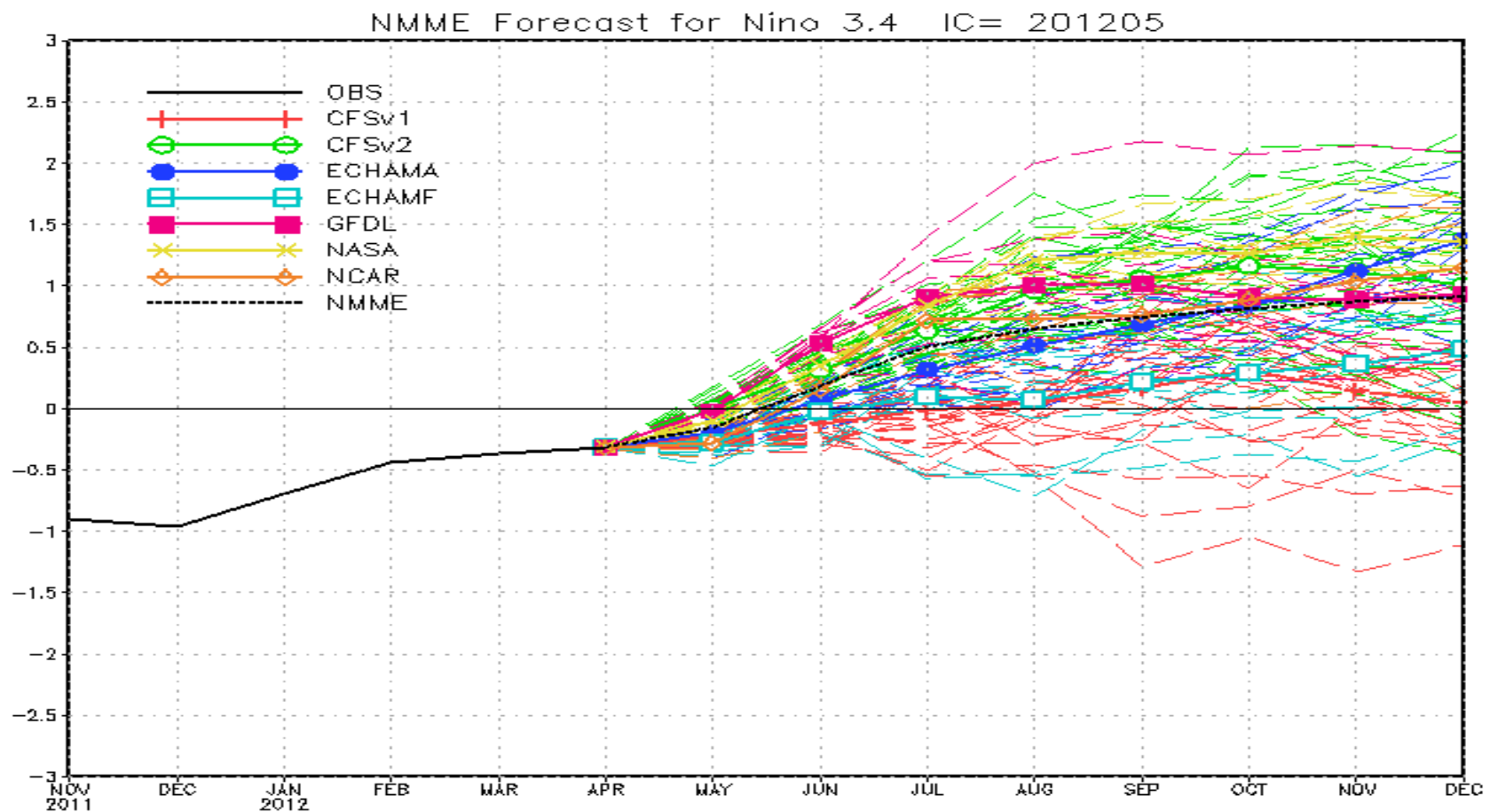


# NMME as a Platform for Modeling and Prediction Research Collaboration

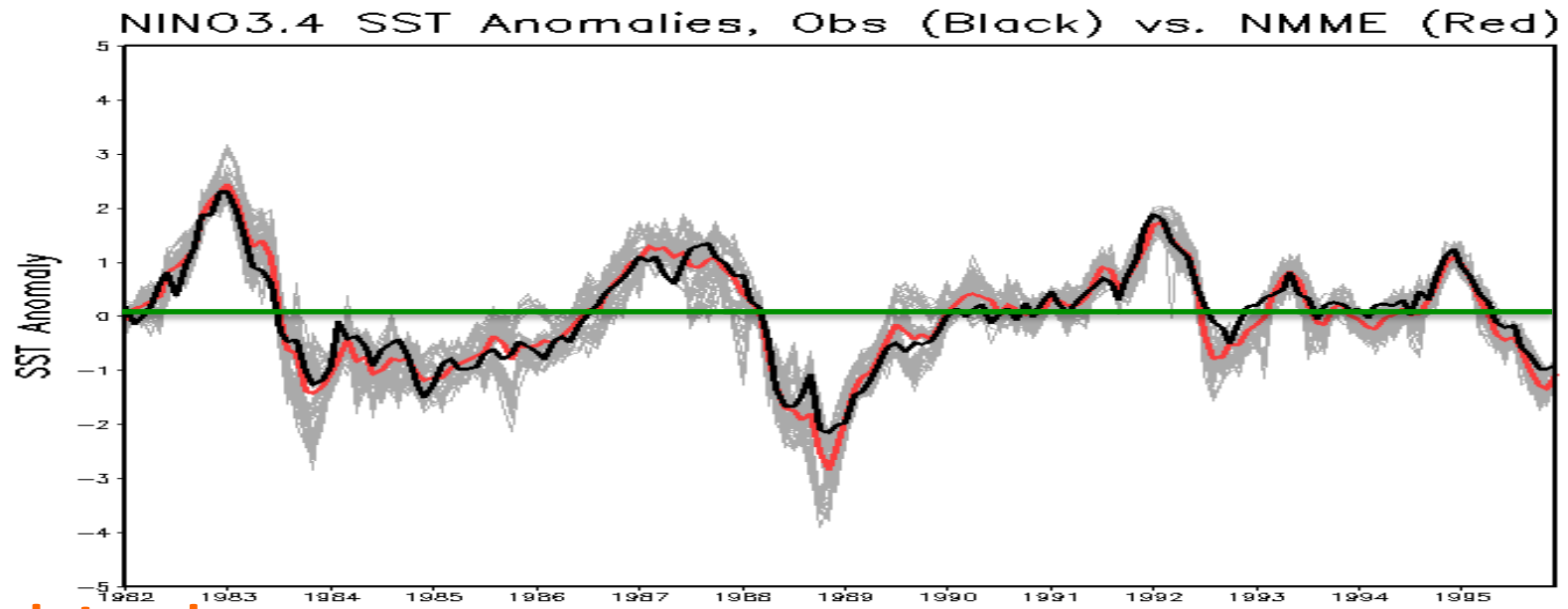


# Phase 1 NMME

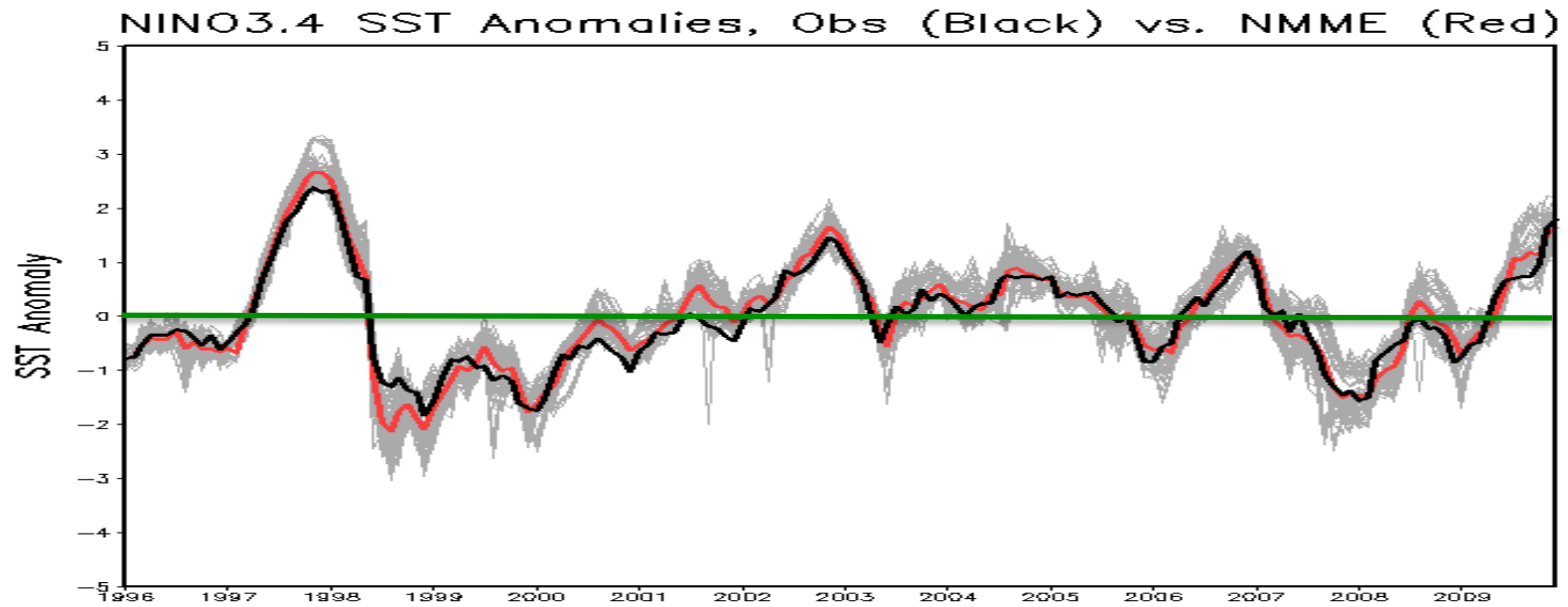
- **CTB NMME Workshops February 18, April 8, 2011**
  - Establish Collaboration and Protocol for Experimental Real-time Multi-Model Prediction
- **Protocol Developed**
- **Distributing Hindcast Data to CPC**
  - Public Dissemination via IRI Data Library
- **Became Real-Time in August 2011**
  - Adhering to CPC Operational Schedule

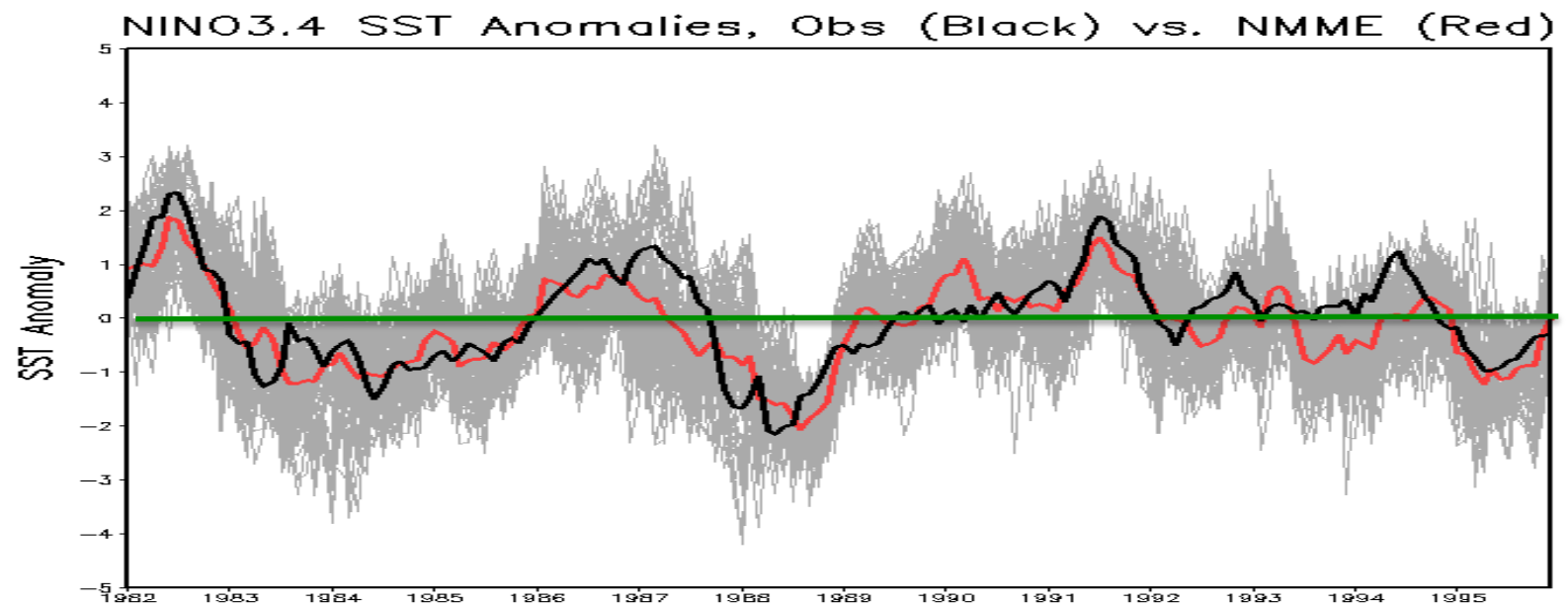
# NMME Partners

- University of Miami – RSMAS
- Nation Center for Atmospheric Research (NCAR)
- Center for Ocean-Land-Atmosphere Studies (COLA)
- International Research Institute for Climate and Society (IRI)
- University of Colorado – CIRES
- NASA – GMAO
- NOAA/NCEP/EMC/CPC
- NOAA/GFDL
- Canadian Meteorological Centre
- Princeton University

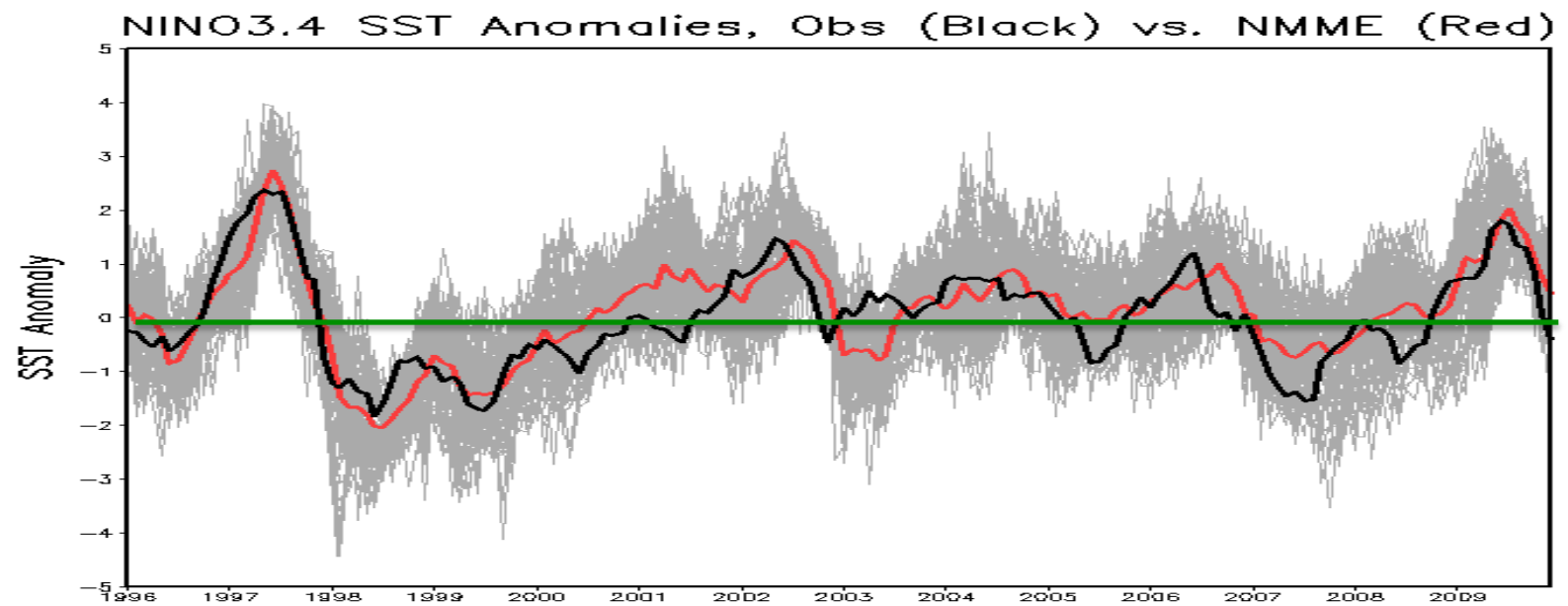


1-month Lead



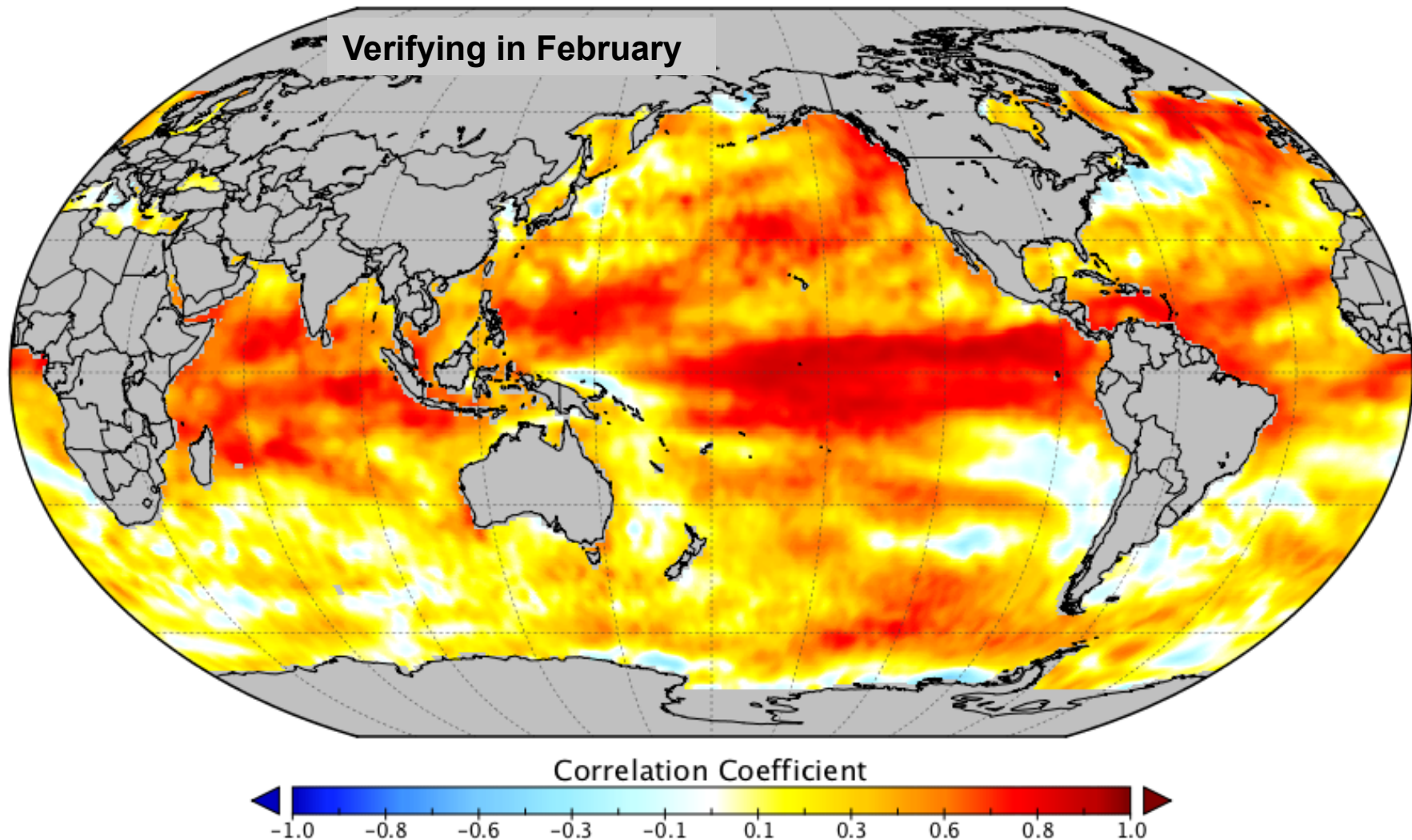


6-month Lead



# Hindcast Quality Assessment

US NMME SSTA Correlation Coefficient  
6 Month Lead August Initial Conditions (1982–2010)



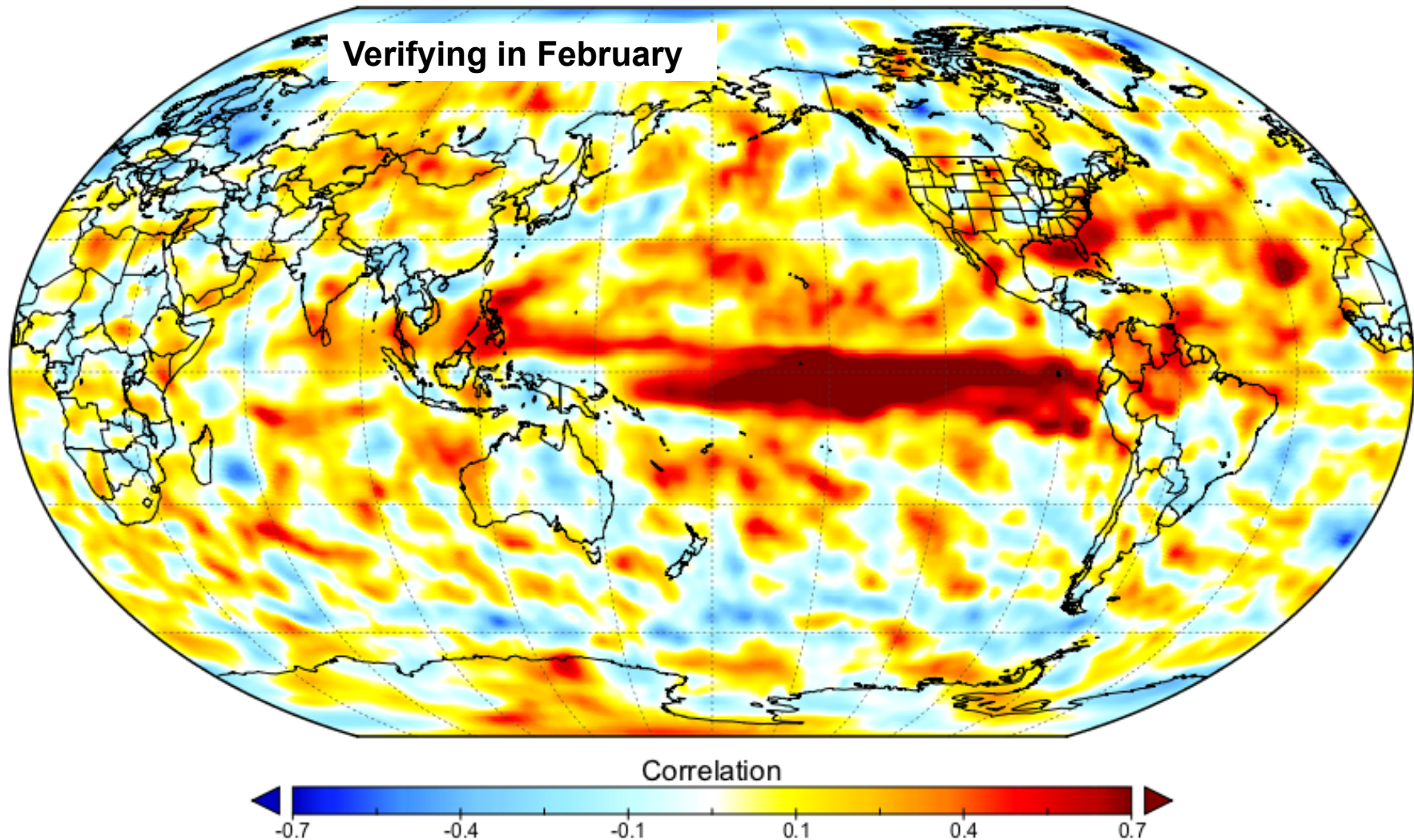
Each Ensemble Member from Each Model Weighted Equally – 87 Ensemble Members



# Hindcast Quality Assessment

NMME Precipitation Correlation 6 Month Lead (August IC)

Each ensemble member weighted equally

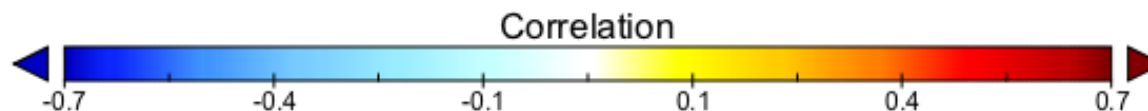
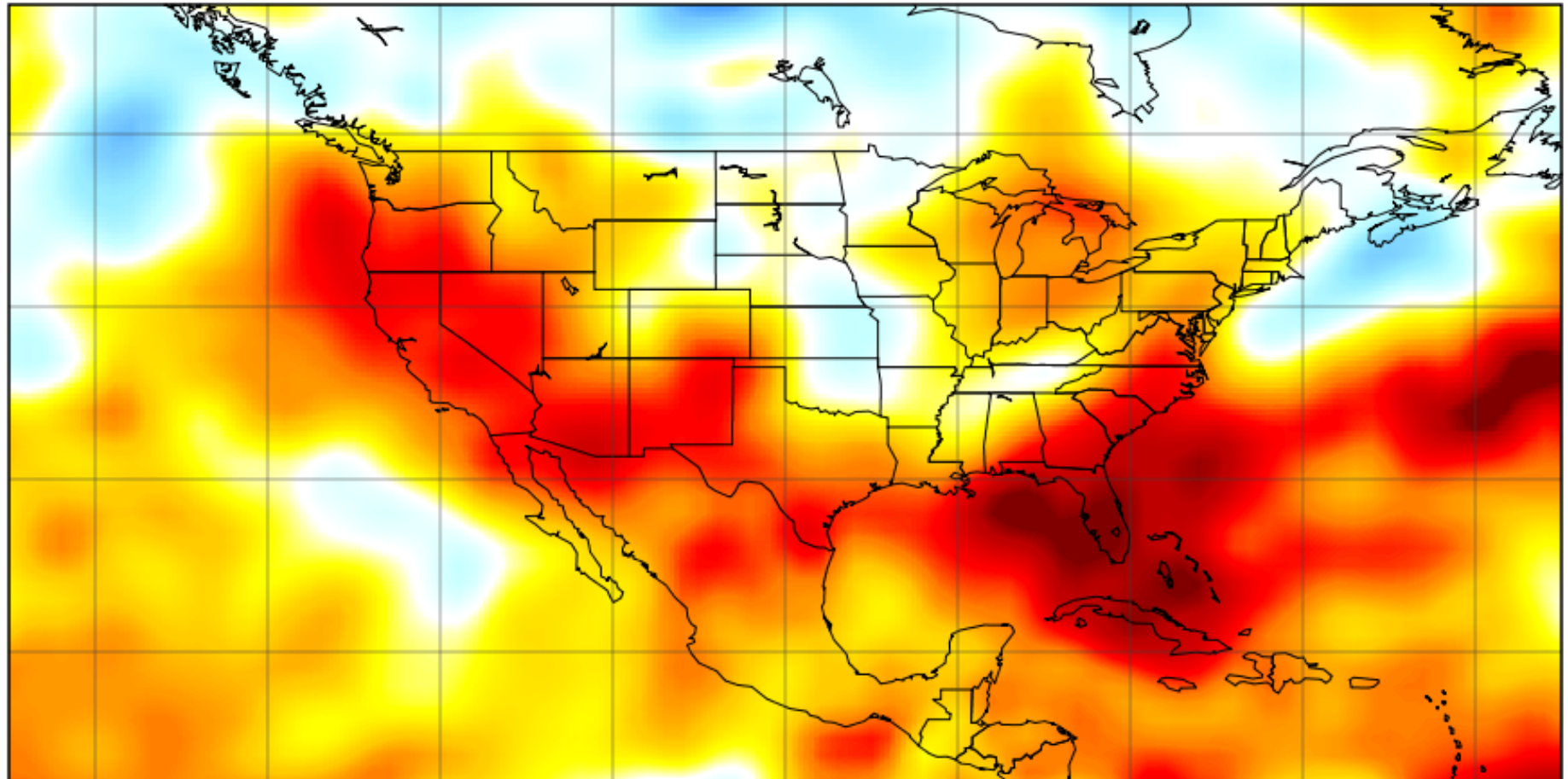


Each Ensemble Member from Each Model Weighted Equally – 87 Ensemble Members

# (Preliminary) Hindcast Quality Assessment

NMME Precipitation Correlation 2 Month Lead (December IC)

Each ensemble member weighted equally

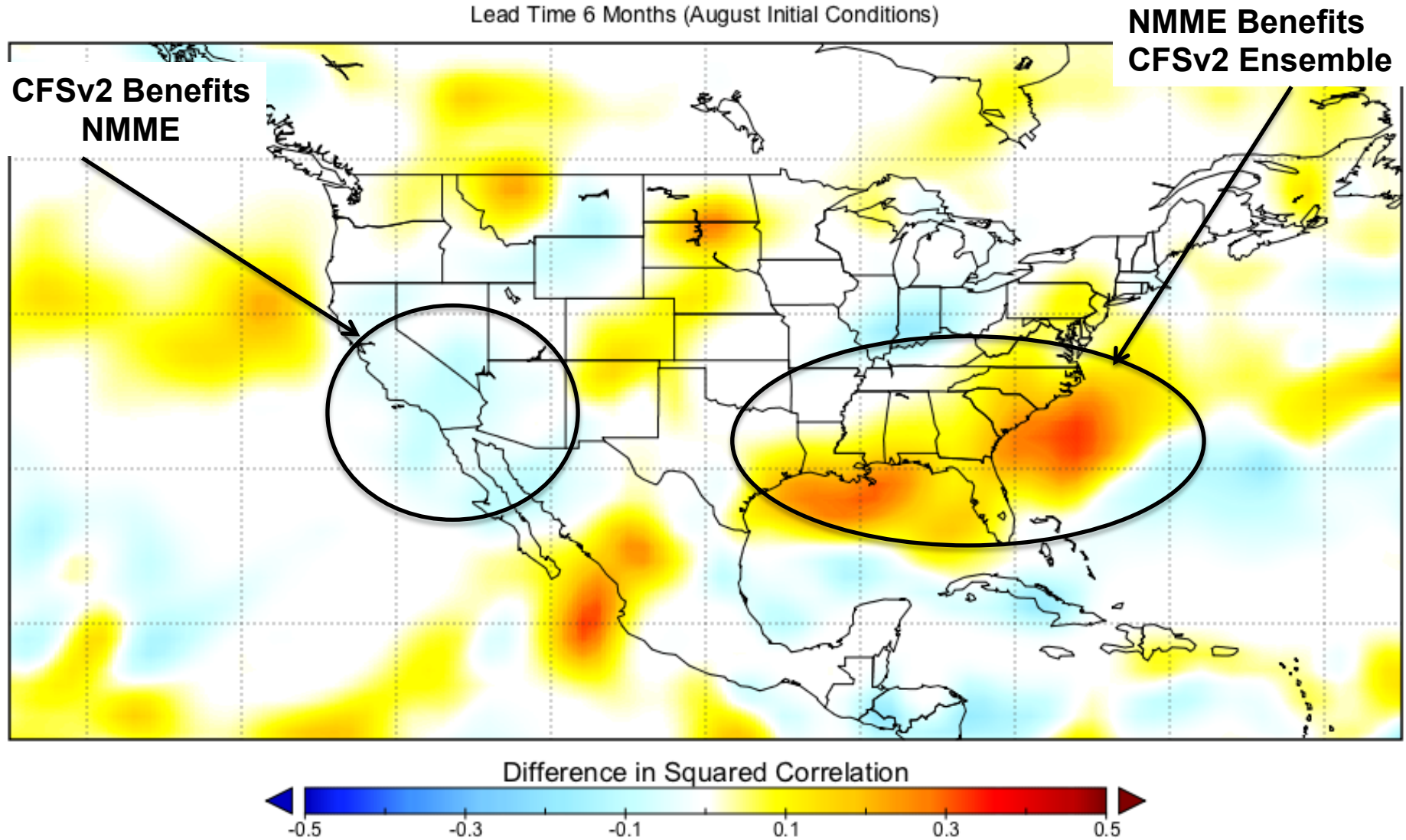


Each Ensemble Member from Each Model Weighted Equally – 83 Ensemble Members



# CFSv2 vs. All Others (24 Member Ensembles)

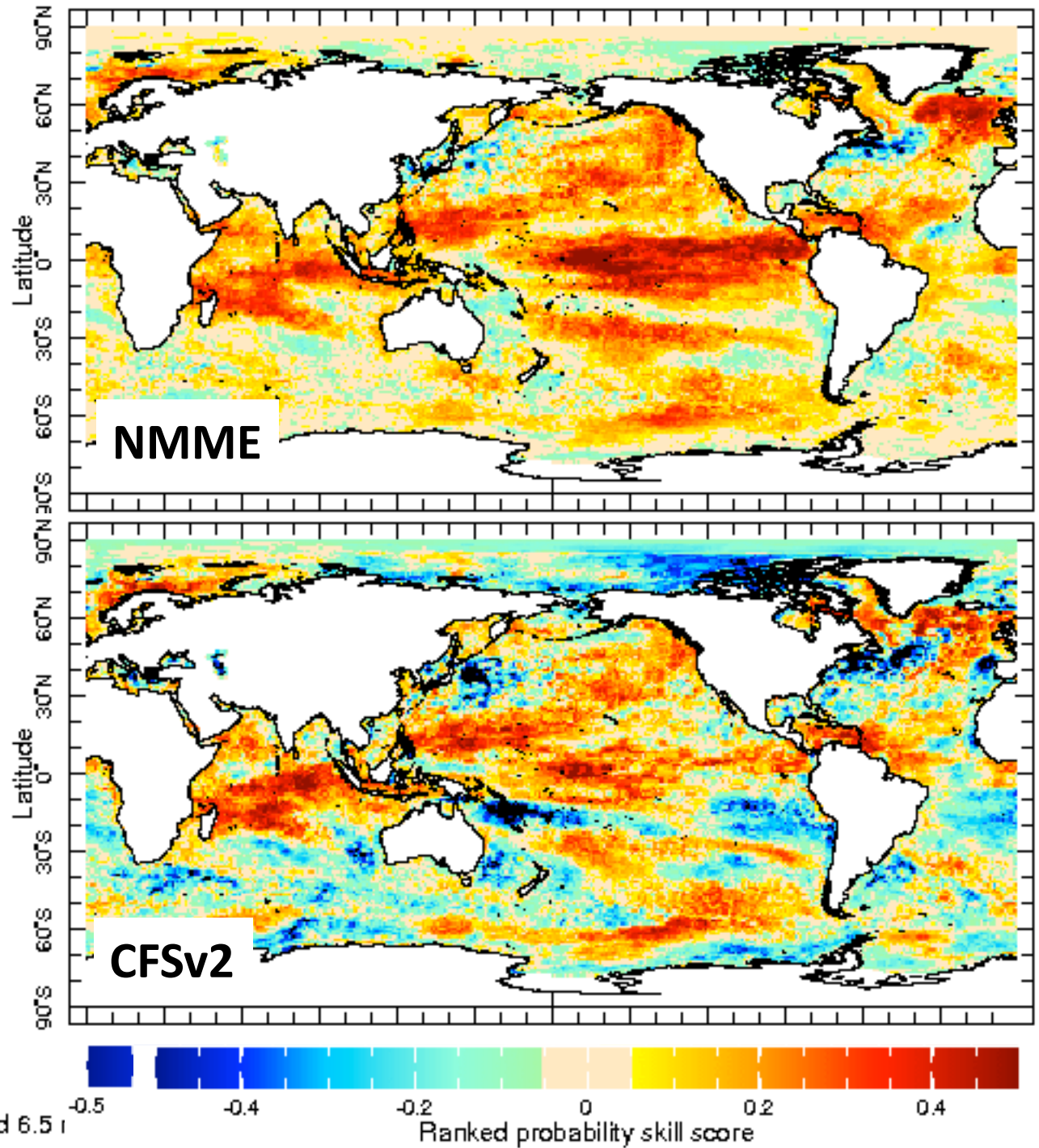
Lead Time 6 Months (August Initial Conditions)



CFSv2(24) vs. CCSM3(4)+IRIa(4)+IRId(4)+CM2.1(4)+GEOS5(4)+CFSv1(4)

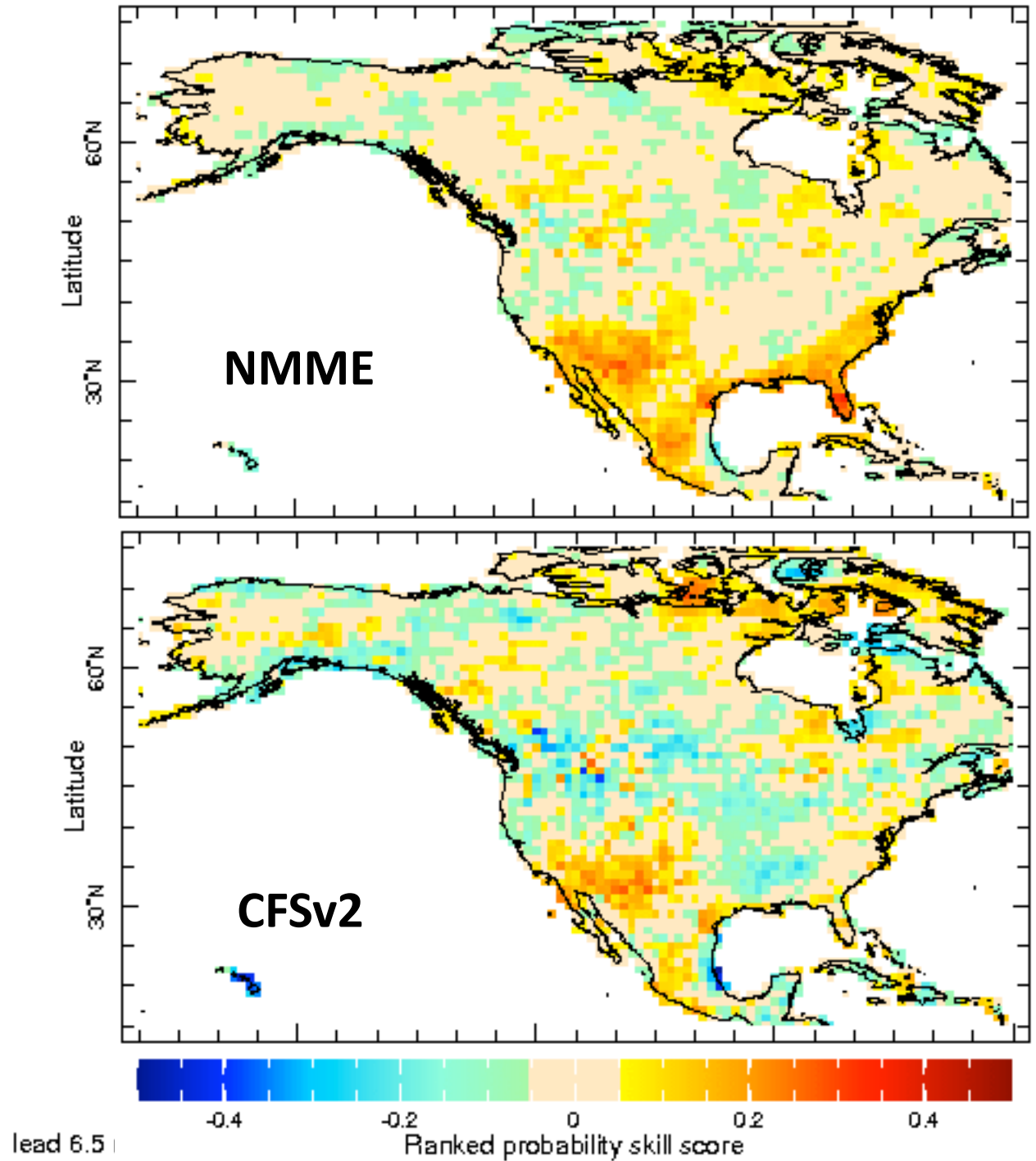


# July 1 start DJF SST forecast RPSS



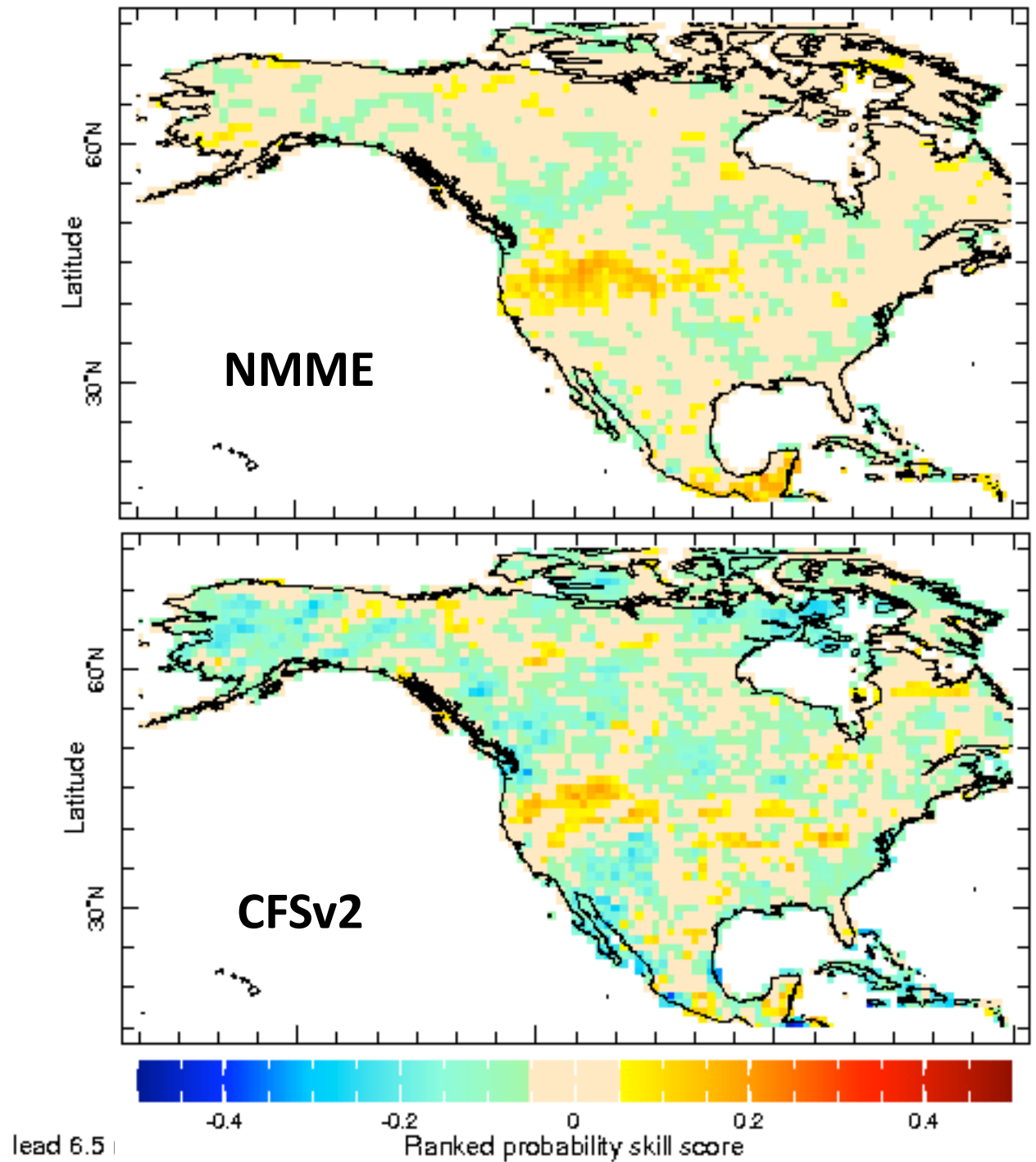


July 1 start  
DJF prec  
forecast  
RPSS





**Jan 1 start**  
**JJA prec**  
**forecast**  
**RPSS**

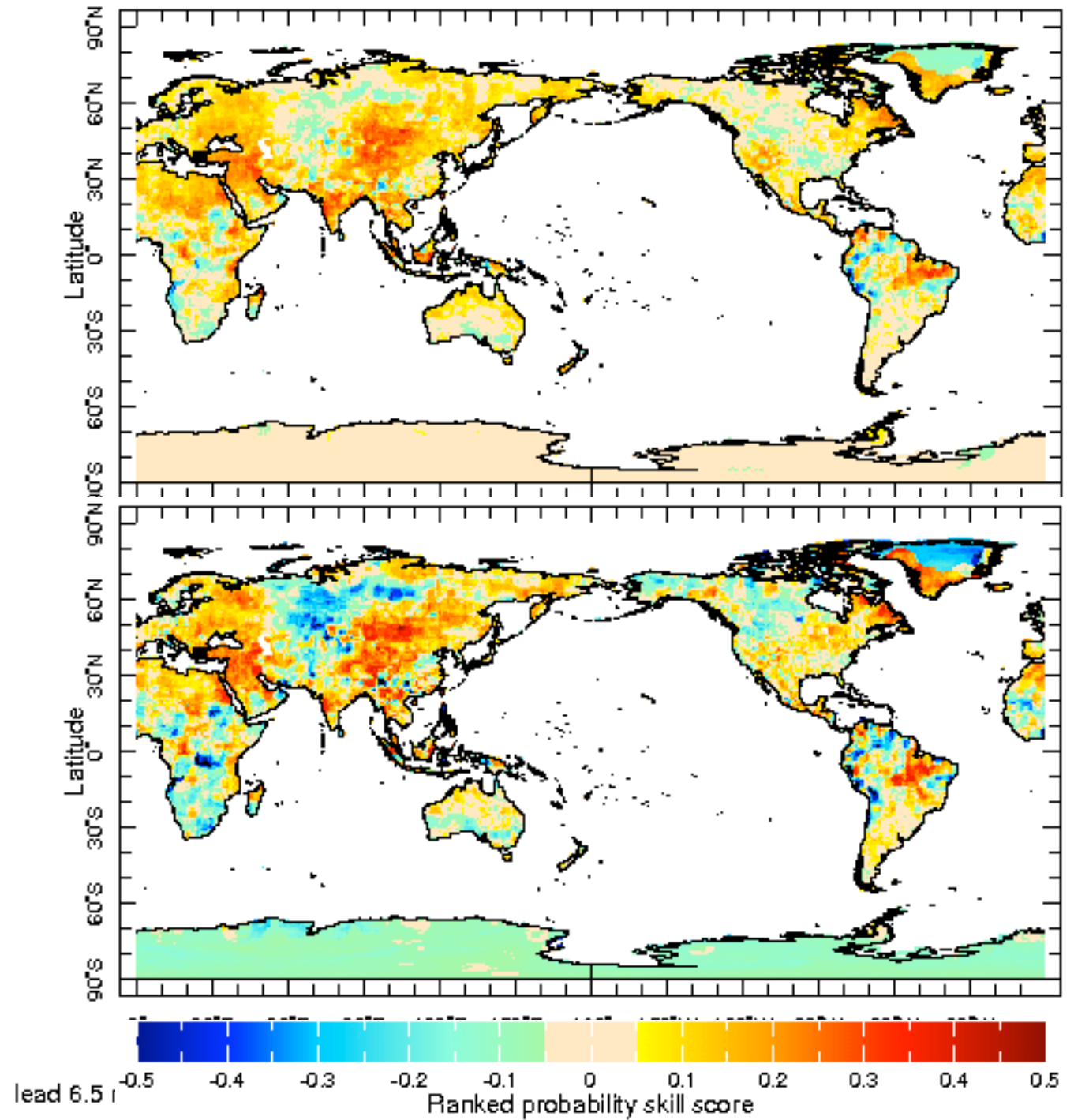




Jan 1 start  
JJA tref forecast  
RPSS

NMME

CFSv2





[Data Library](#)[Maproom](#)[IRI Climate program](#)**National Multimodel Ensemble**

## The National Multimodel Ensemble

There is ample evidence of the need for a US national multi-model seasonal-to-interannual prediction system. It is in the Nation's interest to have a multi-model seasonal-to-interannual prediction capability independent of information that may be available from outside sources. The advantage of a MME prediction system is that it, in addition to providing additional forecast information for the surface air temperature and precipitation outlooks that are currently products of the Climate Prediction Center (CPC), the MME can also provide information about fields and phenomena that the US has specific interest in predicting: ENSO cycle, monsoons, intraseasonal variability and the Madden-Julian Oscillation. (Ben P. Kirtman and Dughong Min)

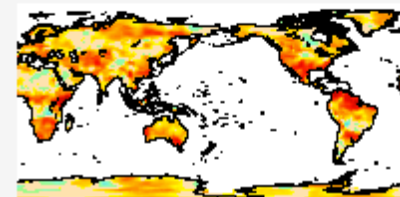
## Verification

[Precipitation](#)[Near-surface temperature](#)[SST](#)

### Precipitation

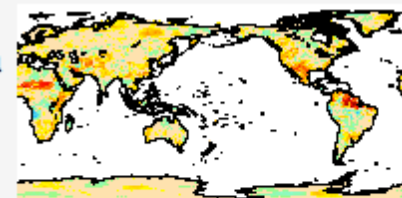
#### Anomaly correlation

This map shows the anomaly correlation between NMME forecast precipitation and observations as a function of start and lead.



#### RPSS

This map shows the RPSS for NMME forecast precipitation as a function of start and lead.

[Share](#)

- [http://iri.columbia.edu/~shuhua/mis-html/Reliability\\_nmme.html](http://iri.columbia.edu/~shuhua/mis-html/Reliability_nmme.html)



The International Research Institute  
for Climate and Society

## NMME Reliability Diagrams

Period: 1982-2010

Lead:

- ☒ Lead-1
- ☐ Lead-2
- ☐ Lead-3
- ☐ Lead-4
- ☐ Lead-5
- ☐ Lead-6

Season:

- ☒ DJF
- ☐ JFM
- ☐ FMA
- ☐ MAM
- ☐ AMJ
- ☐ MJJ
- ☐ JJA
- ☐ JAS
- ☐ ASO
- ☐ SON
- ☐ OND
- ☐ NDJ

Variable:

- ☒ Precipitation
- ☐ 2m Air Temperature
- ☐ Sea Surface Temperature

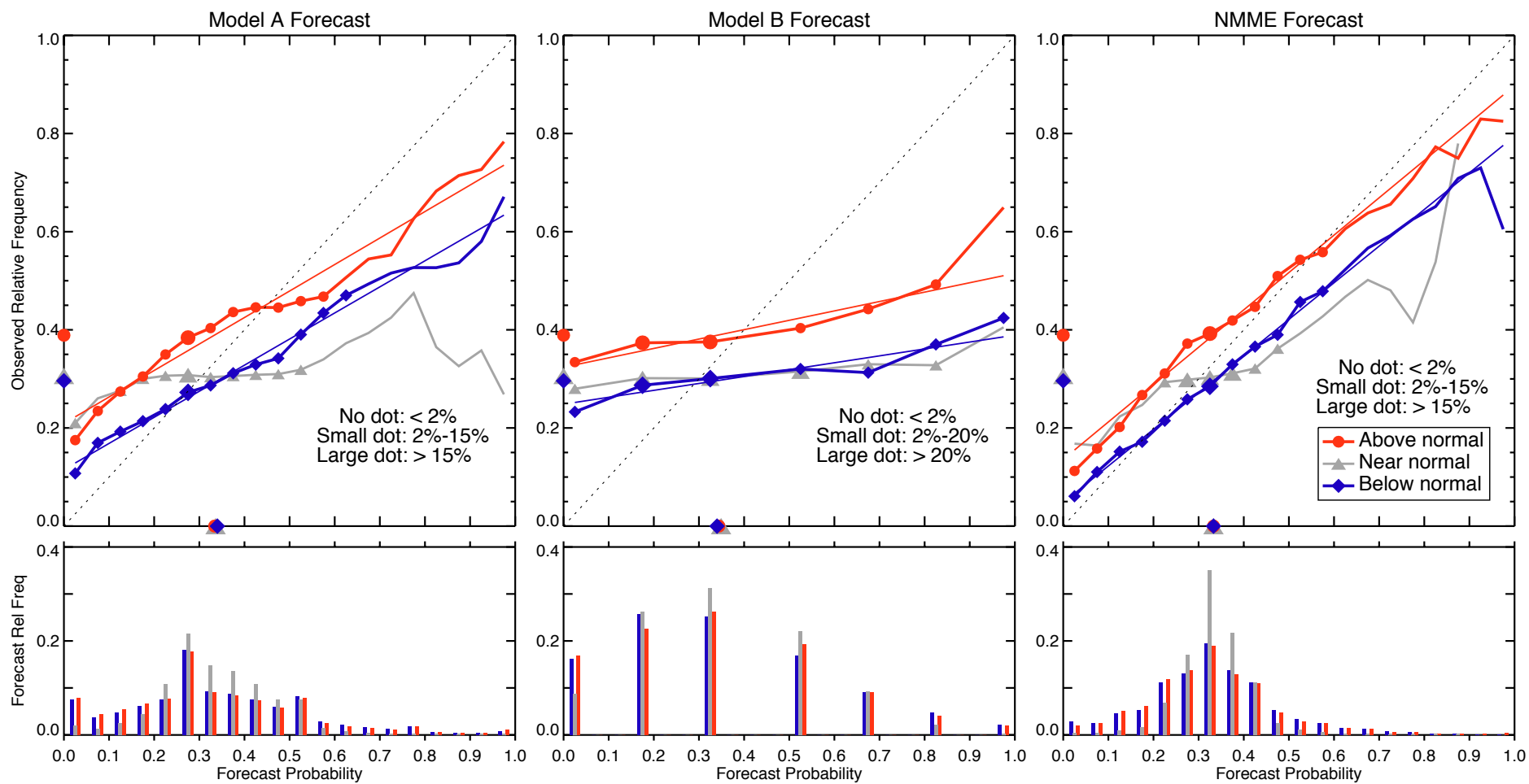
Region:

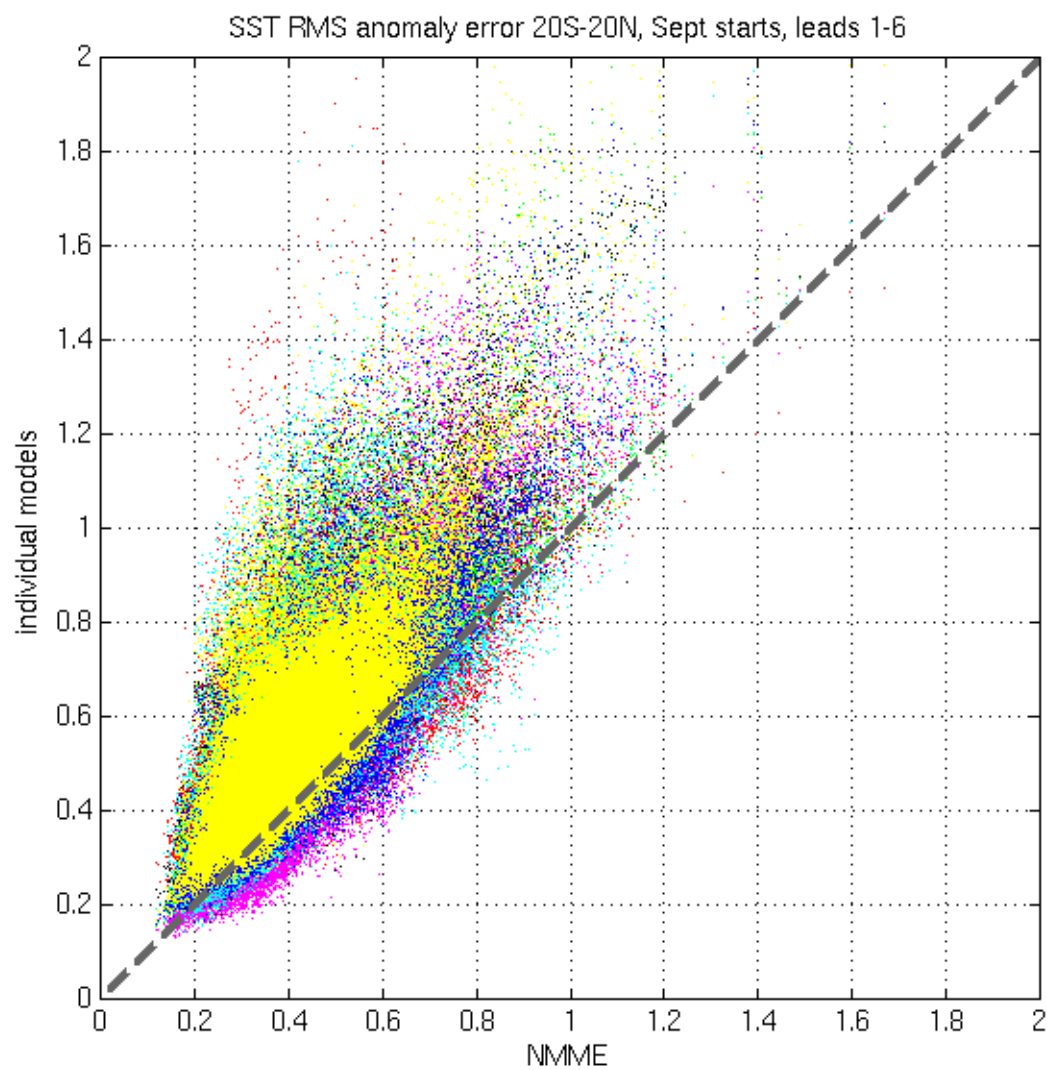
- ☒ Globe
- ☐ Tropics (25S-25N)

Reset

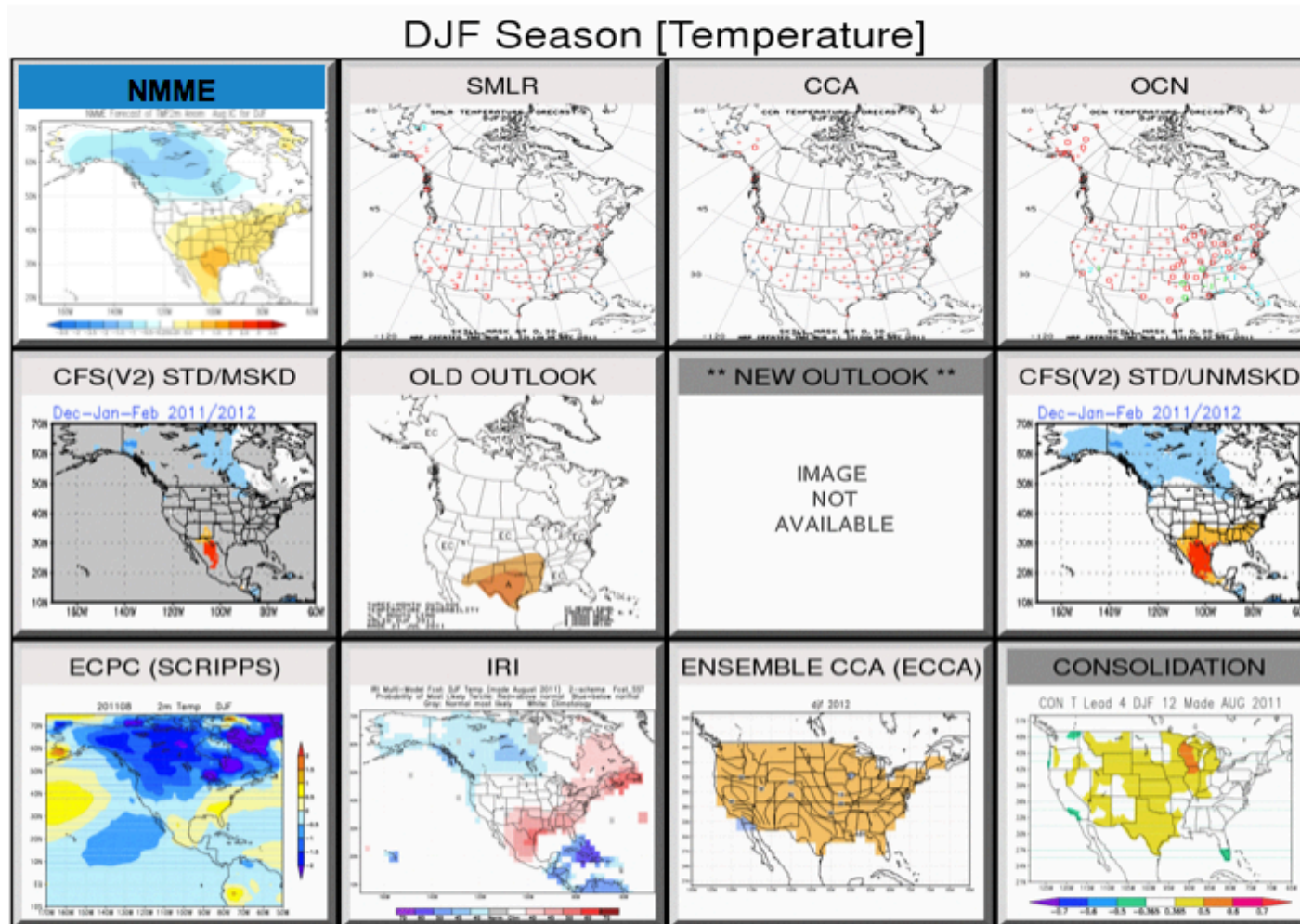
Submit

**Note:** For the tropics, the reliability diagrams are only available for precipitation.





M O D E L S	Winning Percentage	
	CM2.1	35%
	CFSv1	29%
	IRI-Direct	29%
	IRI-Anom	30%
	GEO55	35%
	CFSv2	48%
	CCSM3	26%



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## CPC Seasonal Prognostic Map Discussion (PMD):

“PROGNOSTIC TOOLS USED FOR U.S. TEMPERATURE AND PRECIPITATION OUTLOOKS OUTLOOKS FOR JFM THROUGH AMJ 2012 WERE PRIMARILY BASED ON THE NEW NATIONAL MULTI-MODEL ENSEMBLE MEAN FORECAST (NMME). THE FORECASTS STRONGLY AGREE WITH ...”



# Phase 2 NMME

- **Continue Experimental Real-Time Predictions**
- **Enhancing Current NMME Capability**
  - Model Updates: GFDL-CM2.5 (20 km AGCM), IRI (T106), CCSM4, CESM1
- **Assess Forecast Quality**
  - MME Combinations, Model Independence
  - Drought Assessment
    - Include: soil moisture, runoff, evaporation
- **Sub-Seasonal Assessment**
  - Forecast Protocol
- **Initial Condition Sensitivity Experiments**
  - Ocean, Land
- **Improved Data Distribution**
  - NCAR To Host

# NMME

Data <http://iridl.ldeo.columbia.edu/home/.tippett/.NMME>

Skill maps

<http://iri.columbia.edu/~tippett/NMME/>

Reliability

[http://iri.columbia.edu/~shuhua/mis-html/Reliability\\_nmme.html](http://iri.columbia.edu/~shuhua/mis-html/Reliability_nmme.html)

- Varying NMMEs
- Additional metrics
- ENSO