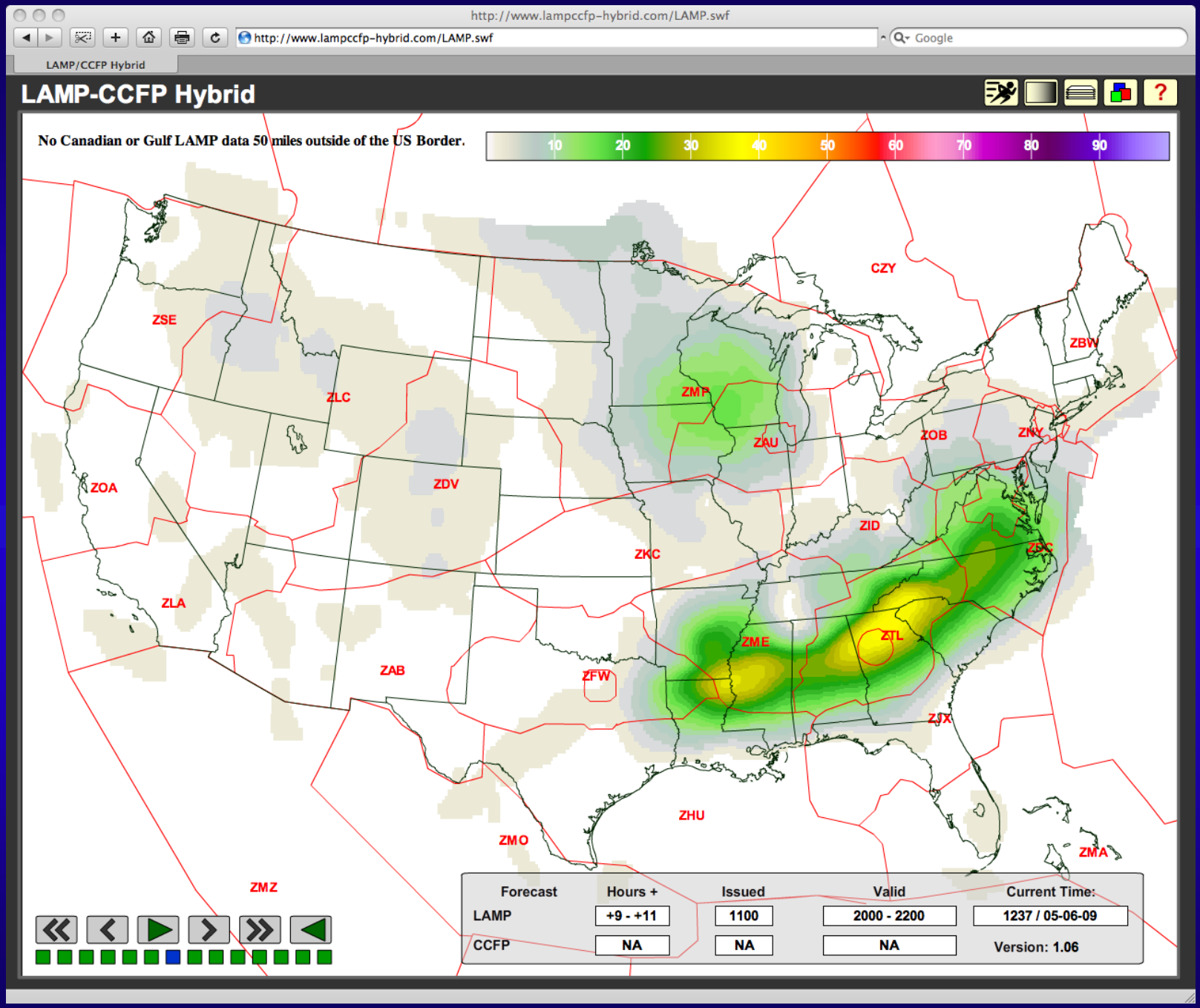
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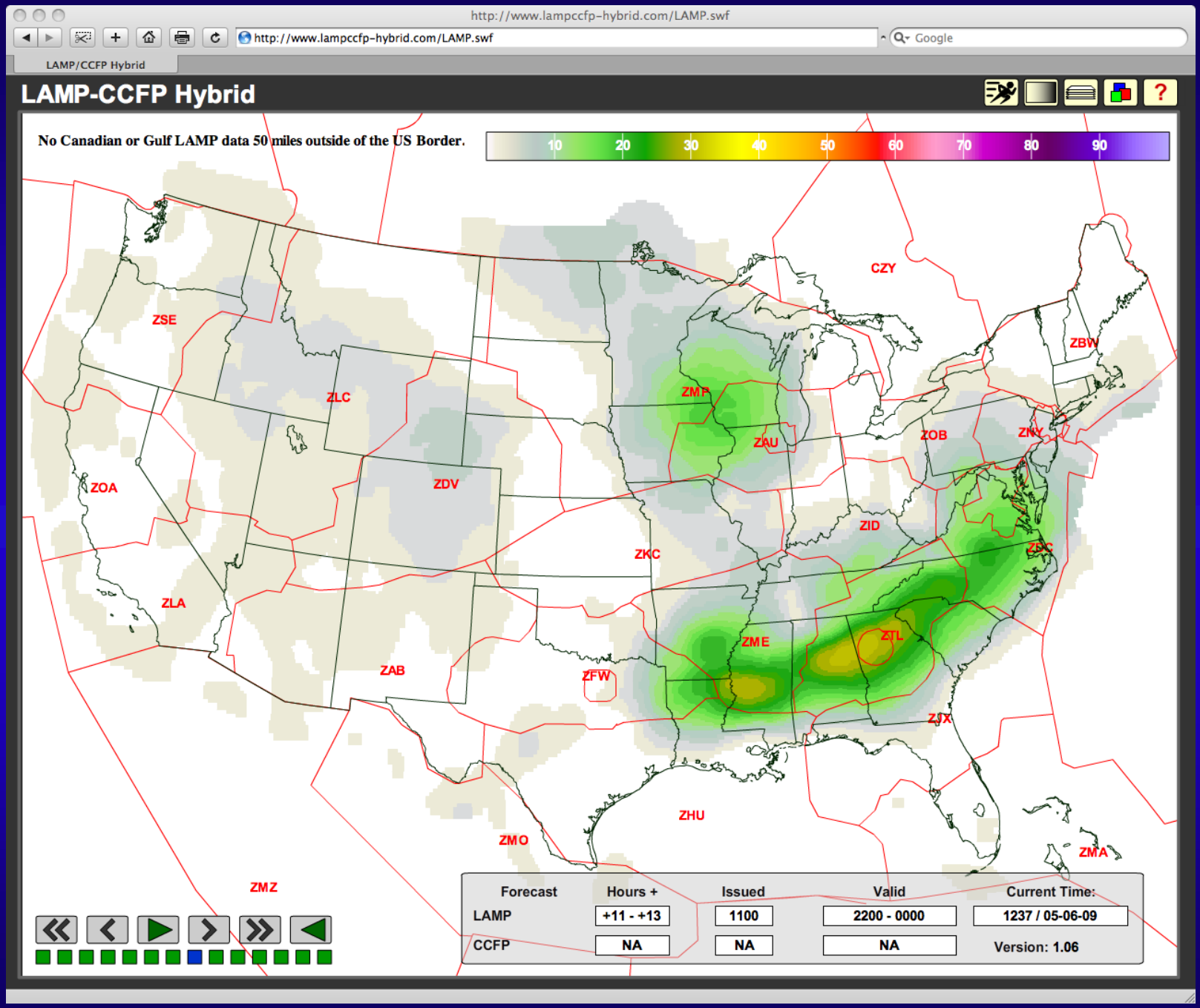
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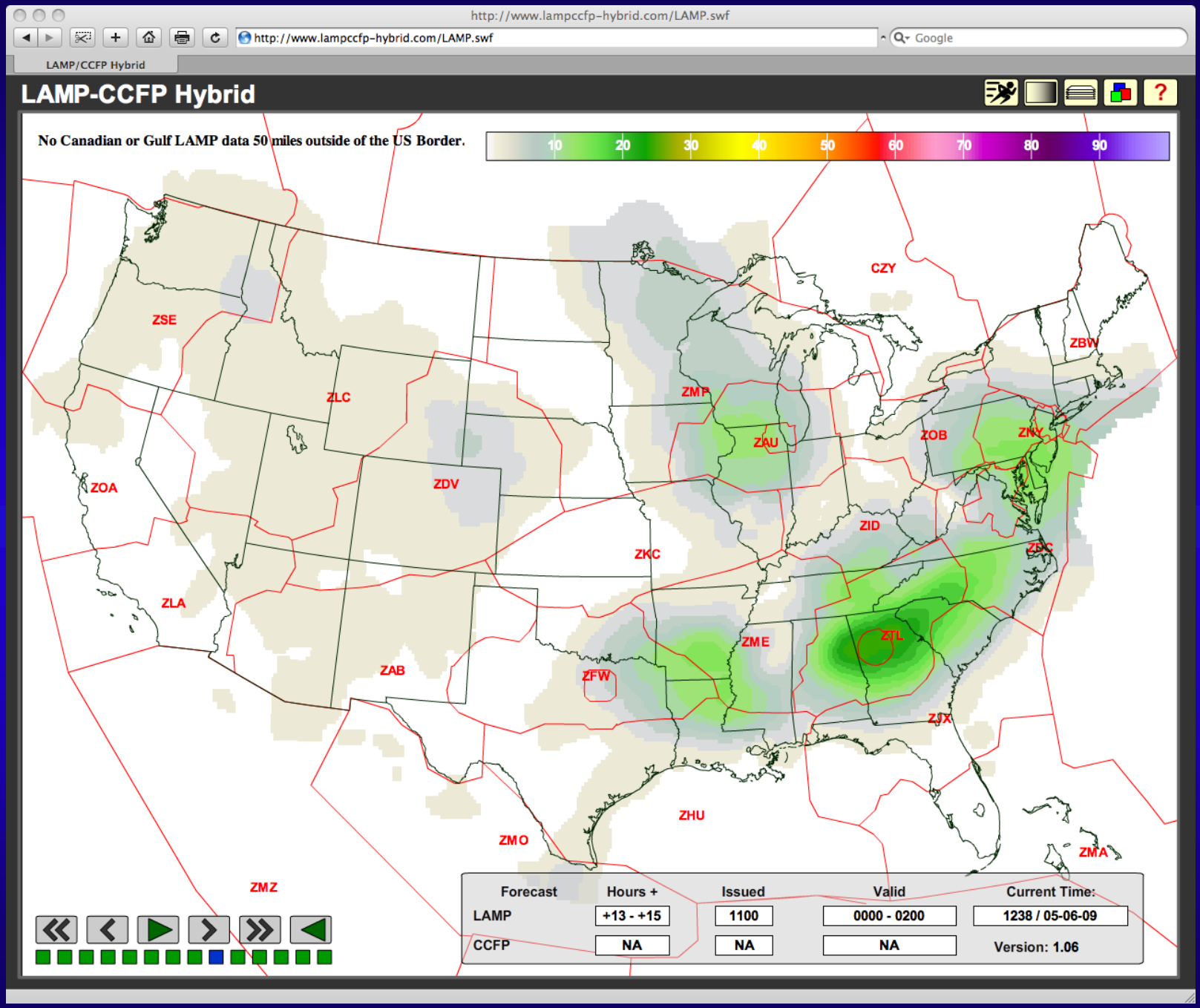
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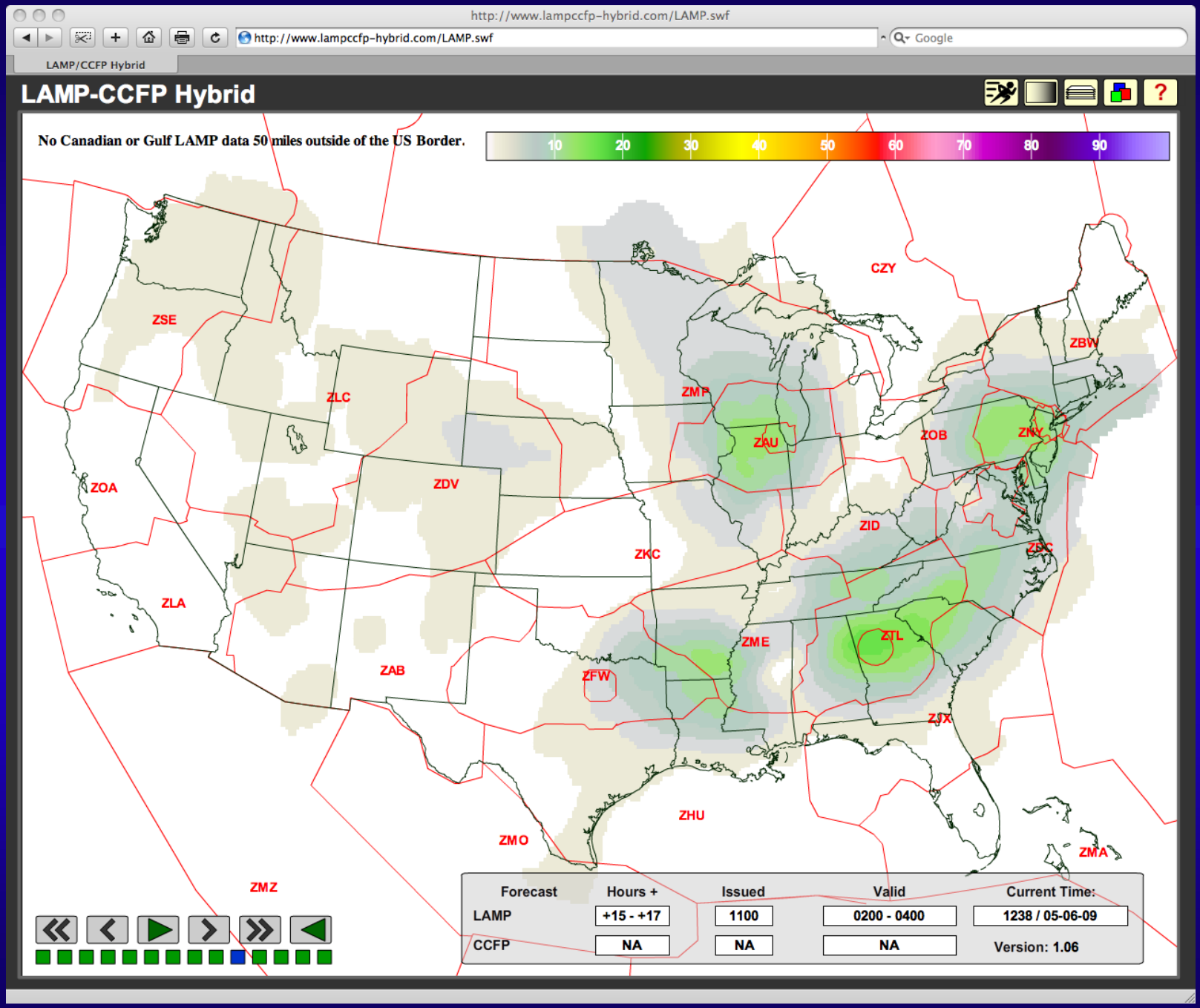
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No Canadian or Gulf LAMP data 50 miles outside of the US Border.
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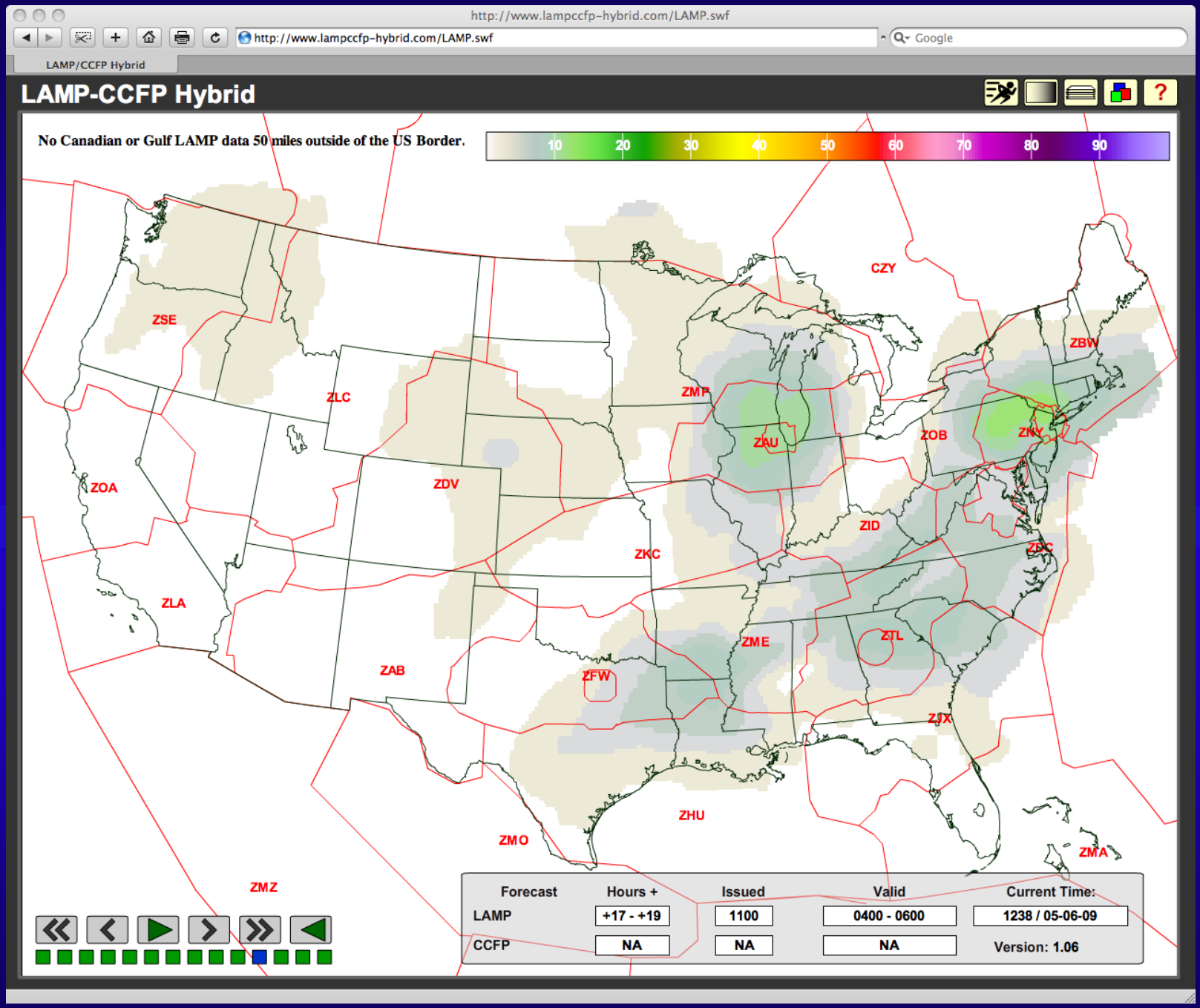
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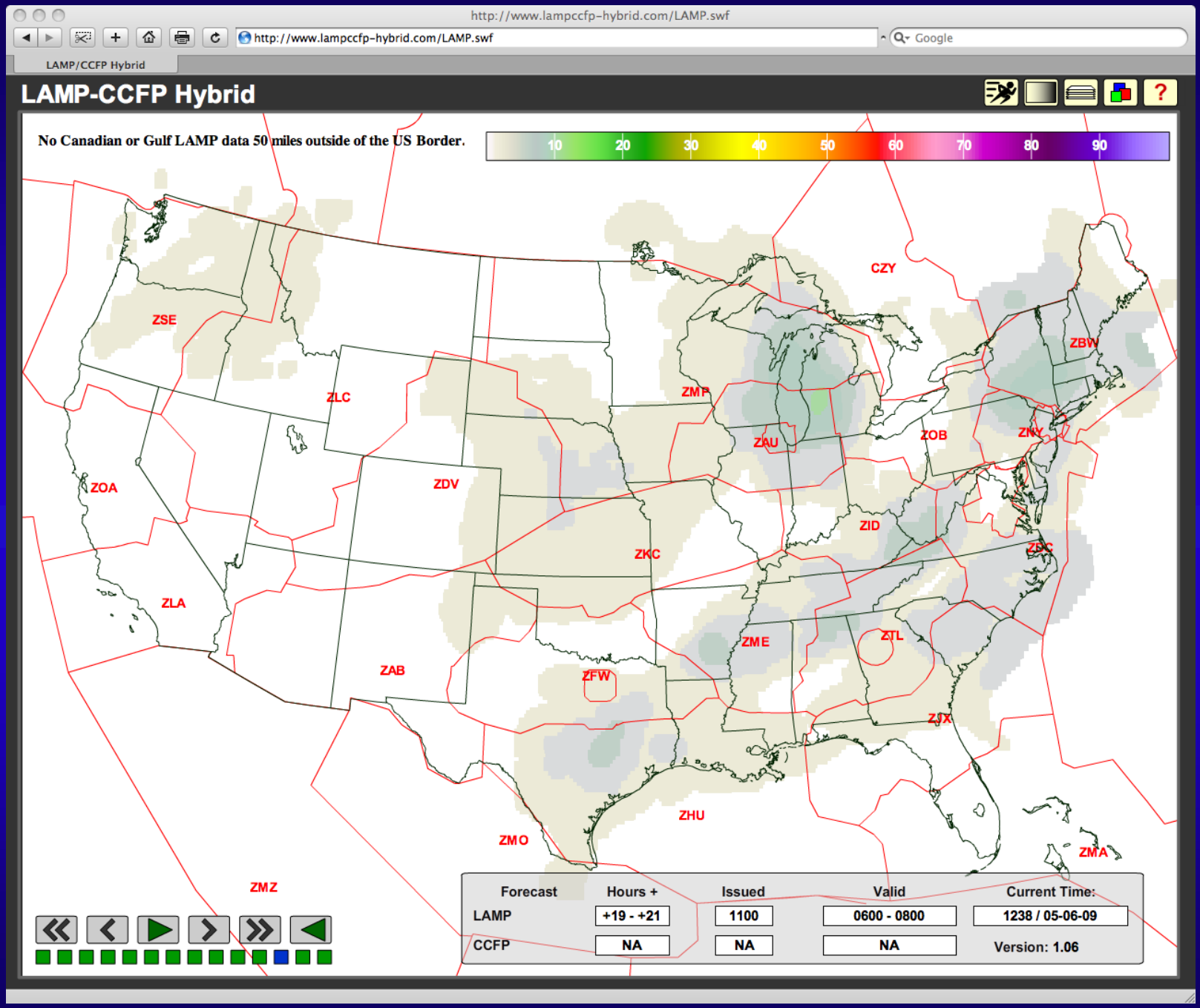
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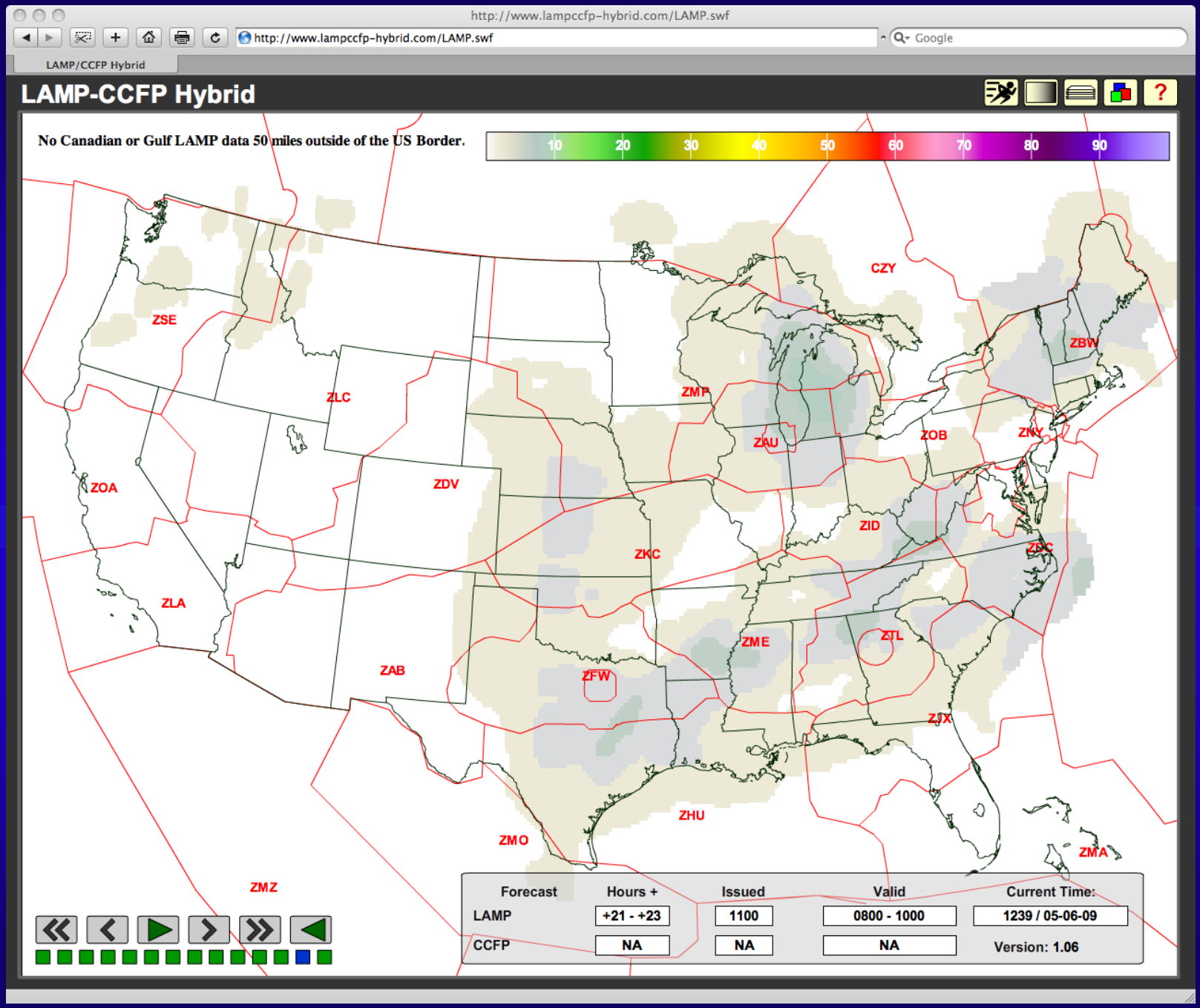
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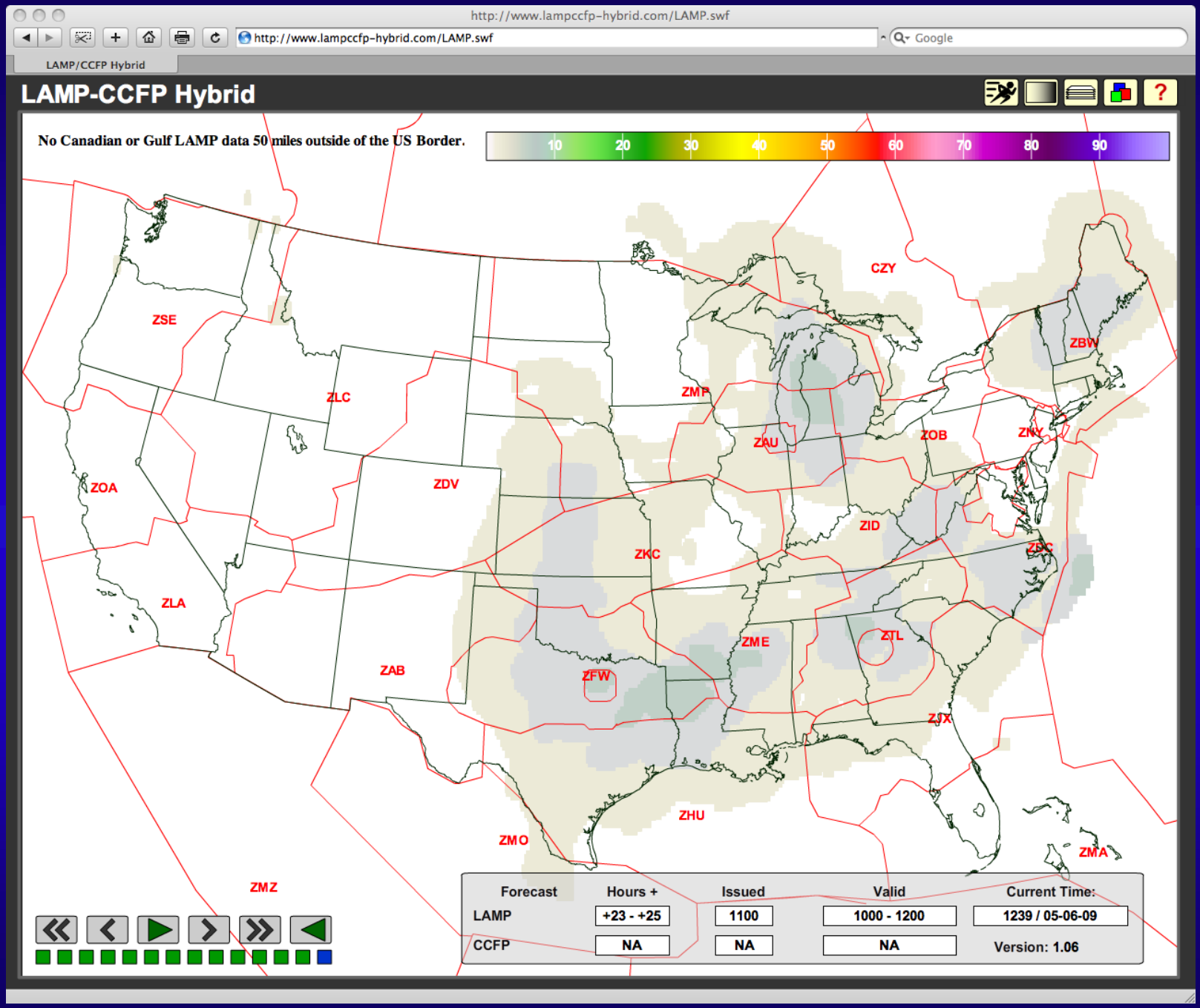
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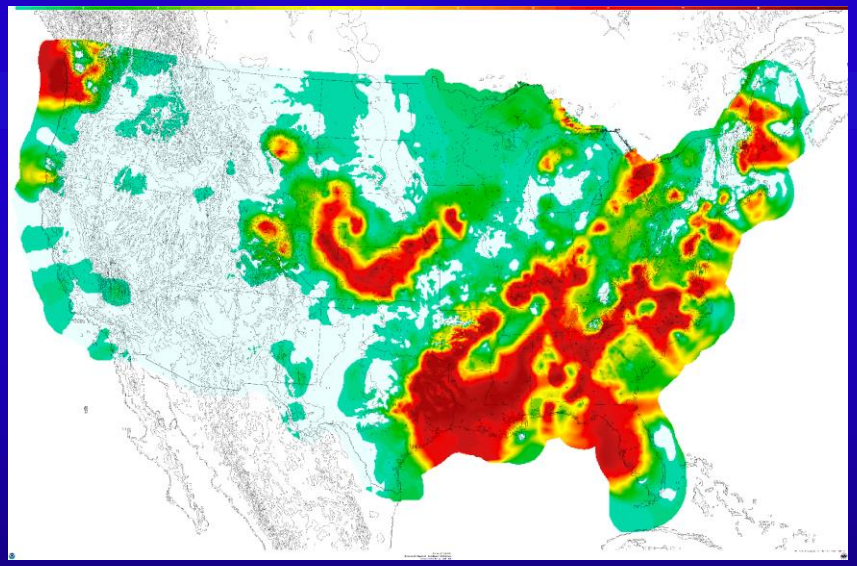
Version: 1.06

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