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

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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

6 mo running mean black line

3 mo running mean (black line)

No smoothing

Red line: monthly mean, no smoothing

drought

SM 1-2 months delay
Overall, it is very wet over the Southeast for the past 6 months and that appears in The SPI.
Multi model SM percentiles

U. Washington

NCEP

Ensemble

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
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.
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