HIC INNOVATION MEETING
Part I – MRF/ESP PROJECT

October 27-28, 2003
Kansas City, MO

By
Dave Brandon / CBRFC

CBRFC AHPS PROJECT

A cooperative effort between:

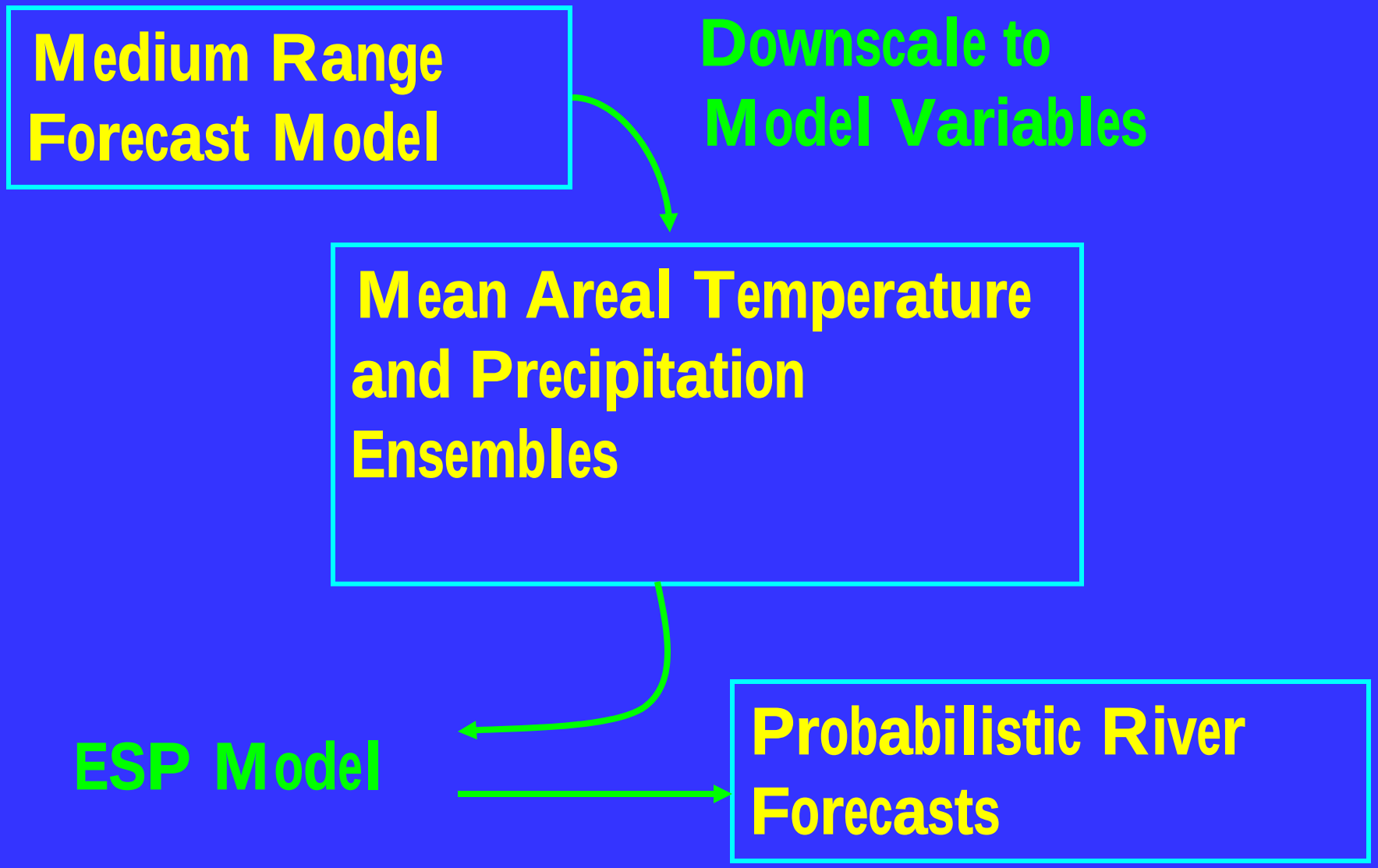
Goals

Introduce probabilistic 14 day meteorological forecasts (ensembles) into a river forecast system.

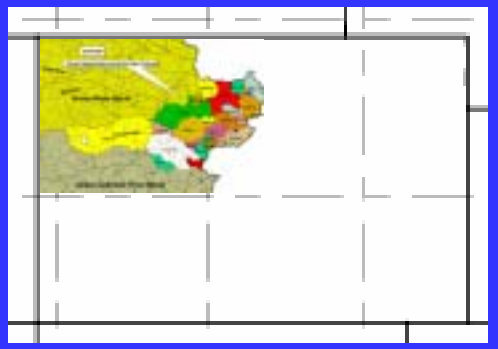
Capture and display the uncertainty.

Verify the process.

Method


Medium Range Forecast Model
Downscale to Model Variables
Mean Areal Temperature and Precipitation Ensembles
ESP Model
Probabilistic River Forecasts

Downscaling



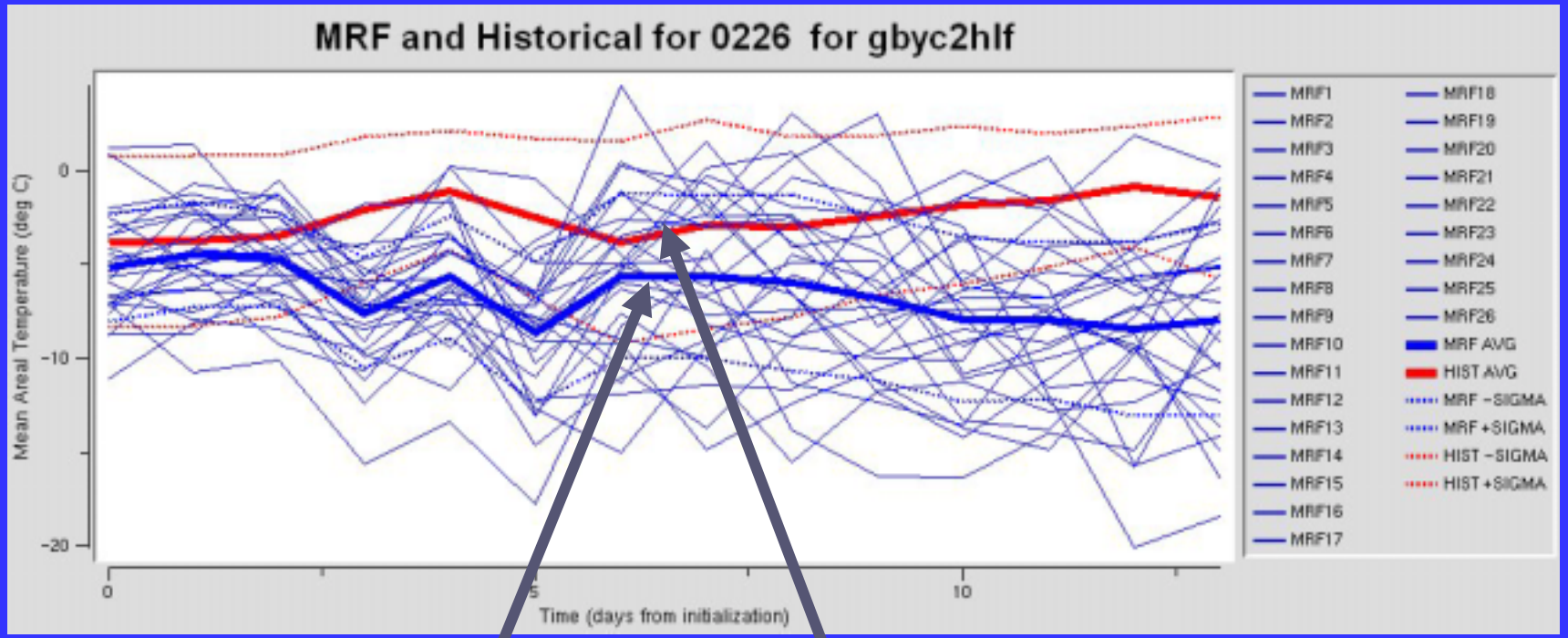
MRF Variables:

- 2m air temp
- Precipitation
- 700mb Relative Humidity
- Sea Level Pressure
- 10m Vector Wind
- Total Column Precipitable Water

Basin Scale Variables:

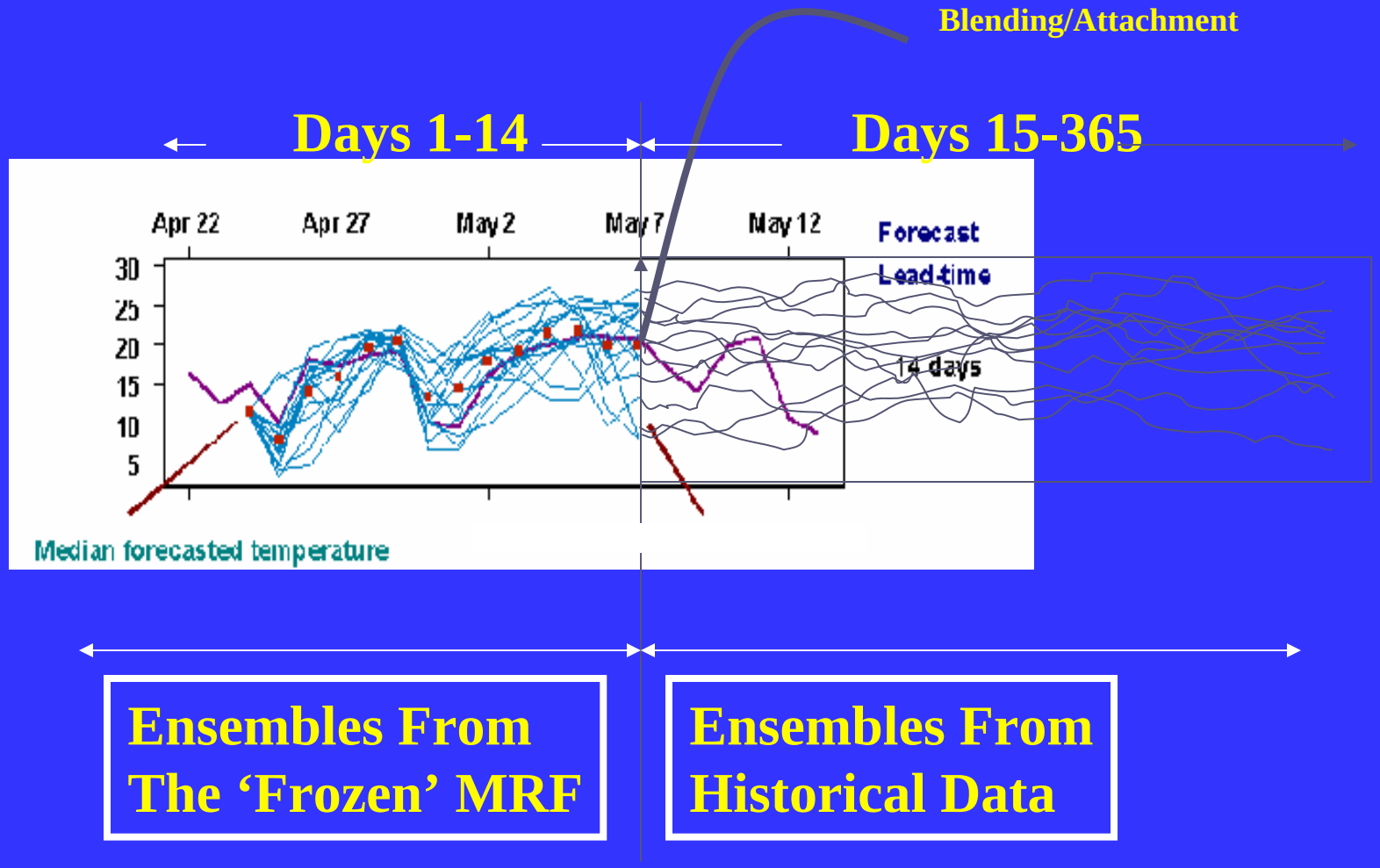
- Mean Areal Temperature
- Mean Areal Precipitation

Downscaling Results



MRF is colder than normal in this case.

Schematic of Using Ensembles from MRF(day 1-14) As Input to ESP



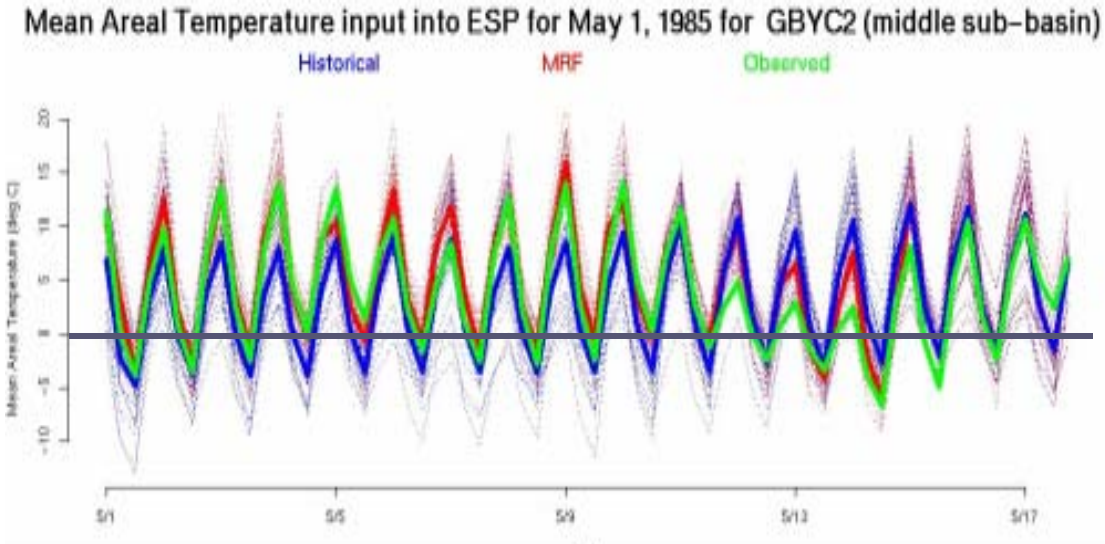
ESP Example

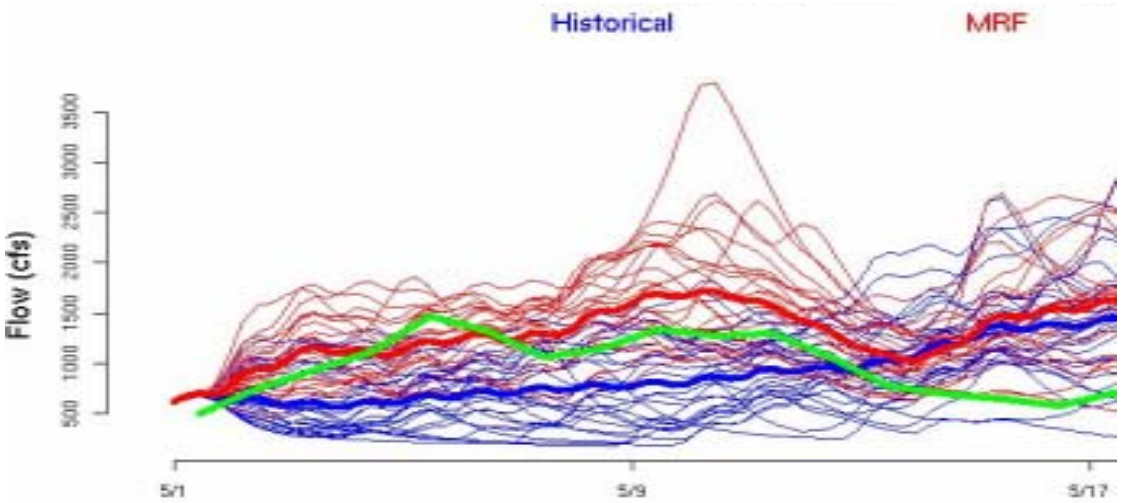
Probabilistic forecast (or model) verification requires a large dataset. This is accomplished through reforecasting.

Reforecasts done for every basin for every day between 1979 – 1999.

Reforecasts made with both reforecasted MRF and historical MAT/MAPs.

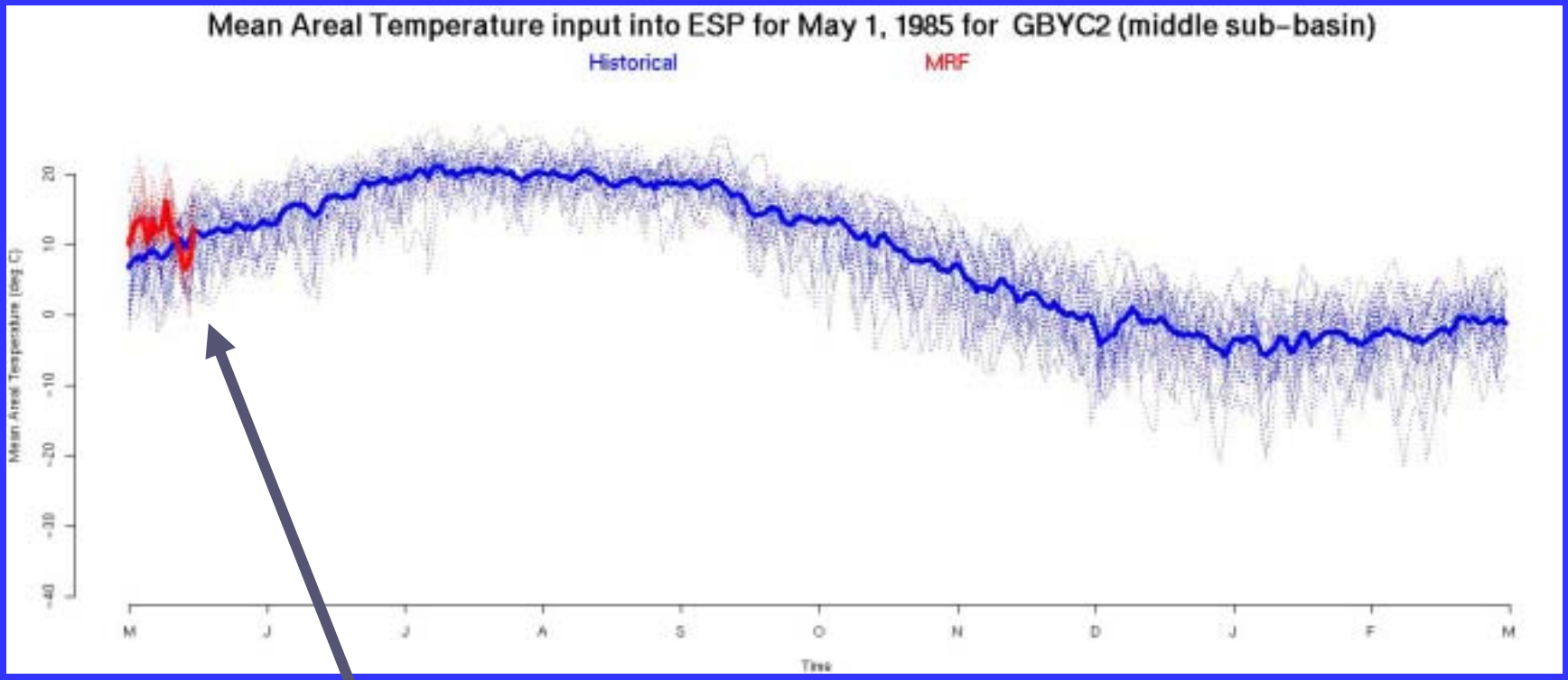
Following example from Granby, CO (GBYC2) reforecast for May 1, 1985.





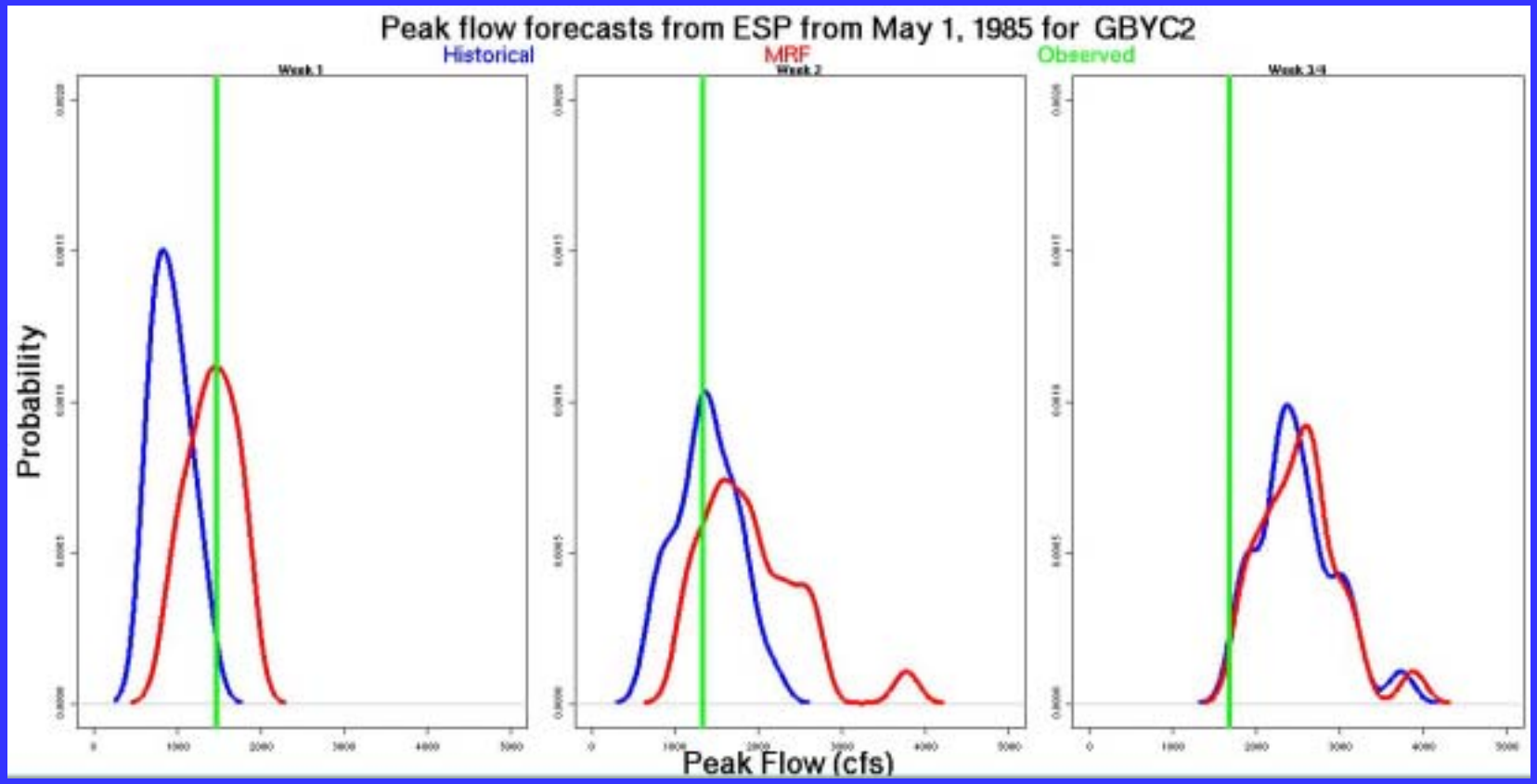
Hourly instantaneous flow ensembles are created by ESP and saved. MRF shows higher flows than historical when it is warmer (during the first week). These may be converted into probabilistic forecasts…

Input into ESP

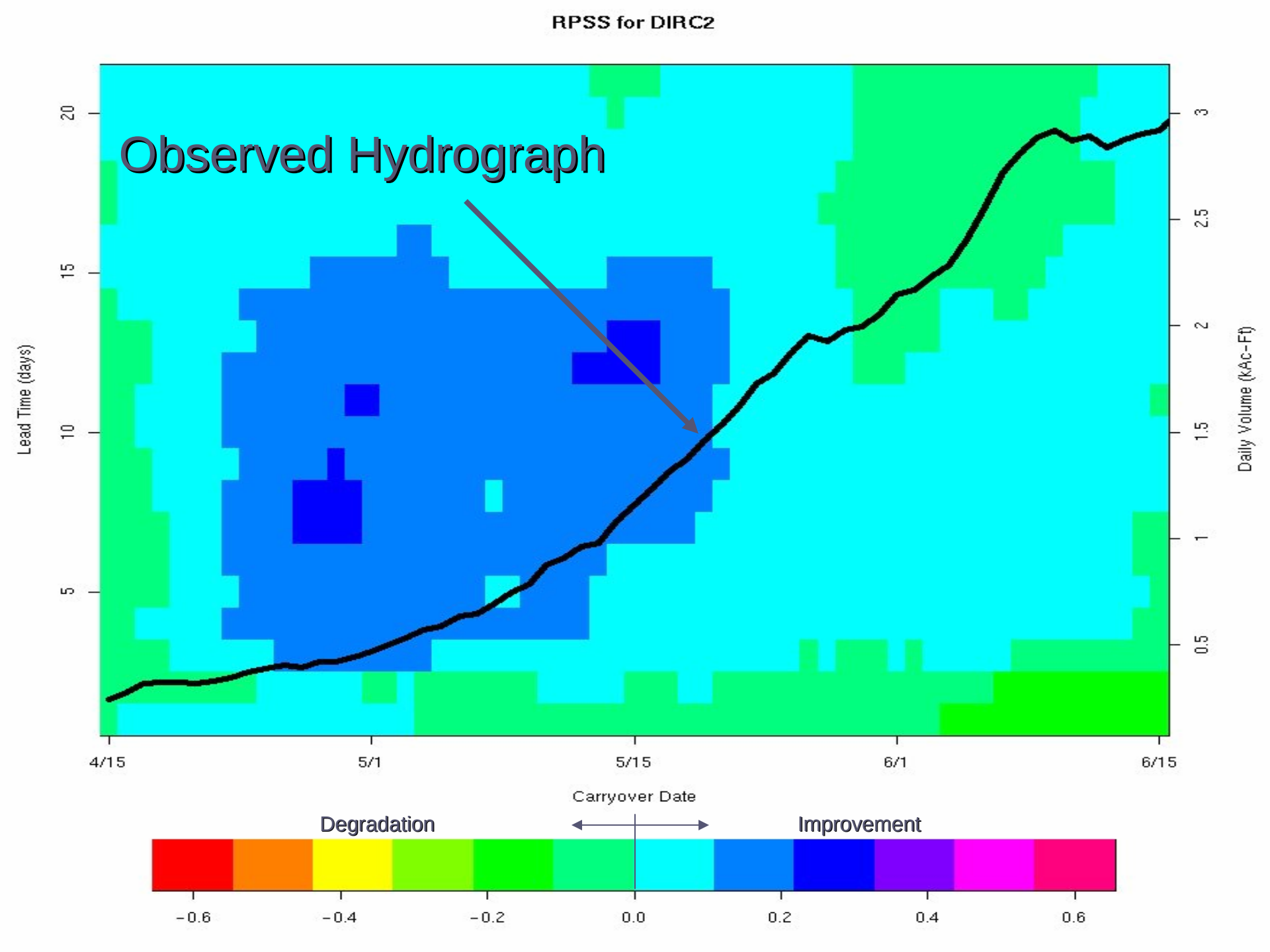


MRF derived MAT/MAPs related to the entire year of historical ensembles.

ESP peak flow

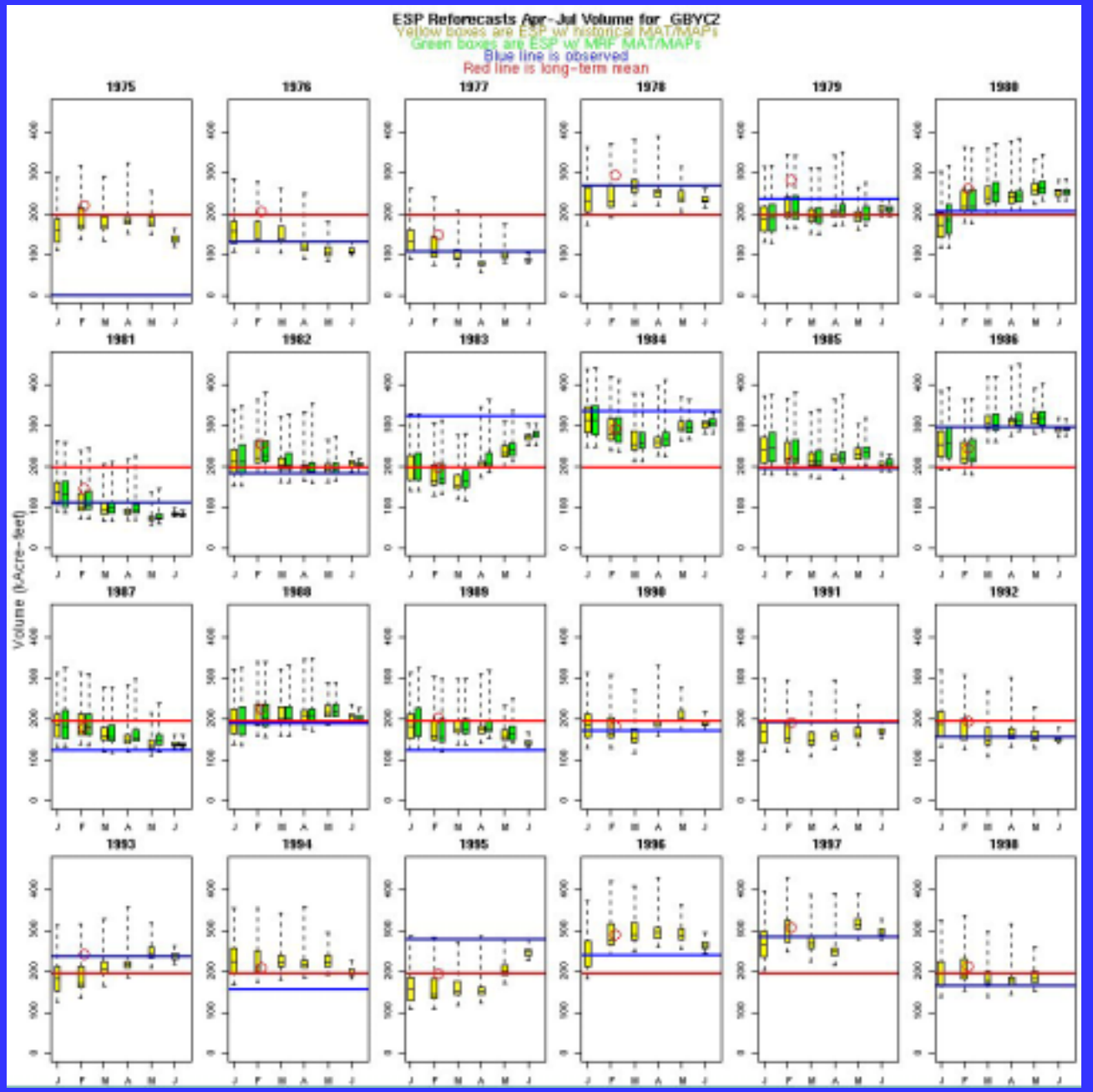


Peak flow forecasts shown as Probability Density Functions (PDFs). MRF shows higher probabilities in higher flows for two weeks.


RPSS for DIRC2
Observed Hydrograph
Lead Time (days)
20
15
10
5
Daily Volume (kAc-Ft)
3
2.5
2
1.5
1
0.5
4/15
5/1
5/15
6/1
6/15
Carryover Date
Degradation
Improvement
-0.6
-0.4
-0.2
0.0
0.2
0.4
0.6

ESP volumes

Examine how forecasts in individual years are modified by changes to input MAT/MAPs



Future Plans

Use Statistical Weather/Climate Generator In Lieu of Historical Ensembles

Use Experimental Technique to Downscale CPC Forecasts/Apply to Historical and WX/Generator – nino 3.4 composites

Use WRF Forecasts for short term 0-2 days and blend into MRF(3-14) and Historical (>14)

More r(v)igorous verification