# Comparative Verification of Experimental HR QPFs with Model and Forecaster-Prepared QPFs in the NWS

Jess Charba
Fred Samplatsky

Meteorological Development Laboratory
National Weather Service, NOAA

Details = http://ams.confex.com/data/manuscript/ams/91Annual/Paper_177686_manuscript_132_0.pdf

HR QPF website = http://www.weather.gov/mdl/hrqpf/

# What is HR QPF ?

- HR QPF = high spatial and intensity resolution quant. precip forecasts
  - GFS-based MOS experimental model
  - Produced 2x / day since June 2008
  - On 4-km grid over CONUS
  - Two articles in Jan 2011 issue of MWR
- HR QPF elements
  - QPF = “single value” precip amount
  - PQPF = probabilities for precip thresholds
  - PoP = probability of precip
  - 6- and 12-h valid periods
  - 6-h projections to “day” 6.5 (day 8 for PoP)

# Objective

- Use comparative scoring to see whether HR QPF elements provide
  - Better model guidance than presently available
- Compare HR performance with forecasters at
  - HPC (NCEP Hydromet. Predict. Center)
  - WFOs (produce NDFD QPFs)
- Compare HR performance with MOS

# Model QPF Guidance Included in Verification

- NCEP models
  - NAM
  - GFS
  - HPC 6-h PQPF “hybrid” exp. model
    - fits prob. density function to ensemble model and HPC forecaster QPFs
- Gridded MOS QPF and PoP
- MOS QPF (at MOS stations)

# Human-Prepared Grids Included In Verification

- HPC 6-h QPF
- NDFD (Nat. Digit. Fcst. Database prod. by WFOs)
  - 6-h QPF
  - 12-h PoP

# QPF Issuance Times (1200 Z Cycle)

- **Model cut-off time**
  - ~ 1800 Z
- **Human cut-off time**
  - HPC ~ 2200 Z
  - NDFD ~ 0000 Z (next day)

# Verification Data and Scoring

- Stage IV quantitative precip estimates (QPE)
- Scoring performed on 4-km QPE grid and at MOS stations
- Independent verification samples
  - Period = Oct 2009 – Nov 2010
  - Cool (Oct – Mar) and warm (Apr – Sep) seasons
- CONUS domain

# 6-h Cat. QPF

## 4-km grid

## Models

NAM, GFS, GMOS, HR

## Humans

HPC, NDFD

## Oct 2009 – Mar 2010

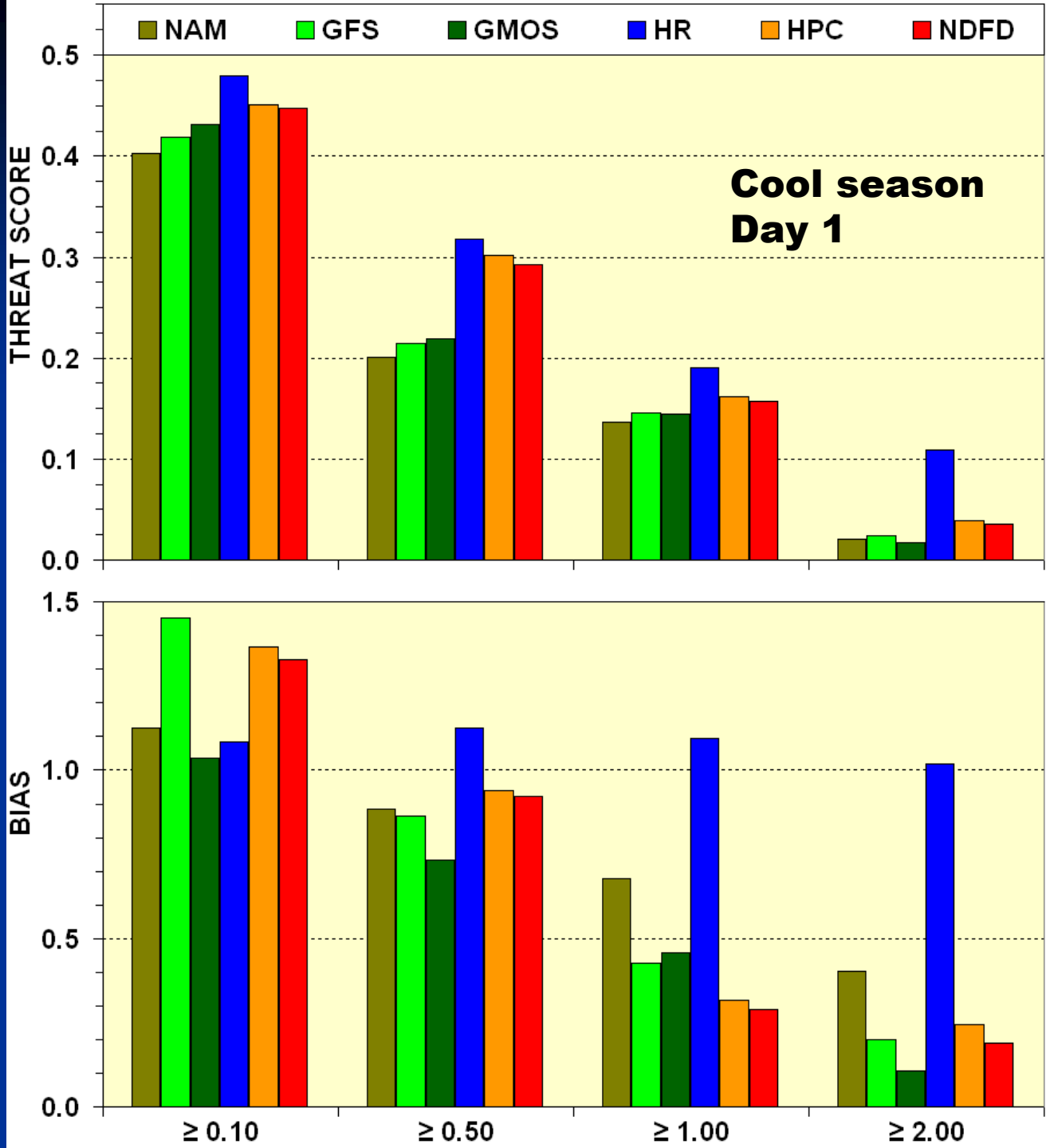
## Notes

Similar rankings -

Warm season

Days 2 – 3

12-h valid period



# 6-h Cat. QPF

## 1647 MOS stations

## Models only

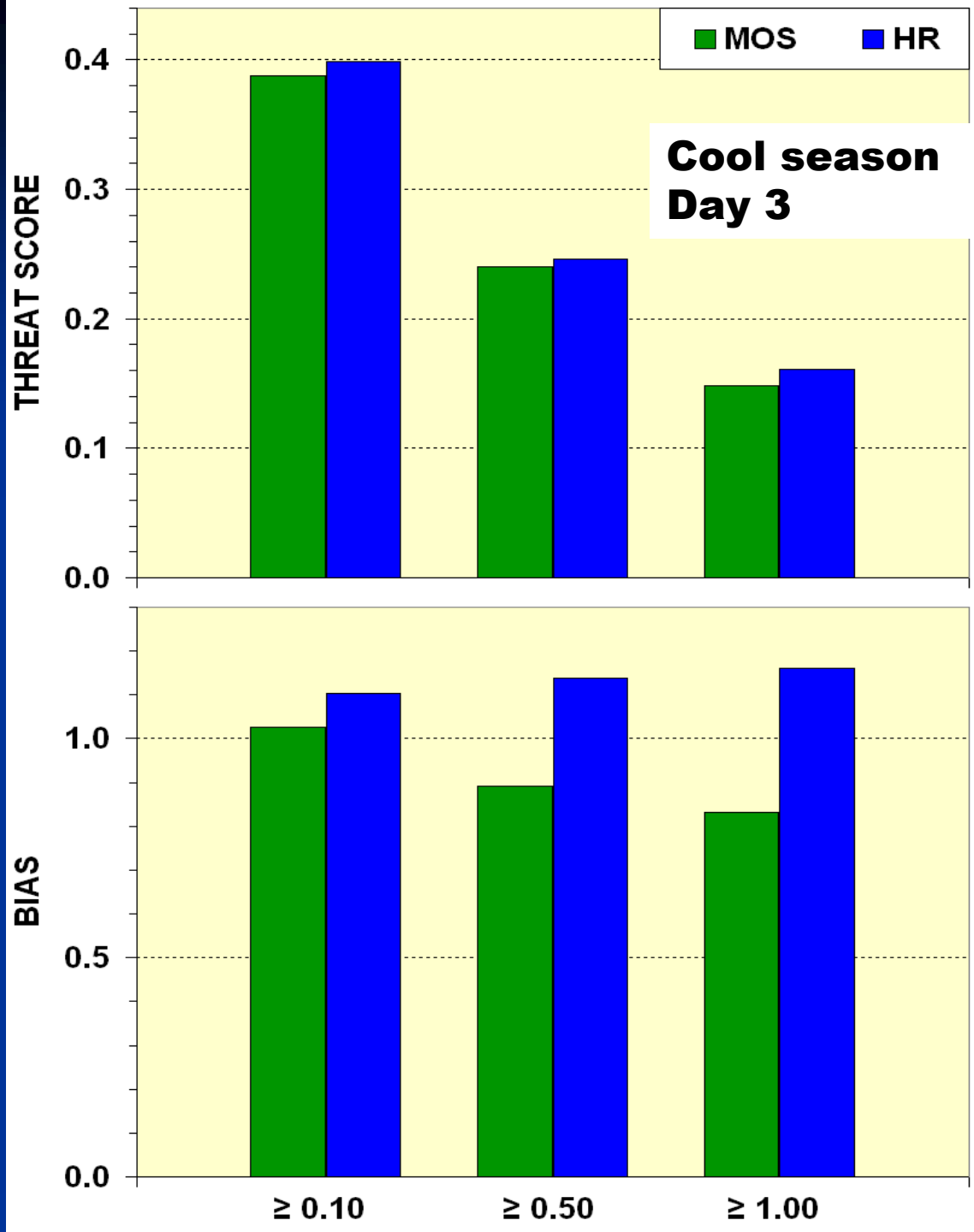
## Oct 2009 – Mar 2010

## Notes

Similar rankings -

Warm season

Thru Day 6.5



# 12-h PoP

## 4-km grid

**BSS = Brier skill score**

## Models

GMOS, HR

## Humans

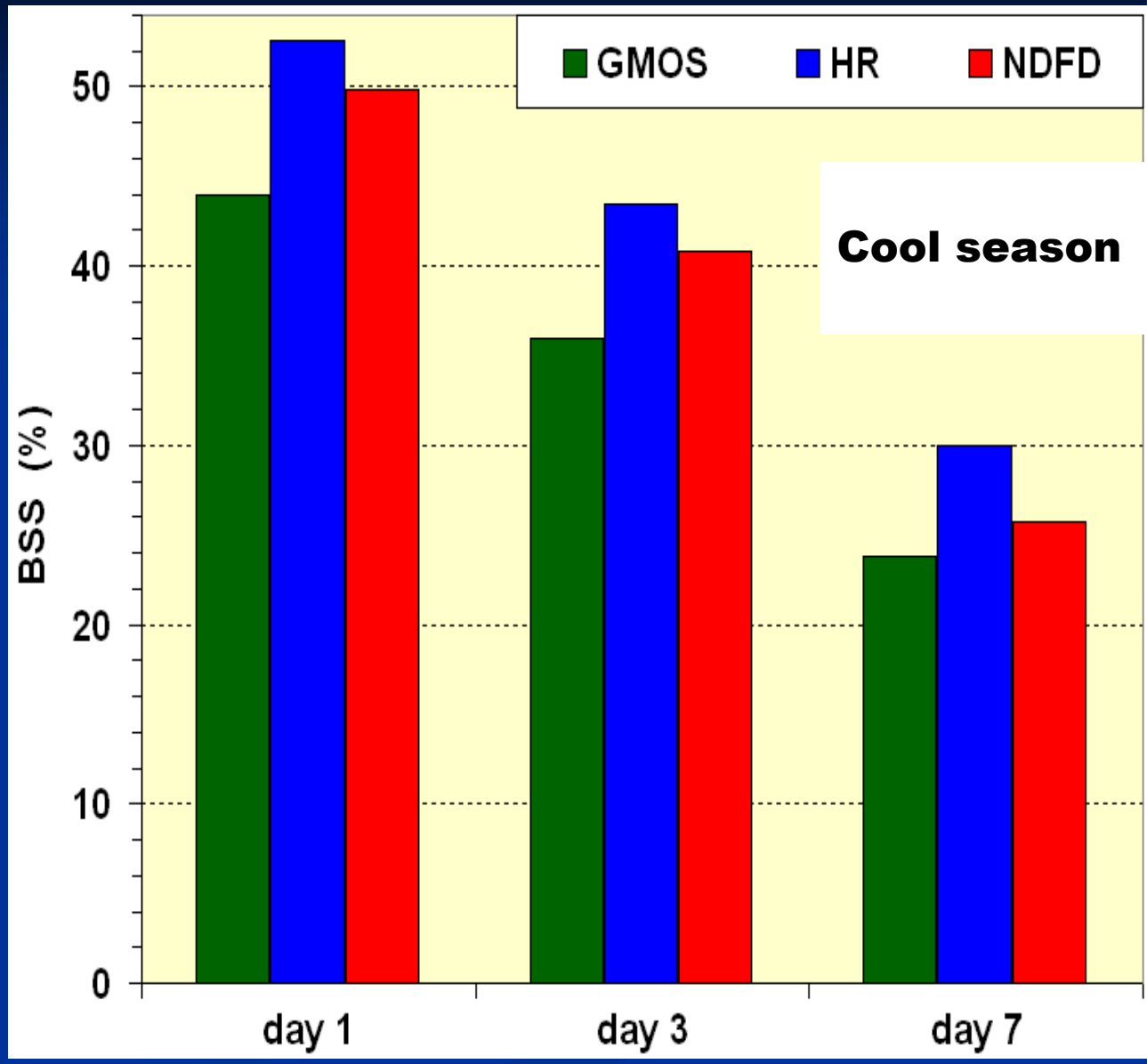
NDFD

## Oct 2009 – Mar 2010

## Note

Similar rankings for -

Warm season



# 6-h PQPF

4-km grid

## Models only

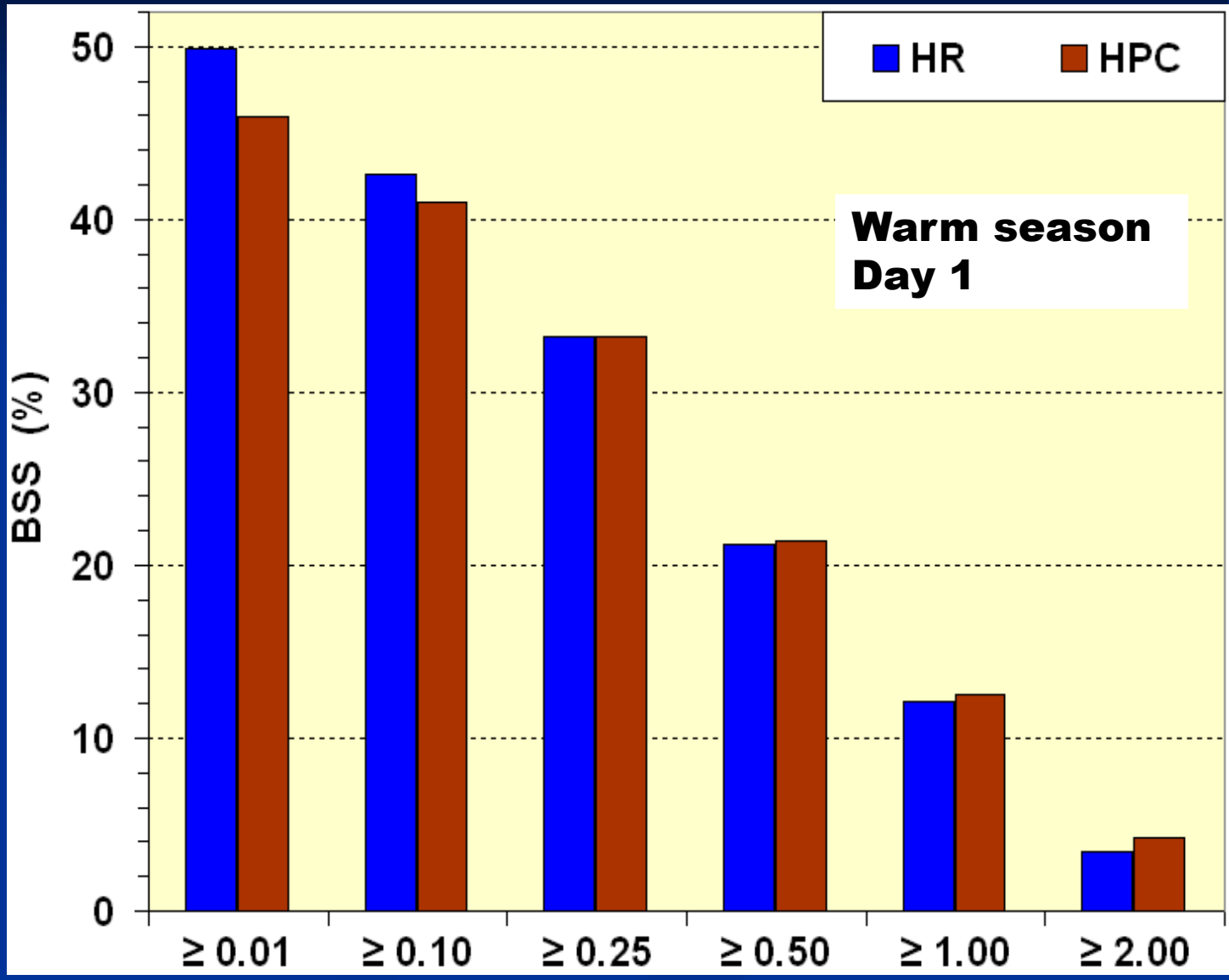
Apr ’10 – Sep ’10

## Notes

Similar ranking -

Cool season

Days 2 and 3



# 6-h PQPF

# Reliability

**4-km grid**

**Models only**

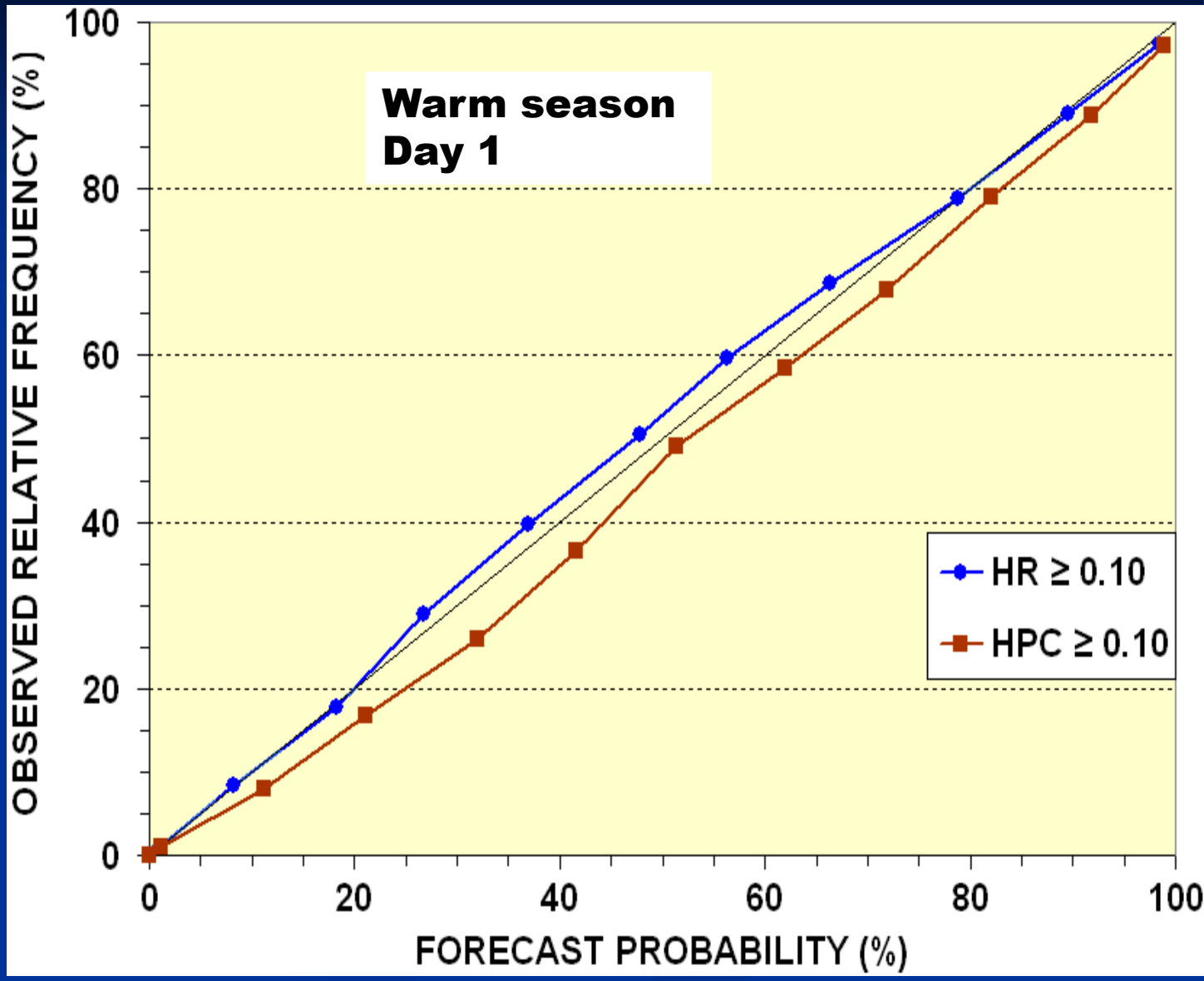
**Apr ’10 – Sep ’10**

**Notes**

**Similar results -**

**Cool season**

**Days 2 and 3**



# 6-h PQPF

# Reliability

**4-km grid**

**Models only**

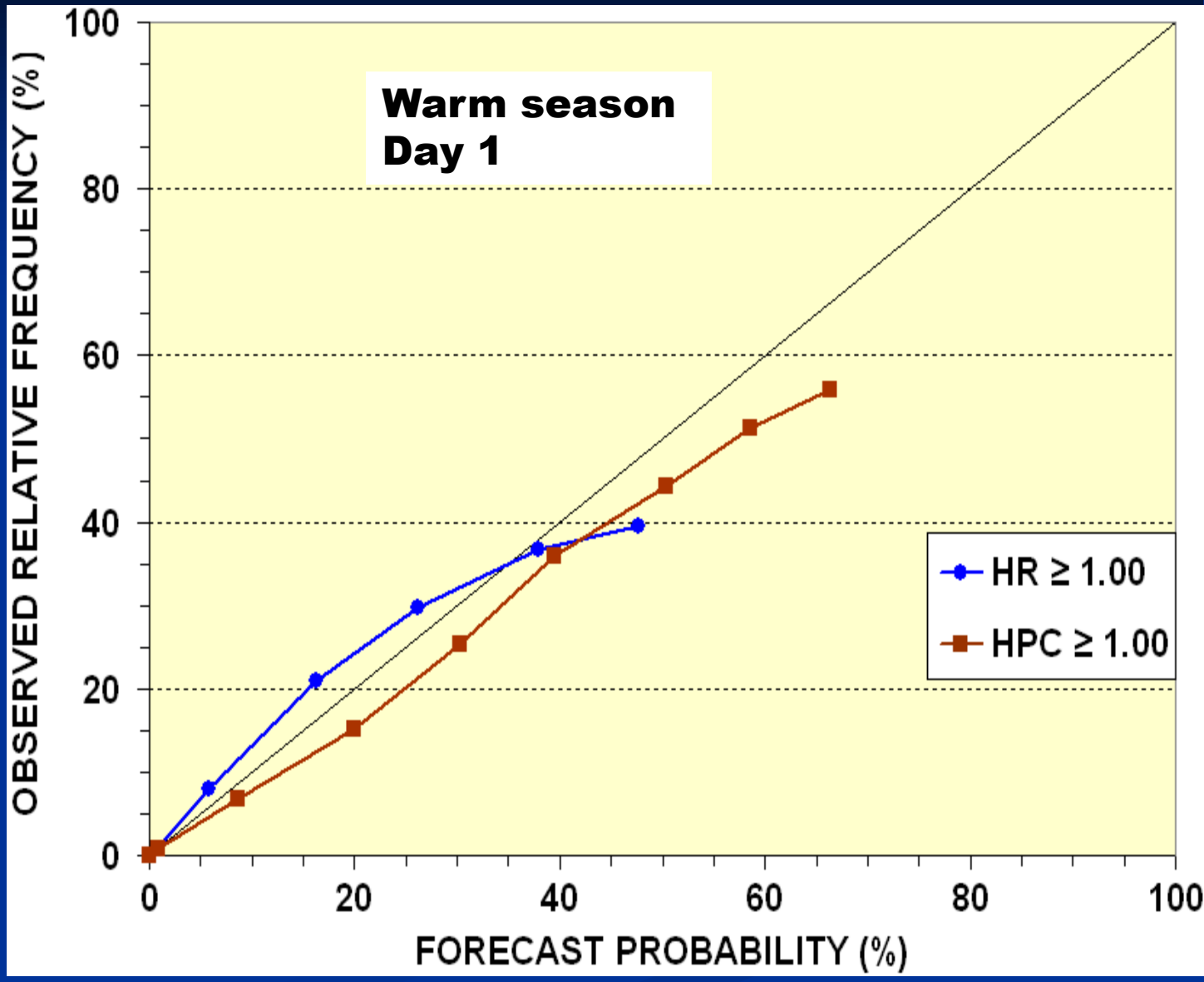
**Apr ’10 – Sep ’10**

**Notes**

**Similar results -**

**Cool season**

**Days 2 and 3**



# 6-h PQPF

## Sharpness

**4-km grid**

## Models only

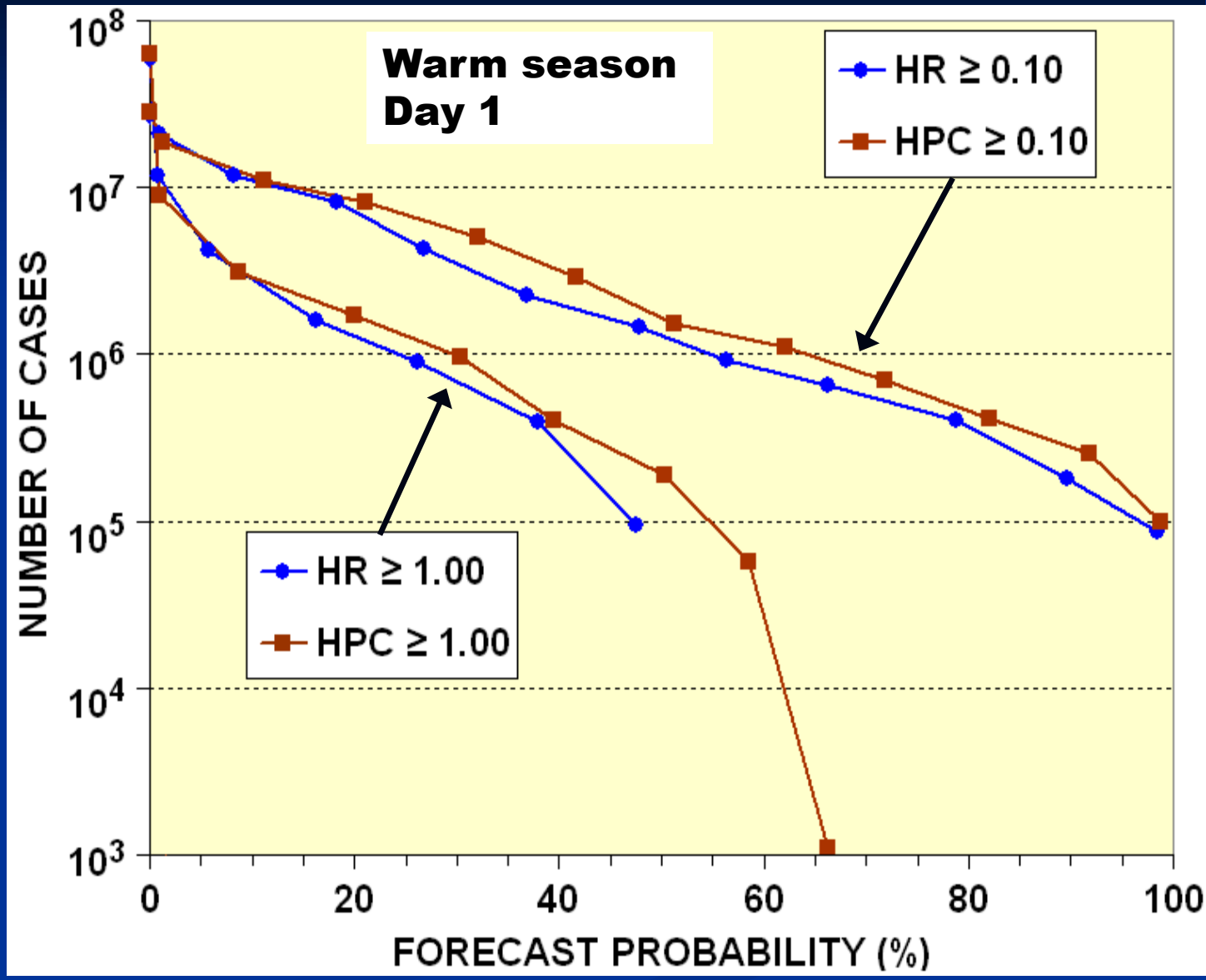
**Apr ’10 – Sep ’10**

## Notes

**Similar results -**

**Cool season**

**Days 2 and 3**



# Findings Summary

- For cat. QPF grids HR scored
  - Somewhat better than HPC and WFO (NDFD) forecasters
  - Much better than NCEP models and GMOS
- For cat. QPF at MOS stations
  - HR improved on MOS but less than for GMOS

# Findings Summary (cont.)

- For PoP grids HR skill
  - Better than GMOS and NDFD
- For PQPF model grids
  - HR and HPC PQPFs have similar skill
  - HR better reliab.; HPC better sharpness
    - HR and HPC PQPFs may complement each other

# HR Implementation Plans

- HR QPF and PoP grids will replace GMOS grids over CONUS in spring 2011
- Issuance of HR PQPF grids expected later in 2011

# Questions ?