Introduction to NCEP's time lagged North American Rapid Refresh Ensemble Forecast System (NARRE-TL)

Binbin Zhou[1,2], Jun Du[2], Geoff Manikin[2]

& Geoff DiMego[2]

1. I.M. System Group
2. EMC/NCEP/NWS/NOAA

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Background

RR will be implemented at NCEP in fall of 2011 to replace RUC

RR: same purpose for aviation, same hourly cycles, same 18 forecast hours, and same resolution as RUC (13km), but with more advanced WRF-ARW model and GSI analysis system, covers larger N.A. domains plus Alaska

NCEP and GSD agreement: 3 WRF-ARW and 3 WRF-NMMB members will be combined to generate N.A. RR Ensemble (6 member NARRE)

Before 6-membered NARRE emerging, first build a Time-lagged NARRE system based on current RR and operational NAM. Benefits:

(1) Fully utilize existing hourly output RR data
(2) Replace VSREF to provide probabilistic guidance to aviation weather
(3) Very low computing resource demand (just post processing)
(4) Provide a baseline to future NARRE/HRRRE development/evaluation

Configuration

10 weighted time-lagged members collected:

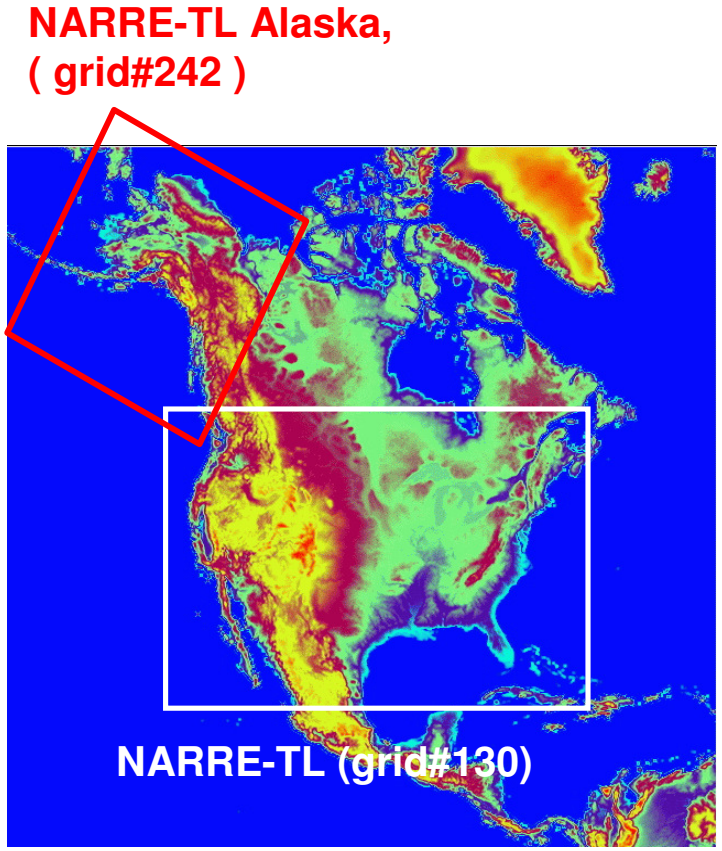
- **6 NCEP's parallel RR members**
  (9 months parallel RR: March ~ Nov 2011)
- **4 operational NAM members**

Output grids:

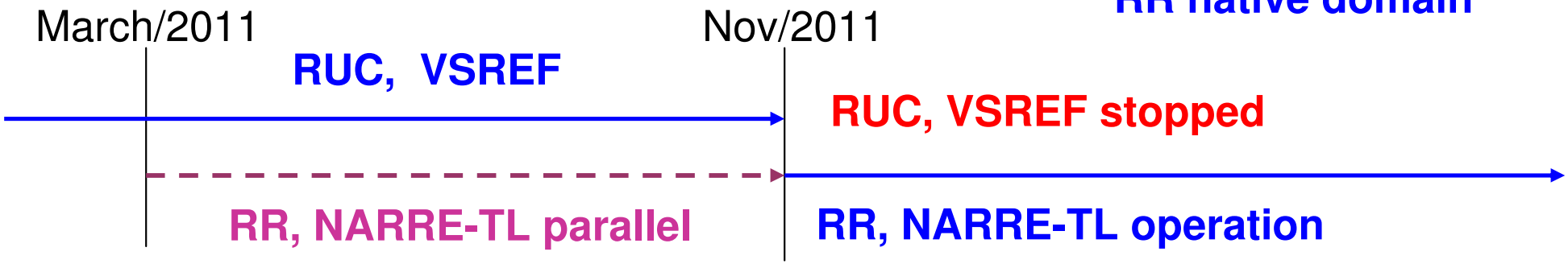
Grid#130 over CONUS (same as RUC/VSREF)
Grid#242 over Alaska

Forecast hours:

12 hours (same as VSREF)



RR native domain



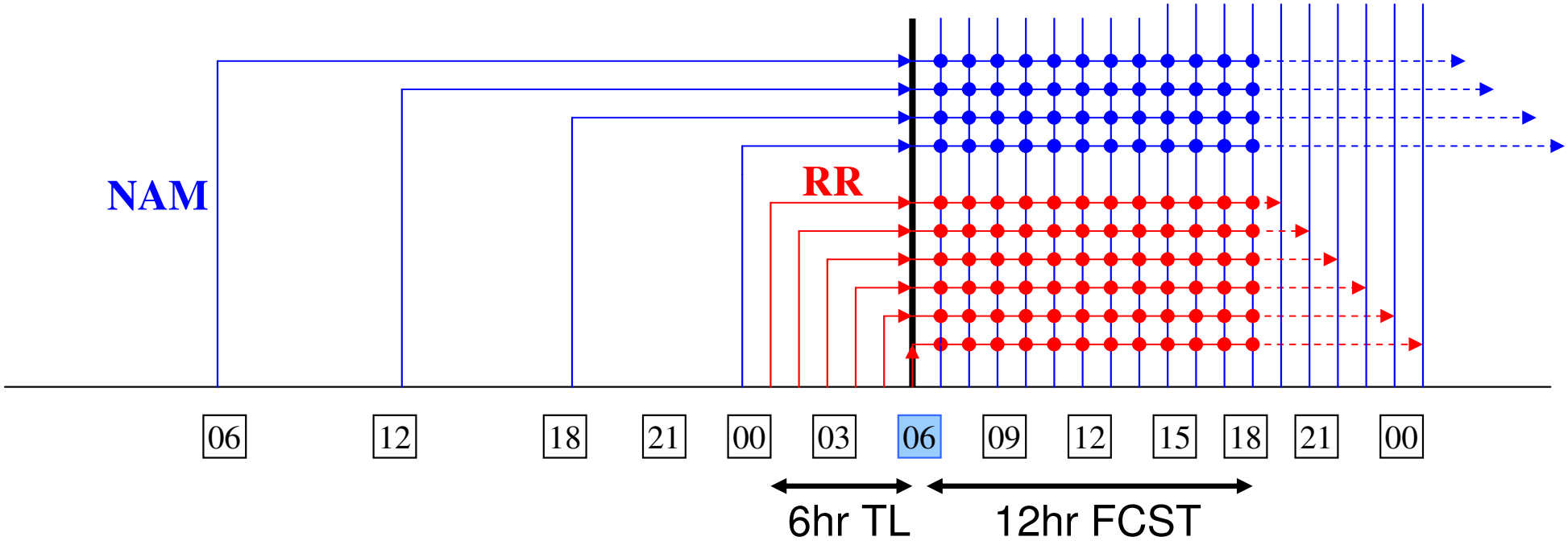
***Member Weighting** = 1 - forecast age (hr)/30*:

1 for current fcst and 0 for 30hr-old fcst

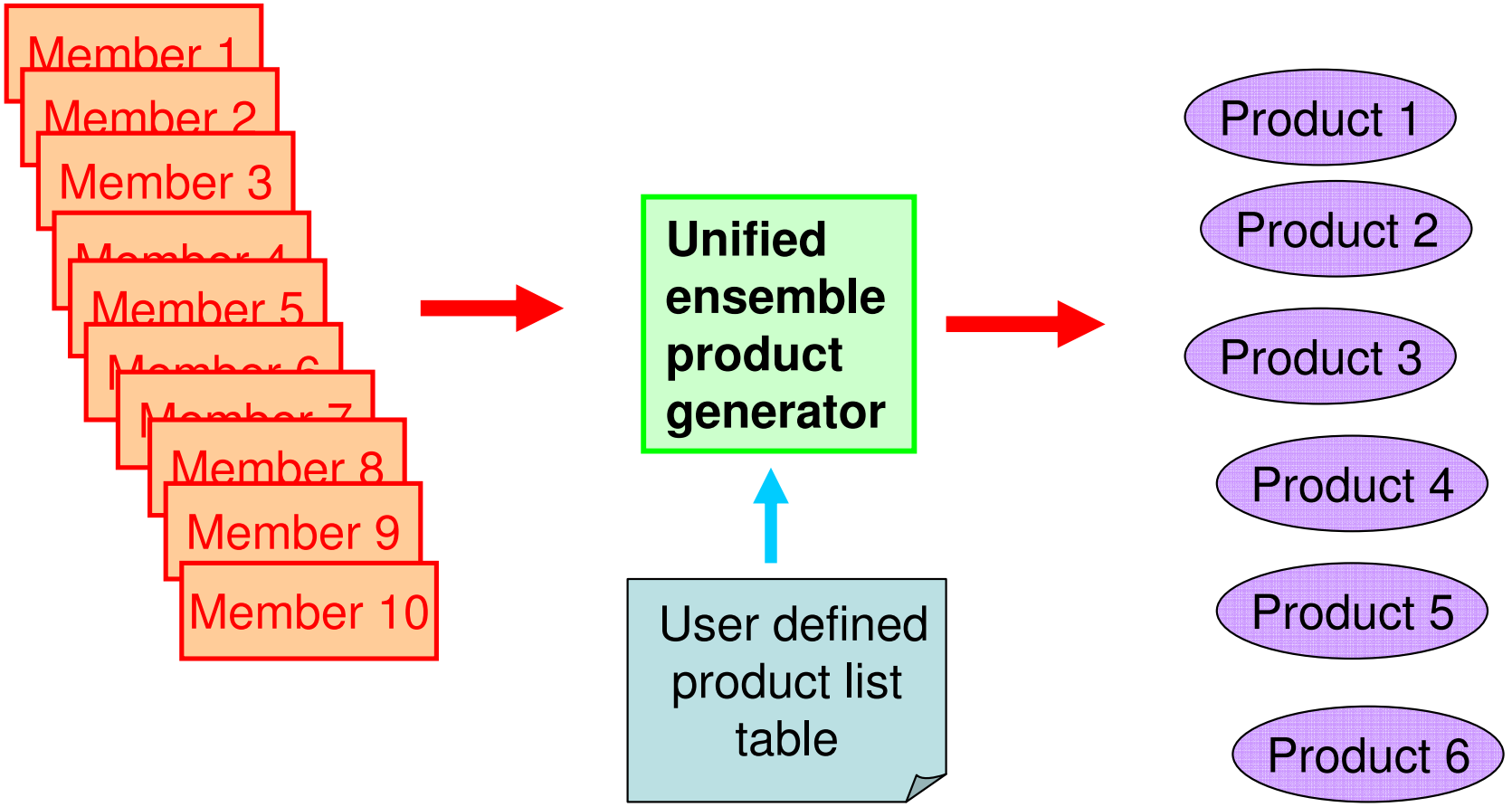
(NAM always older than RR → gives more weight to RR members)

RR's first 6 hr forecasts are used up for time-lag

Example for 06Z cycle's NARRE-TL:



Ensemble product generation (post processing)



Product	Ensemble	VSREF	NARRE-TL
Icing	Occurrence prob on 8 FL	Y	Y
Turbulence (CAT)	3 severity occurrence Prob on 9 FL	Y	Y
Ceiling (cloud base)	Mean/spread/prob of 4 ranges	Y	Y
Visibility	Mean/spread/prob of 4 ranges	Y	Y
Low level Wind shear	Mean/spread/occurrence prob	Y	Y
Jet stream	Prob on 3 levels	Y	Y
Fog (light/dense)	Mean/spread/prob (Zhou & Ferrier)	Y	Y
Convection	Prob of occurrence (Steve W.)	Y	Y
Reflectivity	Prob of 4 thresholds (Ferrier)	Y	Y
Freezing height	Mean/spread	Y	Y
Precipitation type	Prob of rain and snow types	Y	Y
Accumulate Precip	Prob of 3 and 6hr acc. precip	Y	Y
Lightning	Prob of occurrence (D. Bright)	N	Y
Severe thunderstorm	Prob of occurrence (D. Bright)	N	Y

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http://www.emc.ncep.noaa.gov/mmb/SREF_avia/FCST/NARRE/web_site/html/icing.htm

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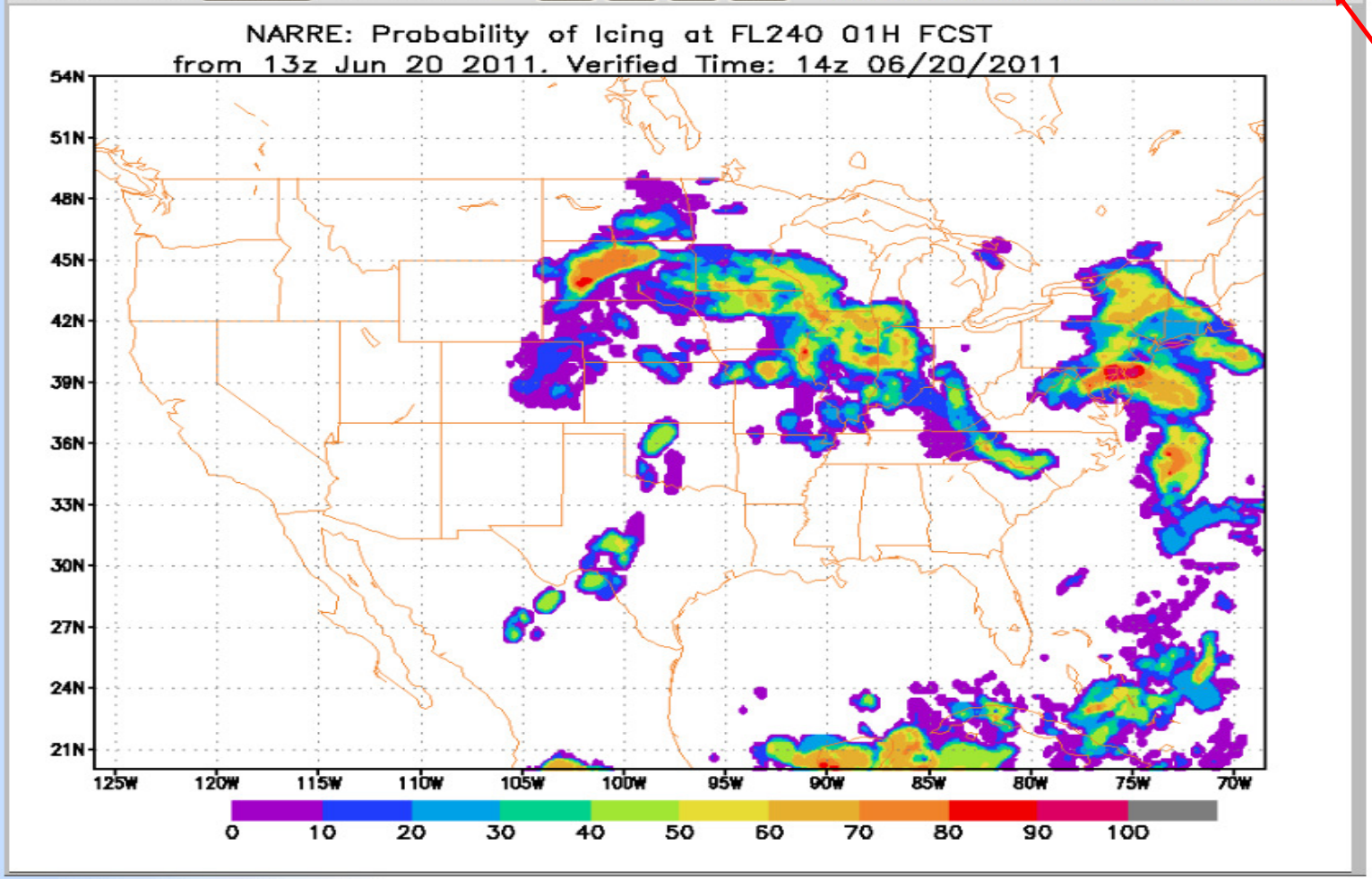
NCEP Experimental N. America Rapid Rrefresh Ensemble System (NARRE)

Go to Alaska Date: 20110620 Cycle: 13Z Product: Icing Thresholds: Prob: FL240

Select speed: normal Animation |< < > >| Email comments SREF Home Get data



Click link to download all NARRE-TL Hourly products in grib2

Done

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http://www.emc.ncep.noaa.gov/mmb/SREF_avia/FCST/NARRE_Alaska/web_site/html/ic

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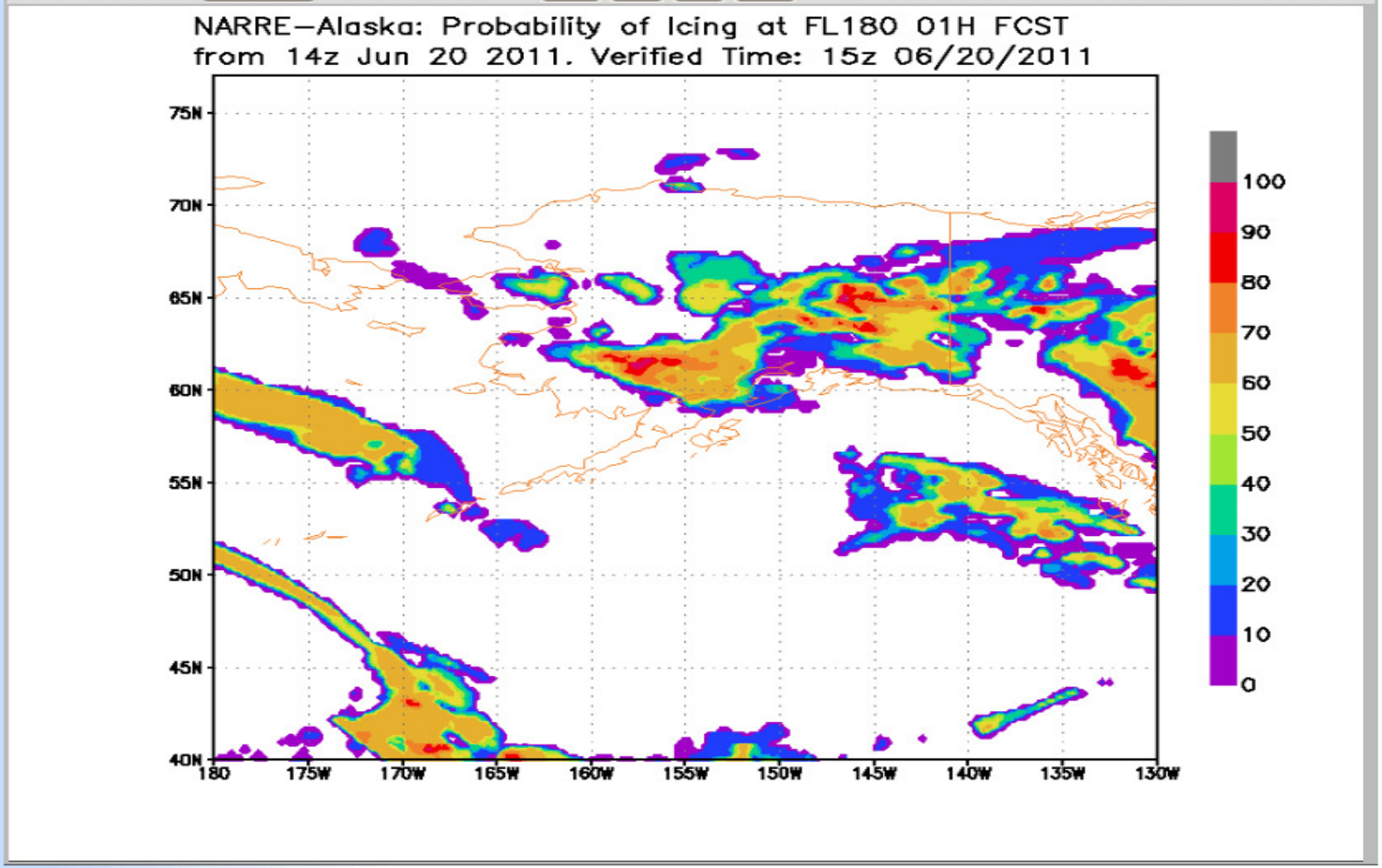
NCEP Model... | Yahoo! Fina... | NCEP Alask... | ADDS - ME... | http:/...g.html | Expedia Sig...

Alaska Experimental NARRE Time-Lag System

Go to CONUS Date: 20110620 Cycle: 14Z Product: Icing Thresholds: Prob: FL180

Select speed: normal Animation |< < > >| Email comments SREF Home Get data



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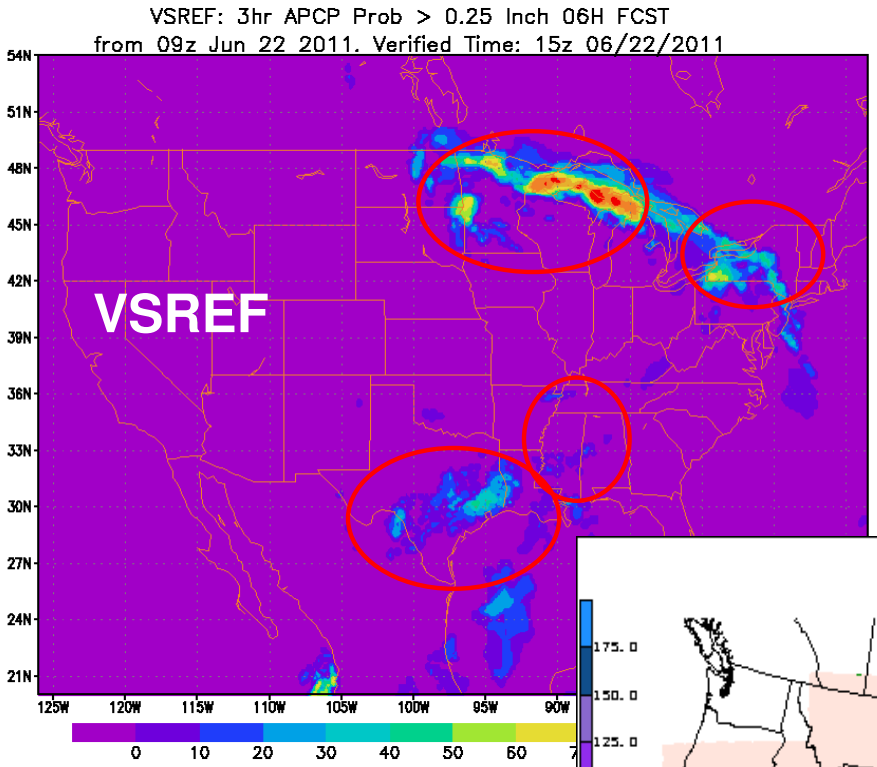
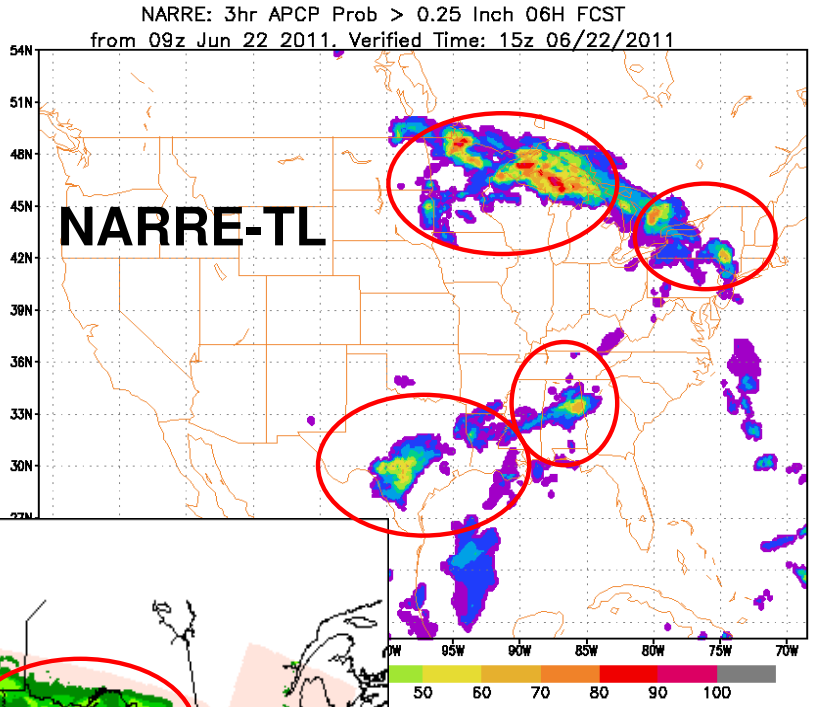
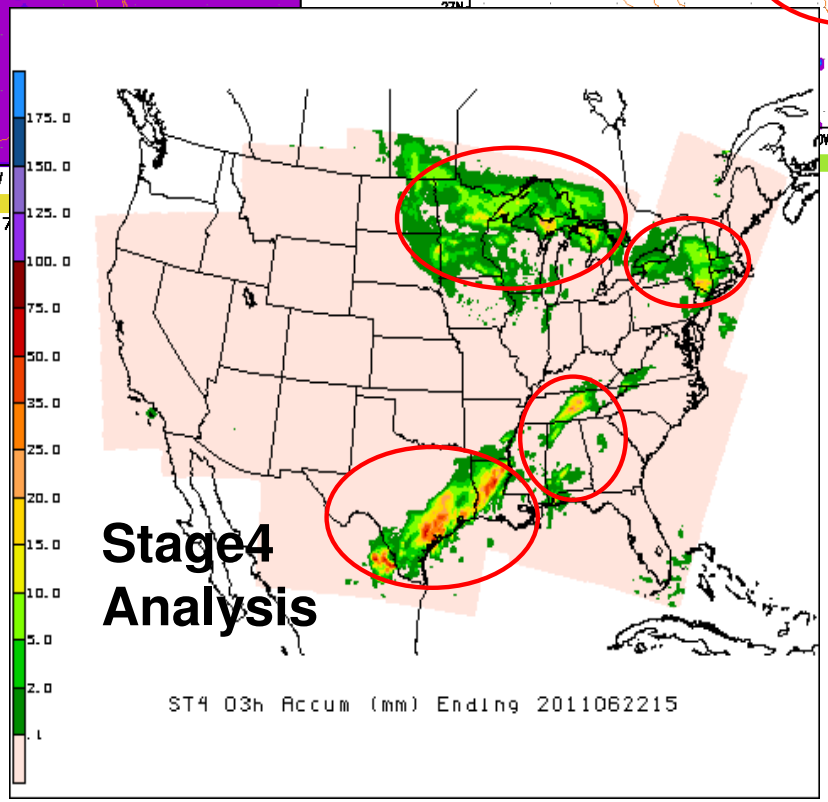
3hr. Accu. Prcp > 0.25 inch (6.35 mm) probability

6hr forecast, validated 15Z, Jun 22, 2011

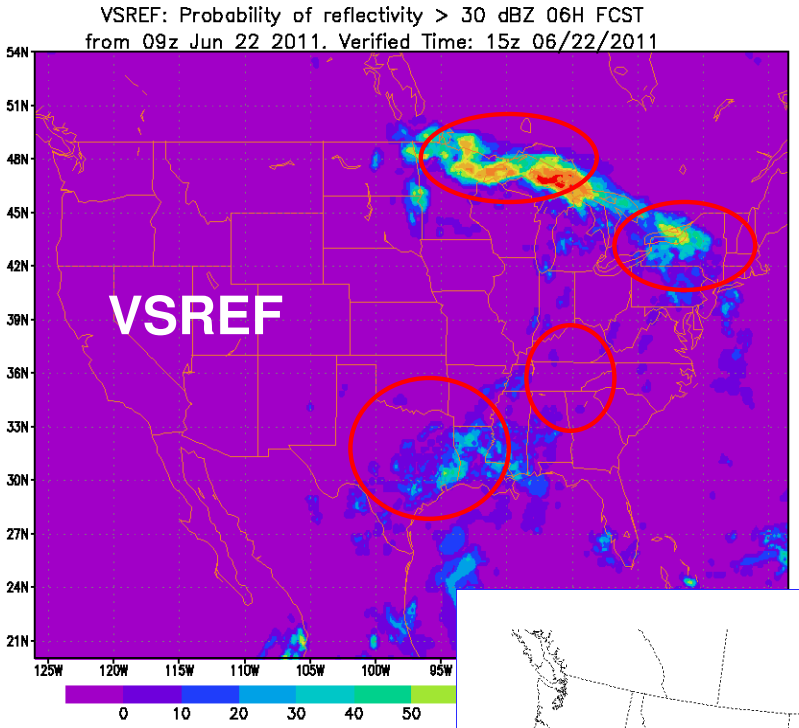


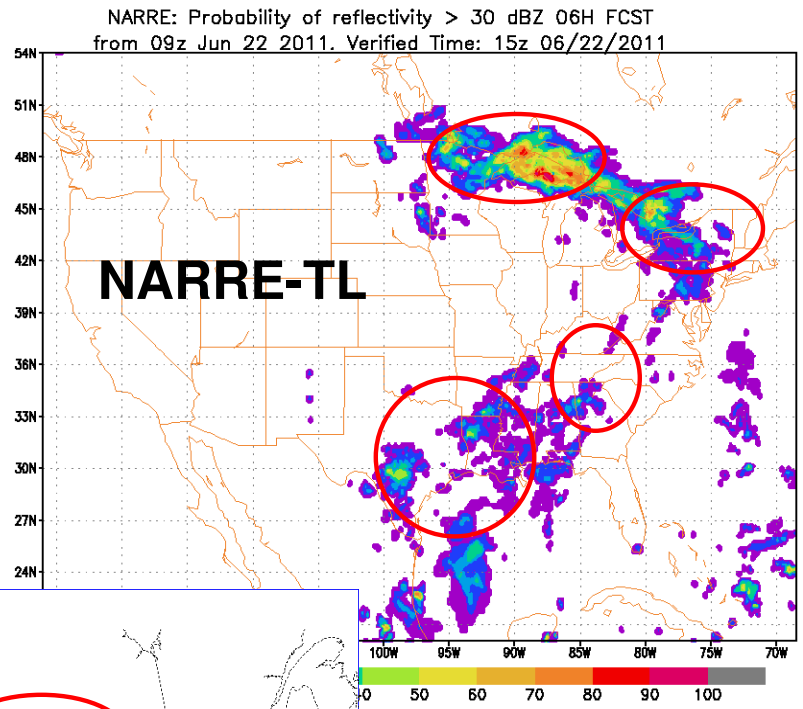


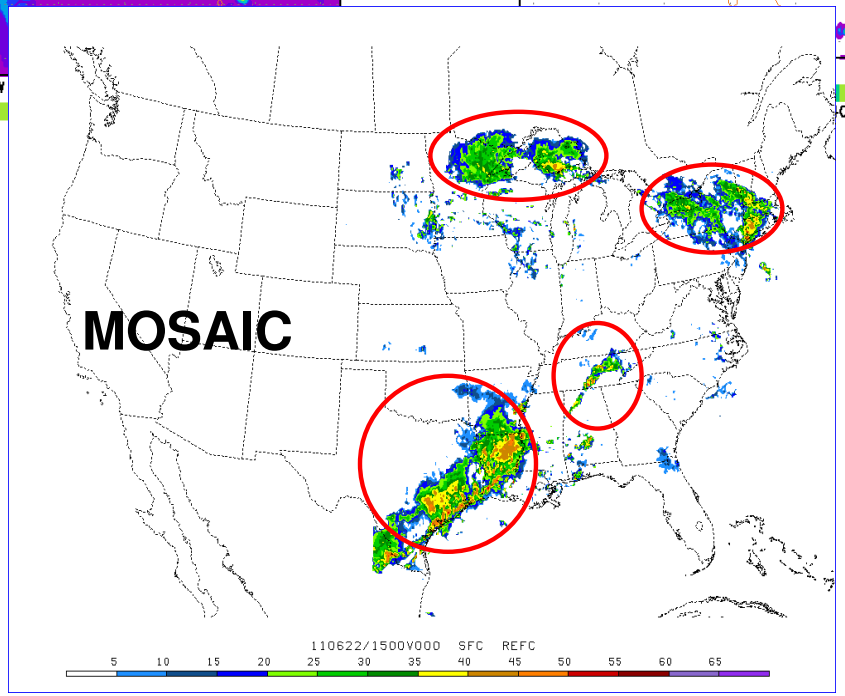


Reflectivity >30 dBZ Probability

6hr forecast, Jun 22, 2011

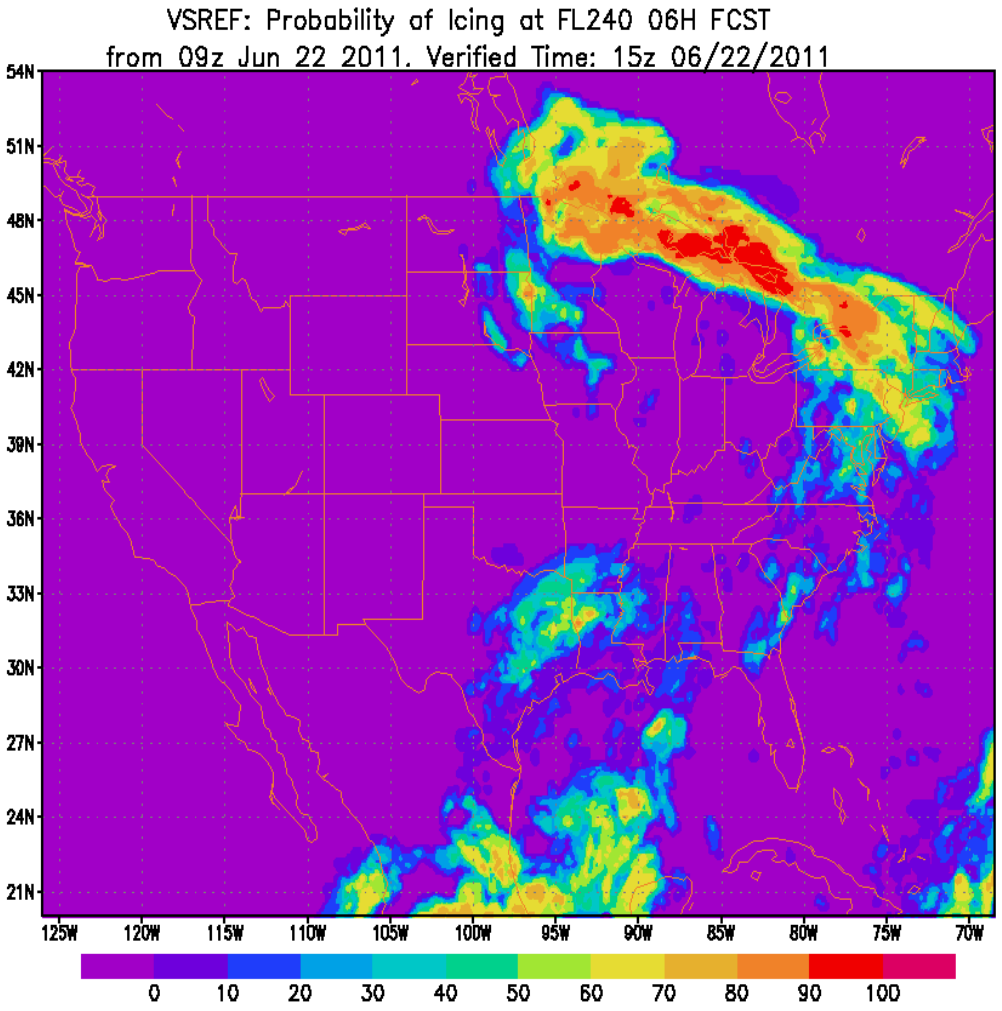




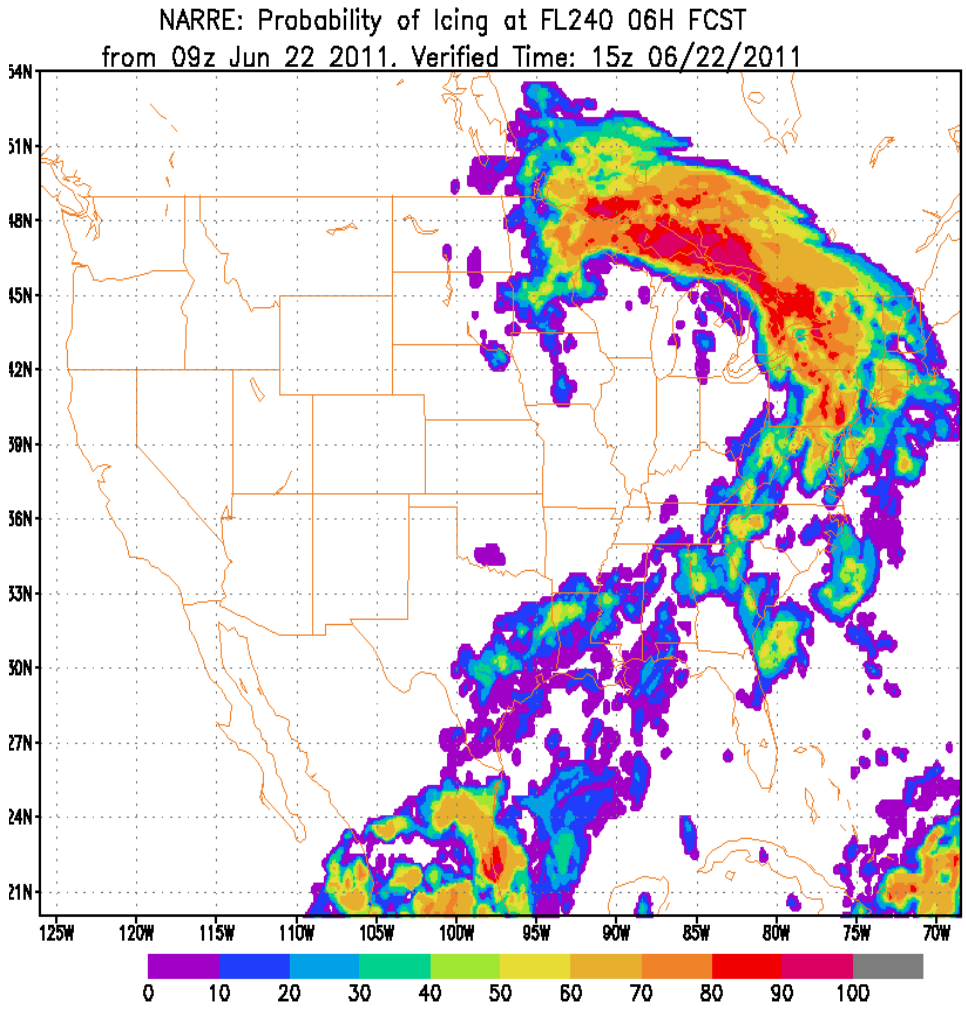


Icing probability 6hr forecast at FL240, Jun 22, 2011

VSREF

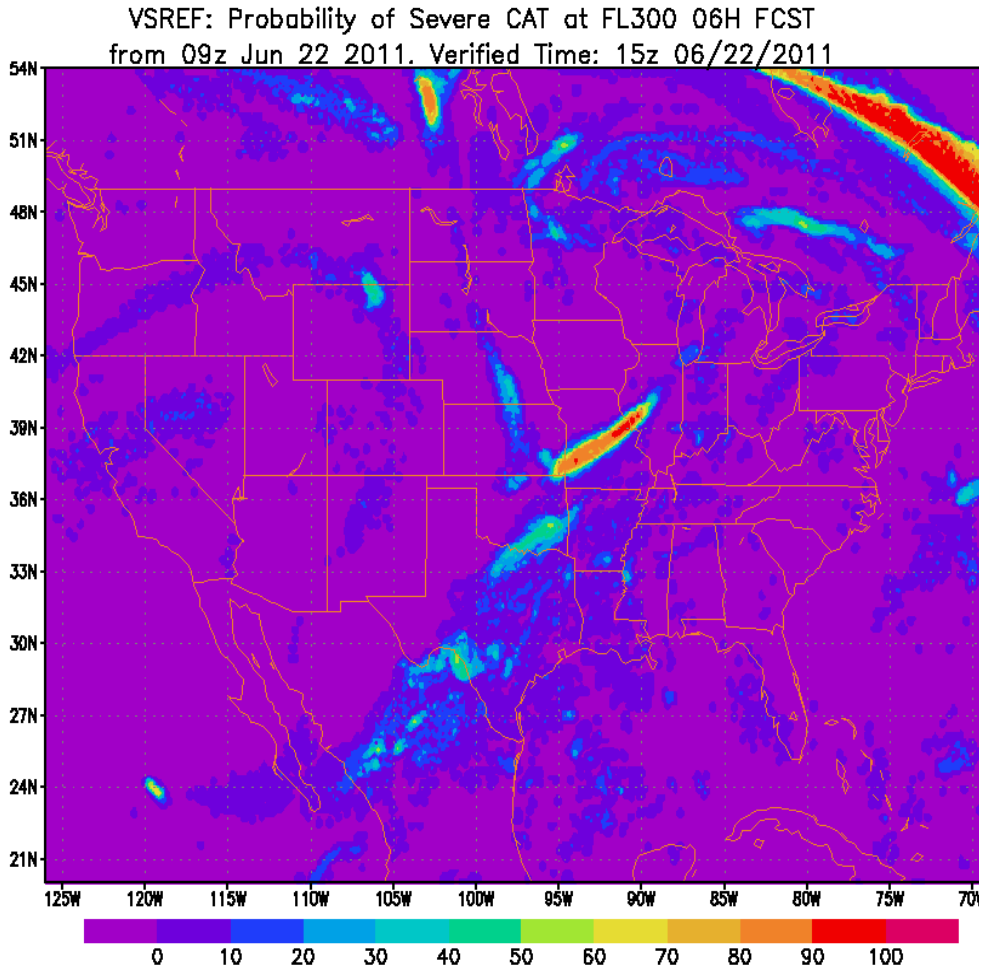


NARRE

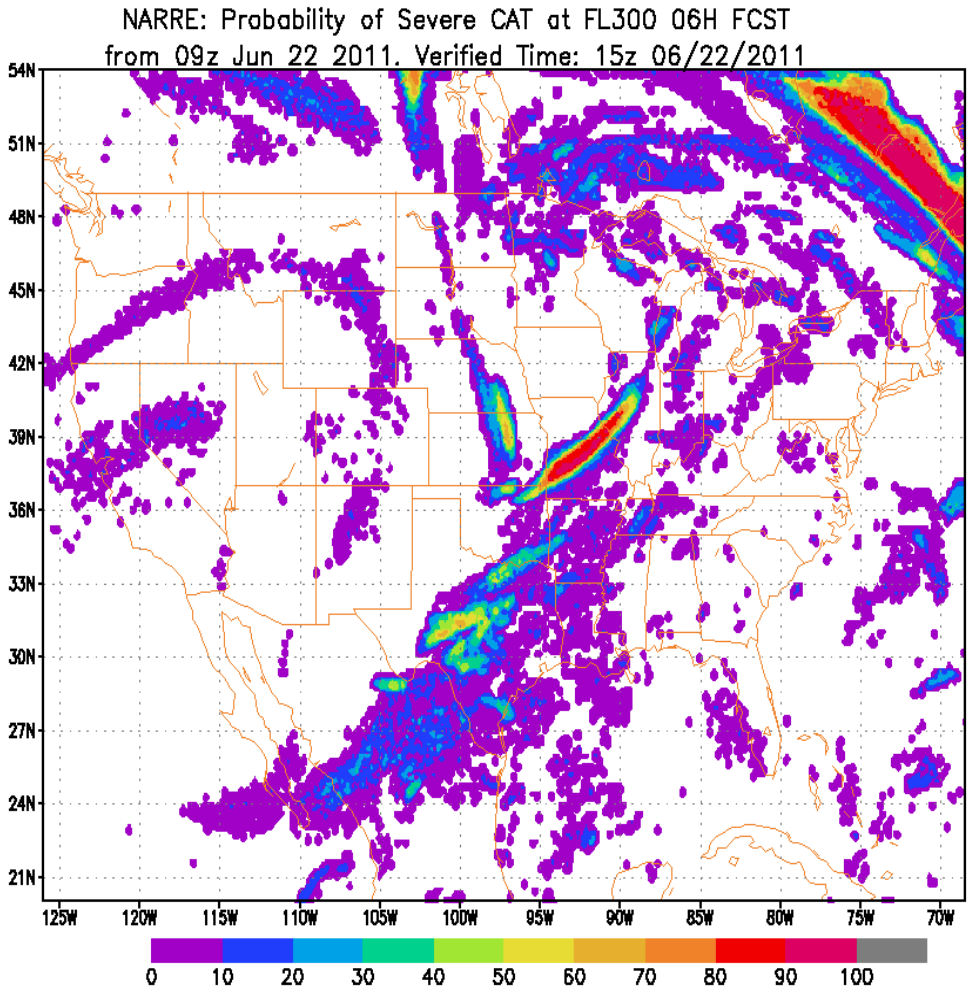


Severe CAT probability 6hr forecast at FL300, Jun 22, 2011

VSREF

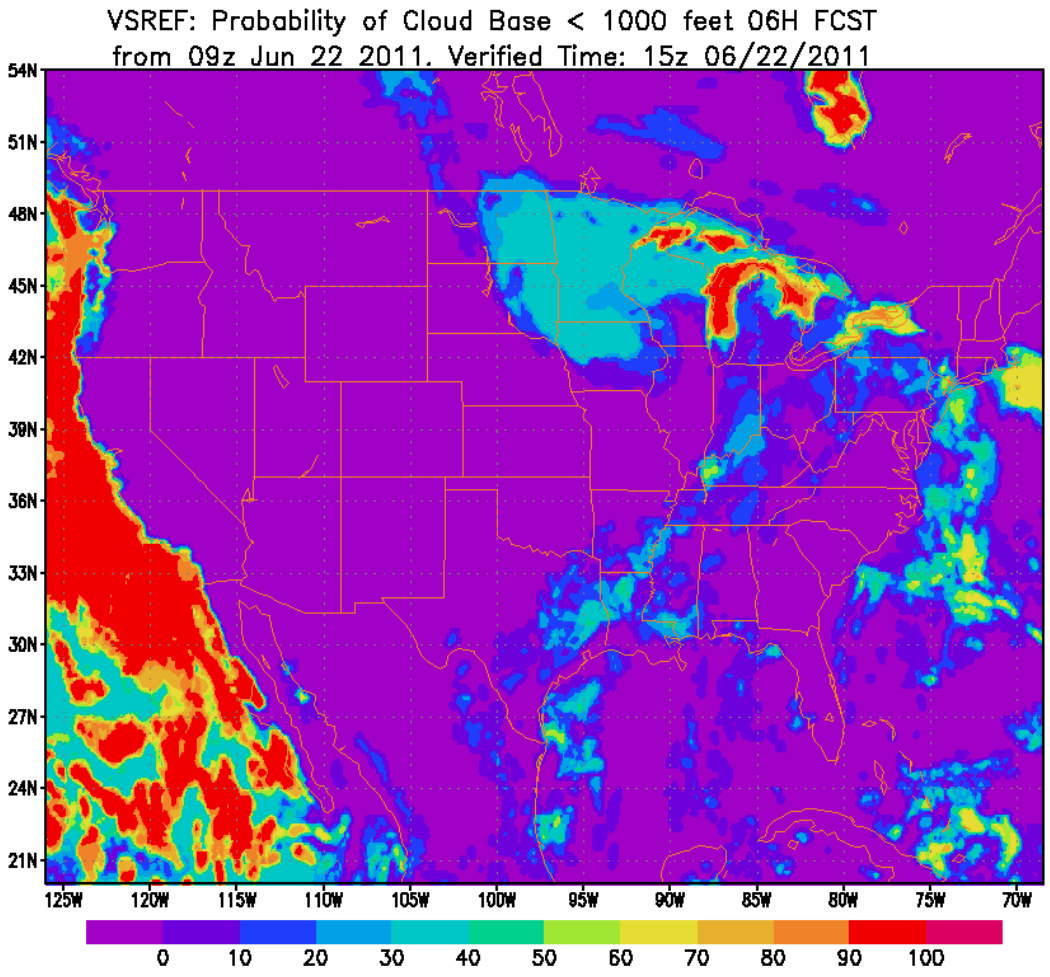


NARRE

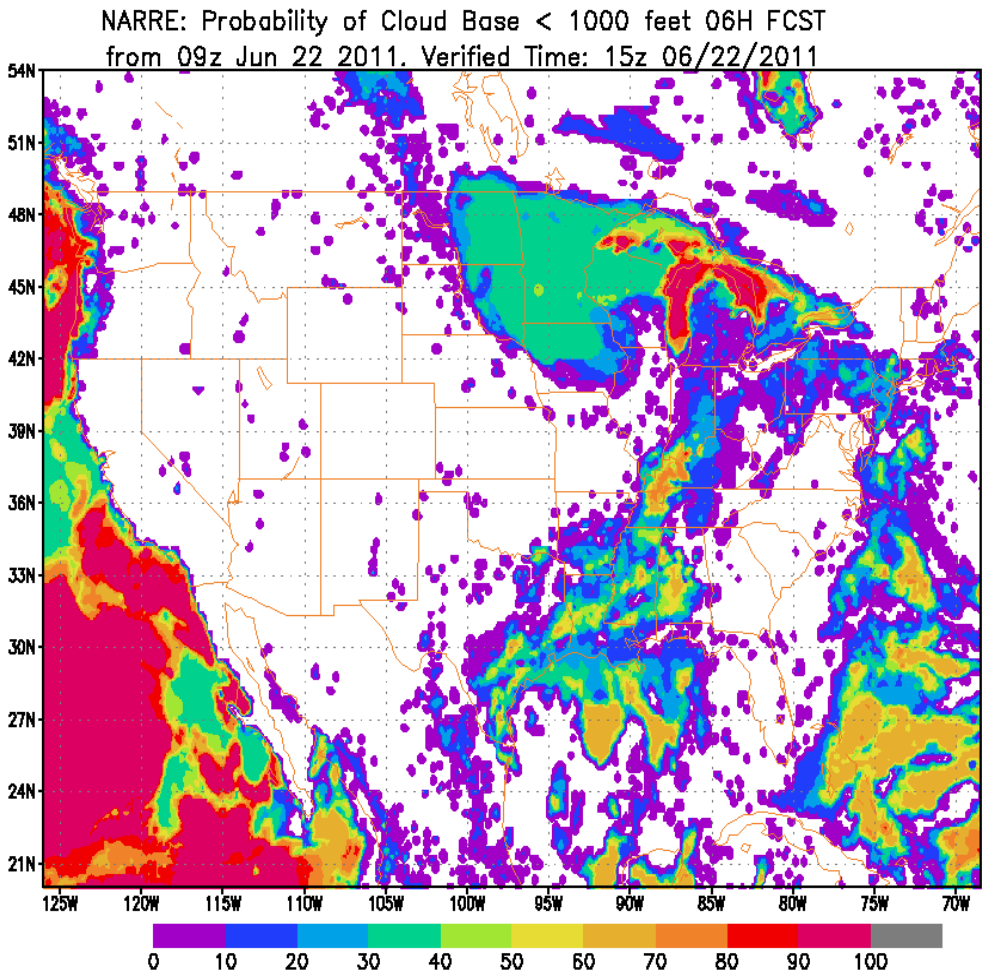


Ceiling < 1000 feet probability 6hr forecast, Jun 22, 2011

VSREF

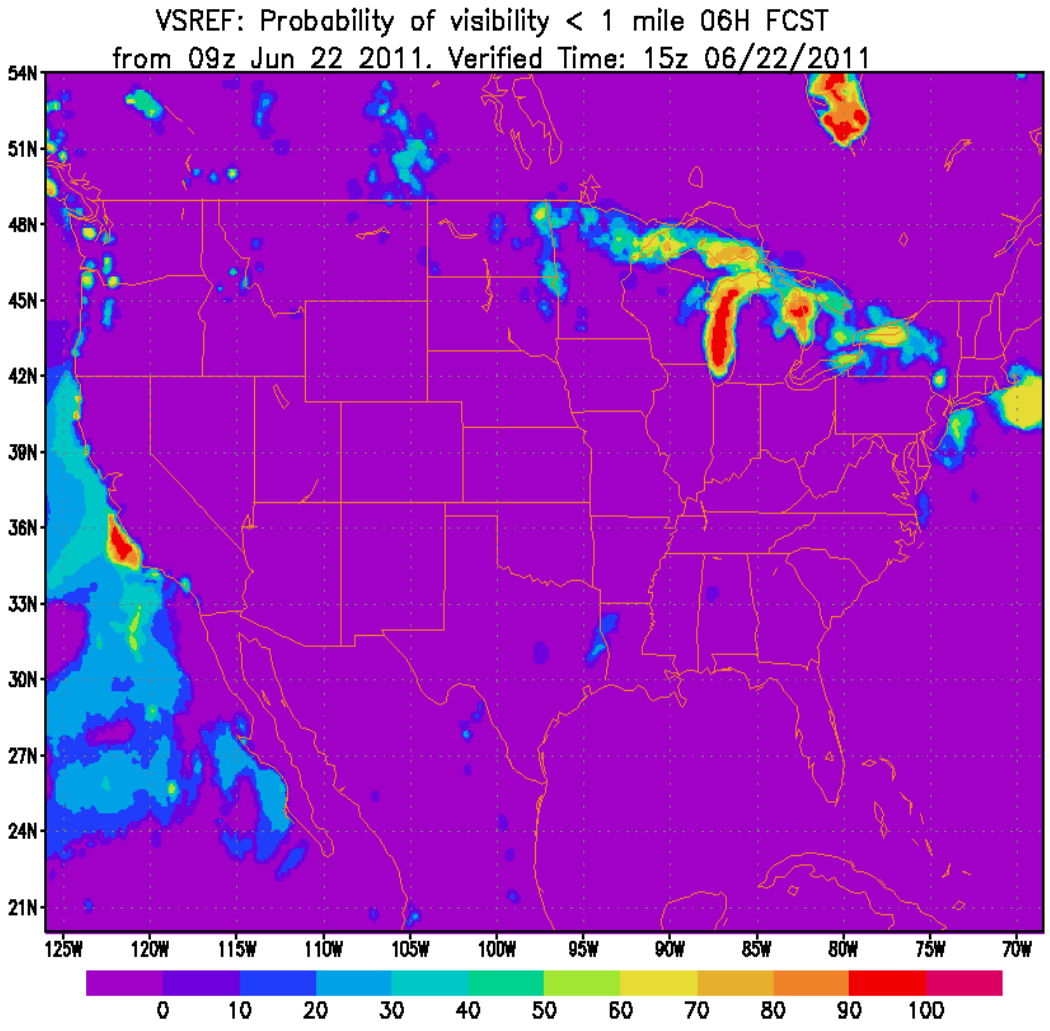


NARRE

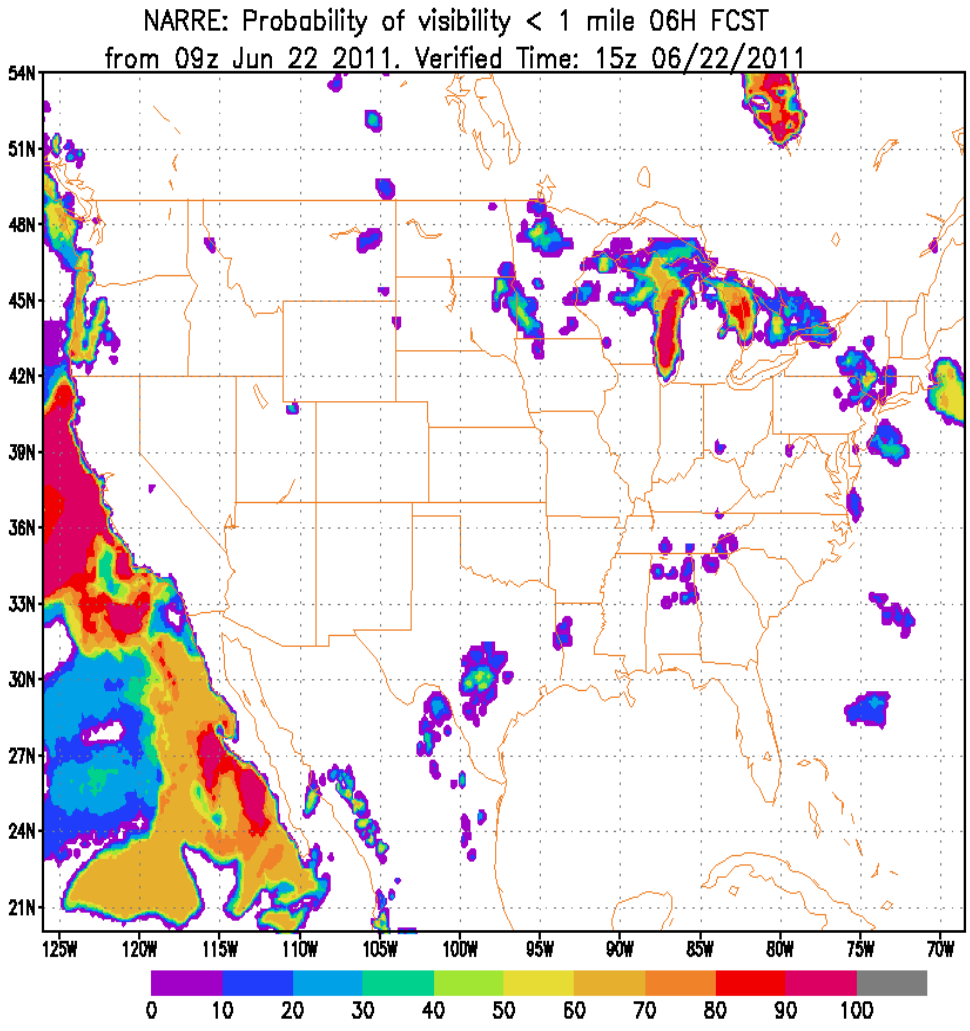


Vis < 1 mile probability 6hr forecast, Jun 22, 2011

VSREF

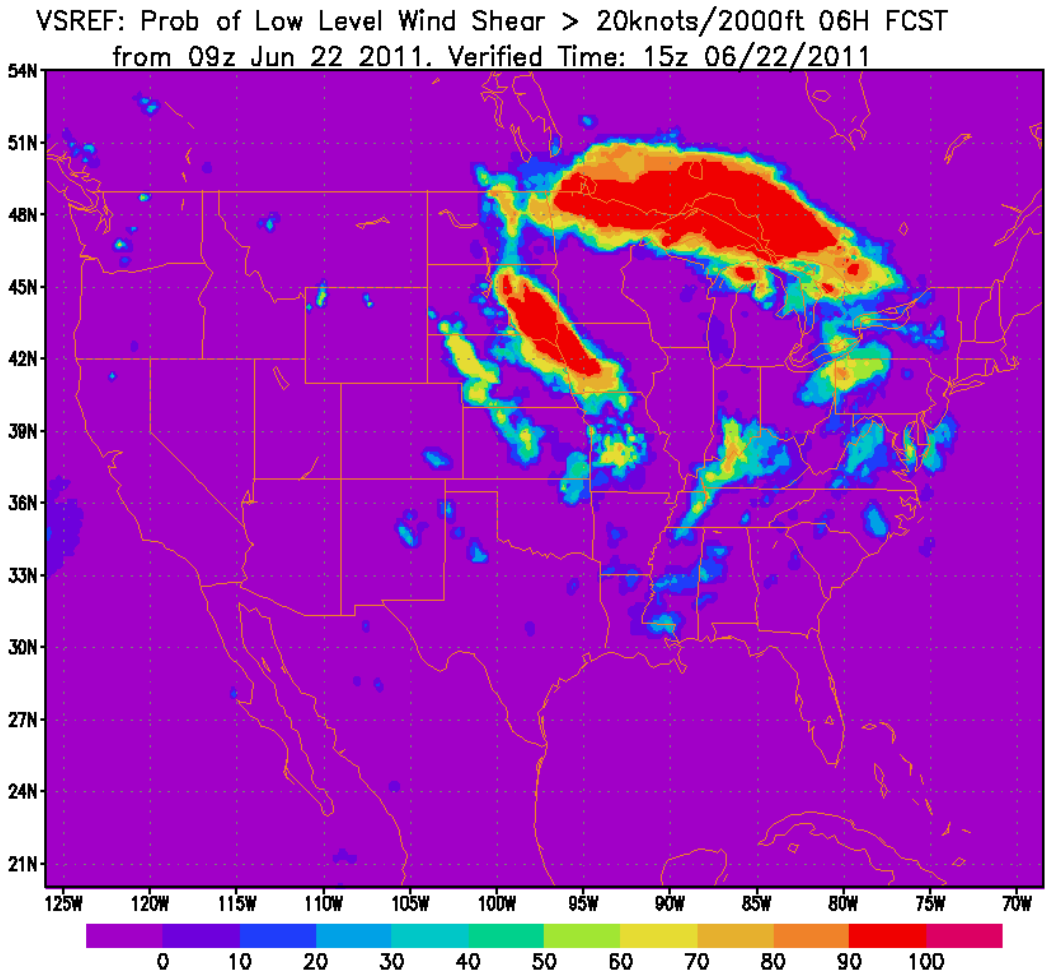


NARRE

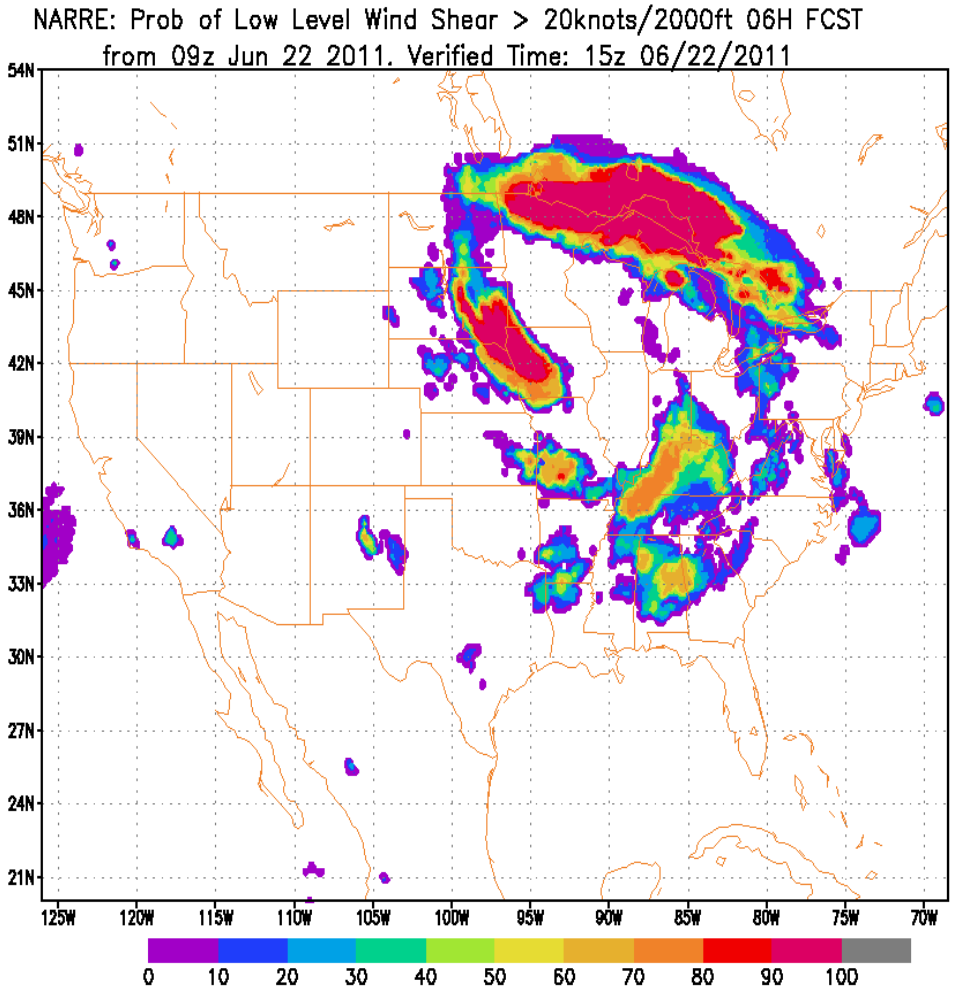


Low level wind shear occurrence prob 6hr forecast, Jun 22, 2011

VSREF



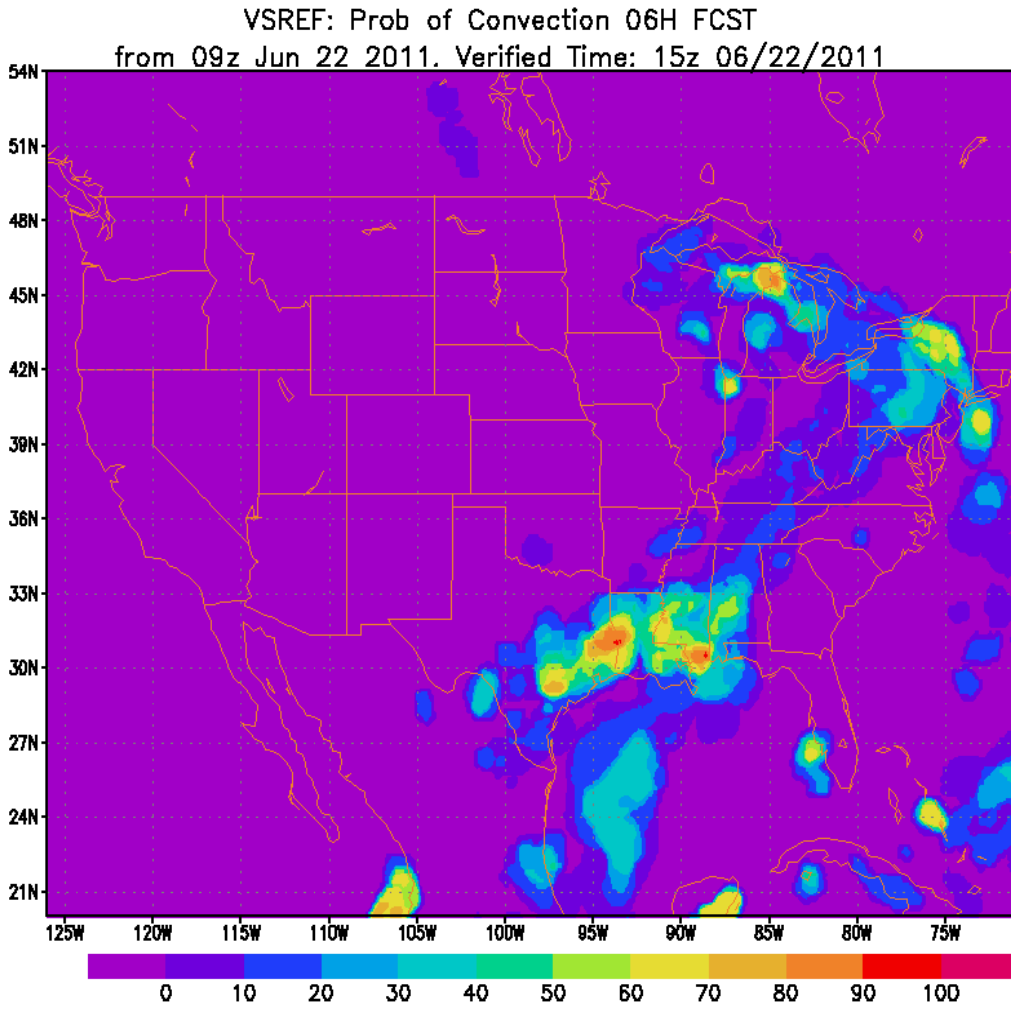
NARRE



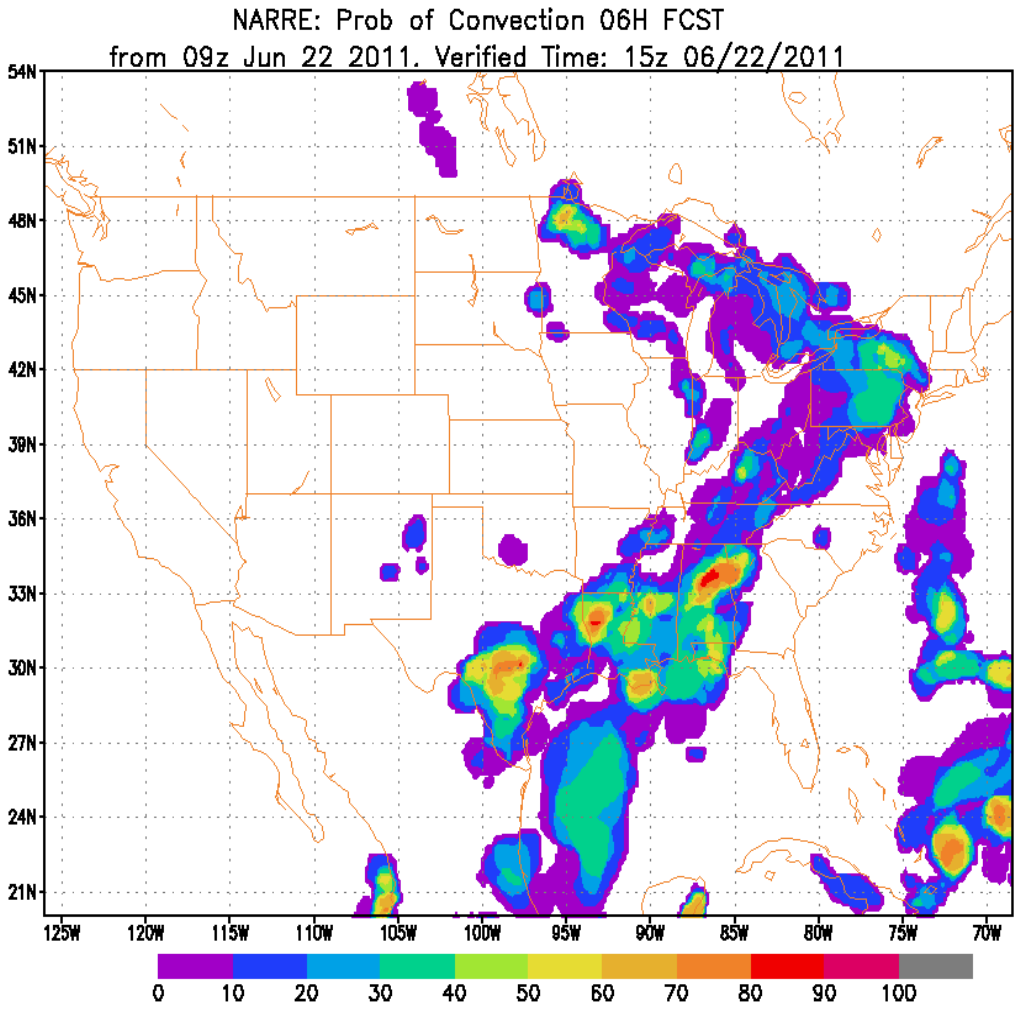
Convection occurrence probability 6hr forecast, Jun 22, 2011

(both use Steve W. method)

VSREF



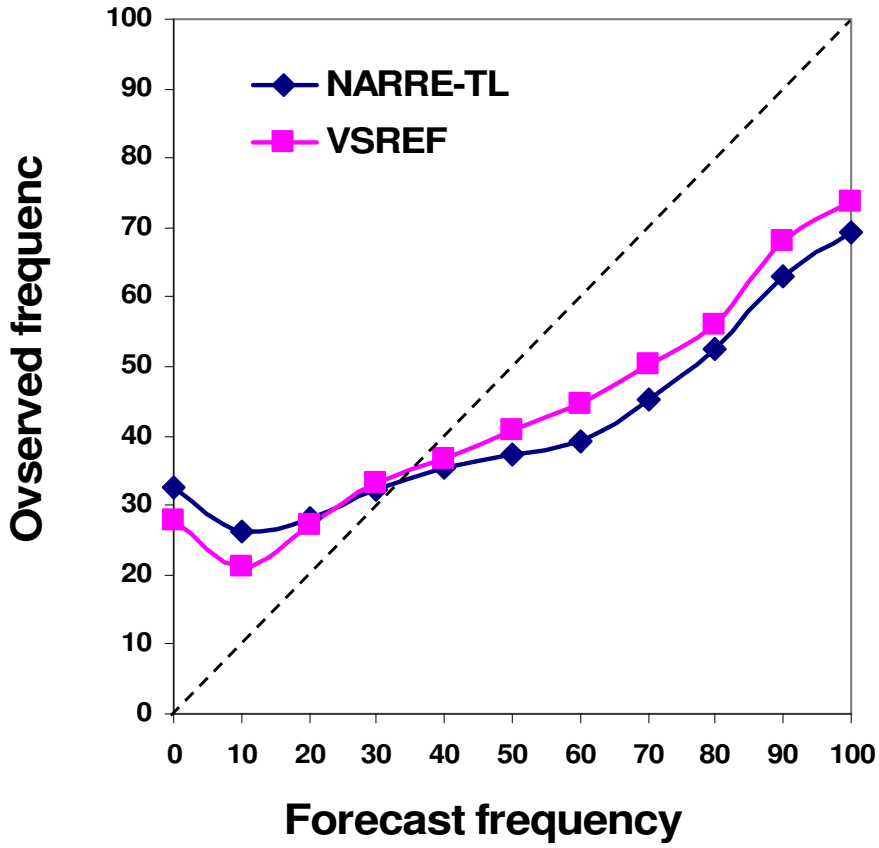
NARRE



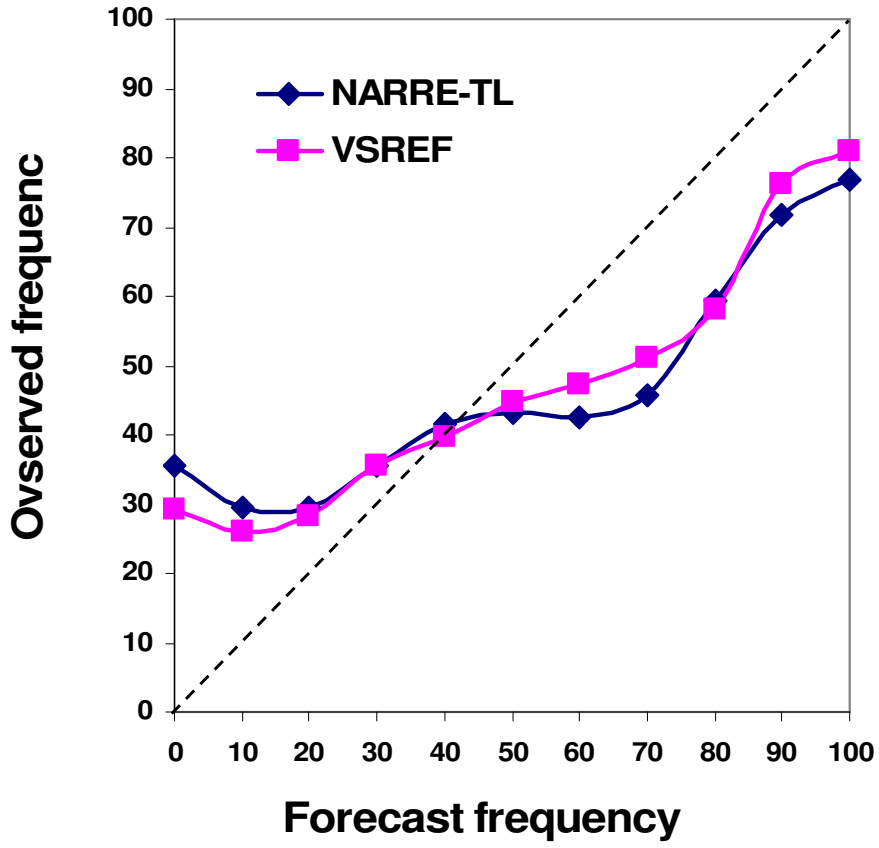
Probabilistic verification example (accumulated Apr 28 ~ Jun 29, 2011)

Icing probability forecasts of NARRE-TL and VSREF against ADDS-CIP

Icing Reliability at FL090 (725mb)
Against ADDS-CIP



Icing Reliability at FL180 (500mb)
Against ADDS-CIP



Next Steps

- Keep NARRE-TL running and data flow after RR operational
- More verifications
- HRRRE-TL over CONUS (Geoff D. Suggested)

4km NAM-nest, 4km HRW-ARW, 4km HRW-NMM, 4km Pyle (for SPC runs), 3km HRRR (GSD runs)

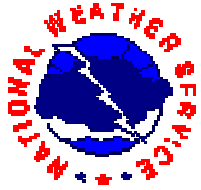
Summary

- Based on NAM and NCEP's parallel RR runs, a 10-member time-lagged ensemble system NARRE-TL was first experimentally developed

- NARRE-TL has similar configuration in file structure and timing as VSREF, similar aviation products, but added 2 more products (lightning and severe thunderstorm probabilities)

- After parallel RR transits to operational RR in Nov 2011, NARRE-TL will continue run but VSREF will be stopped.

- Primary evaluations show a little bit stronger fields, better POD for NARRE-TL than VSREF. More evaluations will be focused.



THANKS!