Southeast pilot project
Ensemble hydrologic Forecasts over the SERFC in support of NIDIS

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SERFC: John Schmidt, John Feldt

OHD: John Schaake and D. J. Seo

Objectives

- Drought seasonal forecasts over the SERFC area based on the Princeton forecast system
- Develop drought applications together with SERFC

Define drought based on the drought Indices

- Meteorological drought: Precipitation deficit.

  Index: Standardized Precipitation Index

- Hydrological drought: Streamflow or runoff deficit

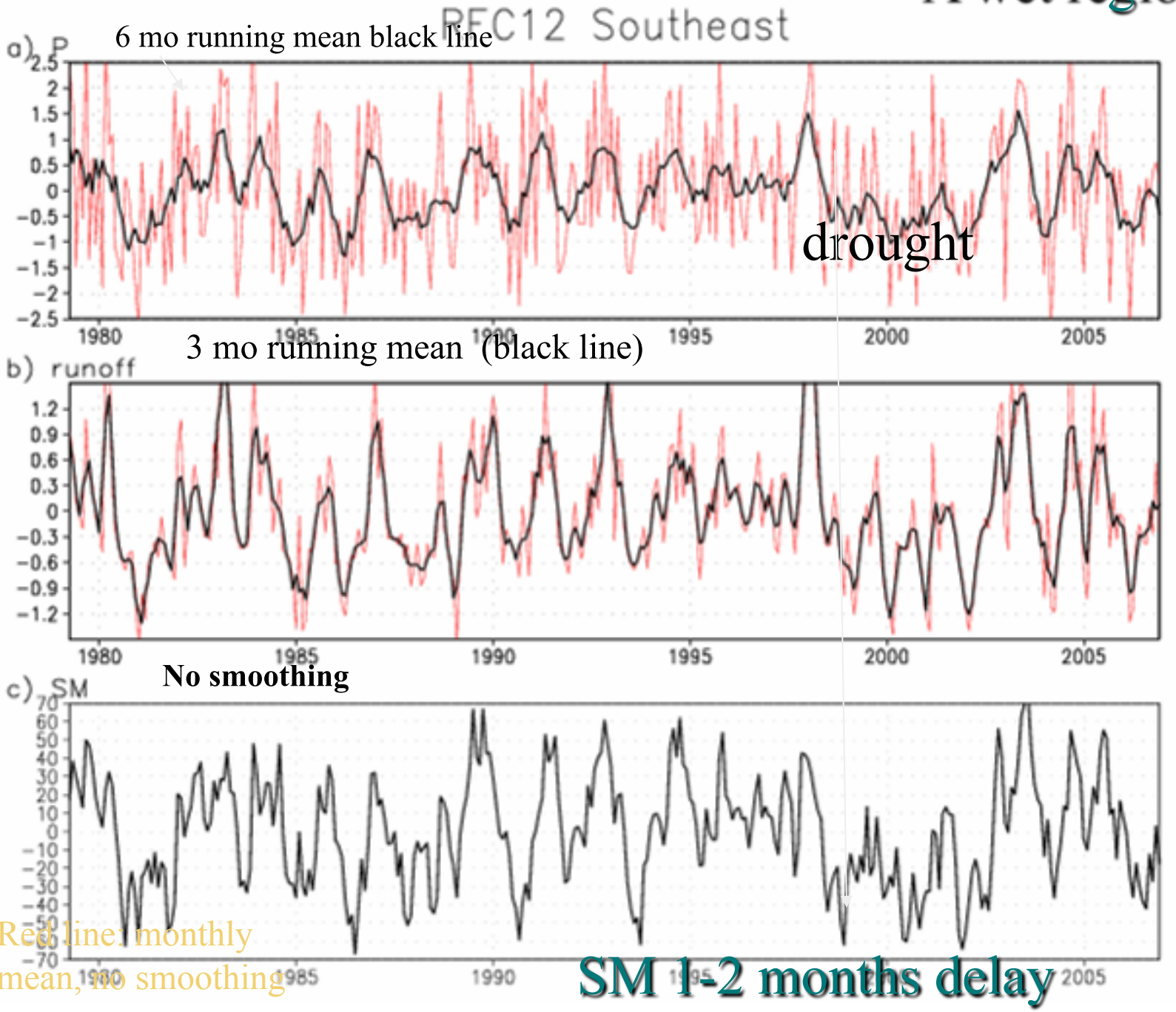
  Index: Standardized runoff index

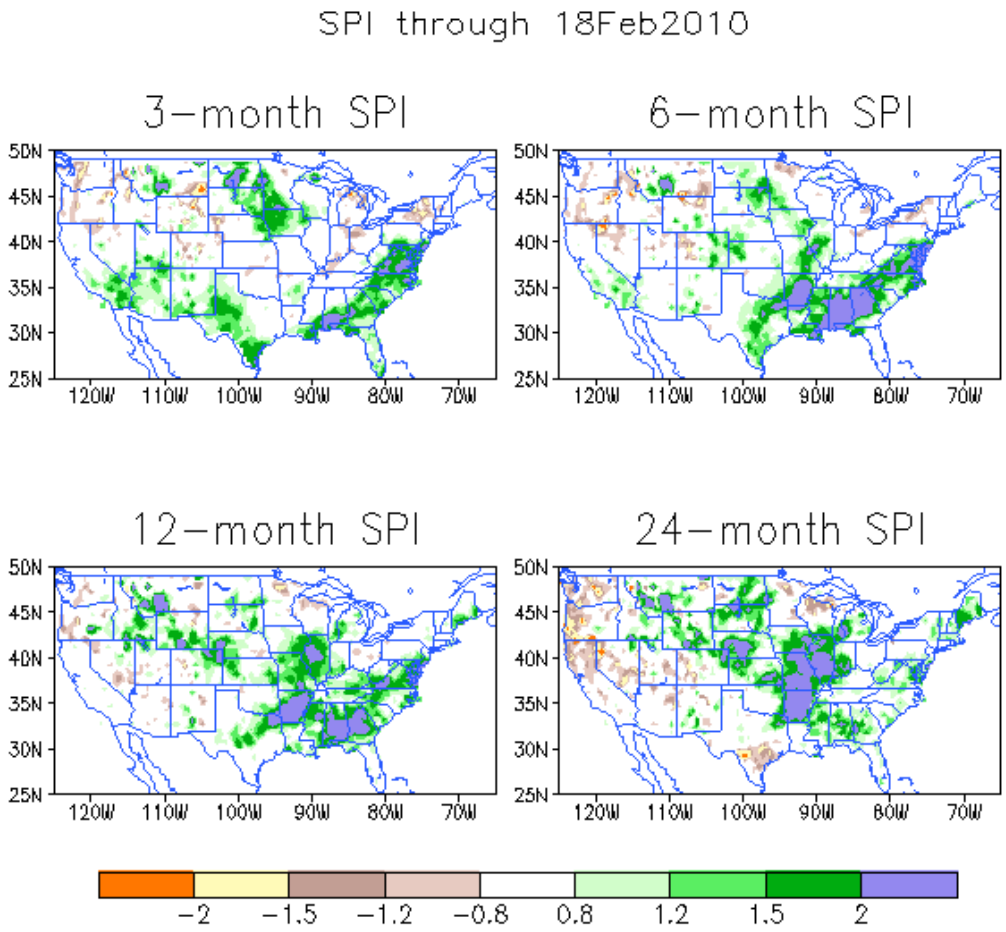
- Agricultural drought: Total soil water storage deficit

  Index: SM anomaly percentile

75-85W,31-35N

A wet region





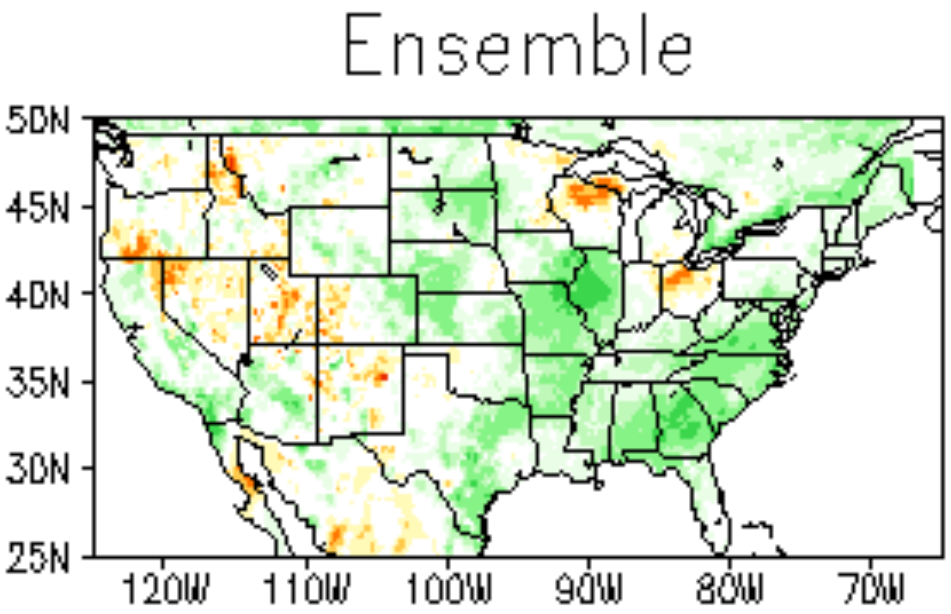
Overall, it is very wet over the

Southeast for the past 6 months and that appears in

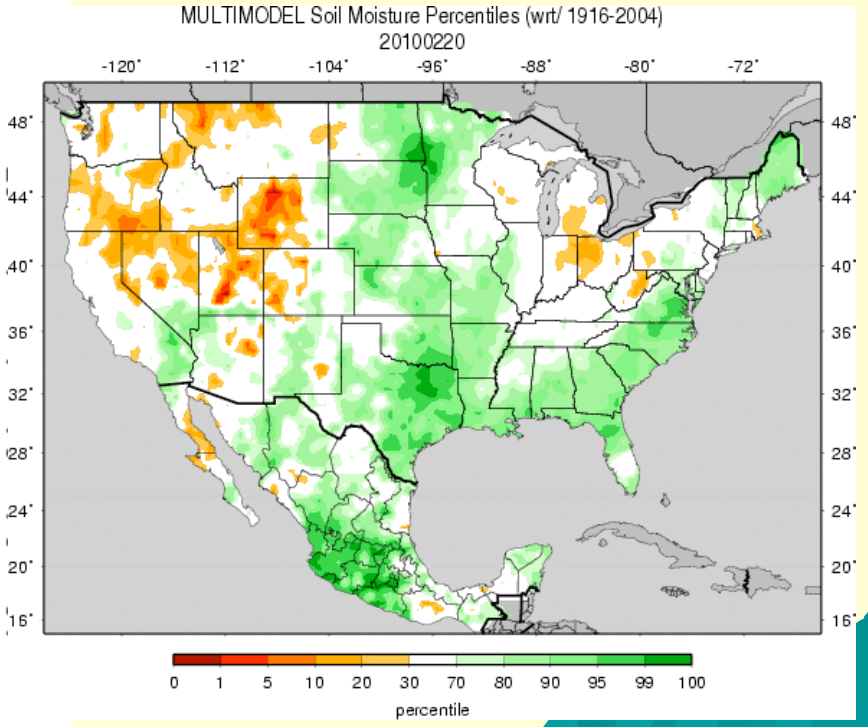
The SPI

Multi model SM percentiles

NCEP

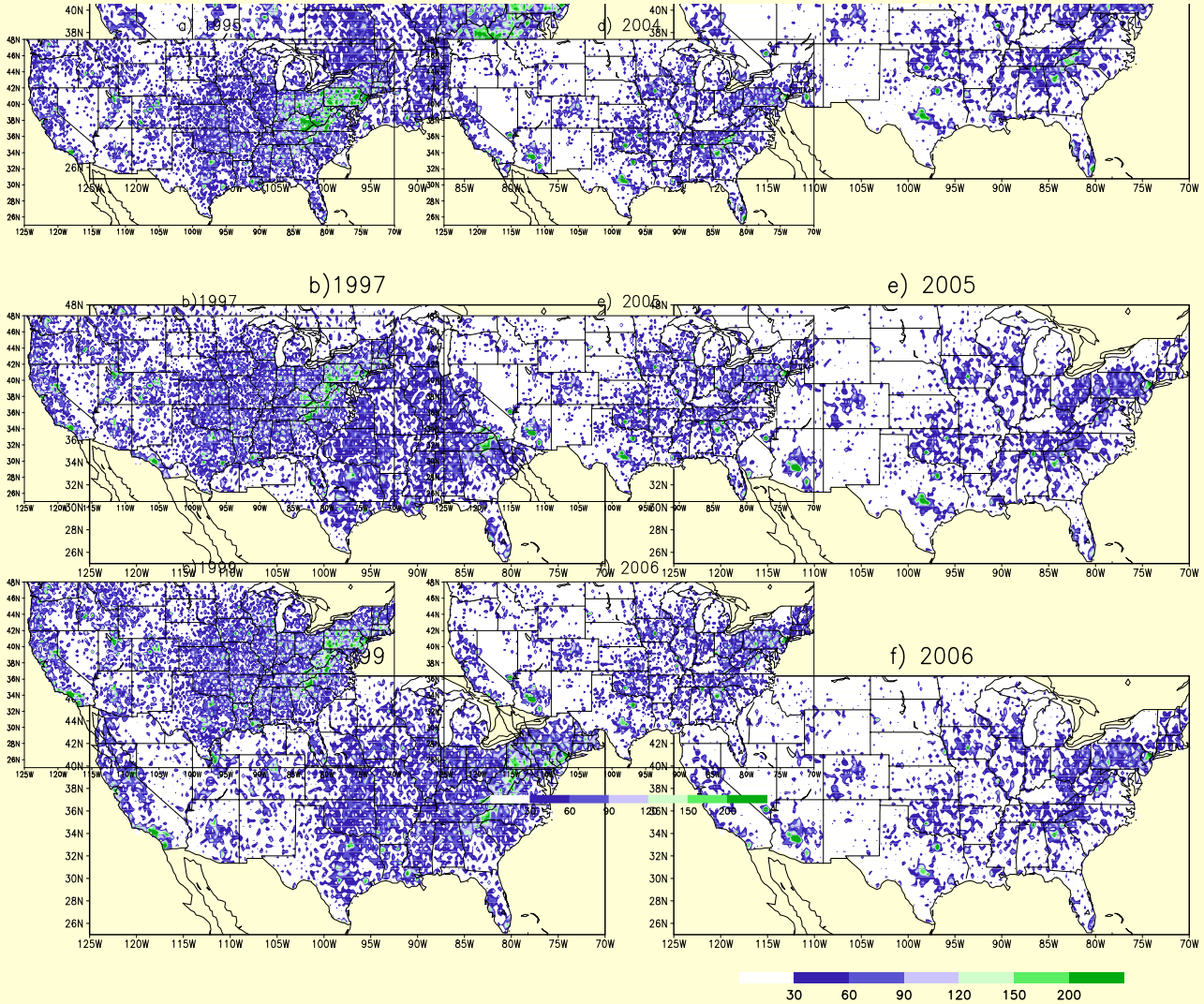


U. Washington



Uncertainties in the NLDAS

Number of station P reports averaged over a year



Reports dropped for real time operation

Hydrological prediction

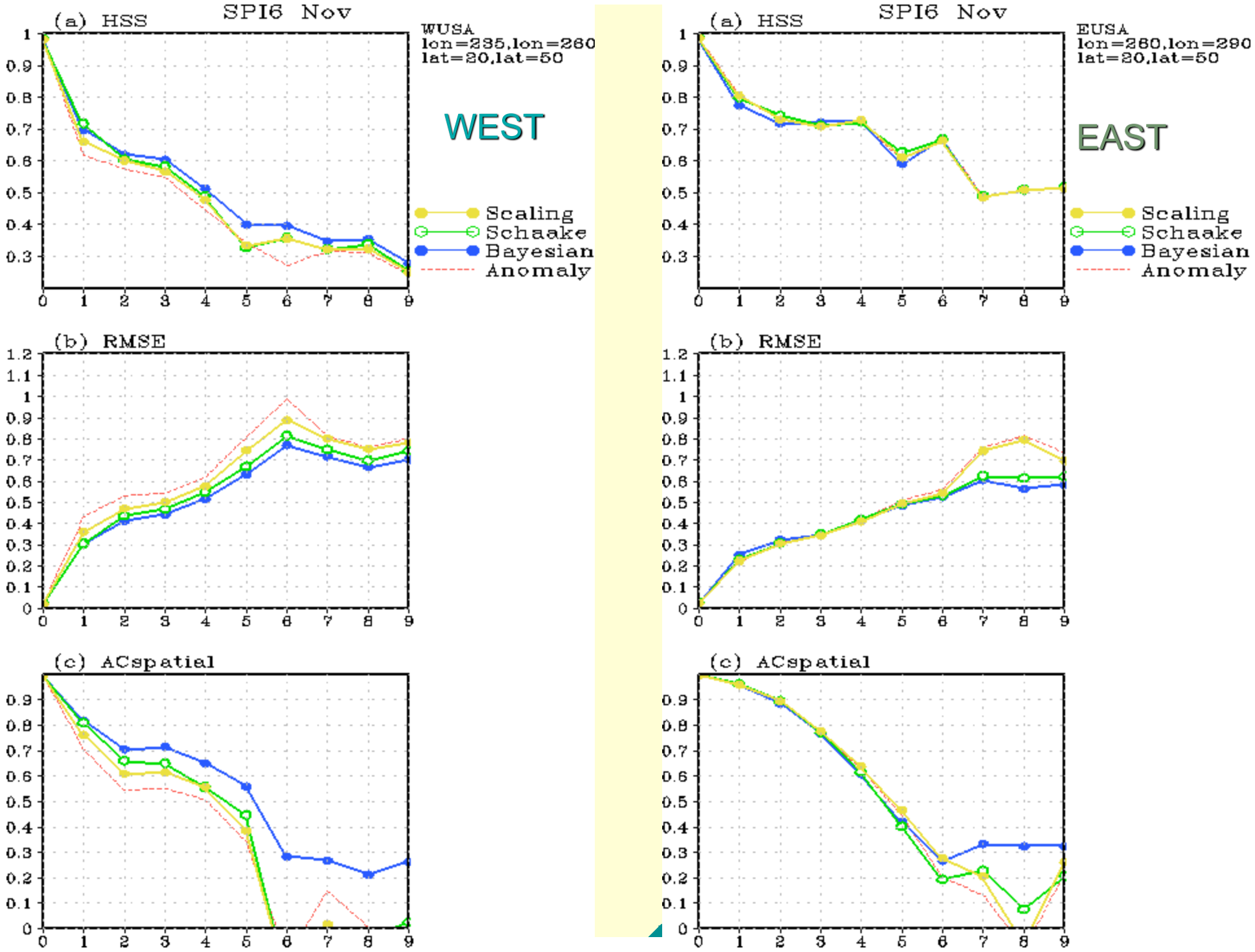
- Develop hydrological forecasts out to 6 months for drought indices
- we will start from the Princeton forecast system (Eric Wood's group)
- We will test the system and improve

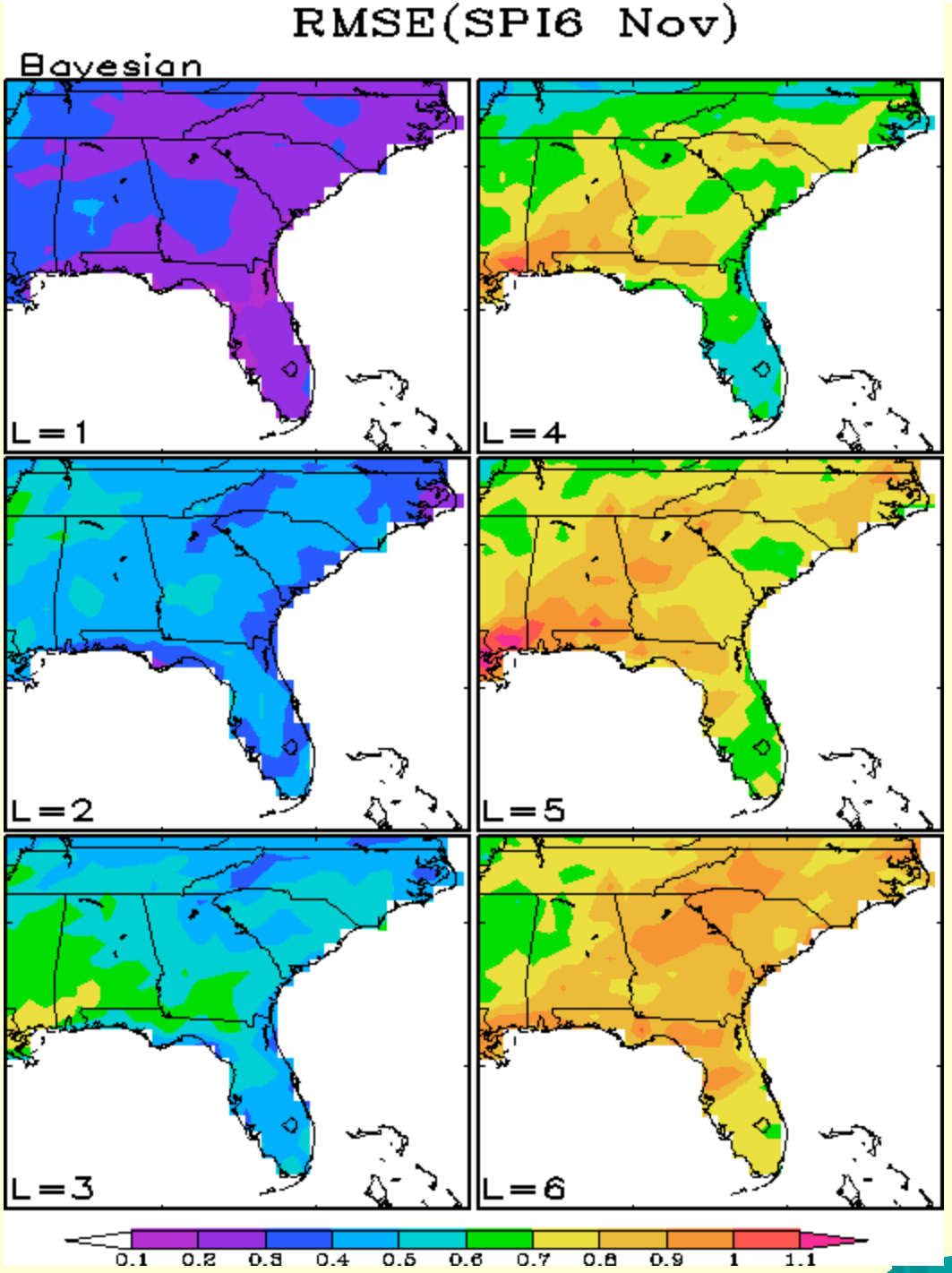
Downscaling & Bias correction

- Anomalies: Correct the model climatology
- Scaling: Probability mapping based on P distribution
- Schaake's linear regression – calibrate P ensemble forecasts based on historical performance
- Bayesian correction – calibrate P forecasts based on historical performance and spread of members in the forecast ensemble

Standardized Precipitation index Forecasts

- Append observed P time series to P errors after bias correction and downscaling
- The advantages are (1) no need of hydrologic model and (2) can use any base period.


(a) HSS
SPI6 Nov
WUSA
lon=235,lon=260
lat=20,lat=50
WEST
Scaling
Schaake
Bayesian
Anomaly
(a) HSS
SPI6 Nov
EUSA
lon=260,lon=290
lat=20,lat=50
EAST
Scaling
Schaake
Bayesian
Anomaly
(b) RMSE
(b) RMSE
(c) ACspatial
(c) ACspatial


RMSE(SPI6 Nov)
Bayesian
L=1
L=4
L=2
L=5
L=3
L=6
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1
1.1

Future plan

- Determine whether high resolution (T382) model forecasts have high skill in predicting SPI – on going
- Determine whether the Regional Model dynamical downscaling has high skill in predicting SPI – on going
- Develop real time prediction of SPI's based on the CFSRR hindcasts
- The bias corrected P and T will drive VIC model to produce hydrologic forecasts of soil moisture and runoff

Questions

- What regional applications do you want to develop?
- How do you use information?
- Do you use data to drive your models or applications for your regional needs?
- Is the assessment of uncertainties important to you? If so, what is the level that you can tolerate?

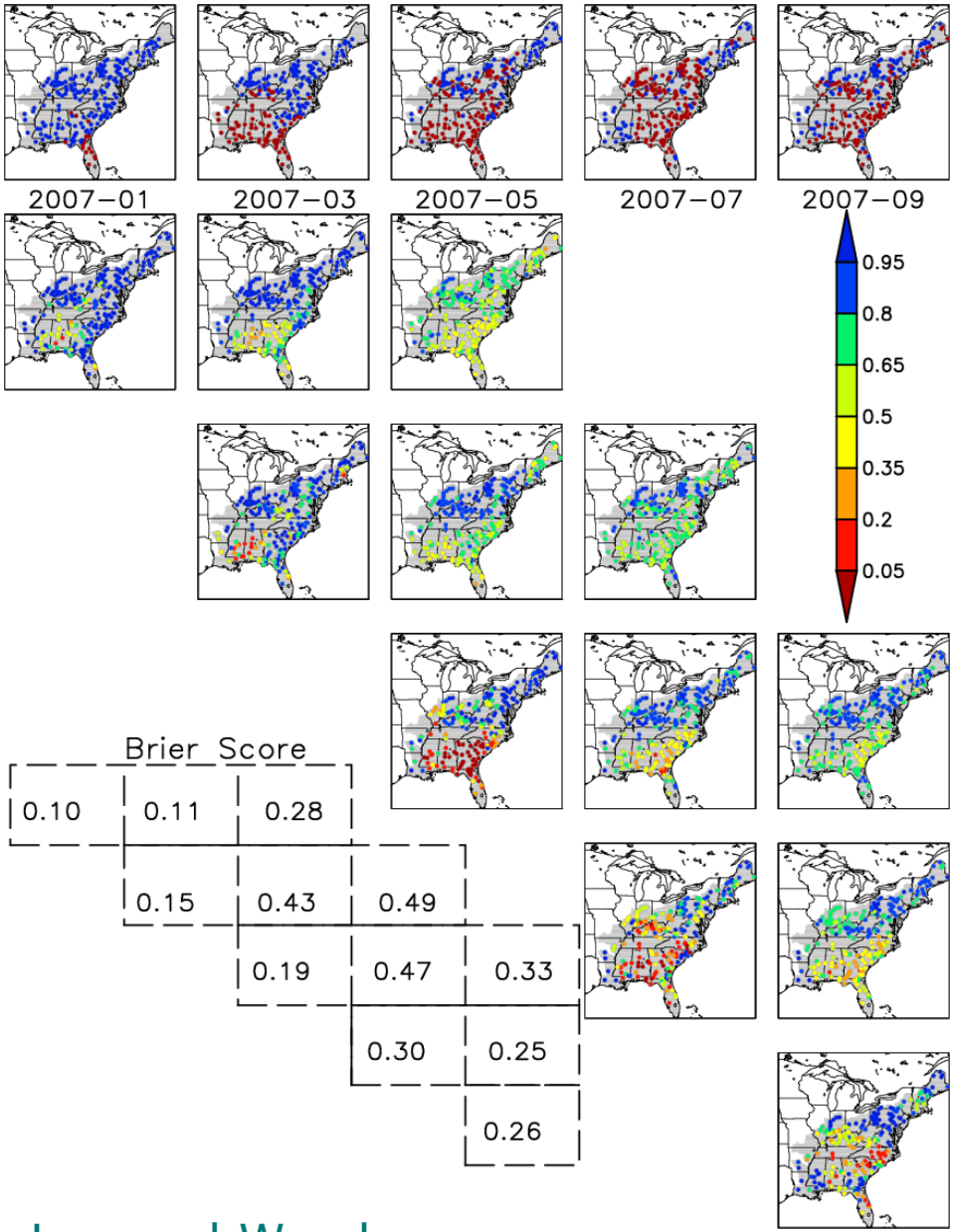
We need your inputs

- What are the spatial scales that are most useful to you?
- What are the temporal scales that are most useful to you?

  (e.g. The SERFC needs forecasts on week2 time scales).
- These products cover the U.S. What kind of products do you like to see for your region?

Discussion questions

- What current activities (monitoring and forecasts) can we build on?
- Regional vs entire United States
- How can we network and coordinate drought related information such as drought impact, planning and information exchange?
- What gaps need to fill?
- What issues are important to you, but have not been discussed?



the binary event for observed monthly mean

Row 2-6 represents the exceedence probability for forecasts initialized from Nov 2006

Luo and Wood

Streamflow fcsts