

# CPC's 3-month Outlook

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# Outline

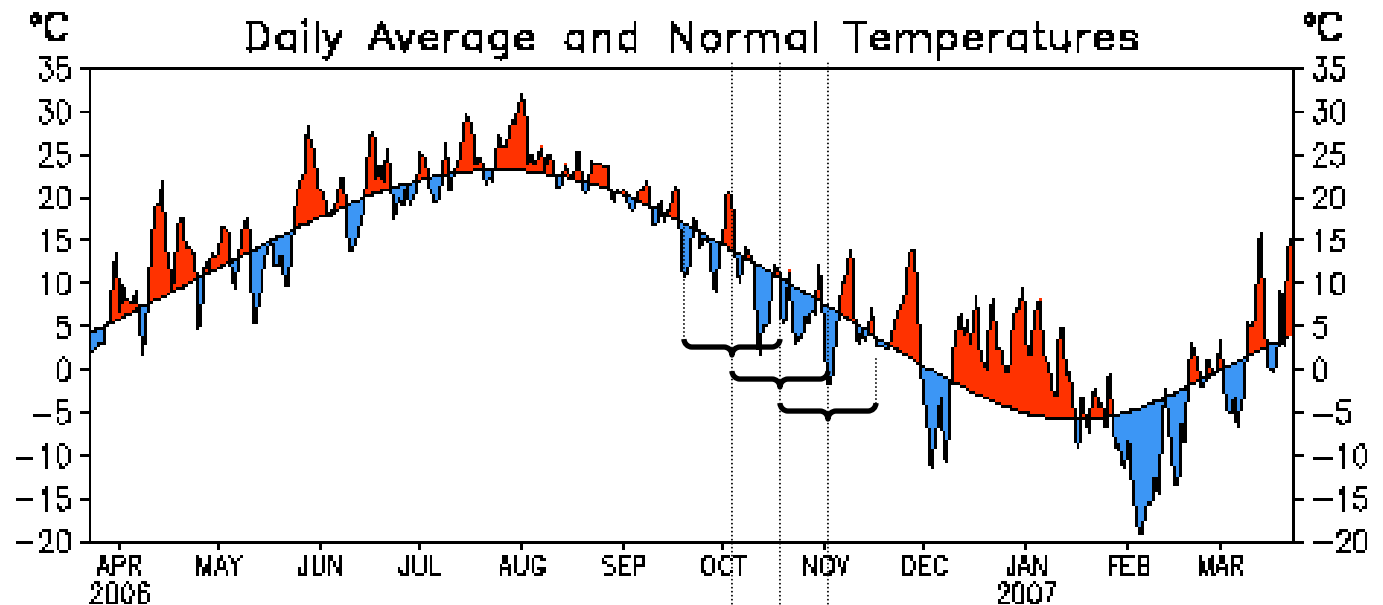
- Scientific basis in low-frequency variability
- Forecast preparation system
- Factors affecting the forecast
- Regional skill, 1995-2005
- Formulation of the forecast
- Recent skill improvements
- Future - New variables, products, based on user requirements.

# The Climate- Weather Connection

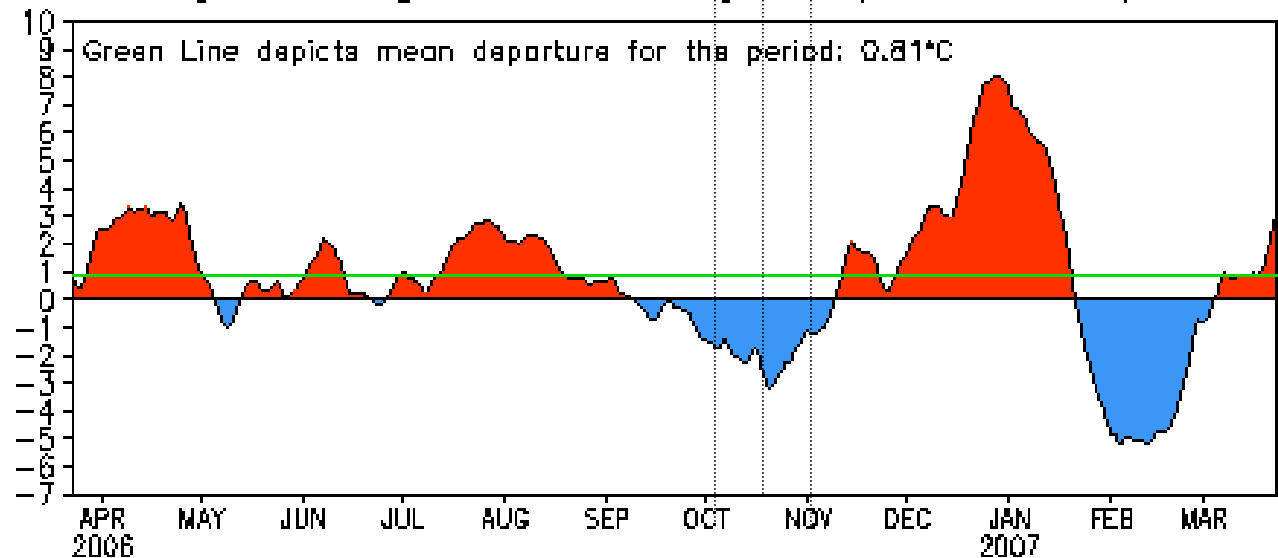
Moving averages reveal different features for different averaging periods.

By using different averaging periods and subtracting the new time series, we can isolate different time scales.

## CHICAGO, ILLINOIS

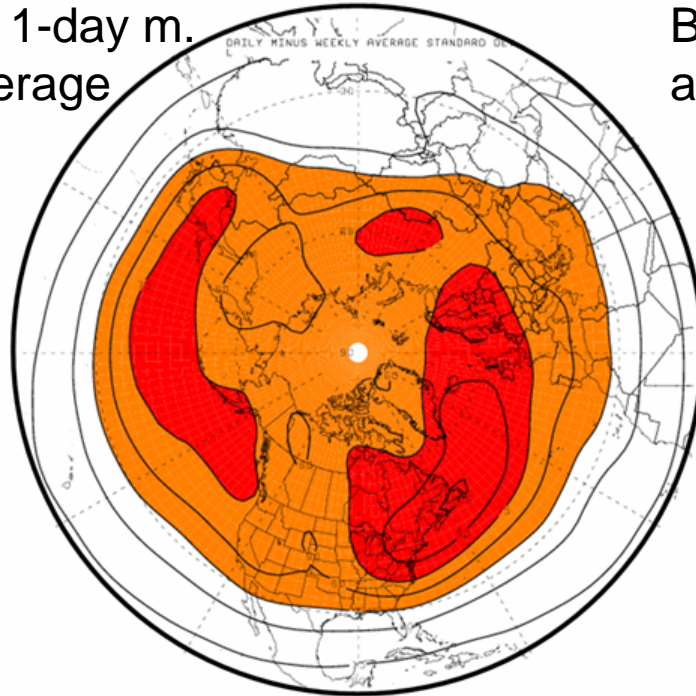


### 31-Day Running Mean of Daily Temperature Departures

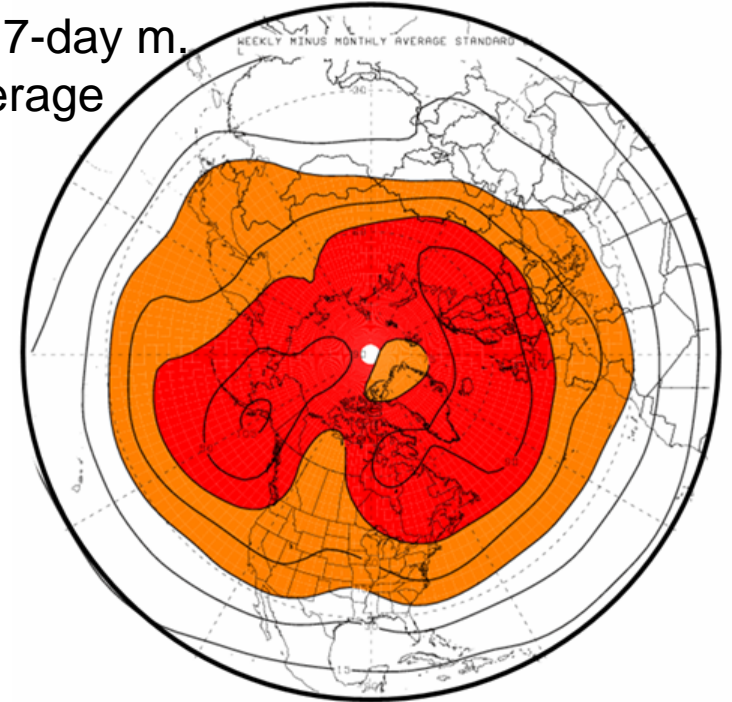


*Typical variability  
(standard deviation) of  
26-years of  
wintertime,  
daily, 500-hPa  
height data*

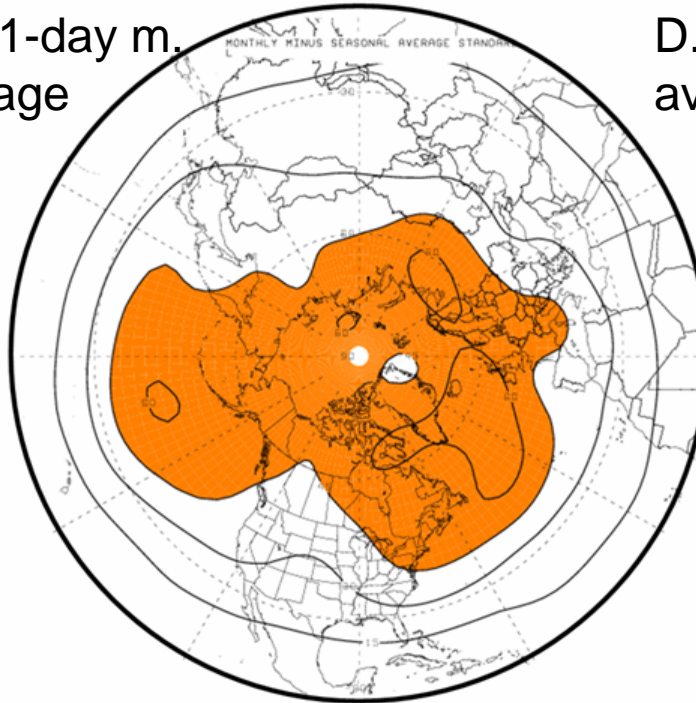
A. 1-day m.  
average



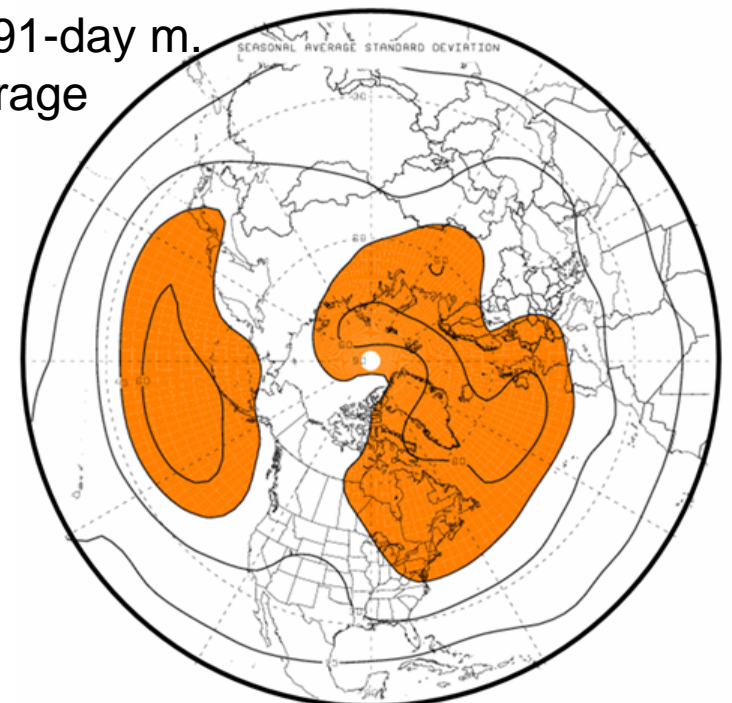
B. 7-day m.  
average



C. 31-day m.  
average



D. 91-day m.  
average



# Source of Signal for Climate Forecasts

- Strong trends in temperature.
- El Niño and La Niña, other phenomena
- Soil moisture
- Near-coastal ocean temperatures
- Improvements over climatology (skill) of about 27%, for temperature, and 12%, for precipitation, on average, over 1995-2005.

# Forecast System Schematic

OBSERVATIONS

A GLOBAL, 3-DIMENSIONAL, LONG AND SHORT-TERM SET OF OBSERVATIONS OF THE OCEANS AND ATMOSPHERE (SATELLITES AND IN GROUND STATIONS)

MODELS

OCEAN & ATMOSPHERE MODELS, DYNAMICAL AND STATISTICAL

A WAY TO BLEND MODELS

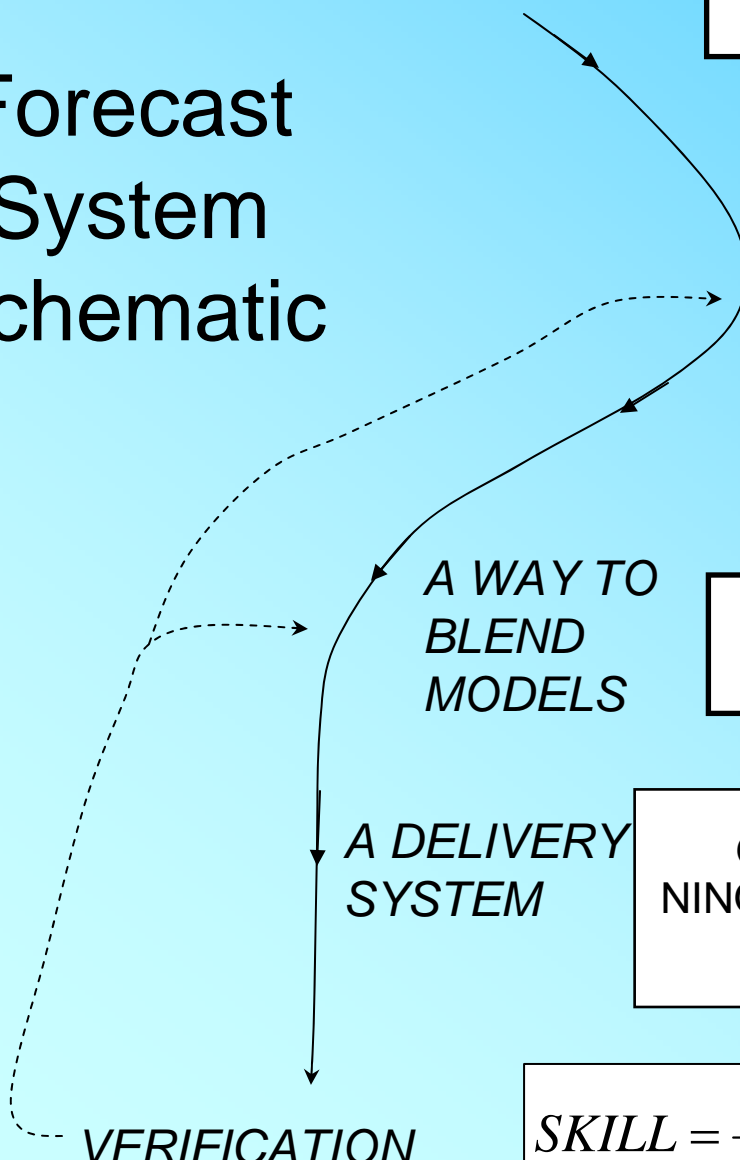
OBJECTIVE CONSOLIDATION BASED ON KNOWN SKILL OF TOOLS, FOLLOWED BY HUMAN INPUT

A DELIVERY SYSTEM

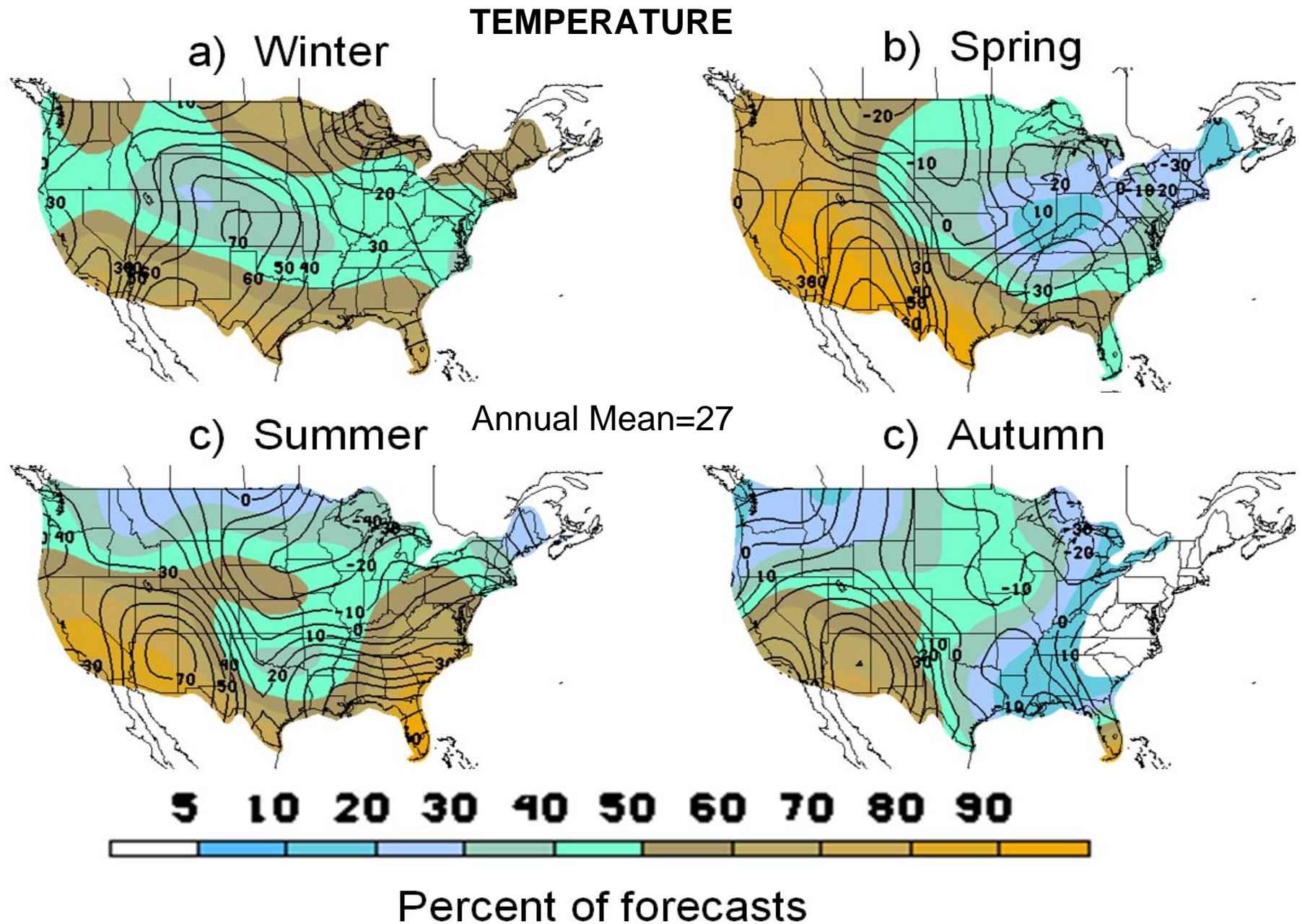
OFFICIAL FORECASTS OF 3-MONTH MEAN EL NINO/LA NINA REGION OCEAN TEMPERATURES AND U.S. TEMPERATURE AND PRECIPITATION

VERIFICATION

$$SKILL = \frac{ACCURACY\_OF\_FORECAST}{ACCURACY\_OF\_STANDARD\_FORECAST}$$



Lines= $\% \text{ improvement over random forecasts, } s - ((c - e) / (t - e)) * 100$

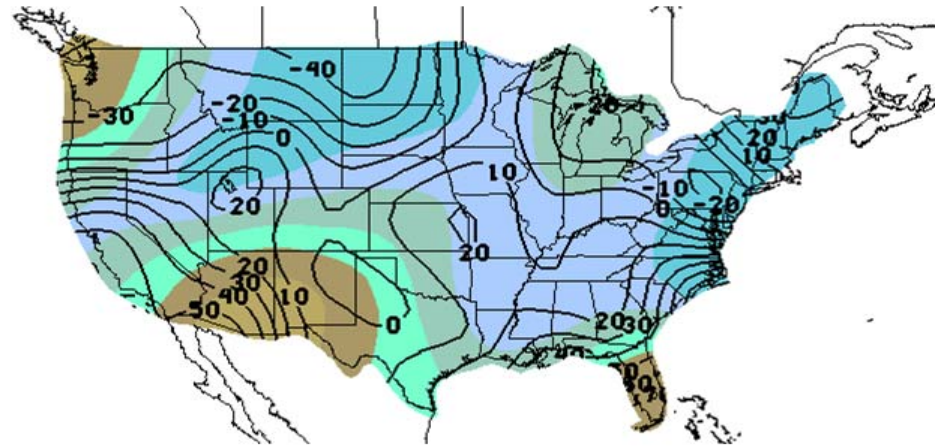
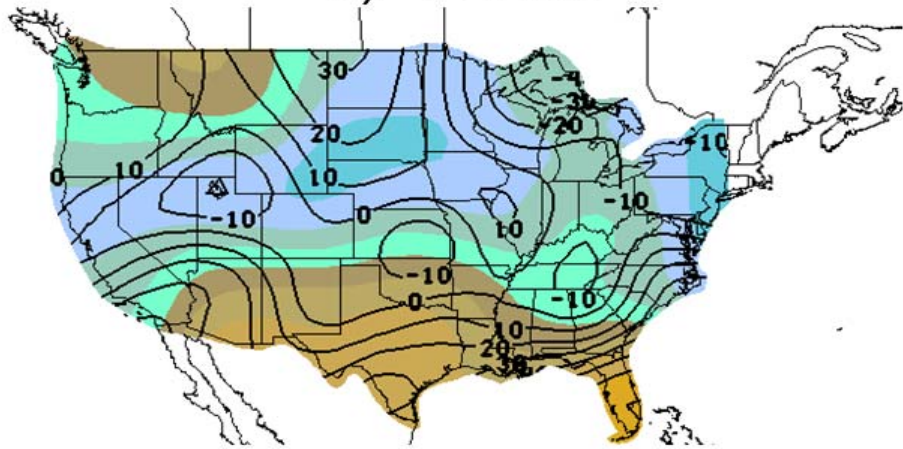


Lines=% improvement over random forecasts,  $s - ((c - e) / (t - e)) * 100$

**PRECIPITATION**

a) Winter

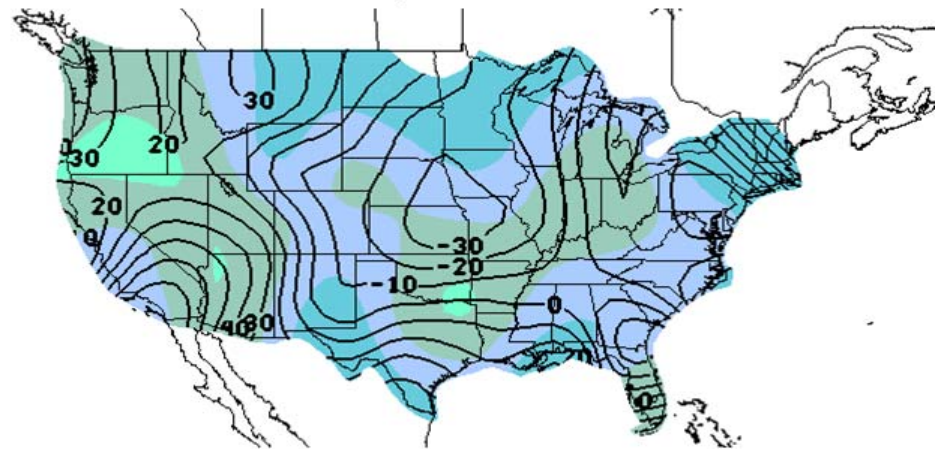
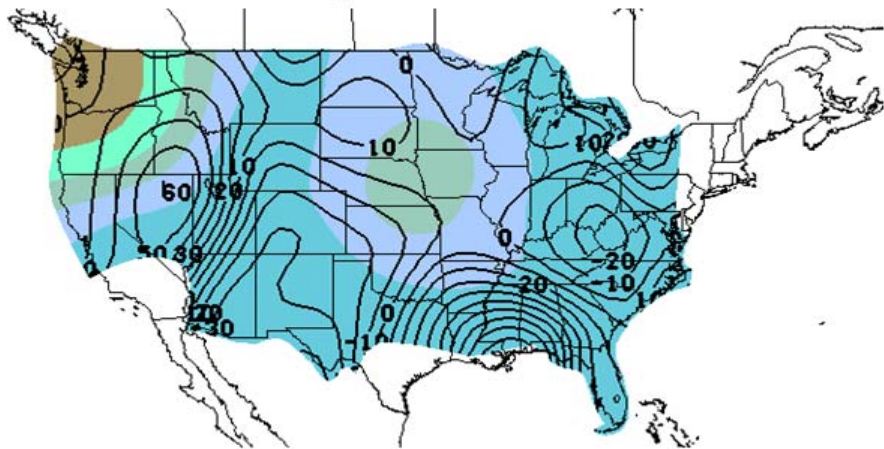
b) Spring



c) Summer

Annual Mean=12

c) Autumn



**5 10 20 30 40 50 60 70 80 90**

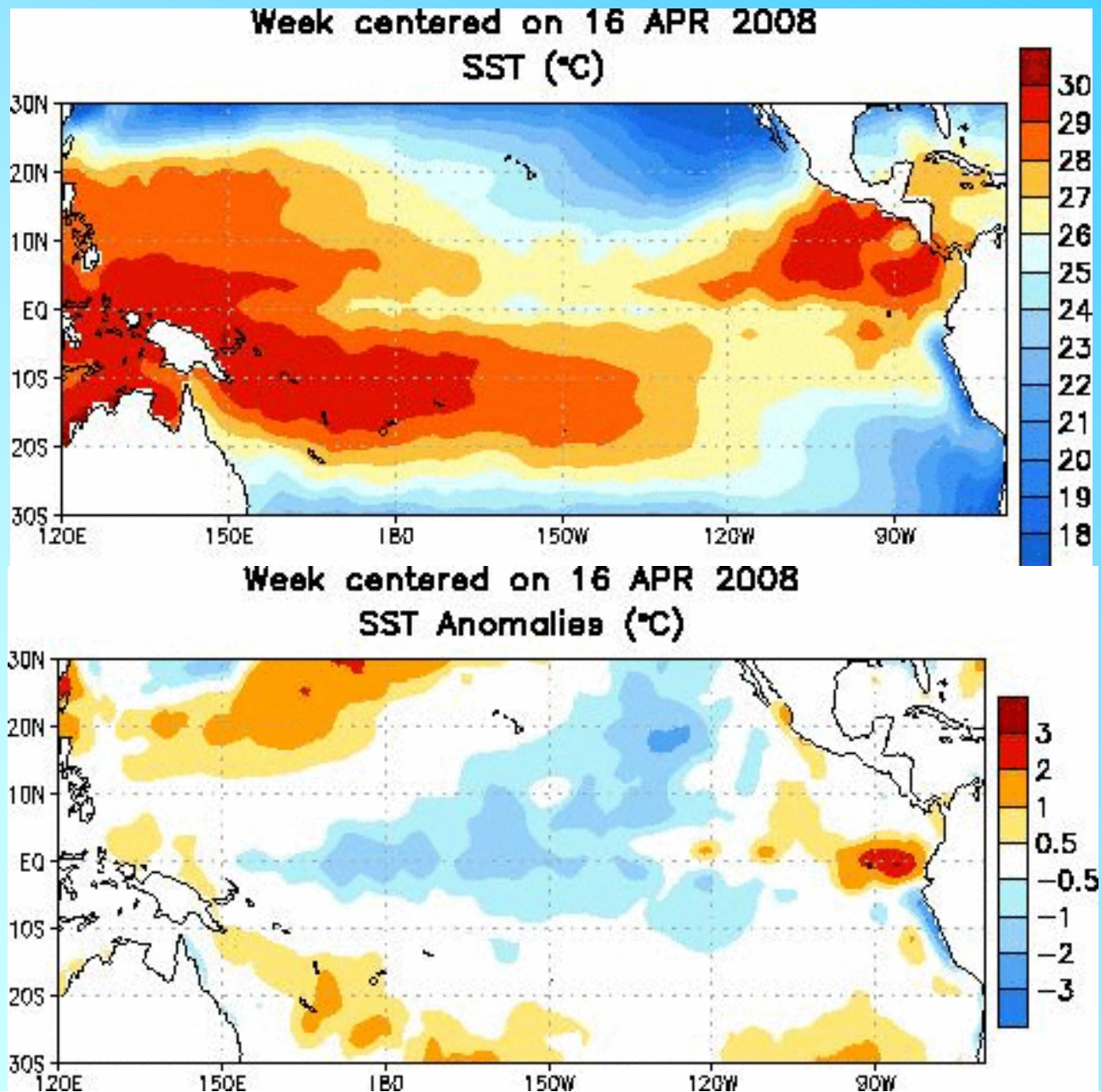


Percent of forecasts



# Factors Affecting the Aug-Sep-Oct 3-Month Forecast

# Demise of La Nina

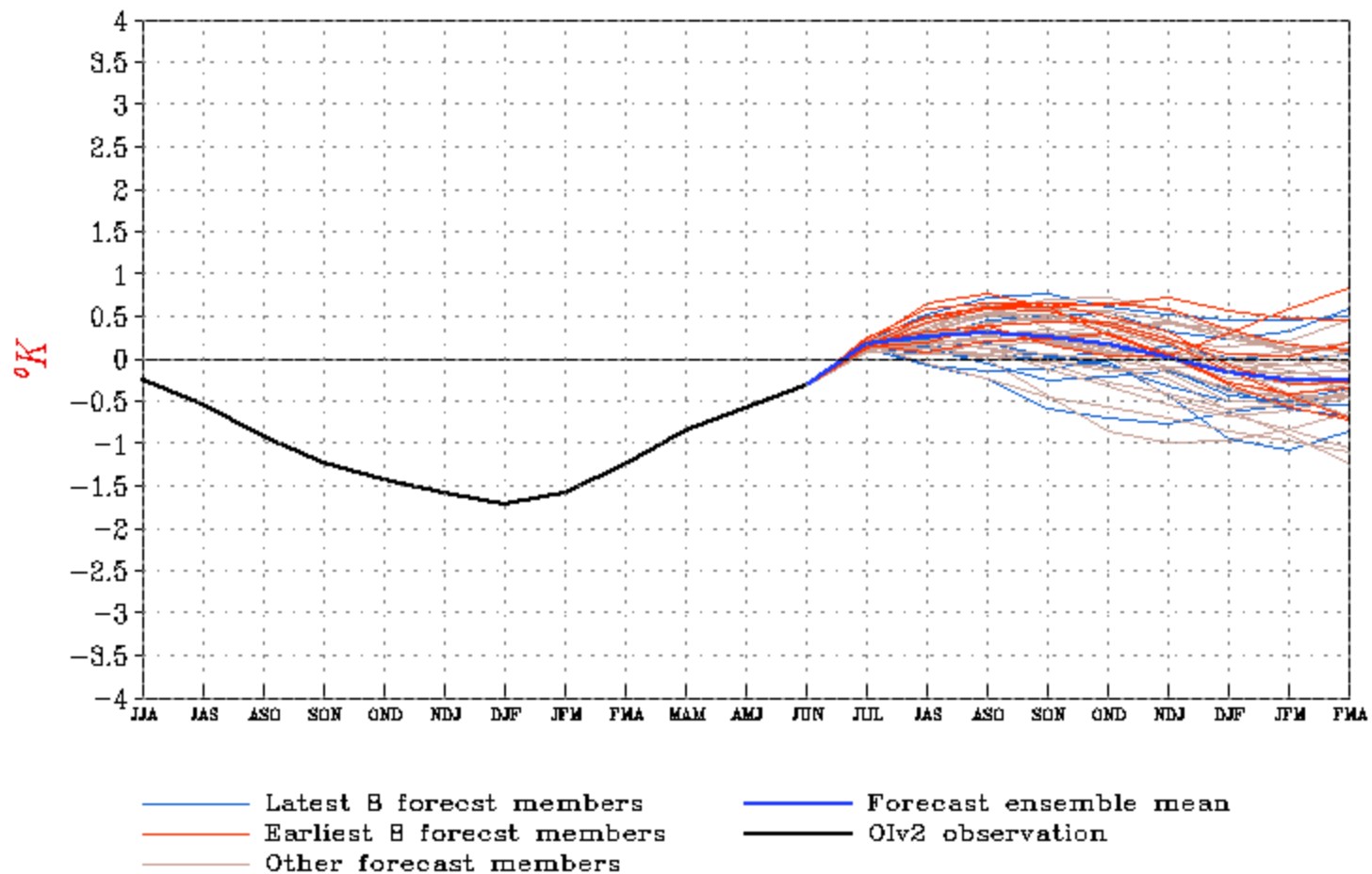




NWS/NCEP

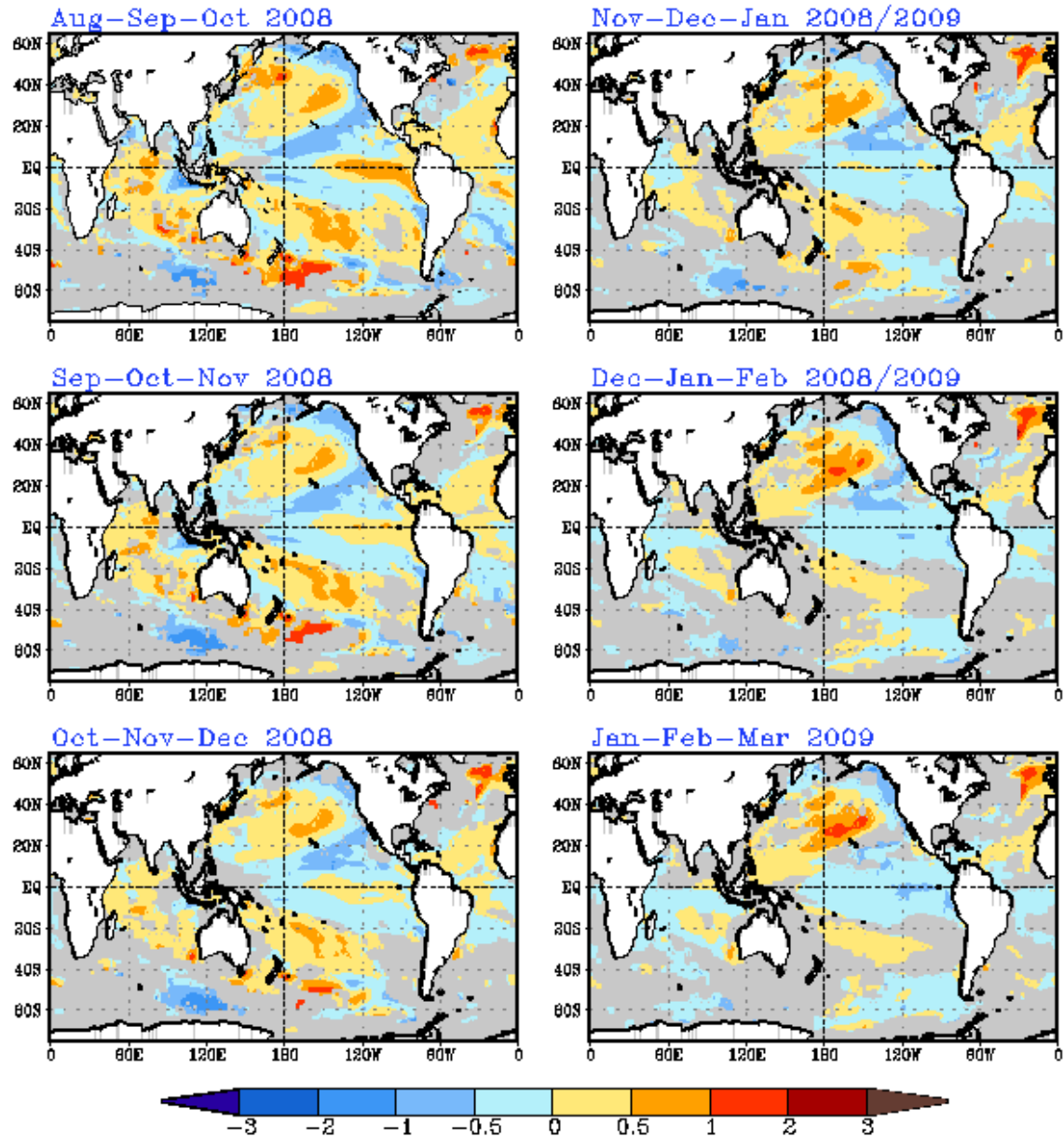
Last update: Sun Jul 13 2008  
Initial conditions: 2Jul2008–11Jul2008

### Forecast *Nino3.4* SST anomalies from CFS





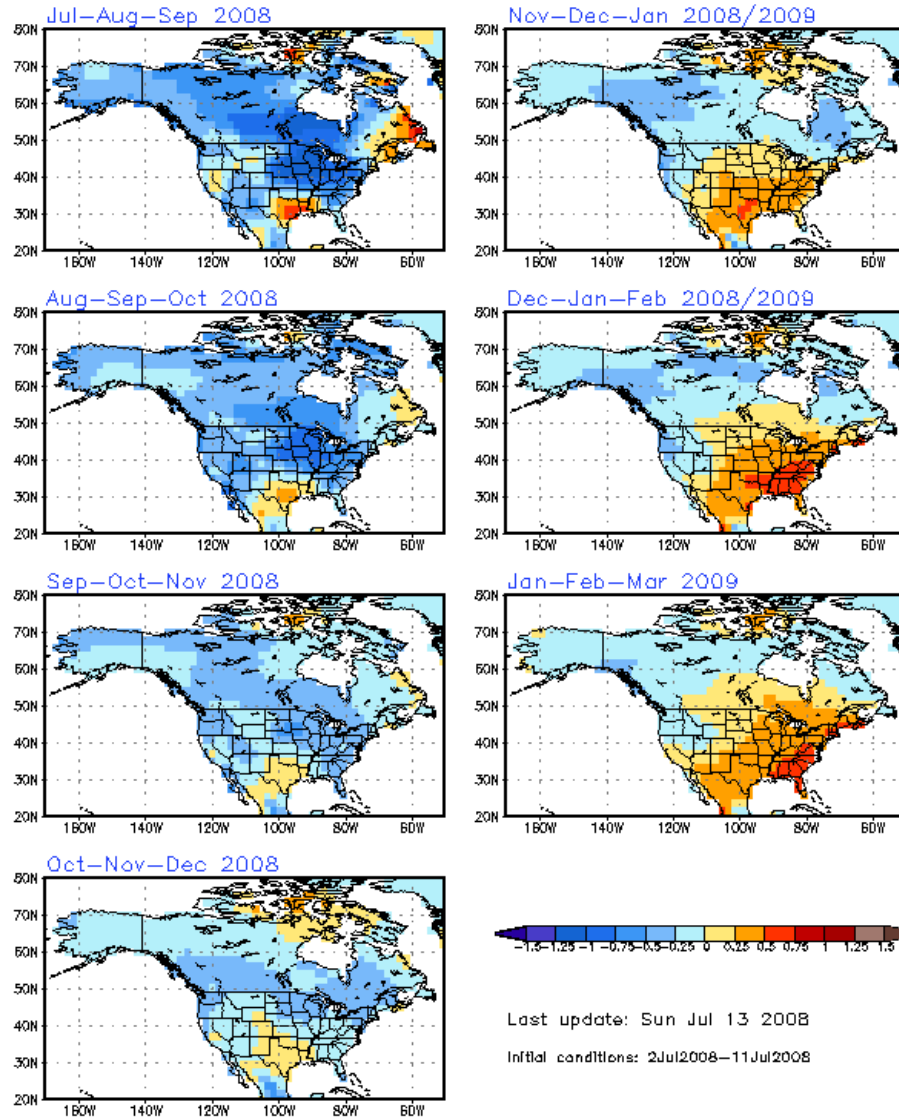
### CFS seasonal SST forecast (K)



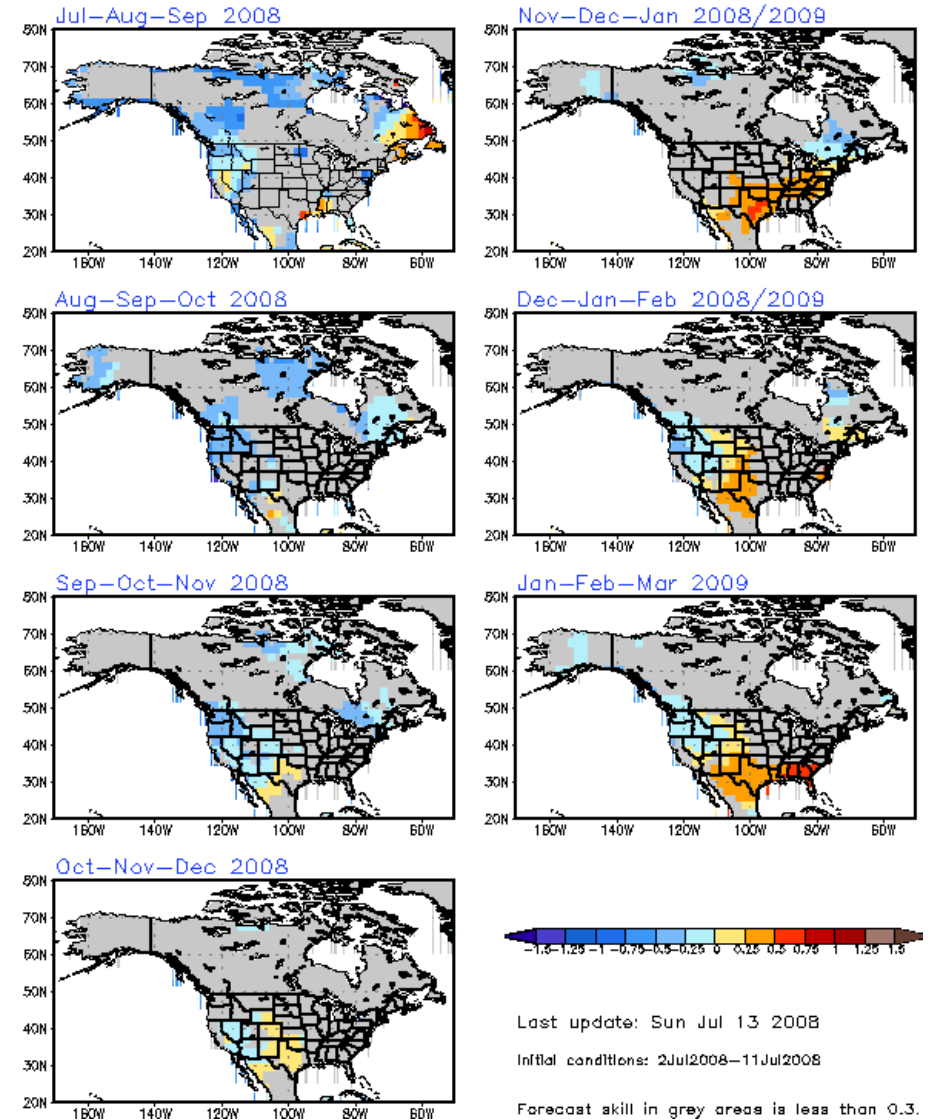
Forecast skill in grey areas is less than 0.3.

# Standardized Temperature Anomalies In Comparison with Their Skill-Masked Counterparts

CFS seasonal standardized T2m forecast

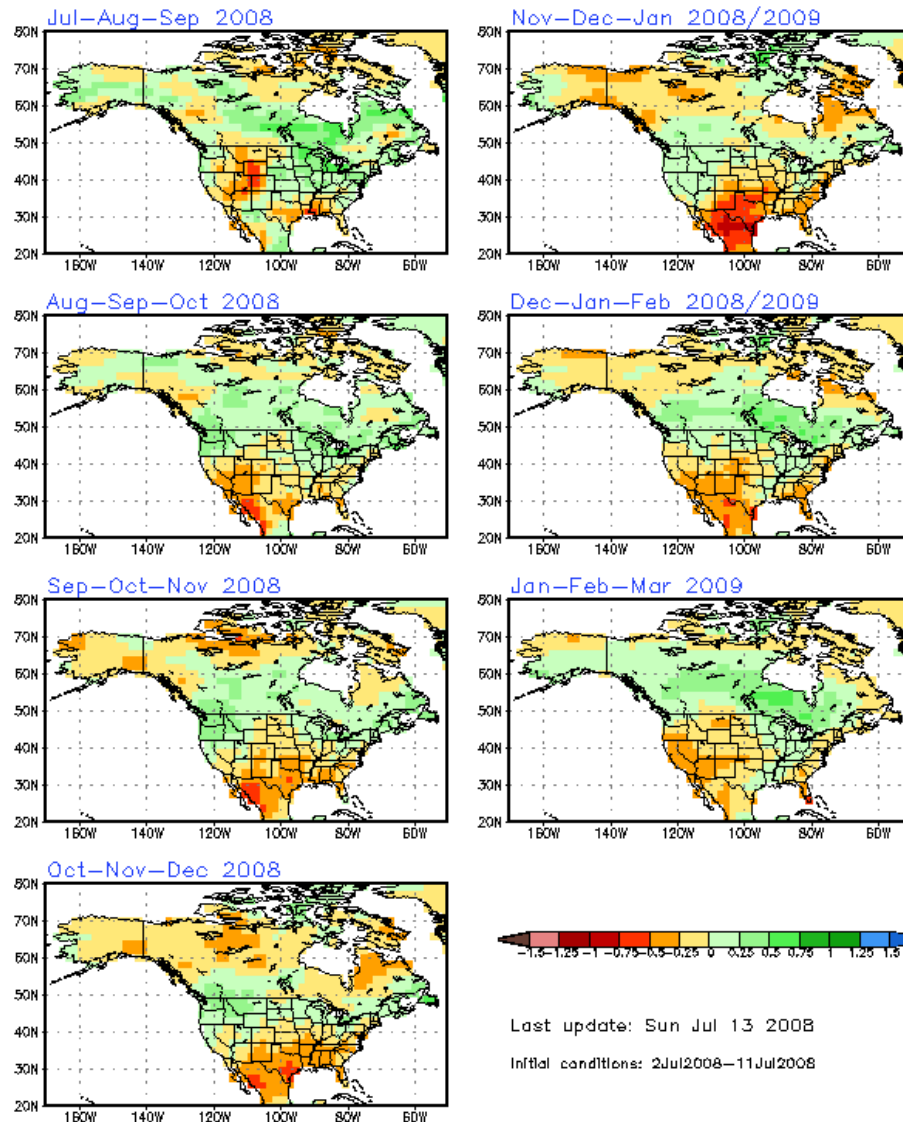


CFS seasonal standardized T2m forecast

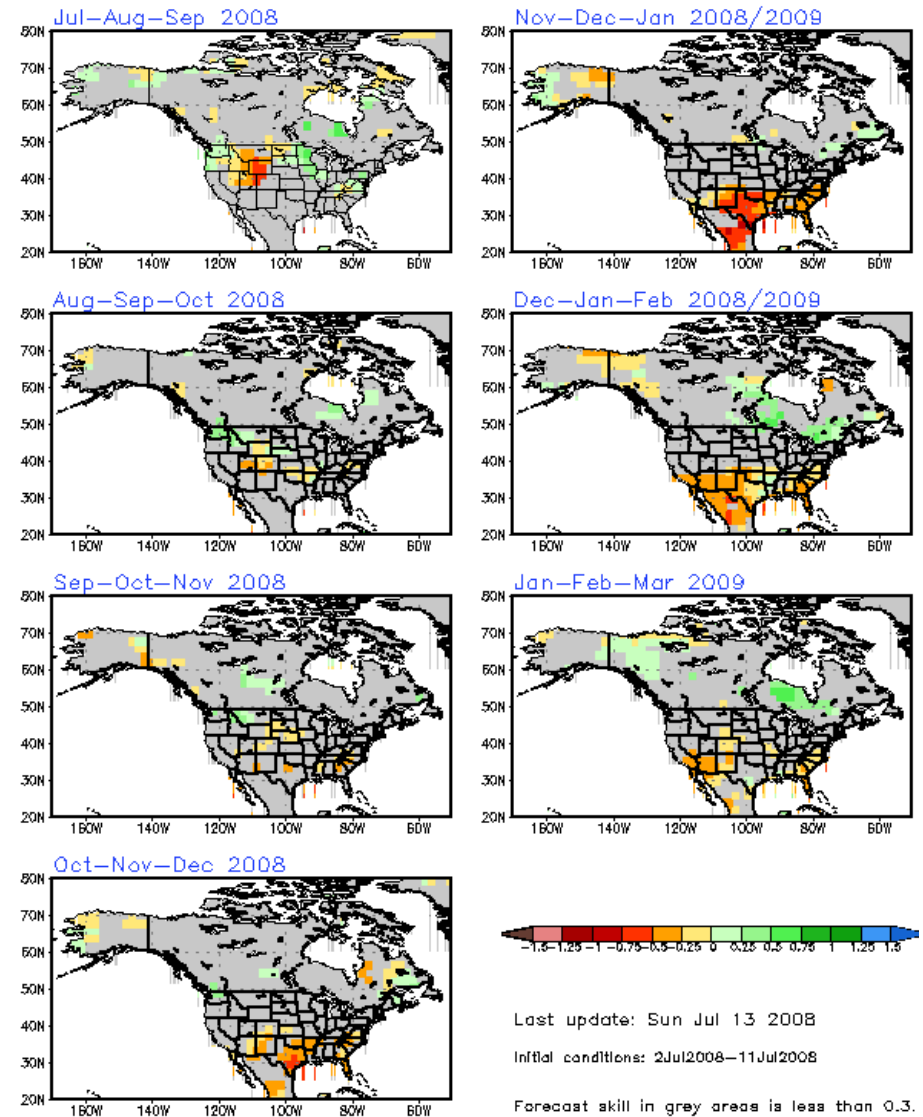


# Standardized Precipitation Anomalies In Comparison with Their Skill-Masked Counterparts

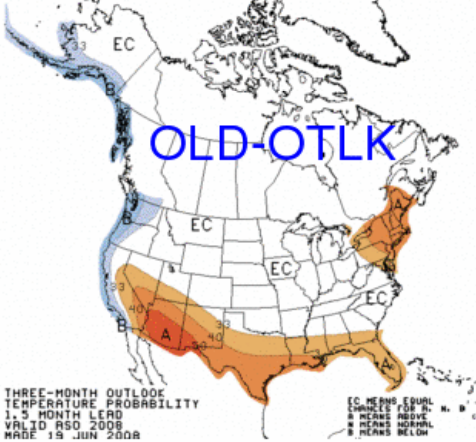
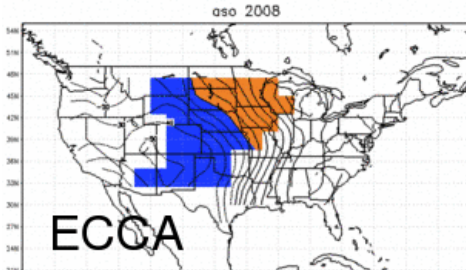
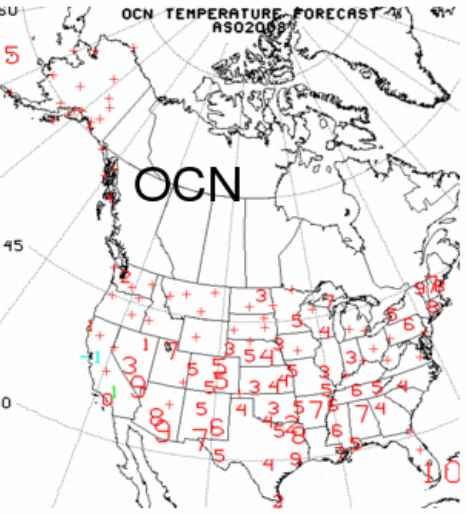
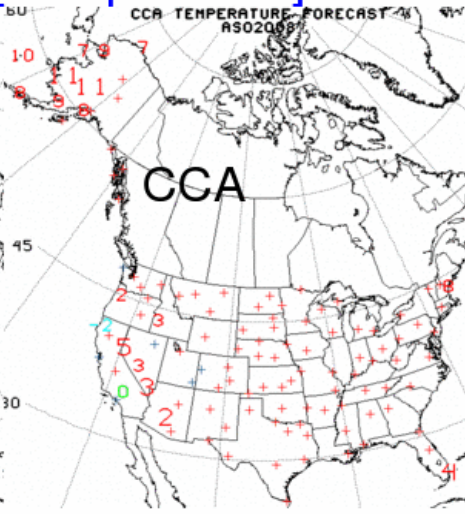
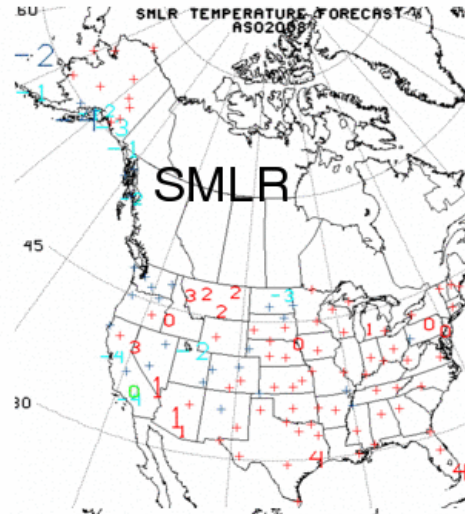
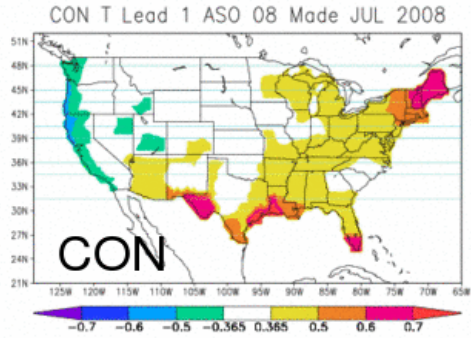
CFS seasonal standardized Prec forecast



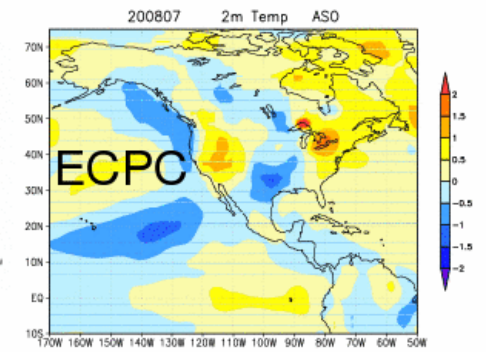
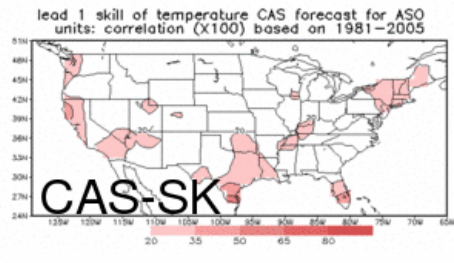
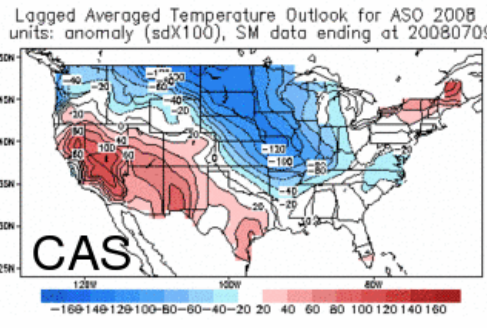
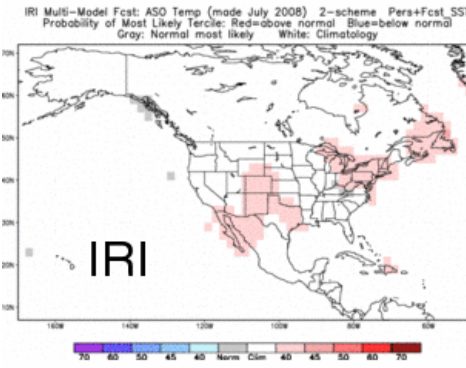
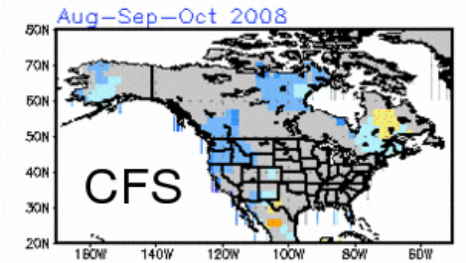
CFS seasonal standardized Prec forecast



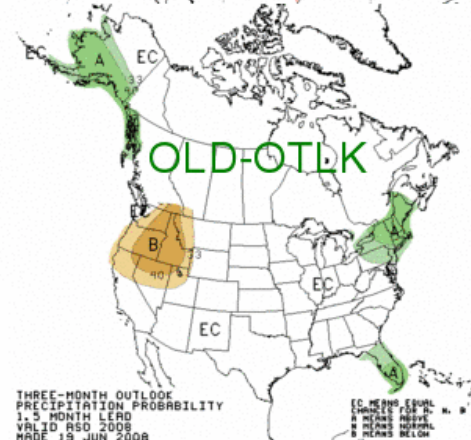
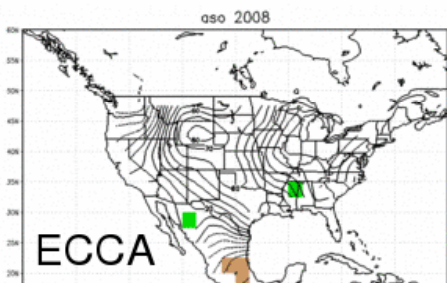
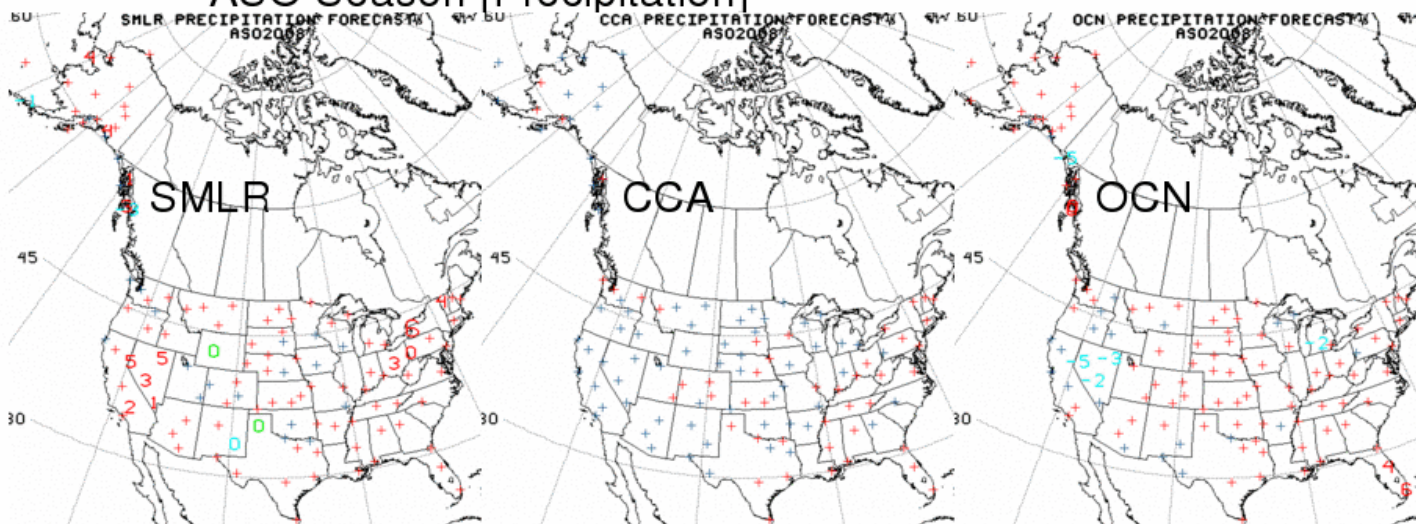
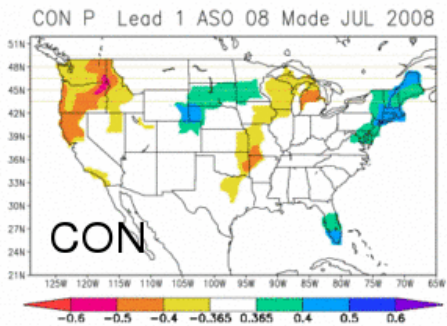
# ASO Season [Temperature]



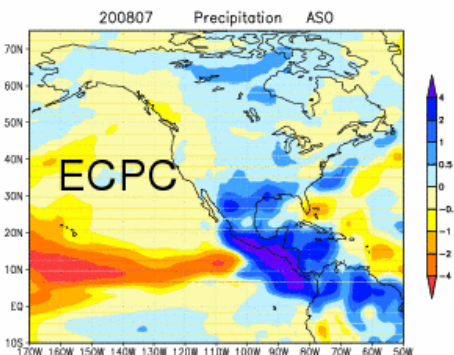
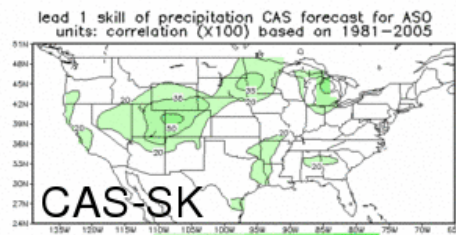
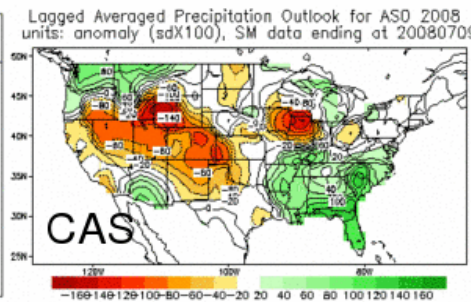
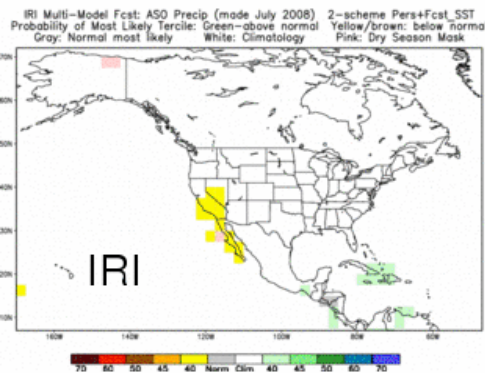
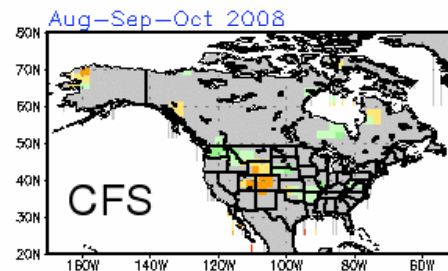
**NEW-OTLK  
IMAGE  
NOT  
AVAILABLE**



# ASO Season [Precipitation]



NEW-OTLK  
IMAGE  
NOT  
AVAILABLE





# Conclusion

- 3-month forecasts are based on trend, El Nino/La Nina, soil moisture, land-ocean contrast, other...
- Forecasts are made using most objective consolidation of model forecasts.
- Verification feeds-back to the process.
- 3 classes (A, B, N) cover the range of possible forecast outcomes.
- Forecast maps show the probability of the most likely class.
- Skill compares official forecast accuracy to that of climatology.
- Skill is highest in winter/summer, in the West/South
- Recently, we have greatly improved the skill of the forecasts.
- Input from Users helps us improve forecast utility to users.