

OHRFC Verification Case Study

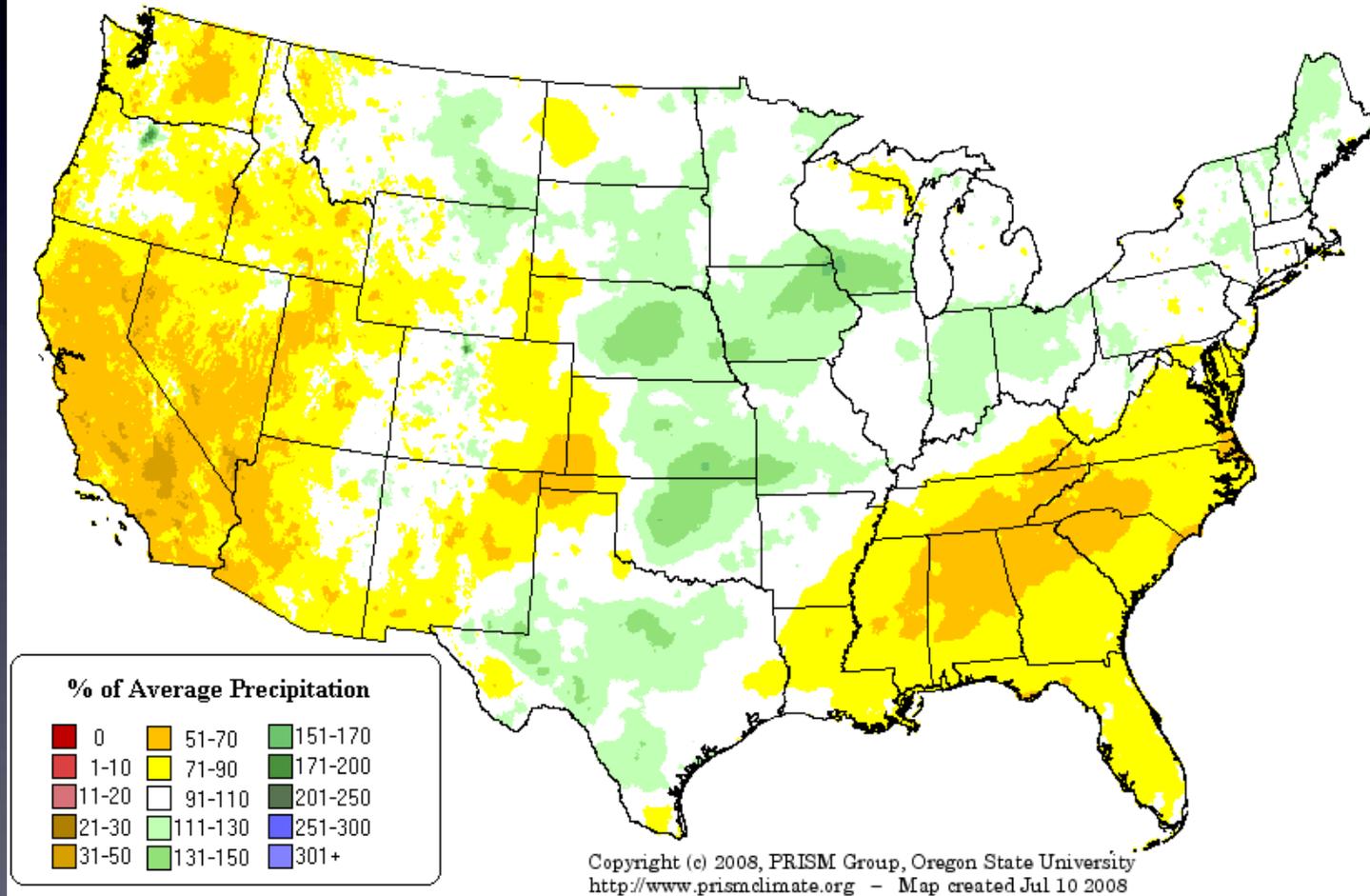
Tom Adams, OHRFC

What's covered?

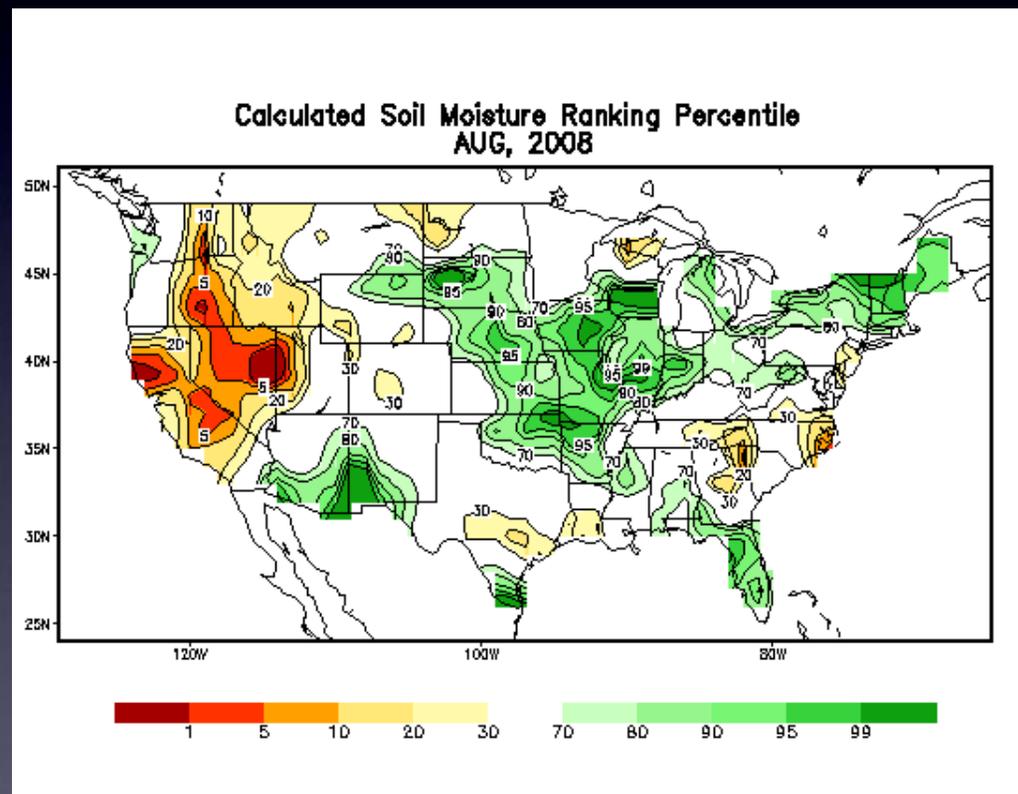
- What's the value of QPF?
- What's the value of run-time MODs?
- Who's QPF is better: HAS or HPC?
- Verification differences across forecast points.

Precipitation Anomalies

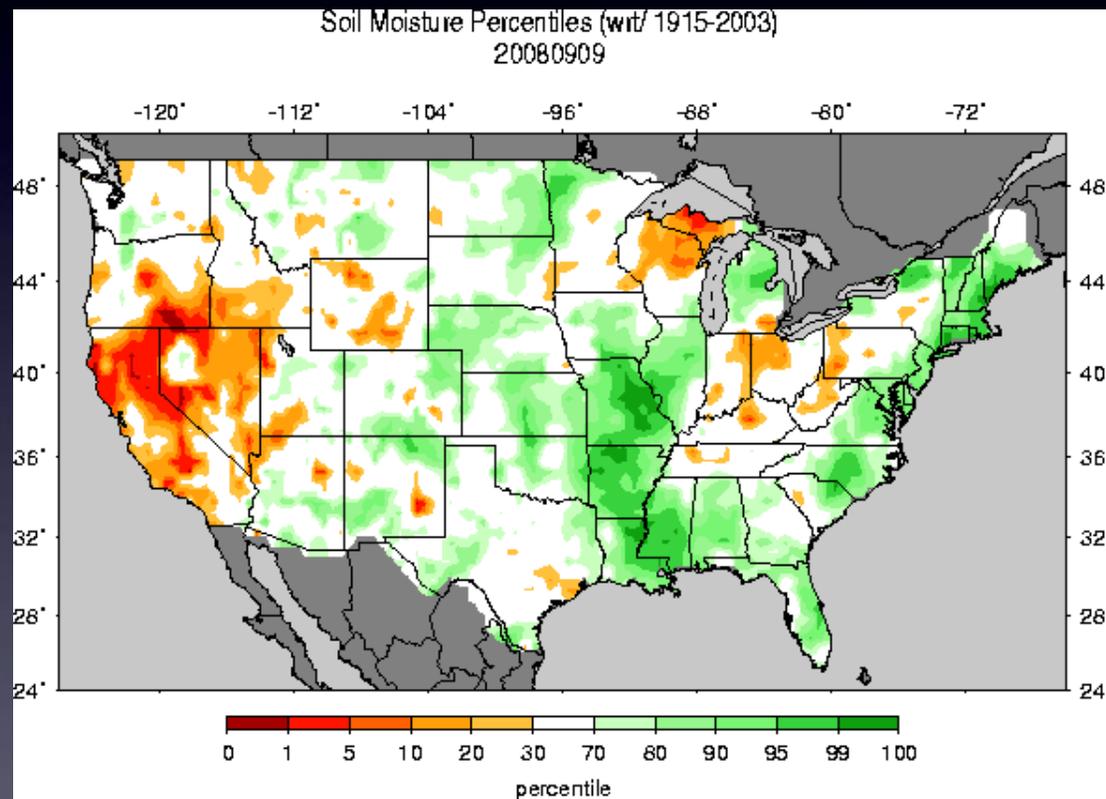
18-month Percent of Average Precipitation: Jun 2008
Provisional Data



CPC Soil Moisture Percentile



University of Washington VIC-CPC soil moisture percentiles



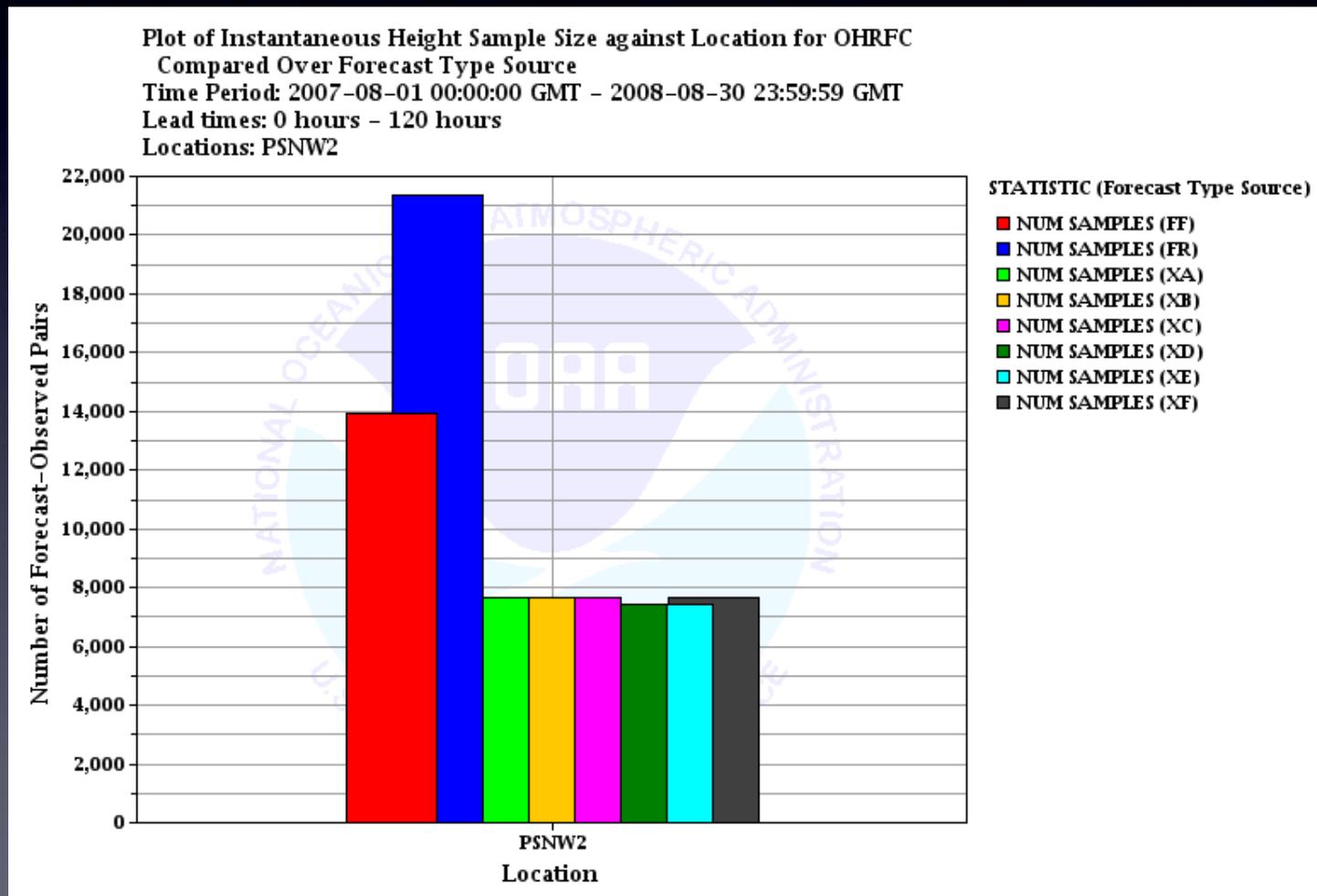
Methodology

- 6 parallel, non-operational batch OFS model runs; once daily on Dell-5
 - No MODs, no QPF
 - No MODs, with HPC QPF
 - No MODs, with HAS QPF
 - With MODs, no QPF
 - With MODS, with HPC QPF
 - With MODS, with HAS QPF
 - Operational Forecast runs with MODs & HAS QPF (directly archived)
- Run PRDUTIL TSDATA command to dump time series data
- Use custom Perl scripts to reformat TS data for Archive Database ingest
- Use IVP for analysis & generate graphics

Preliminary comments...

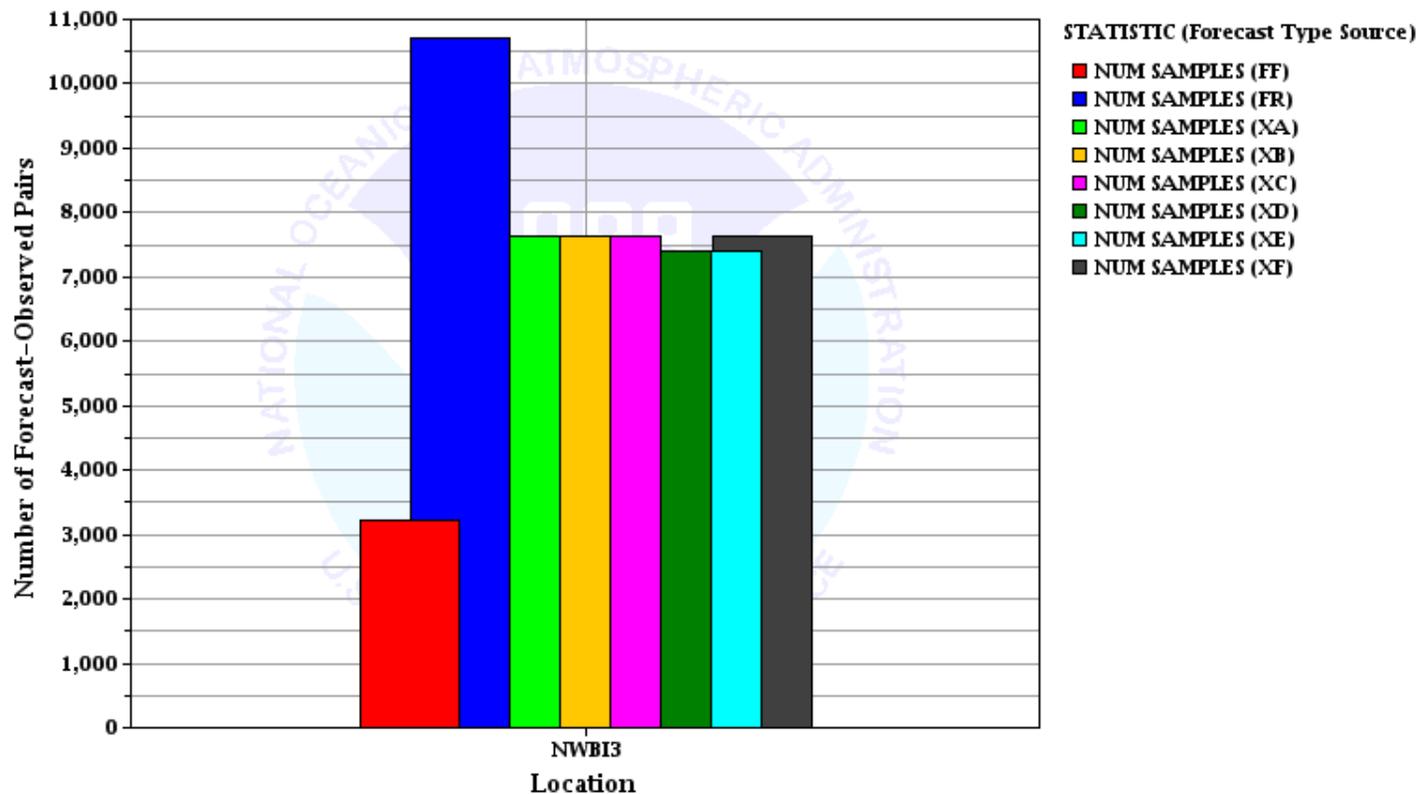
- Limited to 7 basins — range in location, basin size, & basin response characteristics
- Analysis restricted to ~1-year period of concurrent archived OFS forecasts using HPC QPF
- 2 basins (MILO1 & NWBI3) are non-daily forecast points; implies sample size issues
- Some thought exists that OHRFC HAS QPF is not up-to-snuff *wrt* HPC QPF
- Operational Forecast Sample Size \neq Batch OFS Model Runs with-MODs & with-HAS QPF
- Pittsburgh basins (PTTP1 & PSNW2) run twice daily — more verification pairs

Forecast — Observation pairs PSNW2



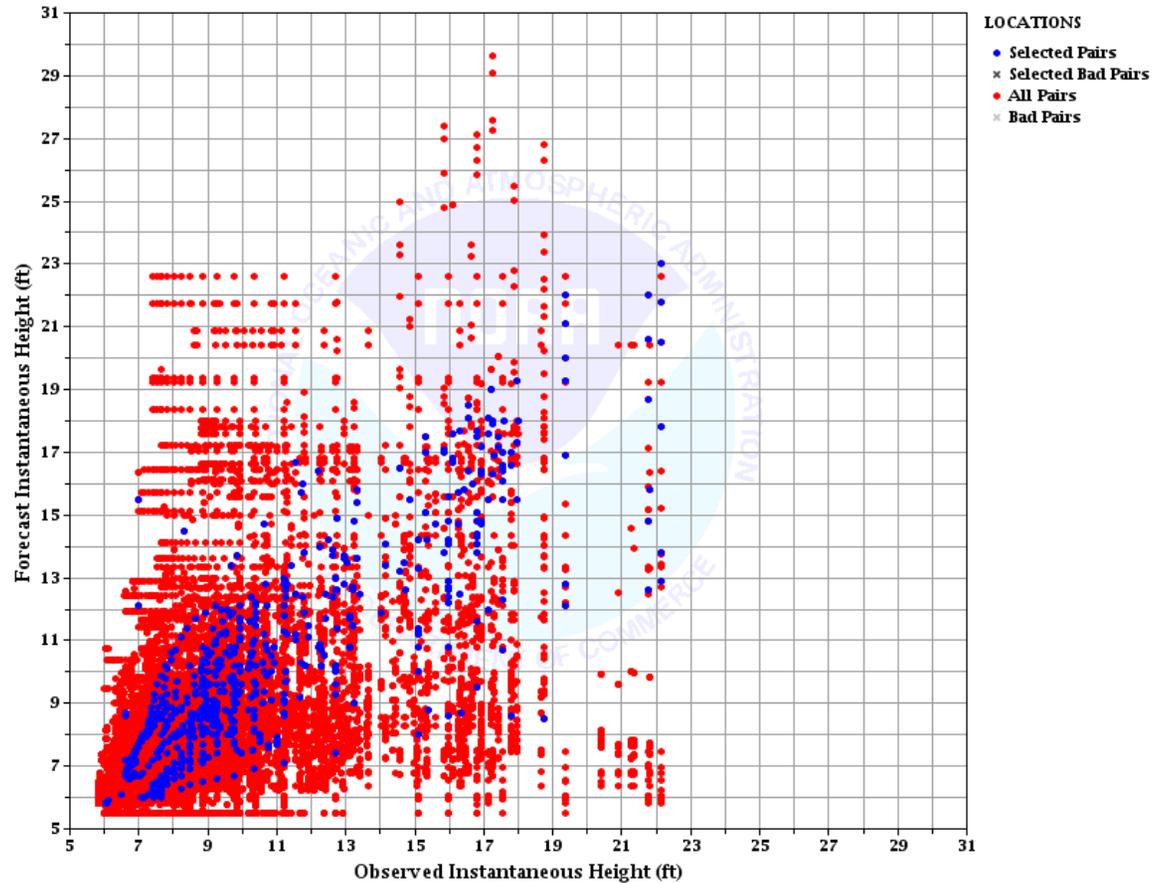
Sample Size NWBI3 (non-daily)

Plot of Instantaneous Height Sample Size against Location for OHRFC
Compared Over Forecast Type Source
Time Period: 2007-08-01 00:00:00 GMT - 2008-08-30 23:59:59 GMT
Lead times: 0 hours - 120 hours
Locations: NWBI3



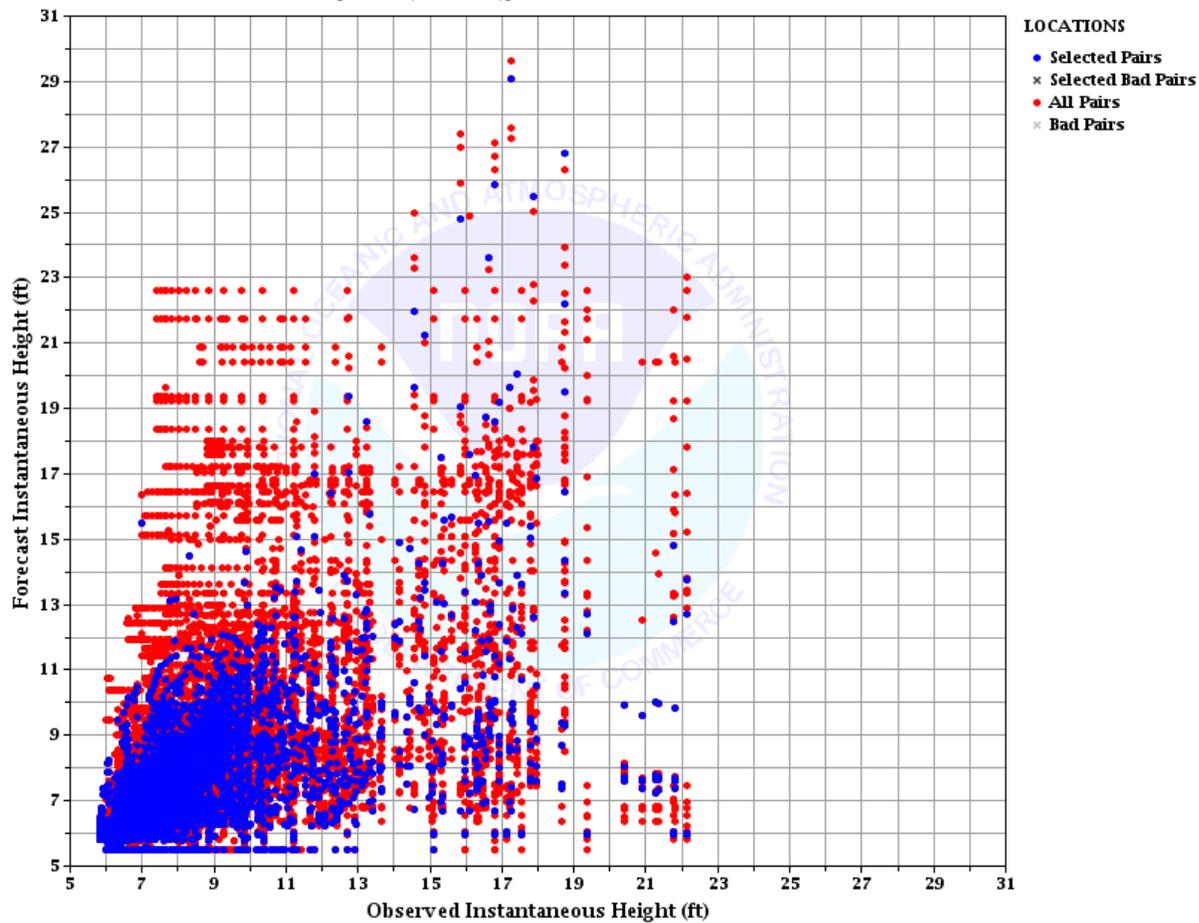
Scatterplot MILO1 (FF)

Plot of Forecast-Observed Instantaneous Height Data Pairs for OHRFC
Time Period: 2007-08-01 00:00:00 GMT - 2008-08-30 23:59:59 GMT
Lead times: 0 hours - 120 hours
Selected Location: Milan at [MILO1(HGIFFZZ)]



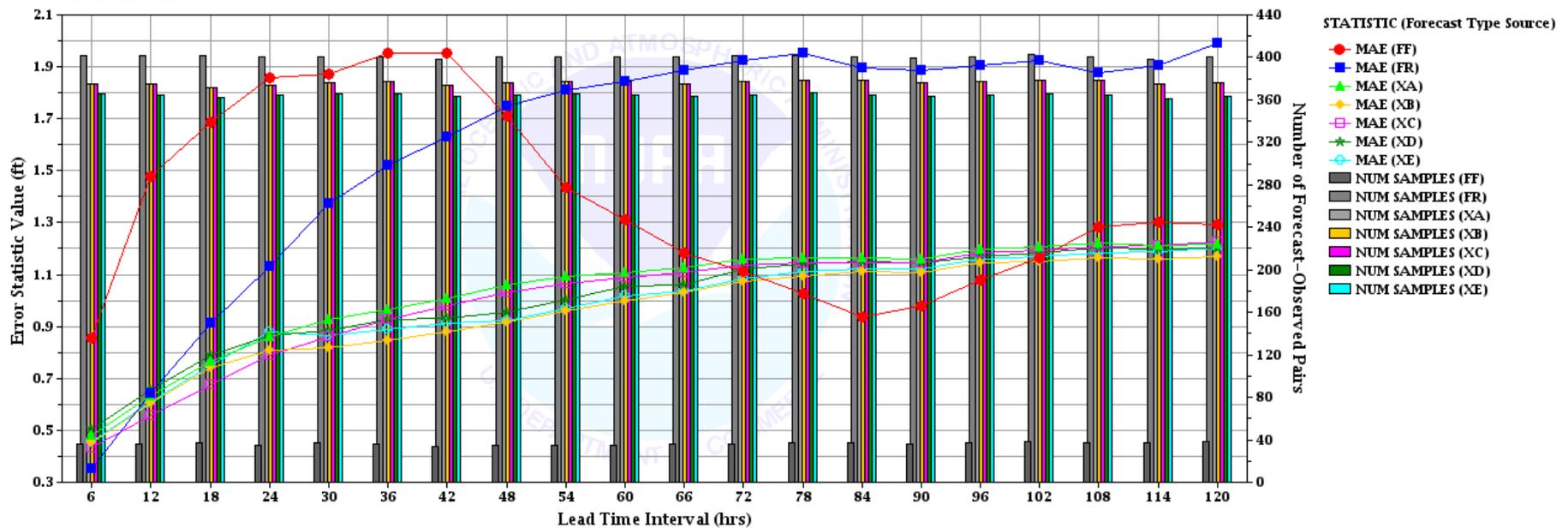
Scatterplot MILO1 (XF)

Plot of Forecast-Observed Instantaneous Height Data Pairs for OHRFC
Time Period: 2007-08-01 00:00:00 GMT - 2008-08-30 23:59:59 GMT
Lead times: 0 hours - 120 hours
Selected Location: Milan at [MILO1(HGIXFZZ)]



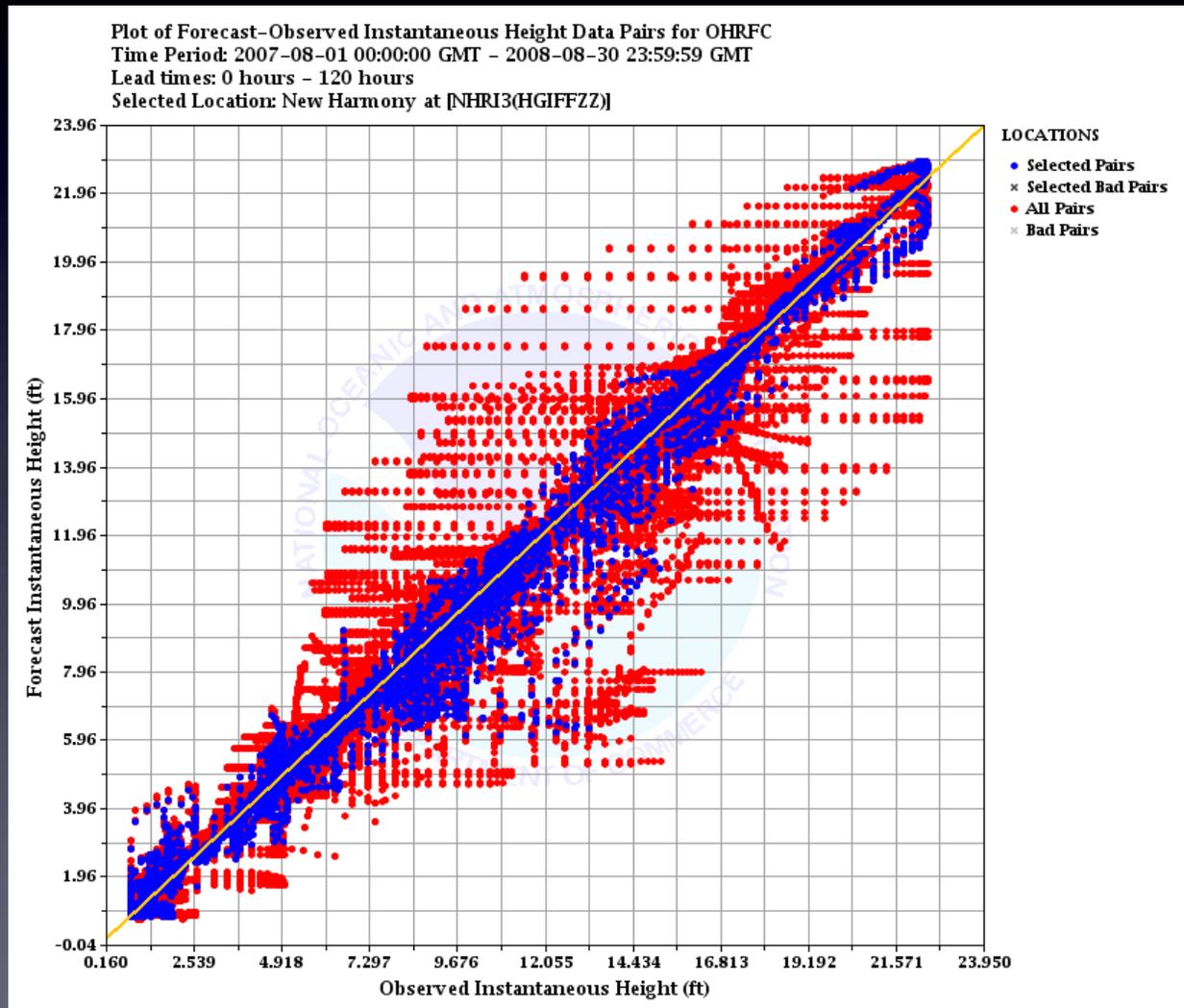
Sample Size MIL01(non-daily)

Plot of Instantaneous Height Error Statistics against Leadtime Interval for OHRFC
 Compared Over Forecast Type Source
 Time Period: 2007-08-01 00:00:00 GMT - 2008-08-31 23:59:59 GMT
 Lead times: 0 hours - 120 hours
 Locations: MIL01



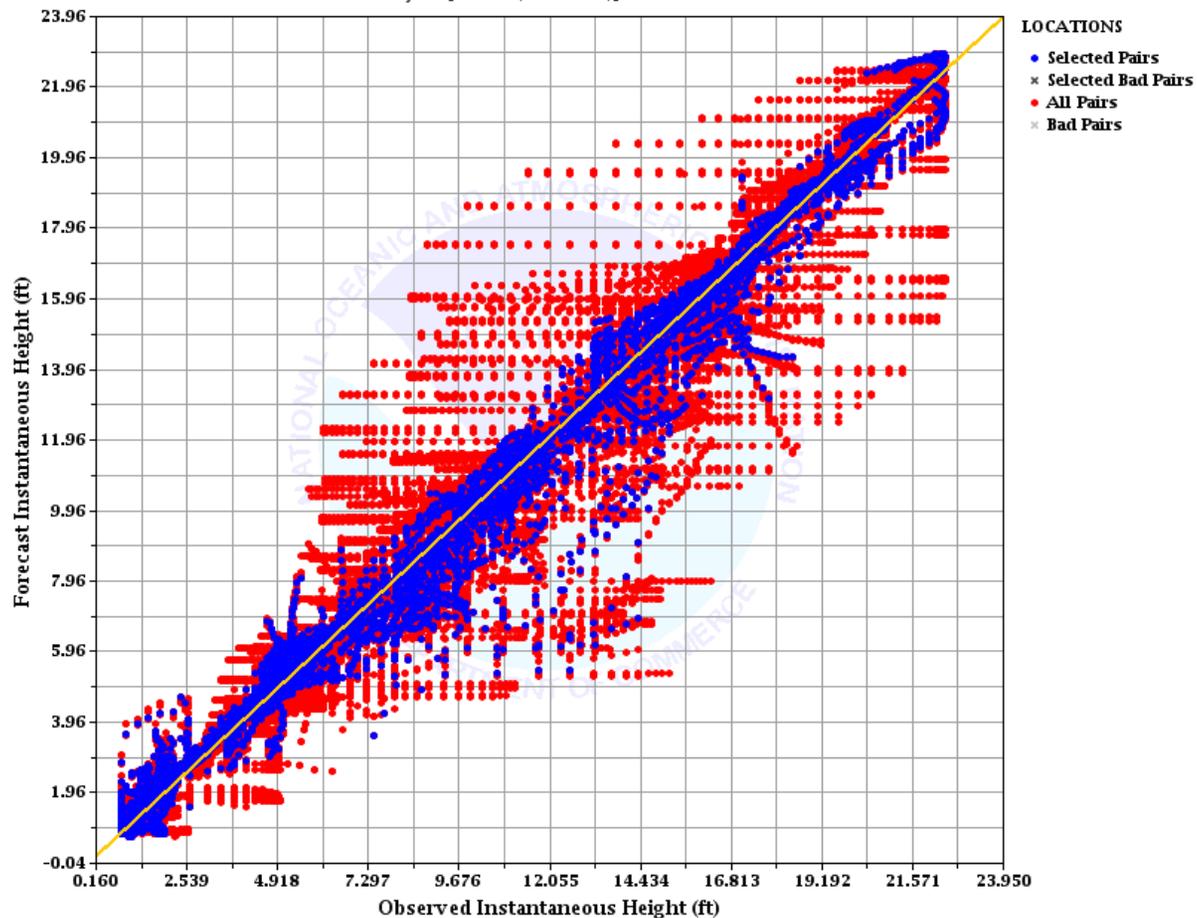
Size matters...

Scatterplot NHRI3 (FF)



Scatterplot NHRI3 (XF)

Plot of Forecast-Observed Instantaneous Height Data Pairs for OHRFC
Time Period: 2007-08-01 00:00:00 GMT - 2008-08-30 23:59:59 GMT
Lead times: 0 hours - 120 hours
Selected Location: New Harmony at [NHRI3(HGIXFZZ)]

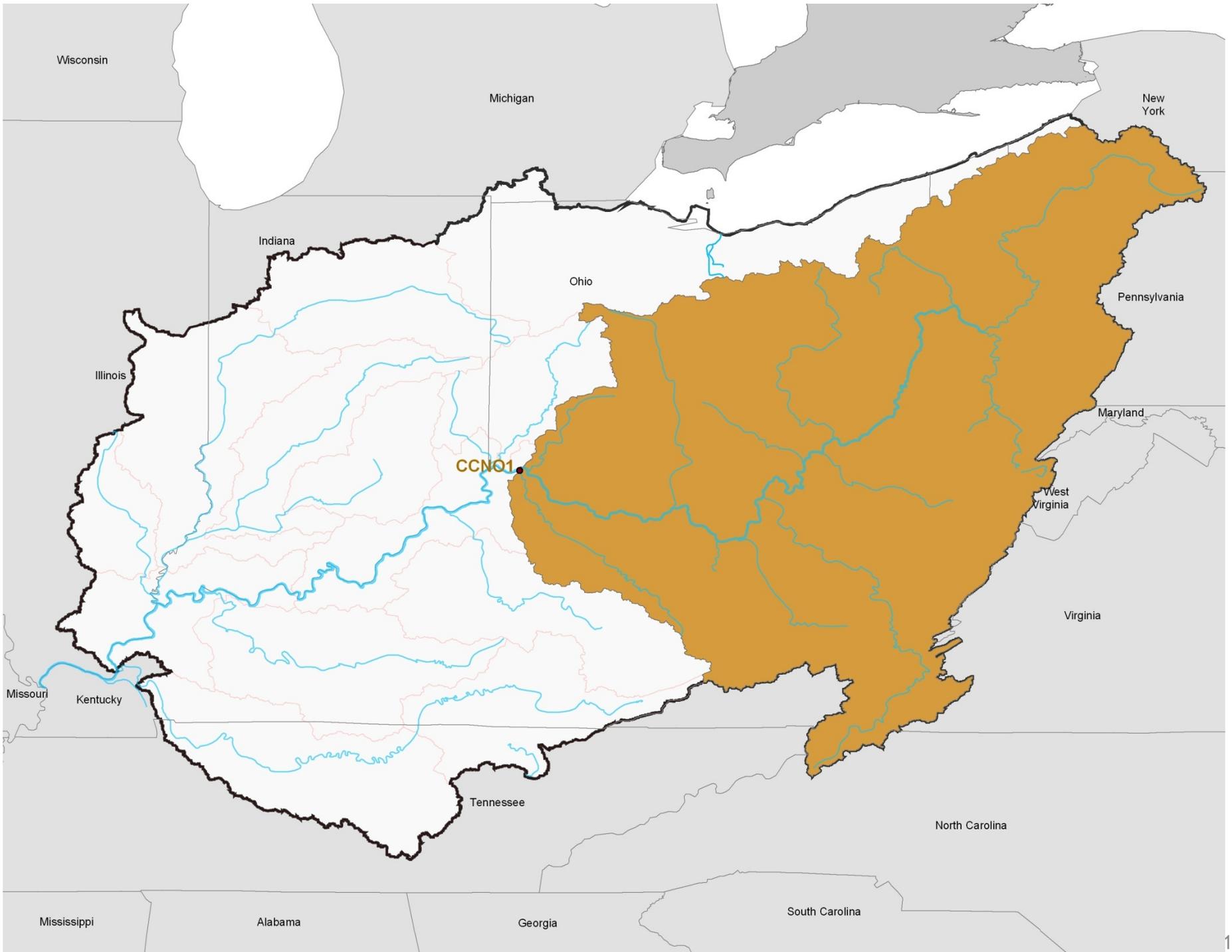


Basins Studied

ID	Forecast Group	Response	Basin Area (mi ²)
MILO1	GTL	fast	371
PSNW2	MNU	fast	722
NWBI3	WHT	medium	4688
LAFI3	WBU	medium	7267
PTTP1	OHW	medium	19101
NHRI3	WBL	slow	29234
CCNO1	OHC	slow	76580







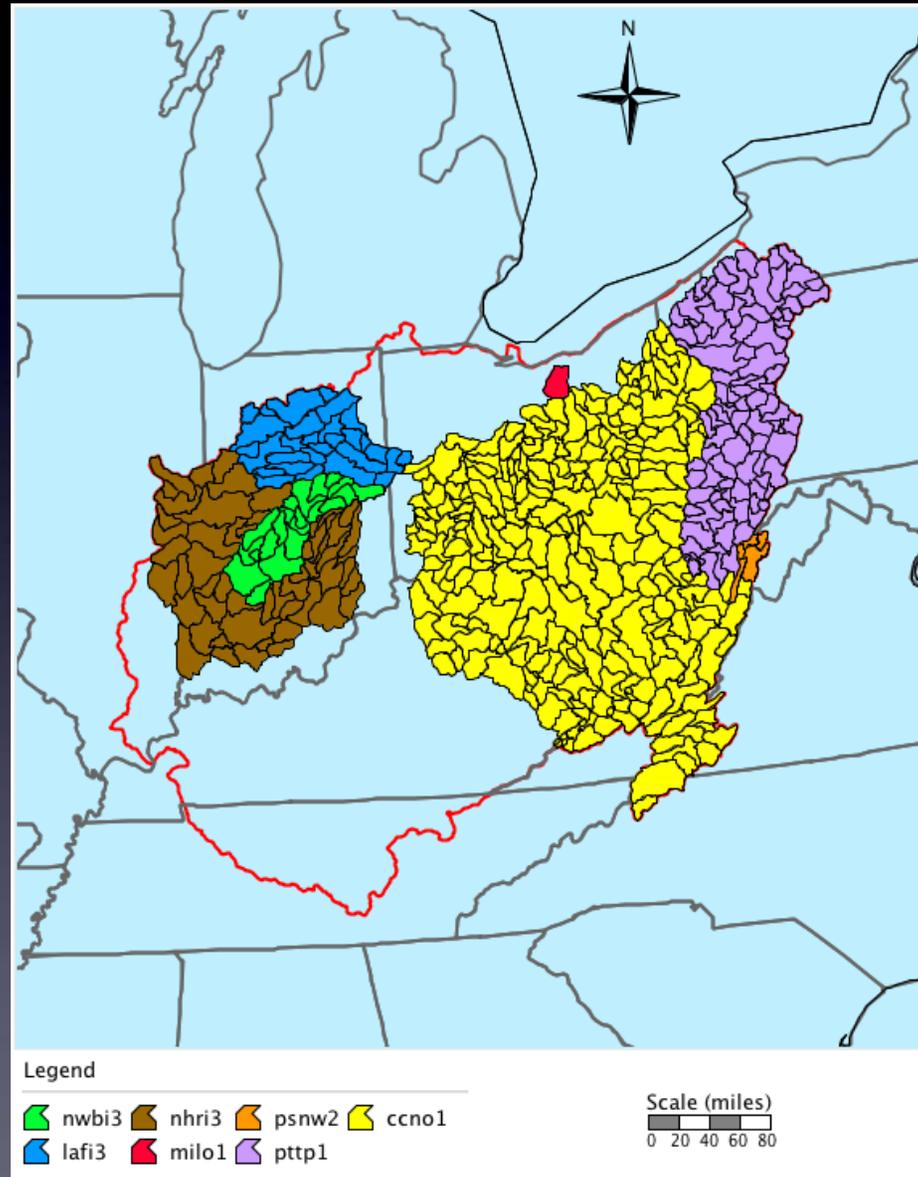








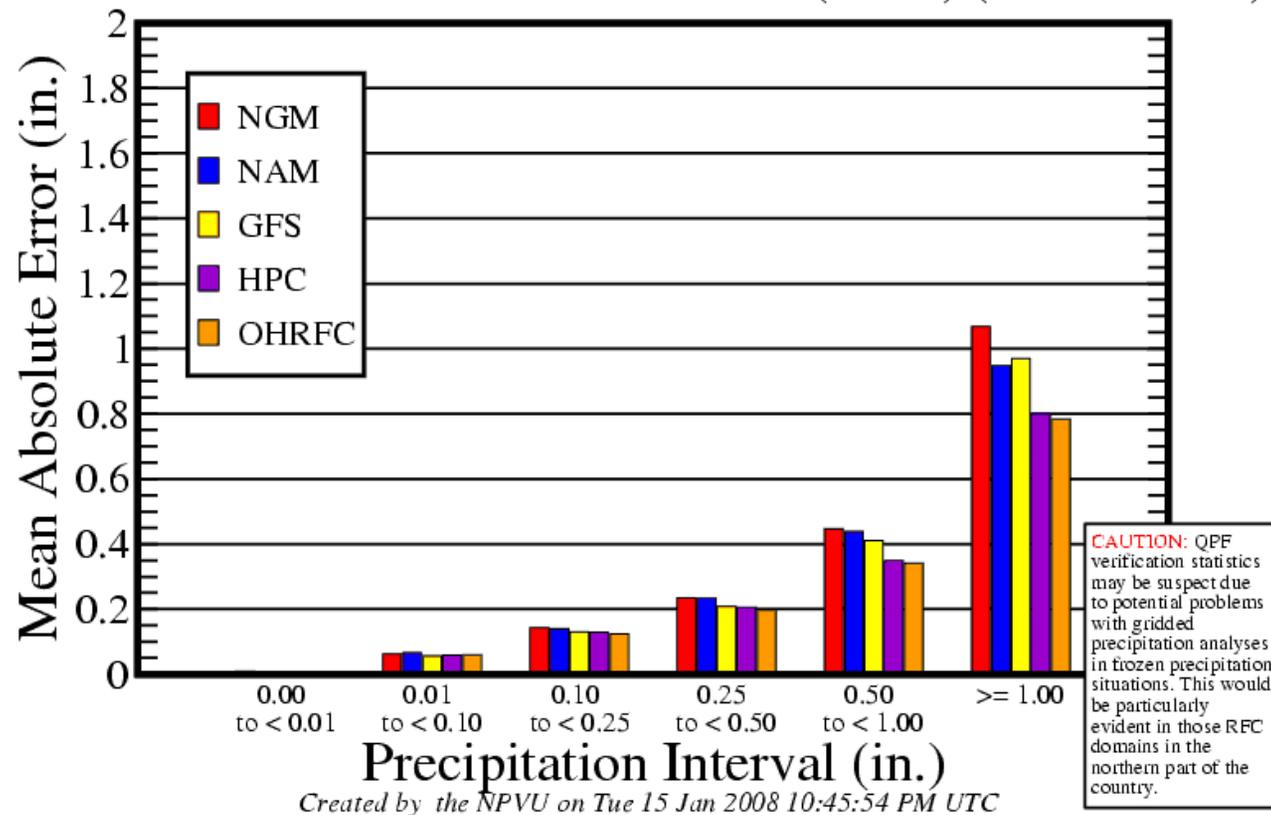
Basin Locations



NPVU Statistics 2007

Ohio RFC - MAE

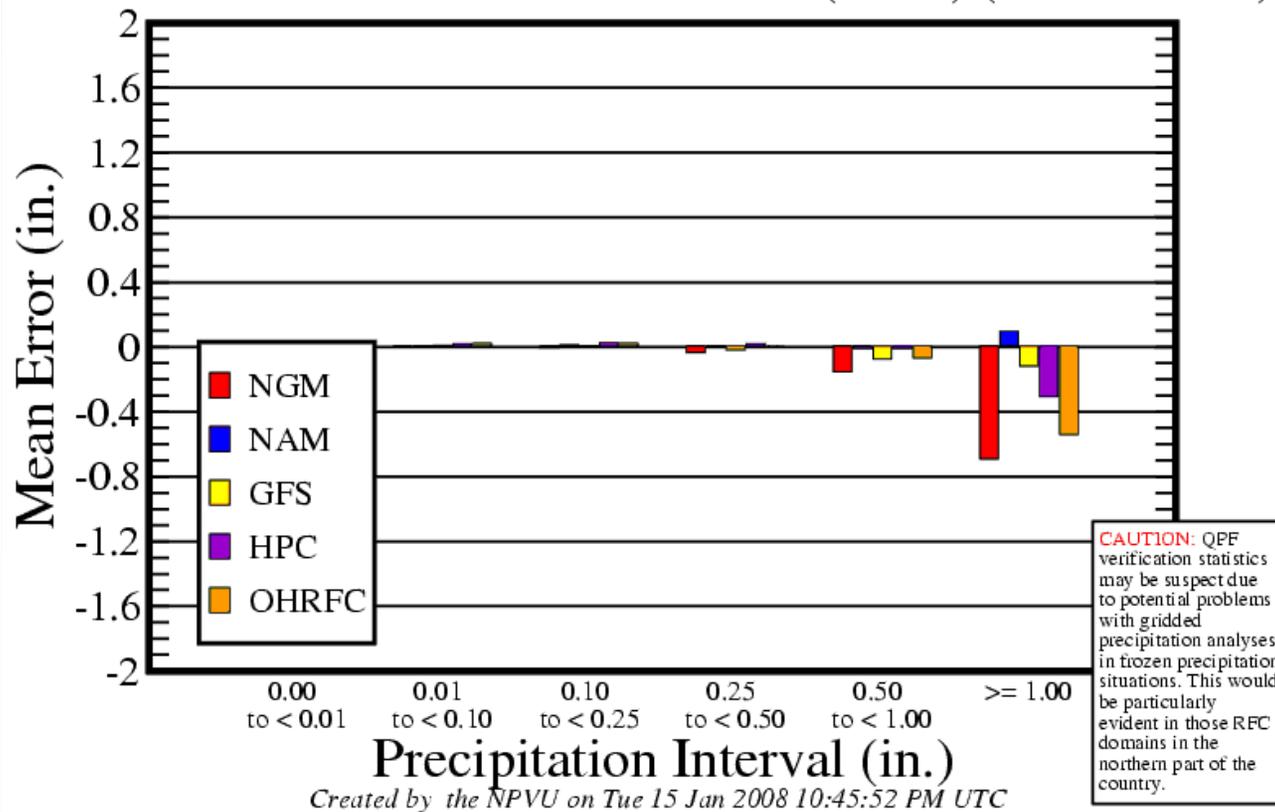
Jan2007-Dec2007 DAY1 06H GRD(32km) (OBS & FOR)



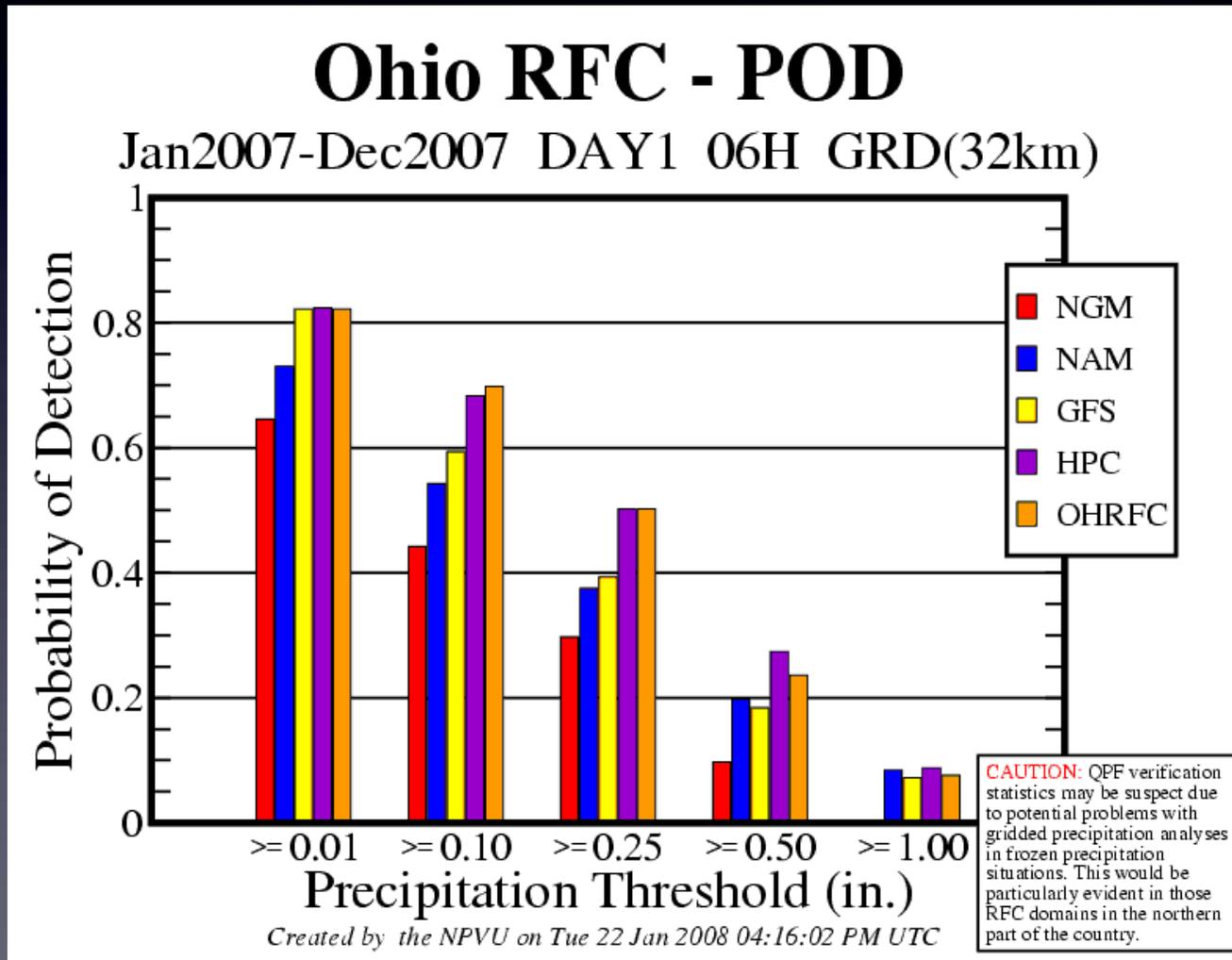
NPVU Statistics 2007

Ohio RFC - ME

Jan2007-Dec2007 DAY1 06H GRD(32km) (OBS & FOR)



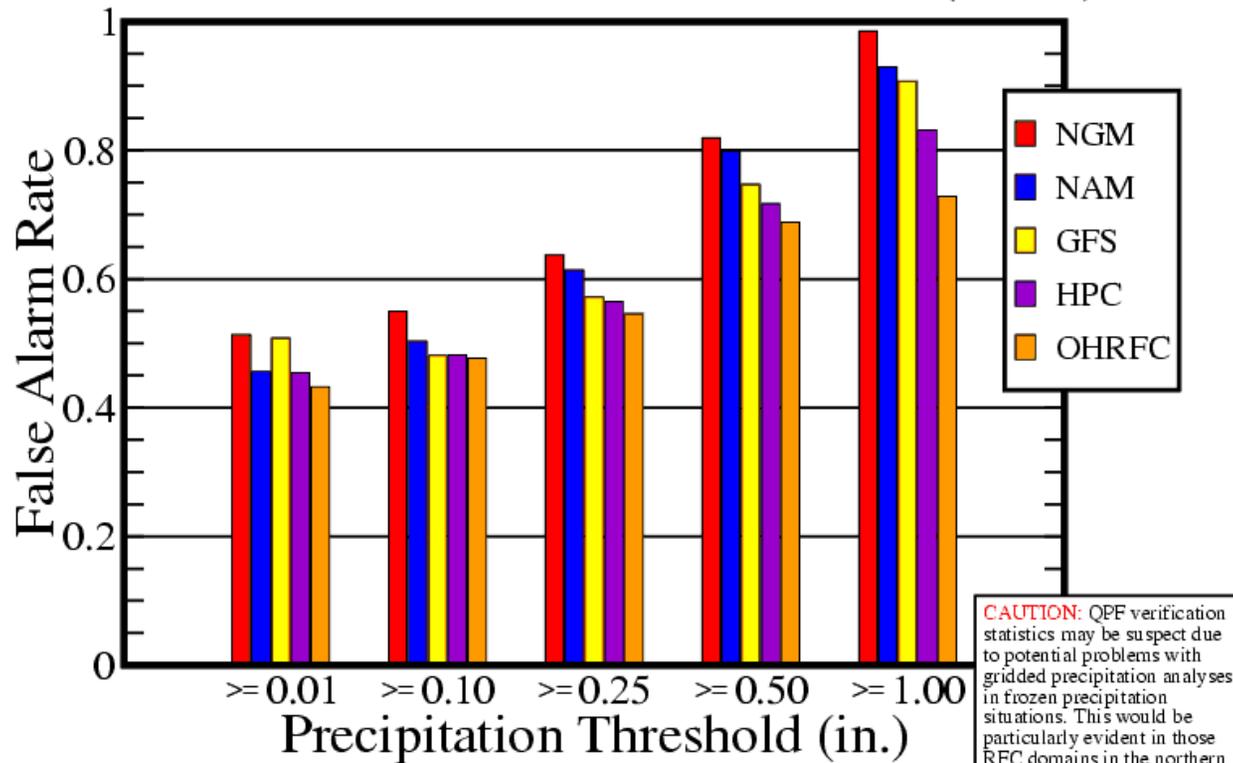
NPVU Statistics 2007



NPVU Statistics 2007

Ohio RFC - FAR

Jan2007-Dec2007 DAY1 06H GRD(32km)



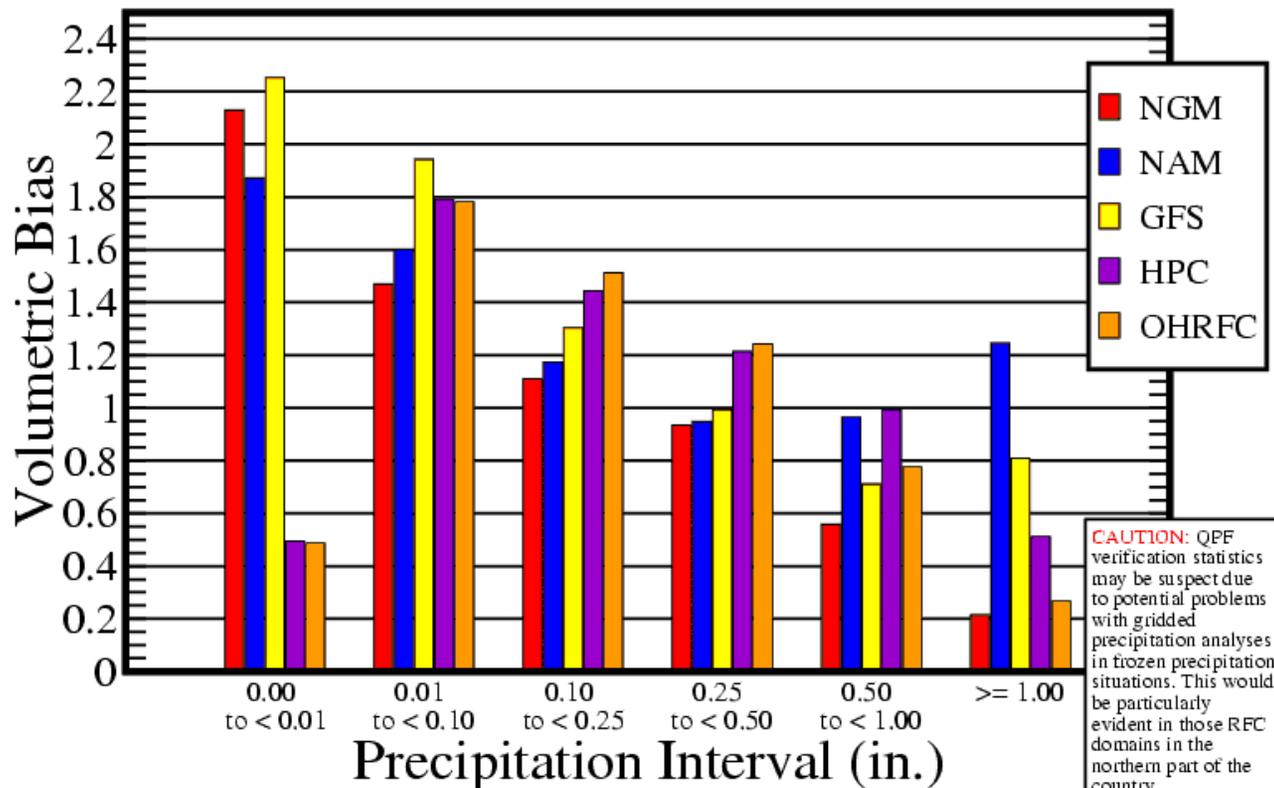
CAUTION: QPF verification statistics may be suspect due to potential problems with gridded precipitation analyses in frozen precipitation situations. This would be particularly evident in those RFC domains in the northern part of the country.

Created by the NPVU on Tue 22 Jan 2008 04:16:03 PM UTC

NPVU Statistics 2007

Ohio RFC - CVBIAS

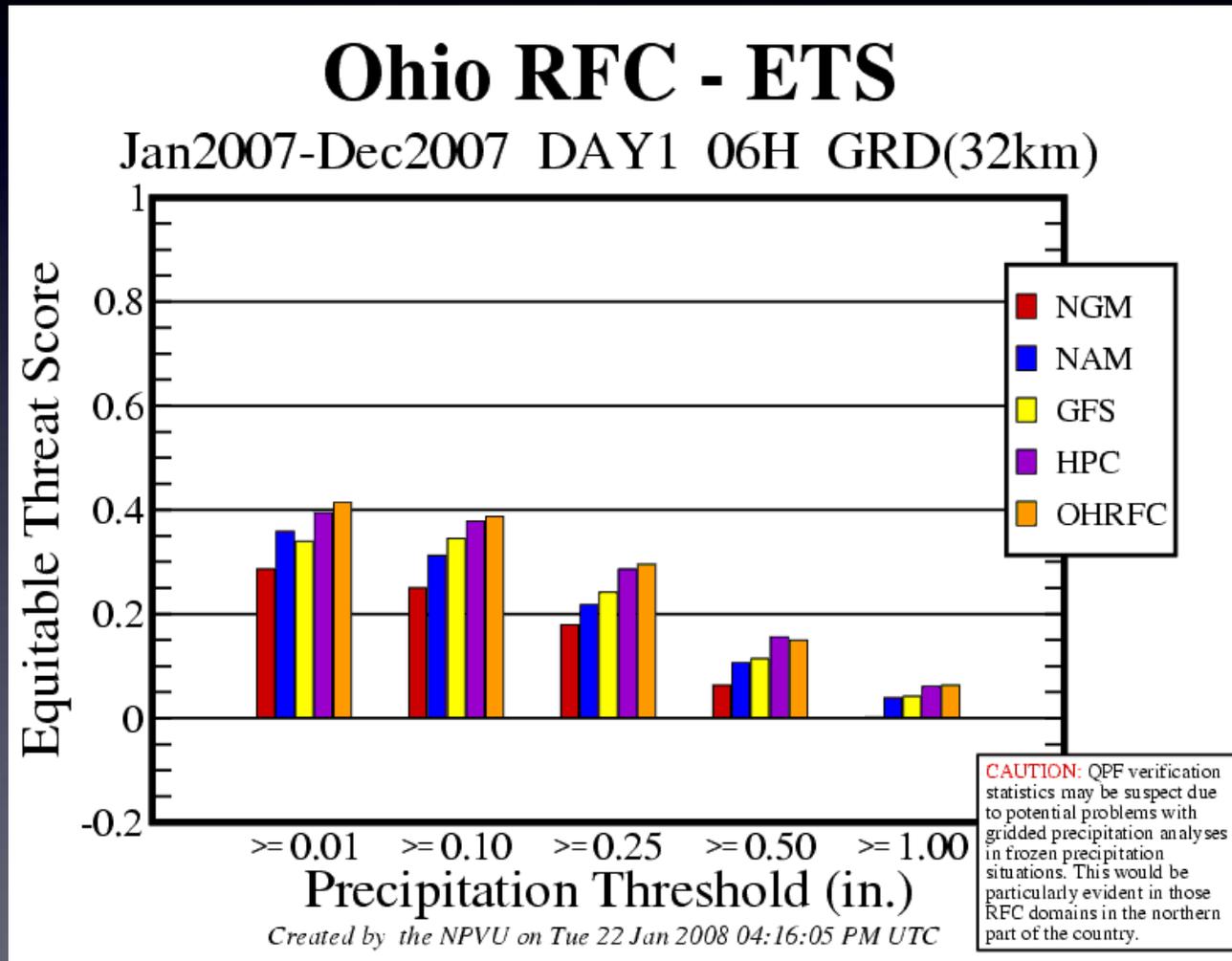
Jan2007-Dec2007 DAY1 06H GRD(32km) (OBS & FOR)



CAUTION: QPF verification statistics may be suspect due to potential problems with gridded precipitation analyses in frozen precipitation situations. This would be particularly evident in those RFC domains in the northern part of the country.

Created by the NPVU on Tue 15 Jan 2008 10:45:58 PM UTC

NPVU Statistics 2007



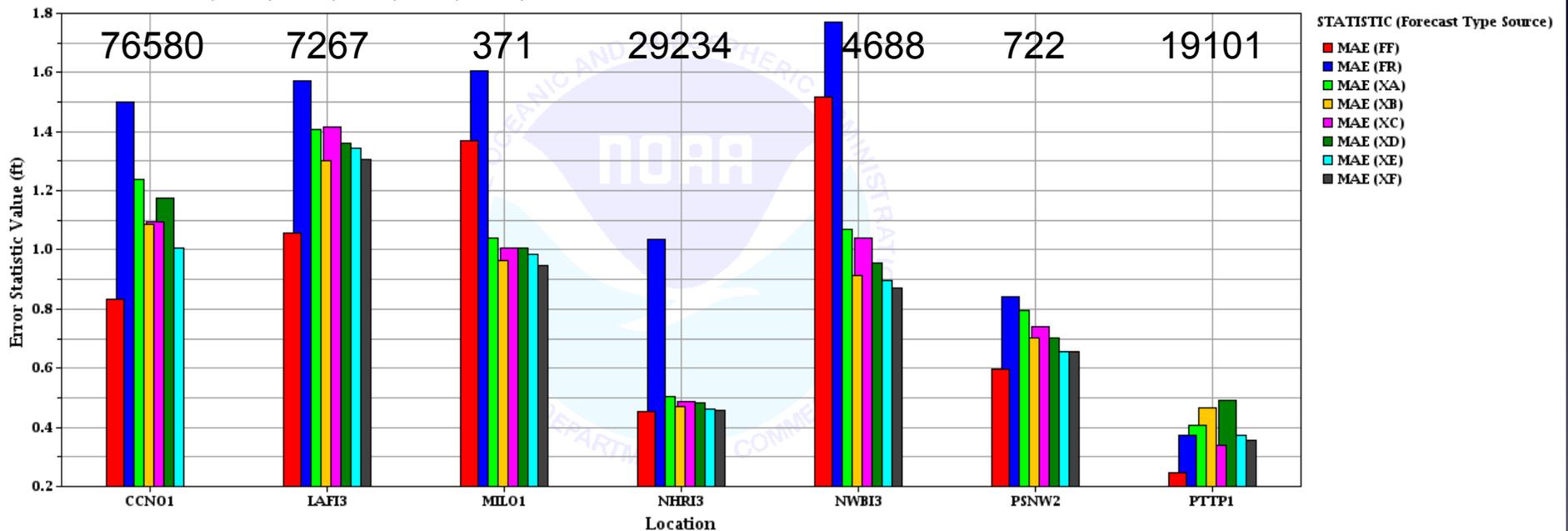
Key

Code	Meaning
XA	No MODs, No QPF
XB	No MODs, with QPF
XC	with MODs, No QPF
XD	No MODs, with HPC
XE	with MODs, with HPC
XF	with MODs, with QPF
FF	Operational Forecast
FR	Persistence

IVP Summary Graphics

MAE

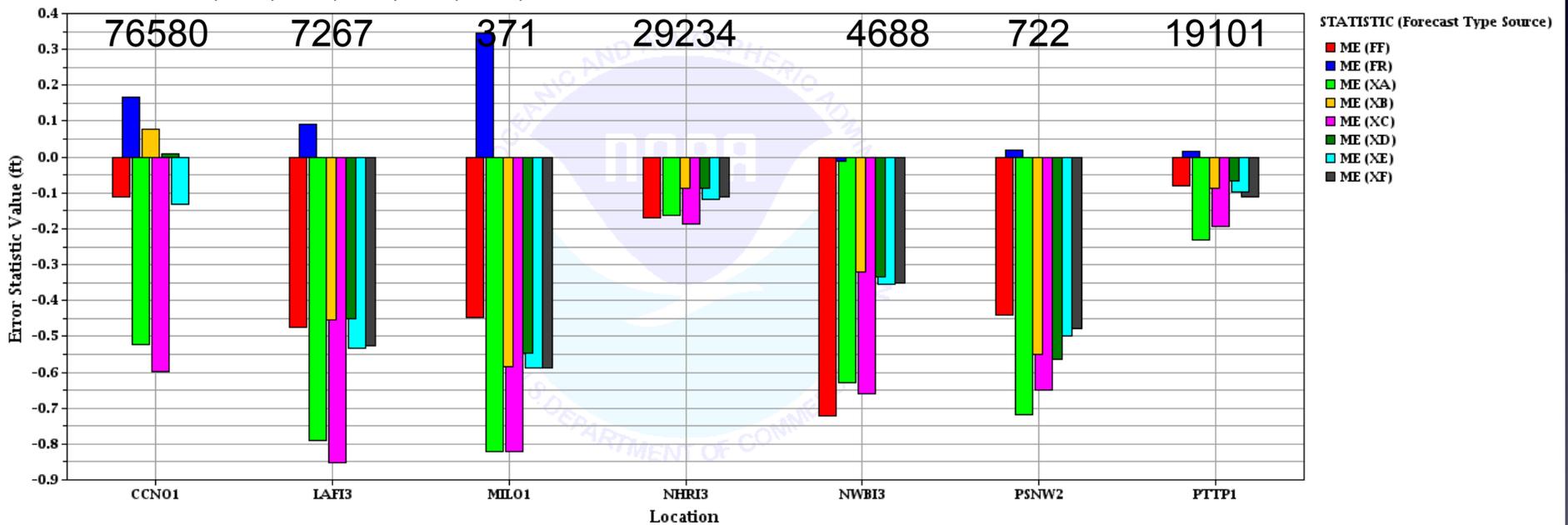
Plot of Instantaneous Height Error Statistics against Location for OHRFC
 Compared Over Forecast Type Source
 Time Period: 2007-08-01 00:00:00 GMT - 2008-08-30 23:59:59 GMT
 Lead times: 0 hours - 120 hours
 Locations: CCN01, LAFI3, MILO1, NHRI3, NWBI3, PSNW2, PTPP1



IVP Summary Graphics

ME

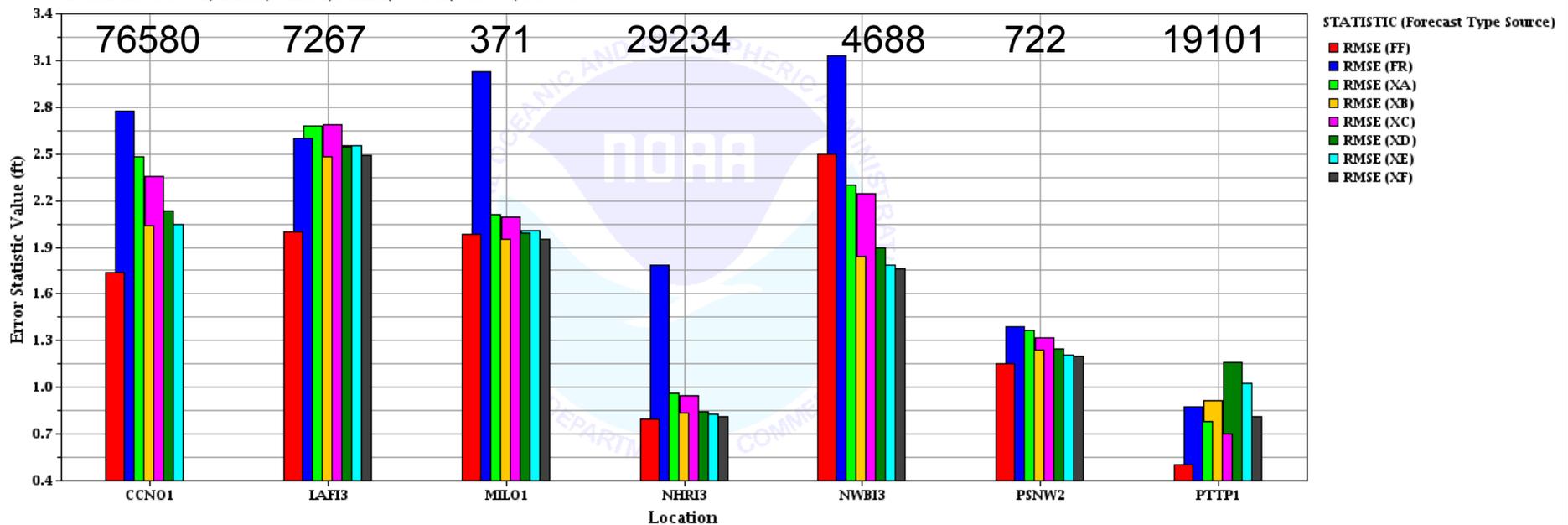
Plot of Instantaneous Height Error Statistics against Location for OHRFC
 Compared Over Forecast Type Source
 Time Period: 2007-08-01 00:00:00 GMT - 2008-08-30 23:59:59 GMT
 Lead times: 0 hours - 120 hours
 Locations: CCNO1, LAFI3, MILO1, NHRI3, NWBI3, PSNW2, PTTP1



IVP Summary Graphics

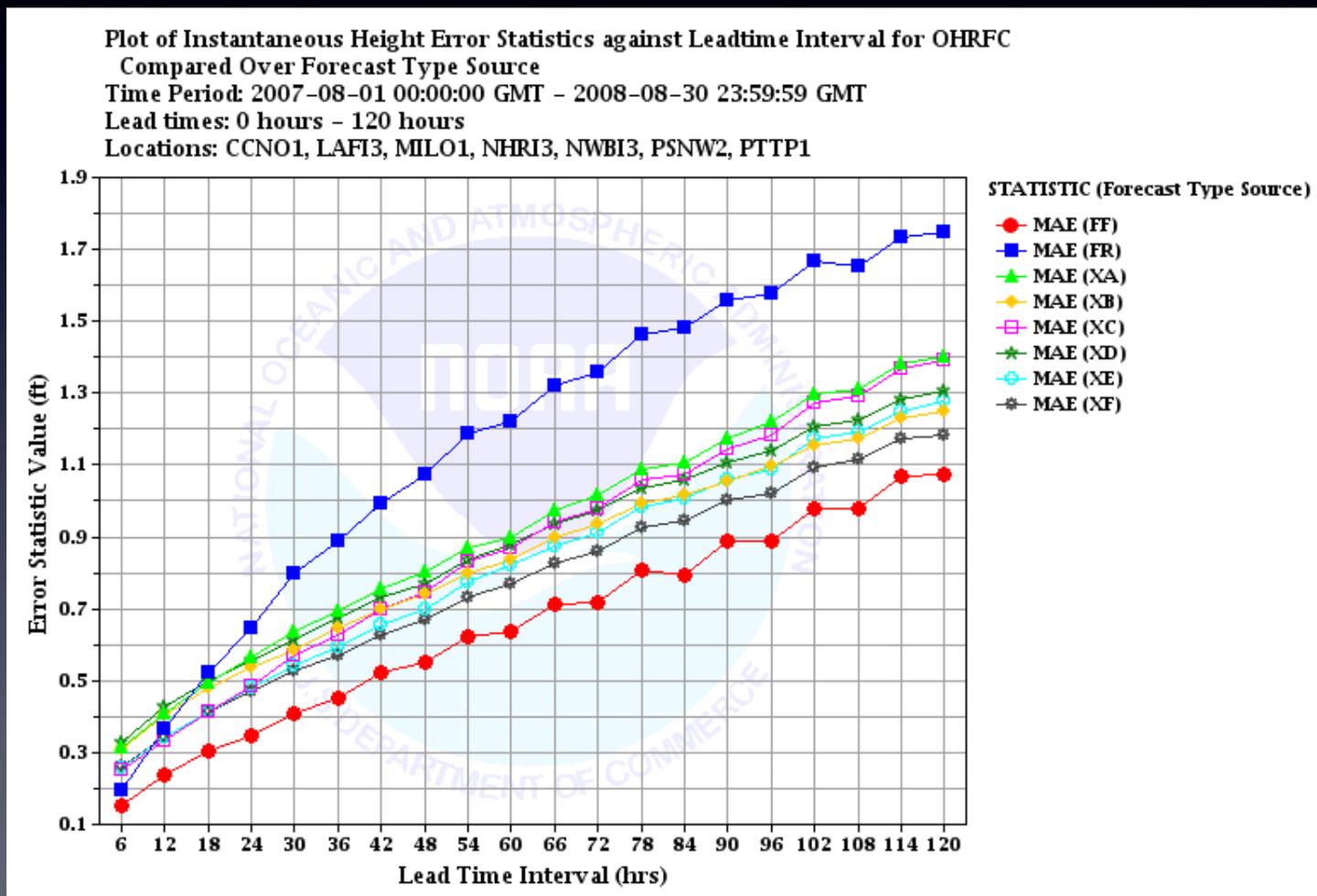
RMSE

Plot of Instantaneous Height Error Statistics against Location for OHRFC
 Compared Over Forecast Type Source
 Time Period: 2007-08-01 00:00:00 GMT - 2008-08-30 23:59:59 GMT
 Lead times: 0 hours - 120 hours
 Locations: CCNO1, LAFI3, MILO1, NHRI3, NWBI3, PSNW2, PTPP1



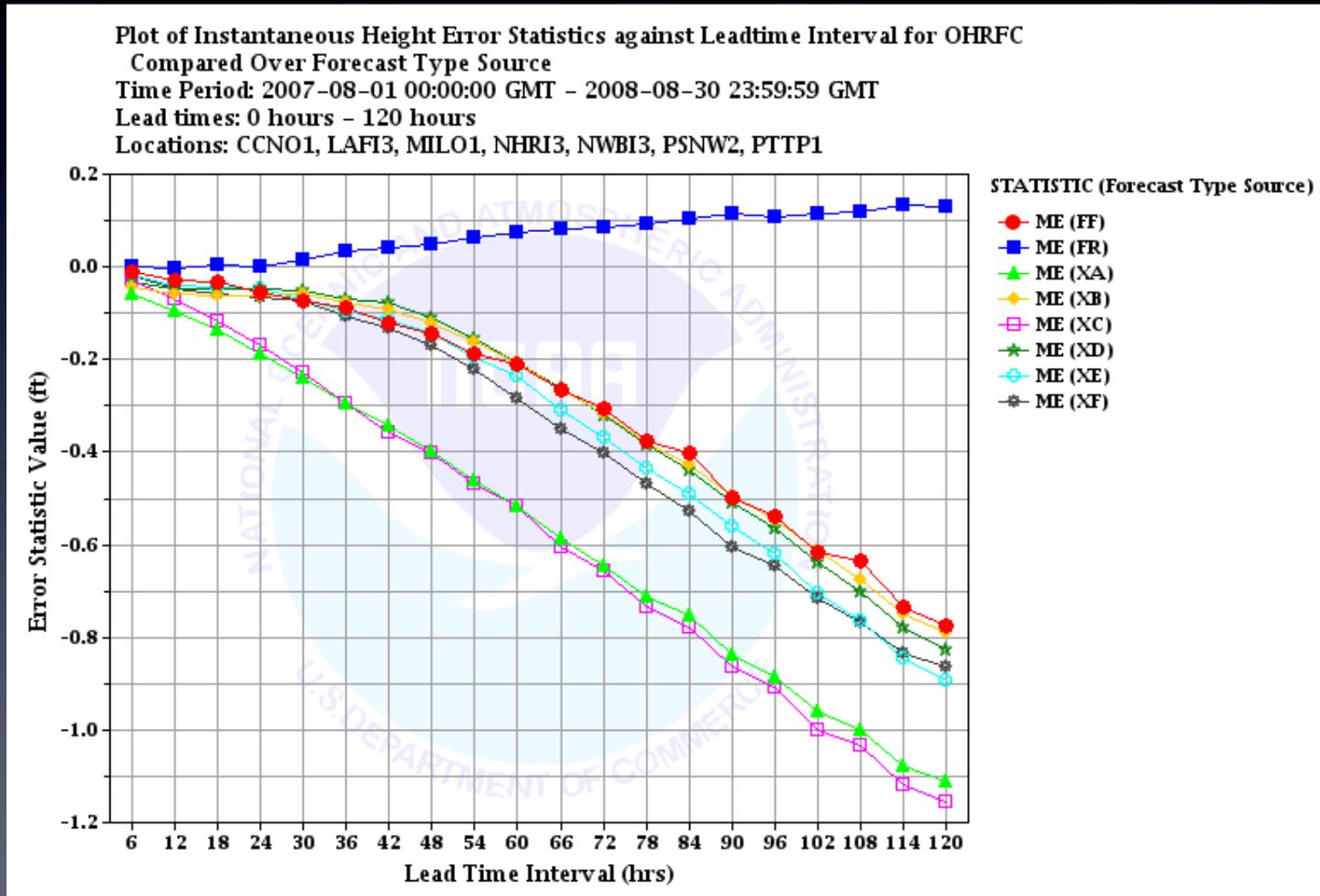
IVP Summary Graphics

MAE by Leadtime



IVP Summary Graphics

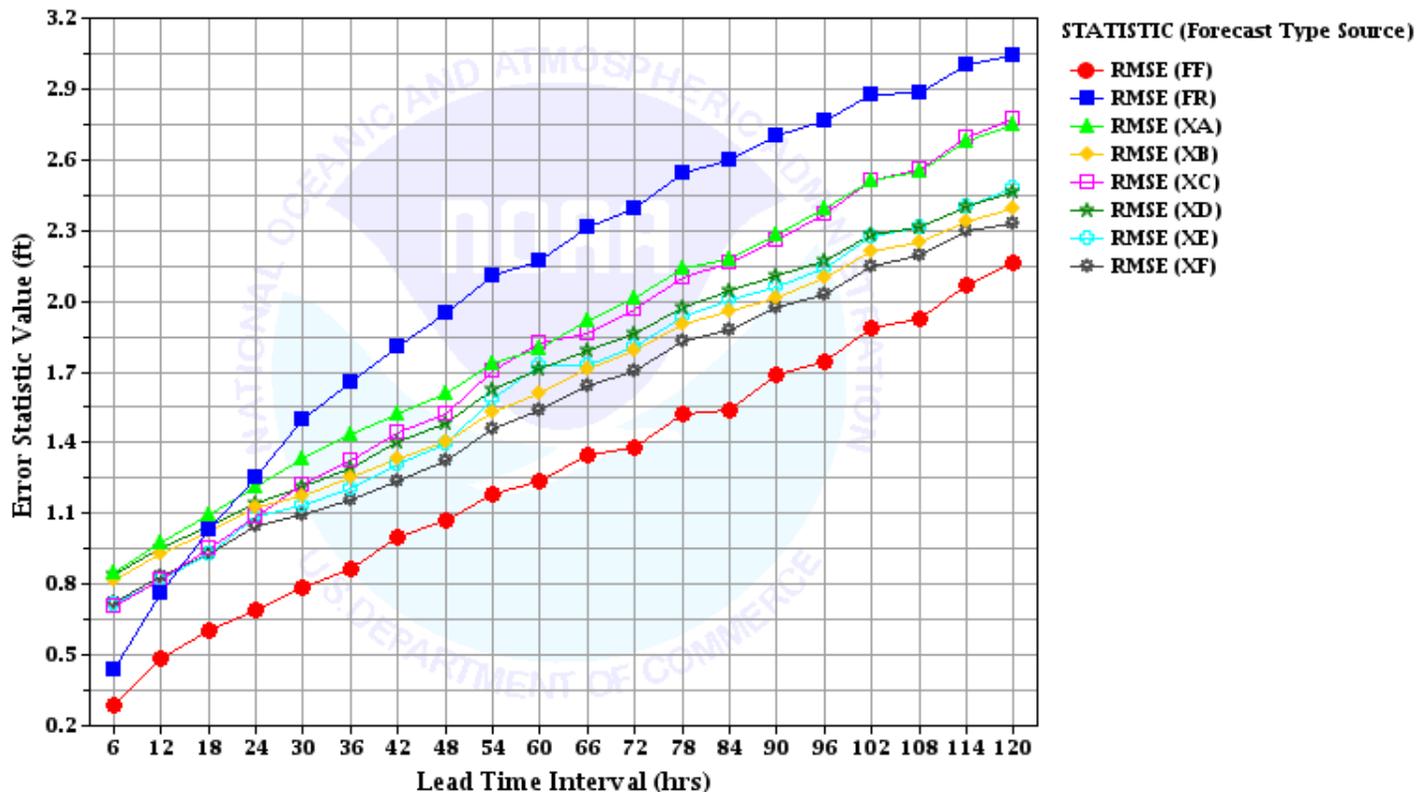
ME by Leadtime



IVP Summary Graphics

RMSE by Leadtime

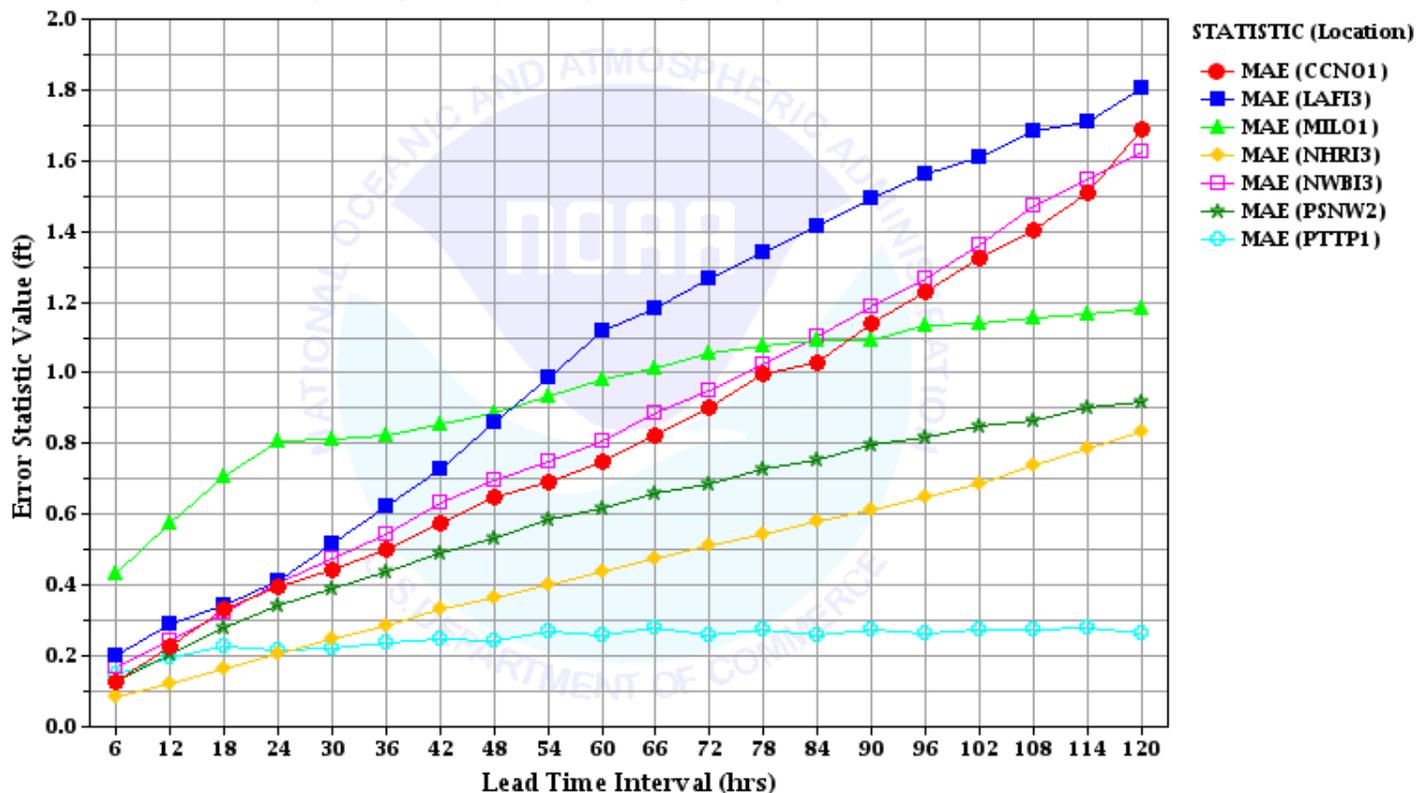
Plot of Instantaneous Height Error Statistics against Leadtime Interval for OHRFC
Compared Over Forecast Type Source
Time Period: 2007-08-01 00:00:00 GMT - 2008-08-30 23:59:59 GMT
Lead times: 0 hours - 120 hours
Locations: CCNO1, LAFI3, MILO1, NHRI3, NWBI3, PSNW2, PTPP1



IVP Summary Graphics

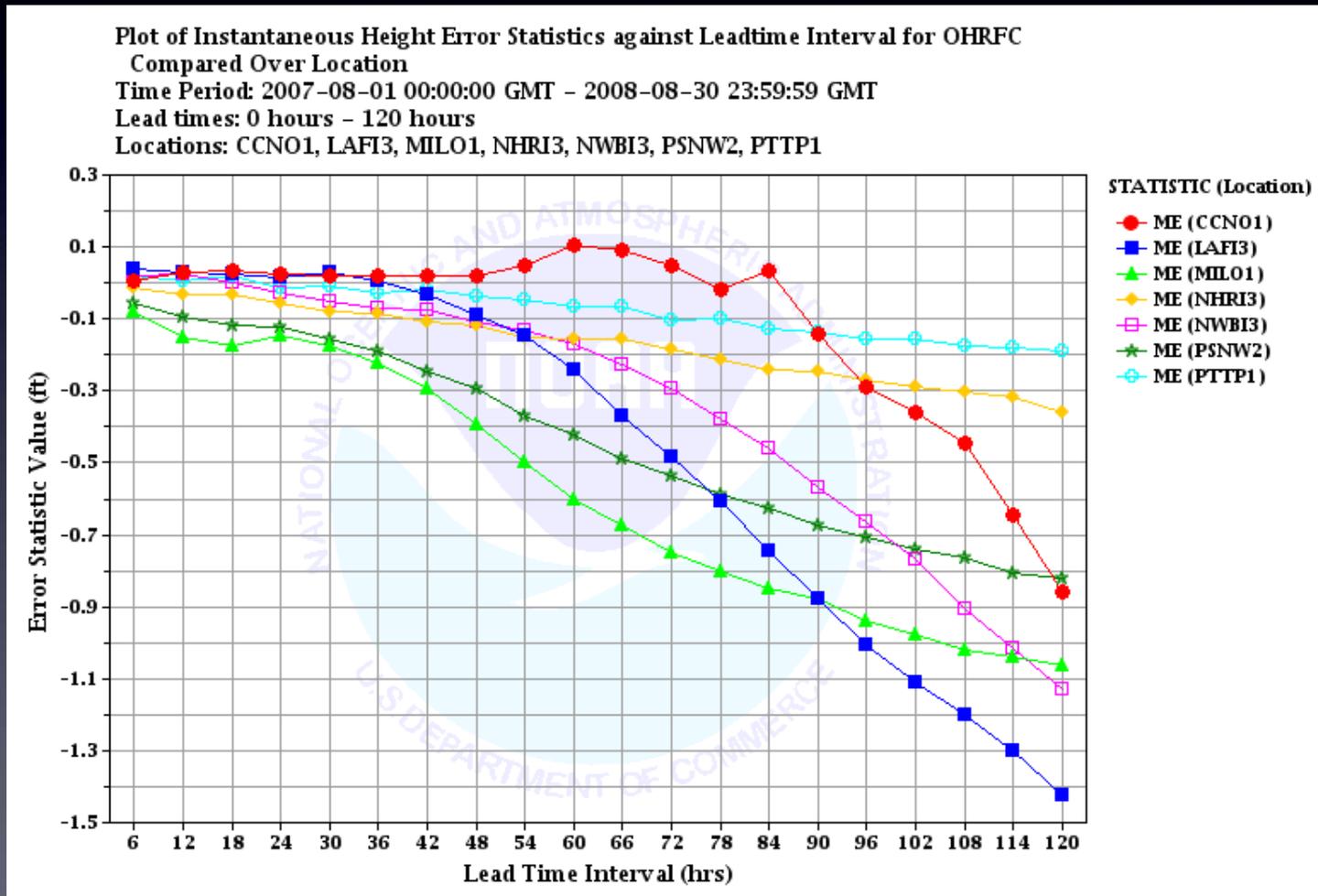
MAE by Location

Plot of Instantaneous Height Error Statistics against Leadtime Interval for OHRFC
Compared Over Location
Time Period: 2007-08-01 00:00:00 GMT - 2008-08-30 23:59:59 GMT
Lead times: 0 hours - 120 hours
Locations: CCNO1, LAFI3, MILO1, NHRI3, NWBI3, PSNW2, PTPP1



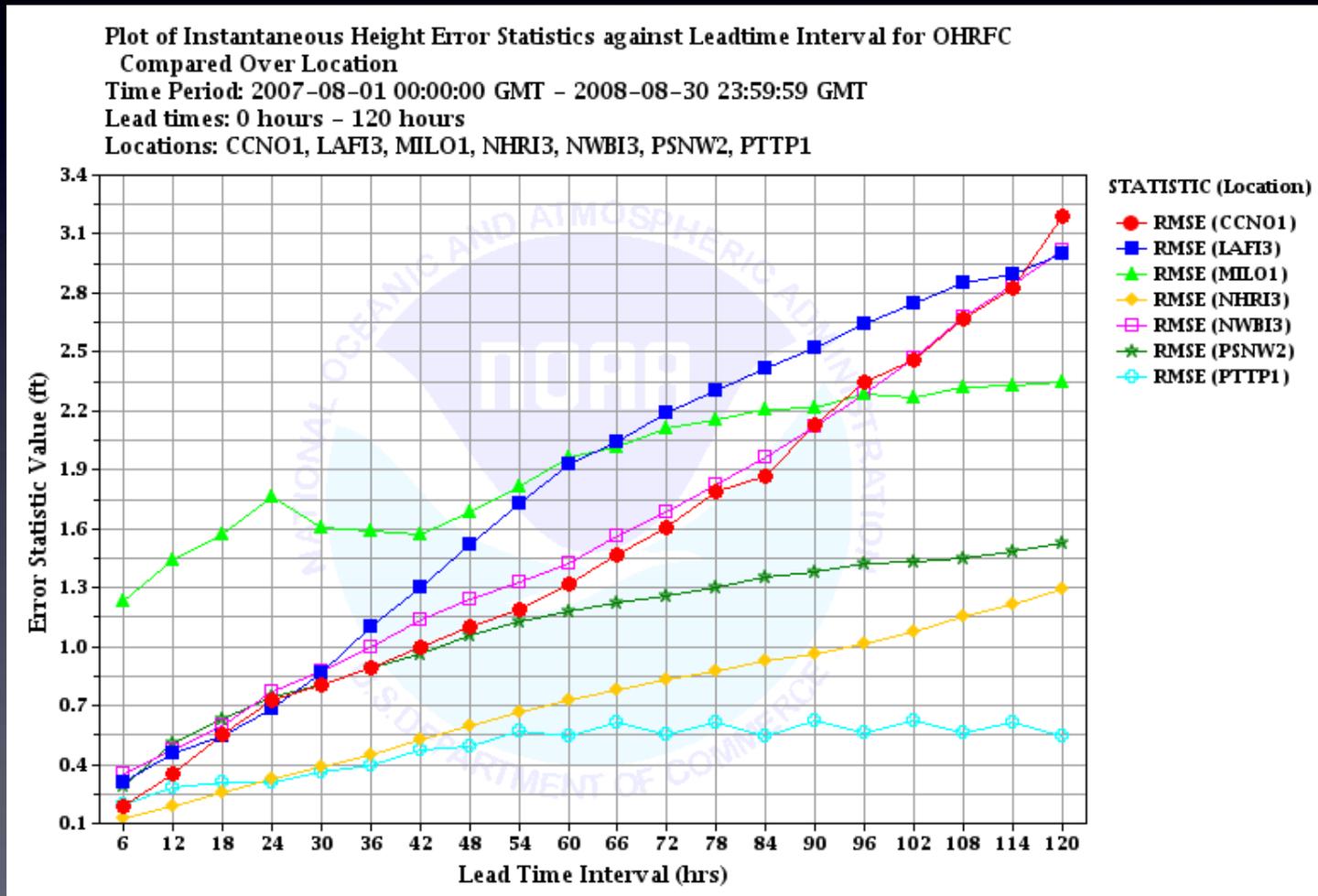
IVP Summary Graphics

ME by Location

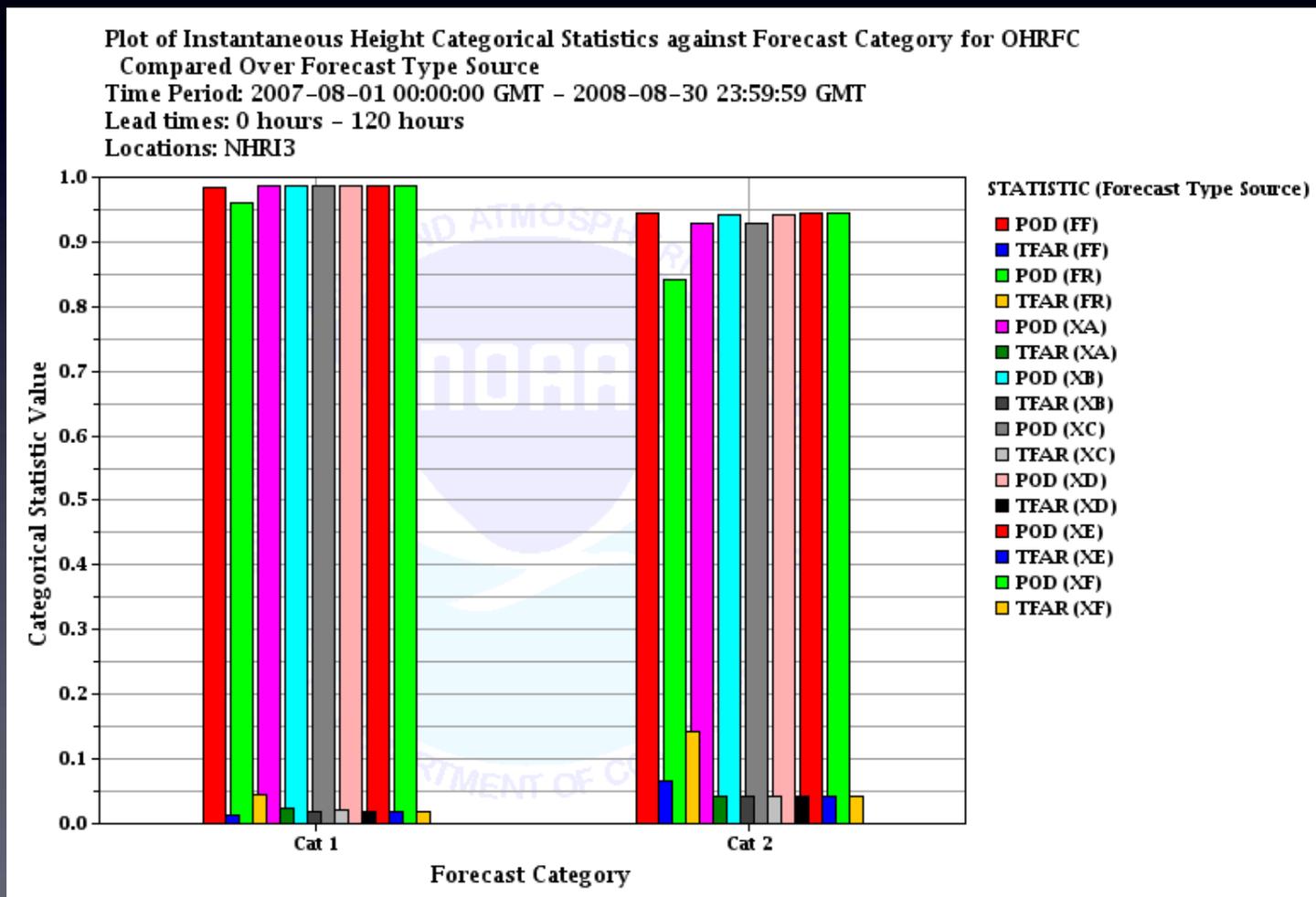


IVP Summary Graphics

RMSE by Location

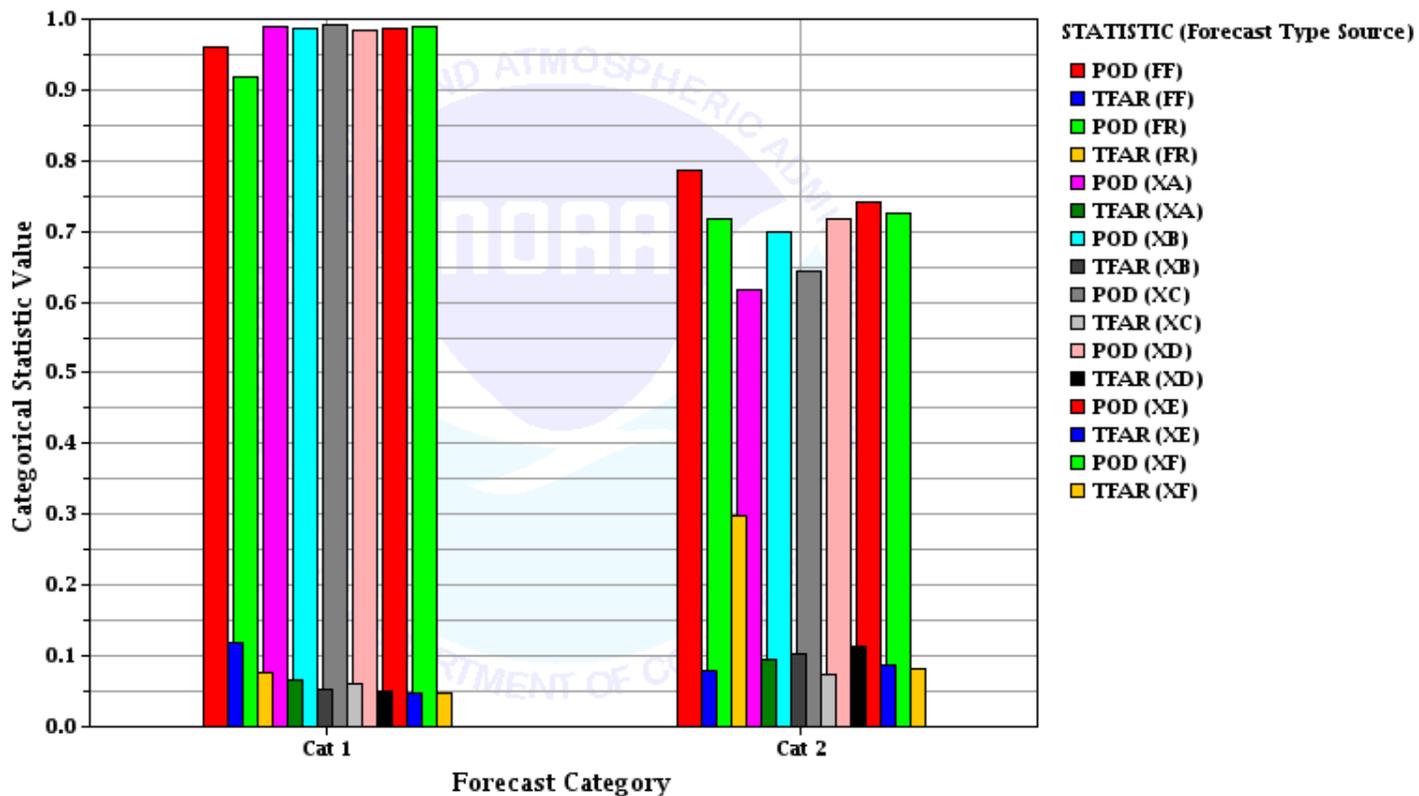


POD & FAR NHRI3



POD & FAR NWBI3

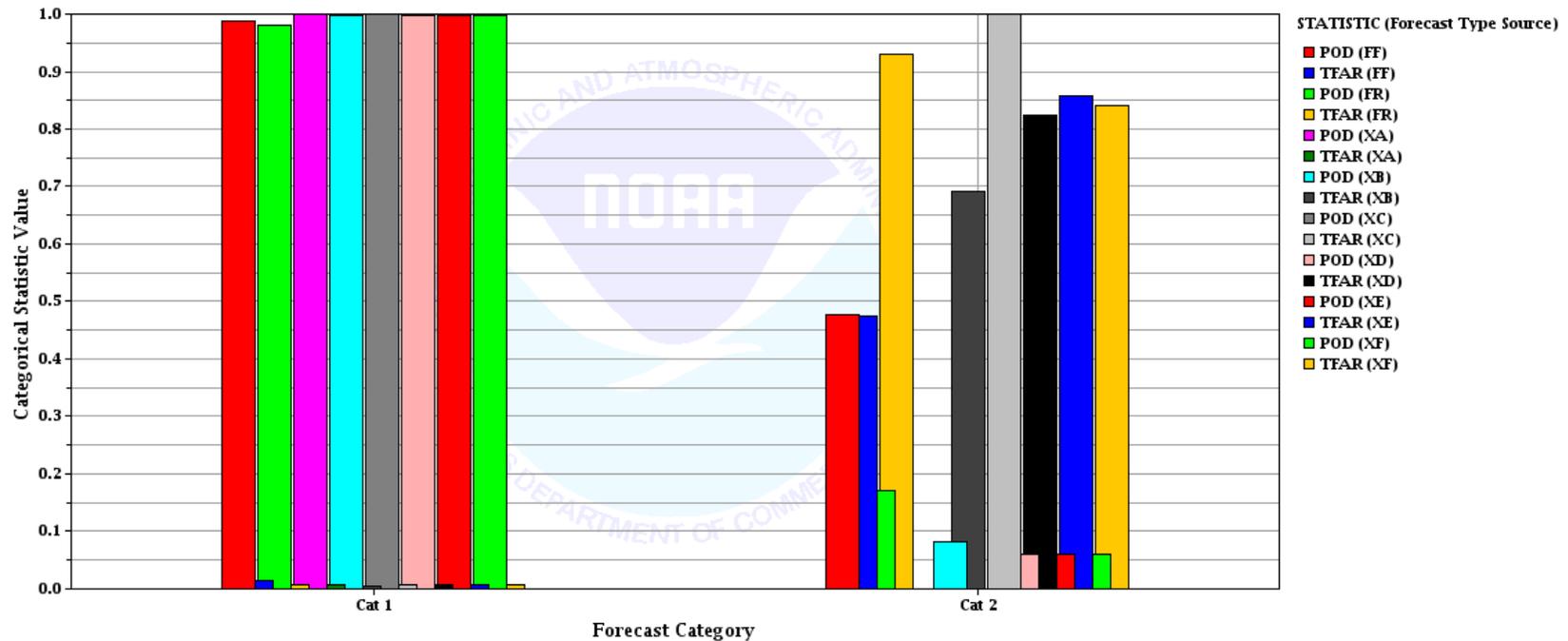
Plot of Instantaneous Height Categorical Statistics against Forecast Category for OHRFC
 Compared Over Forecast Type Source
 Time Period: 2007-08-01 00:00:00 GMT - 2008-08-30 23:59:59 GMT
 Lead times: 0 hours - 120 hours
 Locations: NWBI3



POD & FAR

MILO1

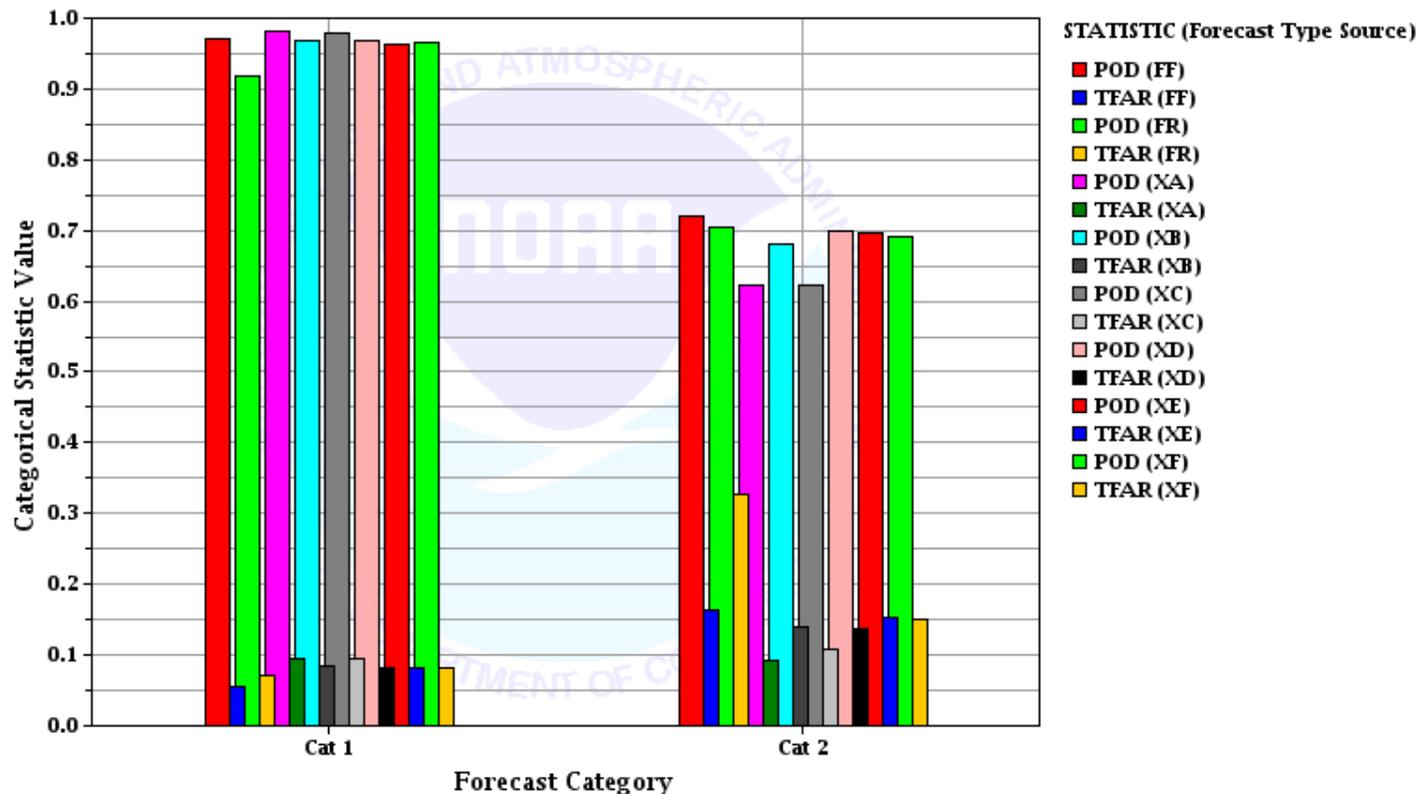
Plot of Instantaneous Height Categorical Statistics against Forecast Category for OHRFC
 Compared Over Forecast Type Source
 Time Period: 2007-08-01 00:00:00 GMT - 2008-08-30 23:59:59 GMT
 Lead times: 0 hours - 120 hours
 Locations: MILO1



POD & FAR

LAFI3

Plot of Instantaneous Height Categorical Statistics against Forecast Category for OHRFC
 Compared Over Forecast Type Source
 Time Period: 2007-08-01 00:00:00 GMT - 2008-08-30 23:59:59 GMT
 Lead times: 0 hours - 120 hours
 Locations: LAFI3



Summary

- Use of QPF improves forecasts...
 - more apparent for larger basins
- MODs *generally* improve forecasts
- Forecasts better with OHRFC HAS QPF than with HPC QPF
- Must carefully scrutinize statistics when drawing conclusions
- Statistics worse for flood-only points
- Sample size!

Future Study

- Analyze all modeled points (including non-daily)
- Look at >0 QPF forecasts vs zero-QPF forecasts
- Study 6-, 12-, 24-, 48-, 72-hour HPC forecasts