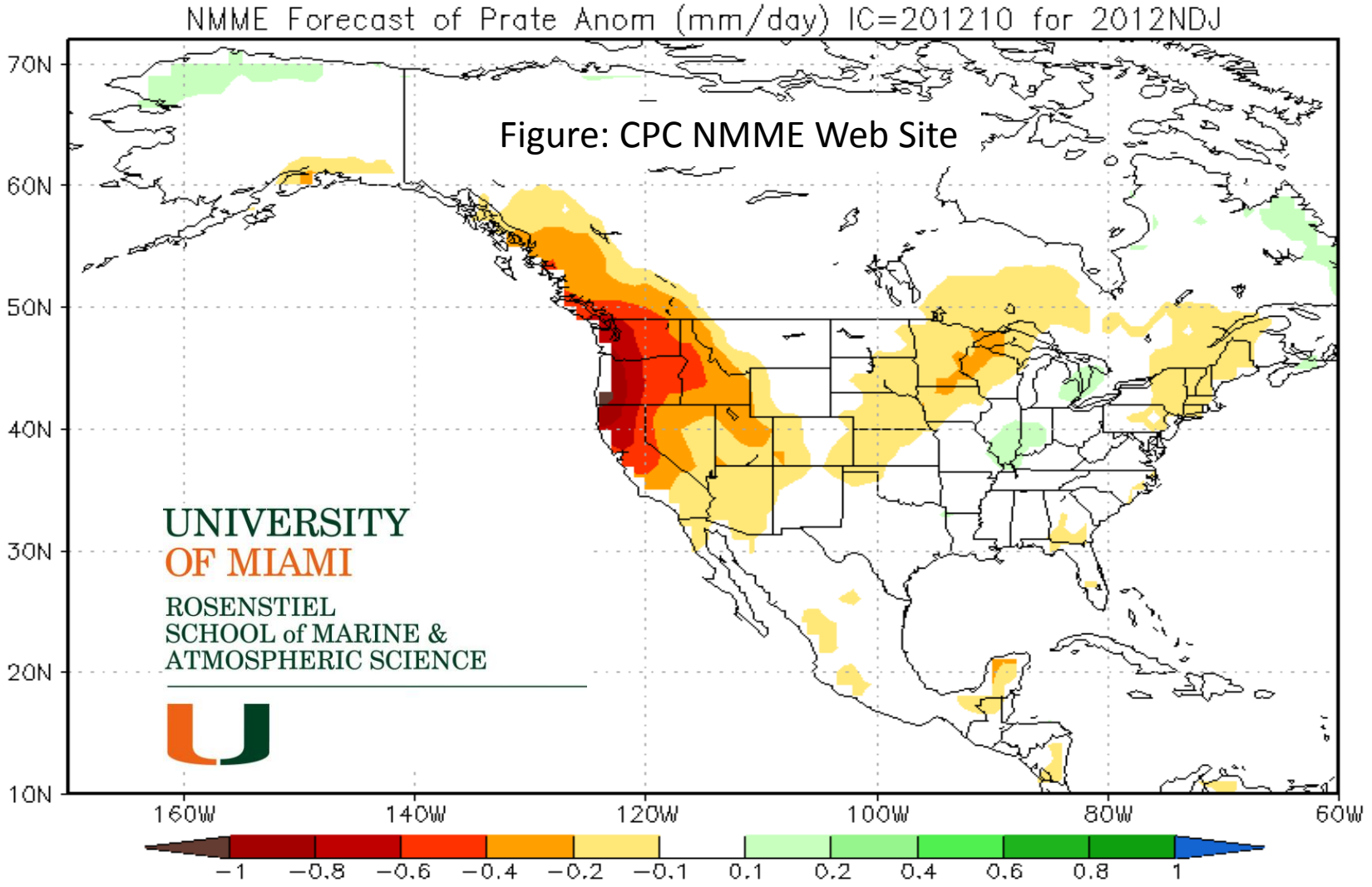
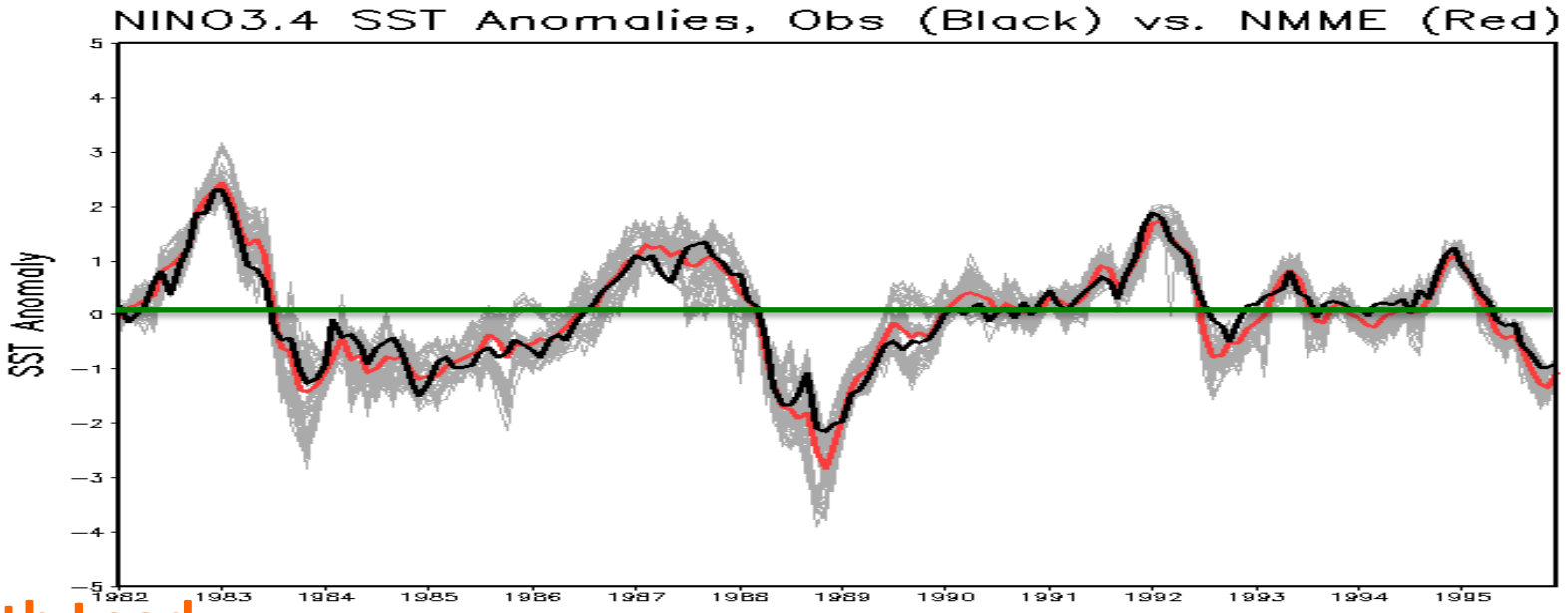
Predictability of the 2006-07 South East US Drought

Ben Kirtman and Johnna Infanti

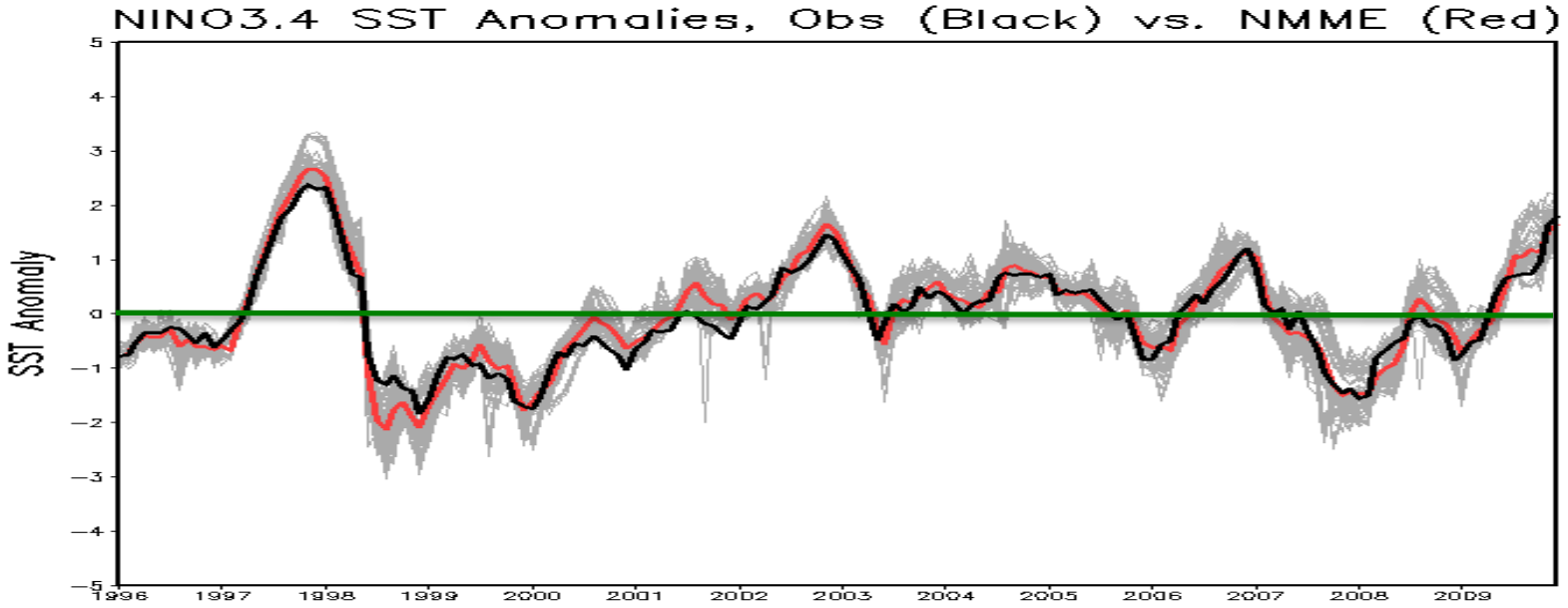


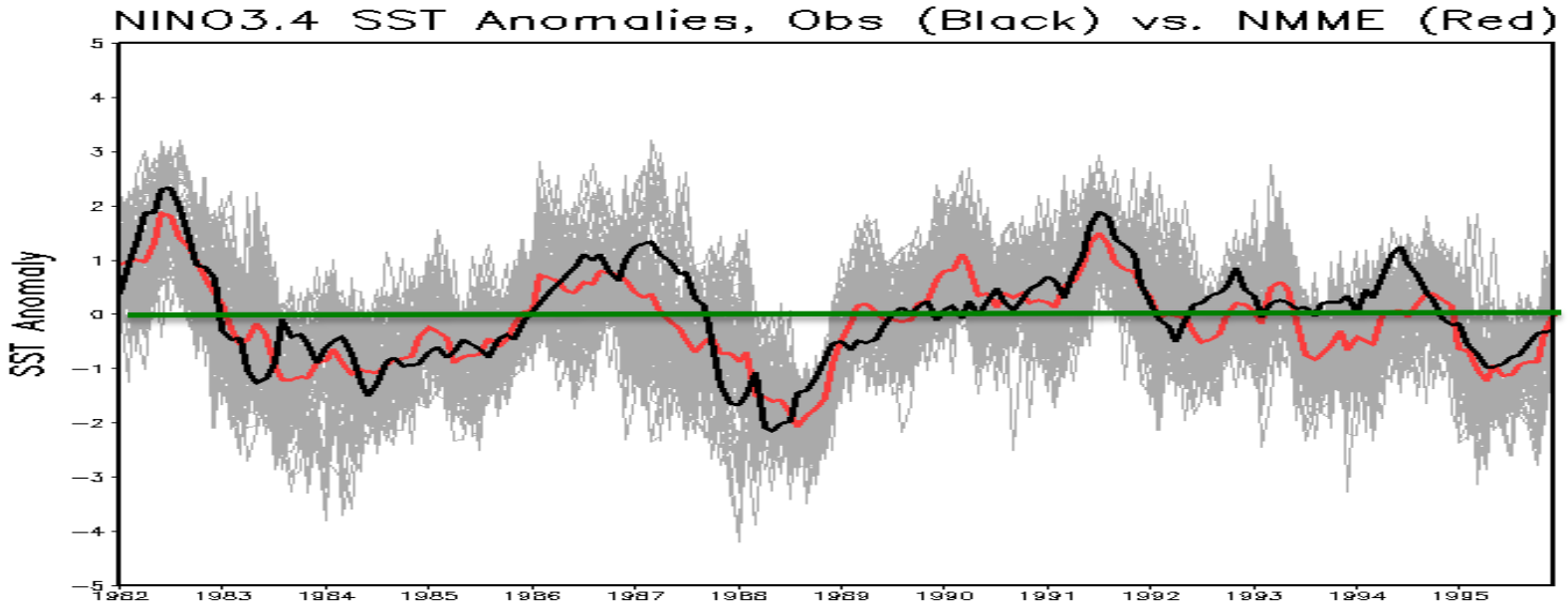
2006-07 Drought Predictability

- Analysis Based on the NMME Hindcast Data
- SST Correlation and RPSS
  - NMME vs. CFSv2
- North American Precipitation Correlation and RPSS
  - NMME vs. CFSv2
    - Winter vs. Summer
  - Lead Time Dependence
- 2006-07 Precipitation Hindcasts
  - Predictability: Spread vs. Nino34

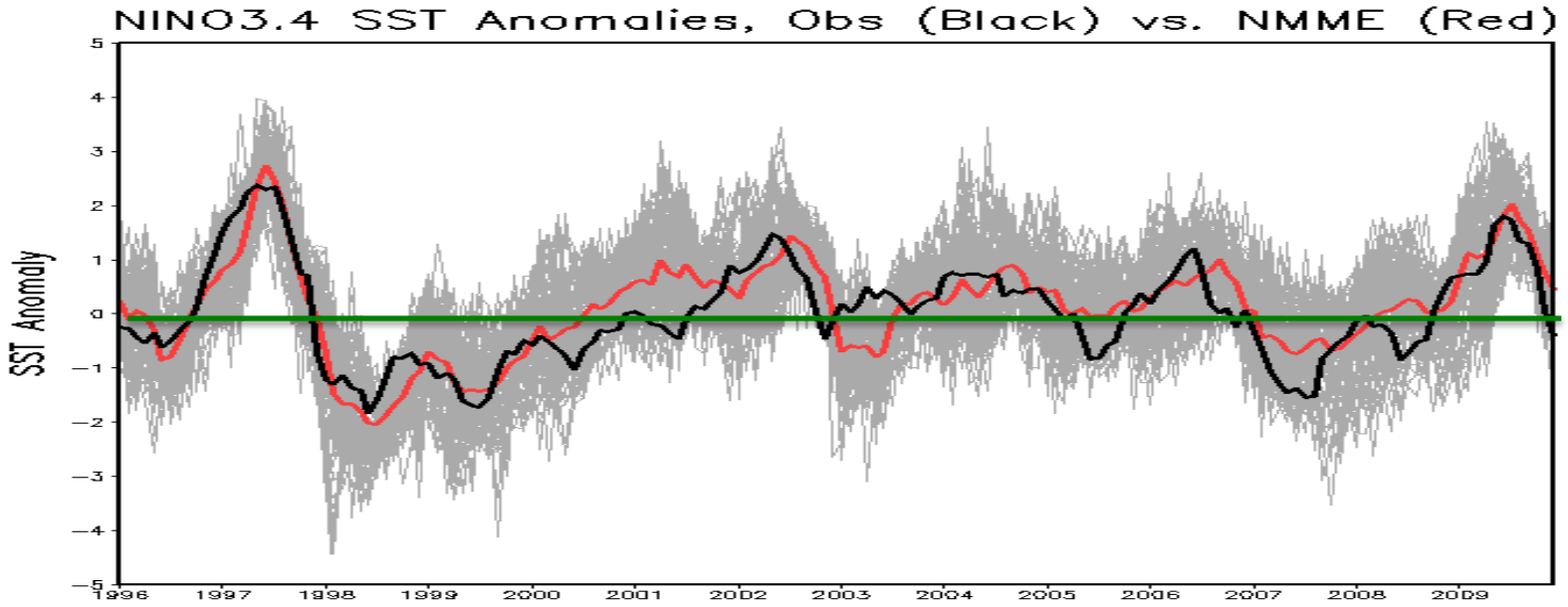

NINO3.4 SST Anomalies, Obs (Black) vs. NMME (Red)
SST Anomaly
5
4
3
2
1
0
−1
−2
−3
−4
−5
1982
1983
1984
1985
1986
1987
1988
1989
1990
1991
1992
1993
1994
1995

1-month Lead


NINO3.4 SST Anomalies, Obs (Black) vs. NMME (Red)
SST Anomaly
5
4
3
2
1
0
−1
−2
−3
−4
−5
1996
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009


NINO3.4 SST Anomalies, Obs (Black) vs. NMME (Red)
SST Anomaly
5
4
3
2
1
0
−1
−2
−3
−4
−5
1982
1983
1984
1985
1986
1987
1988
1989
1990
1991
1992
1993
1994
1995

6-month Lead


NINO3.4 SST Anomalies, Obs (Black) vs. NMME (Red)
SST Anomaly
5
4
3
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1
0
−1
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−3
−4
−5
1996
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2006
2007
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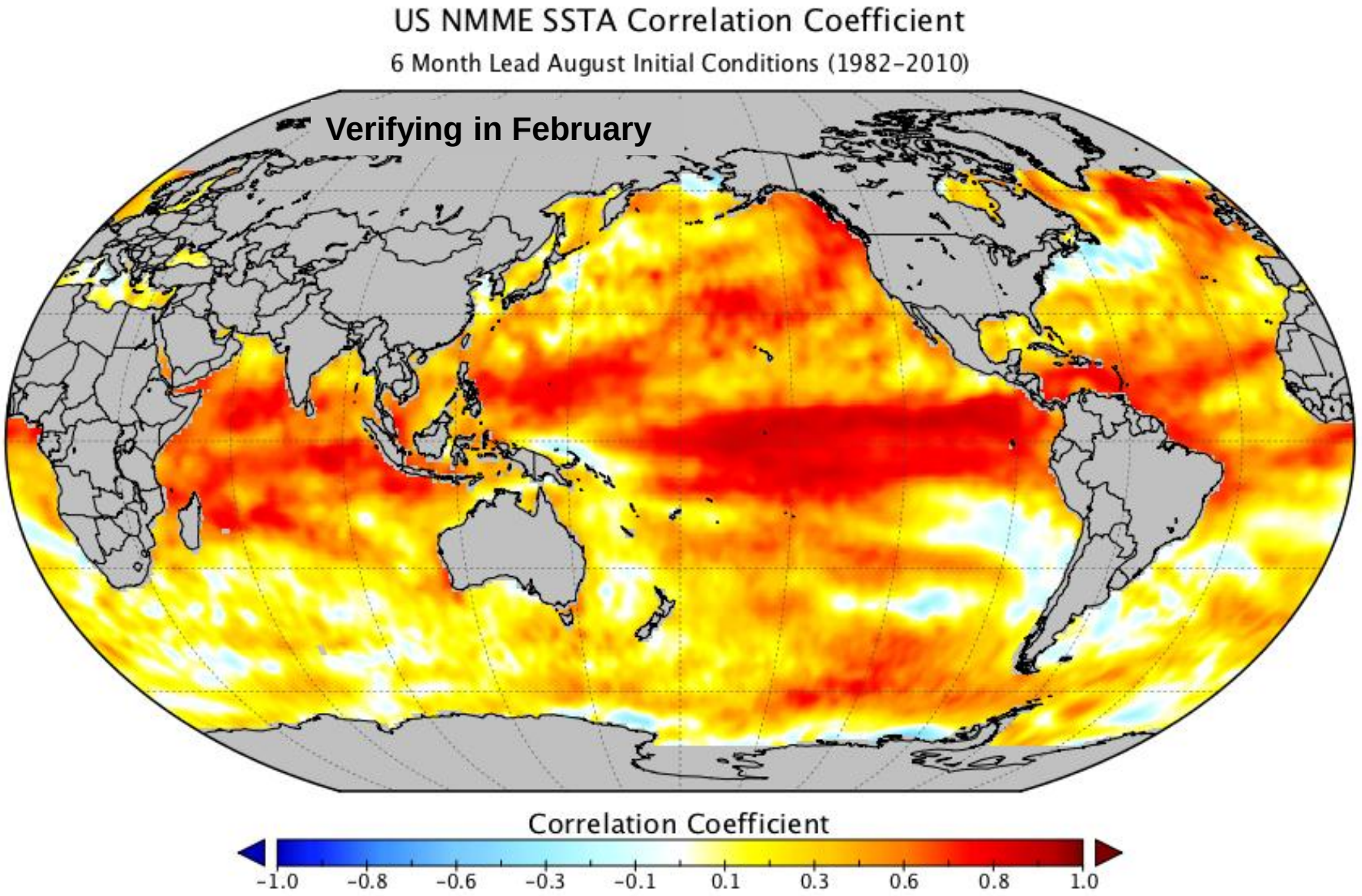
2009



Each Ensemble Member from Each Model Weighted Equally – 89 Ensemble Members

July 1 start
DJF SST
forecast
RPSS

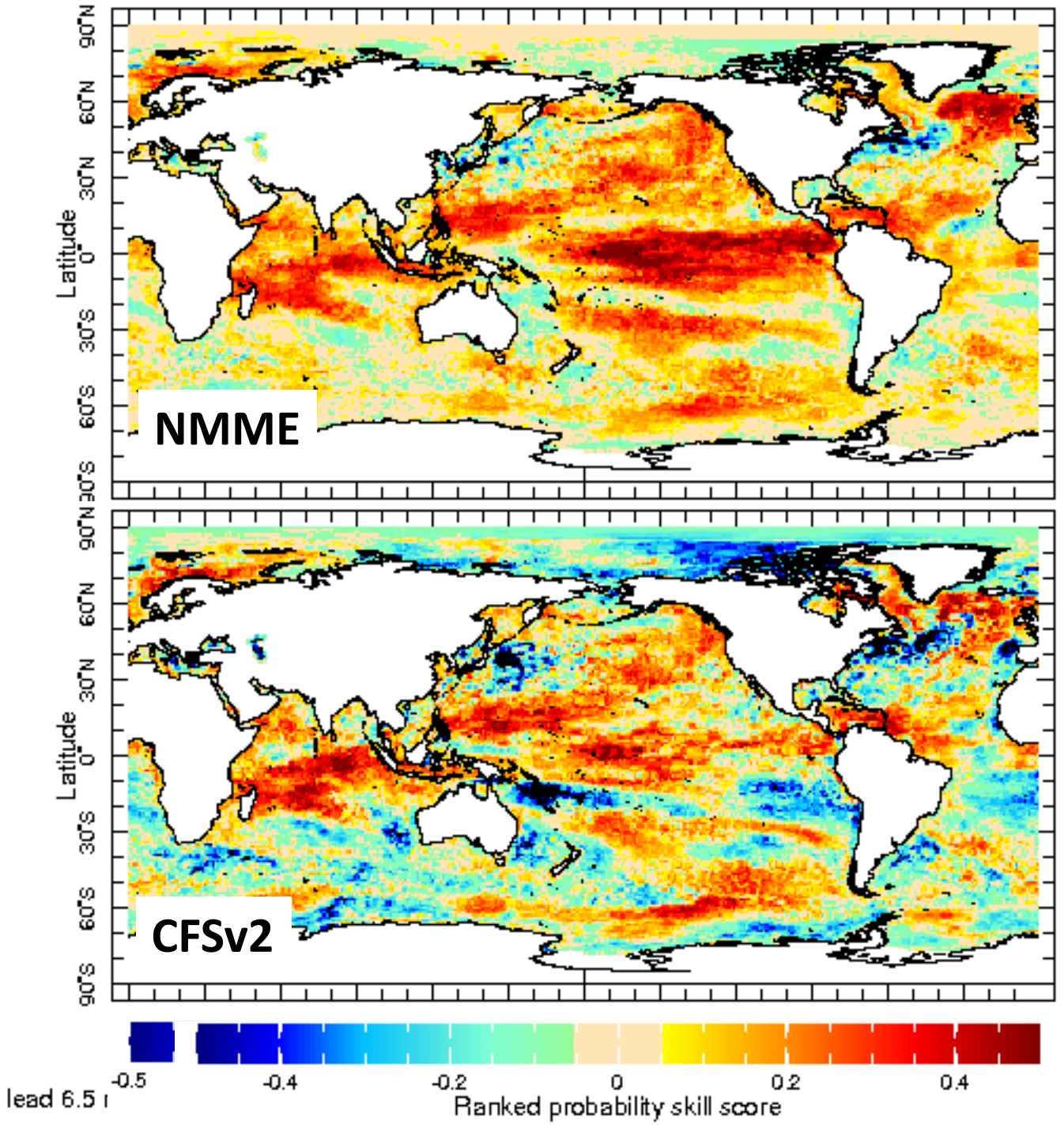
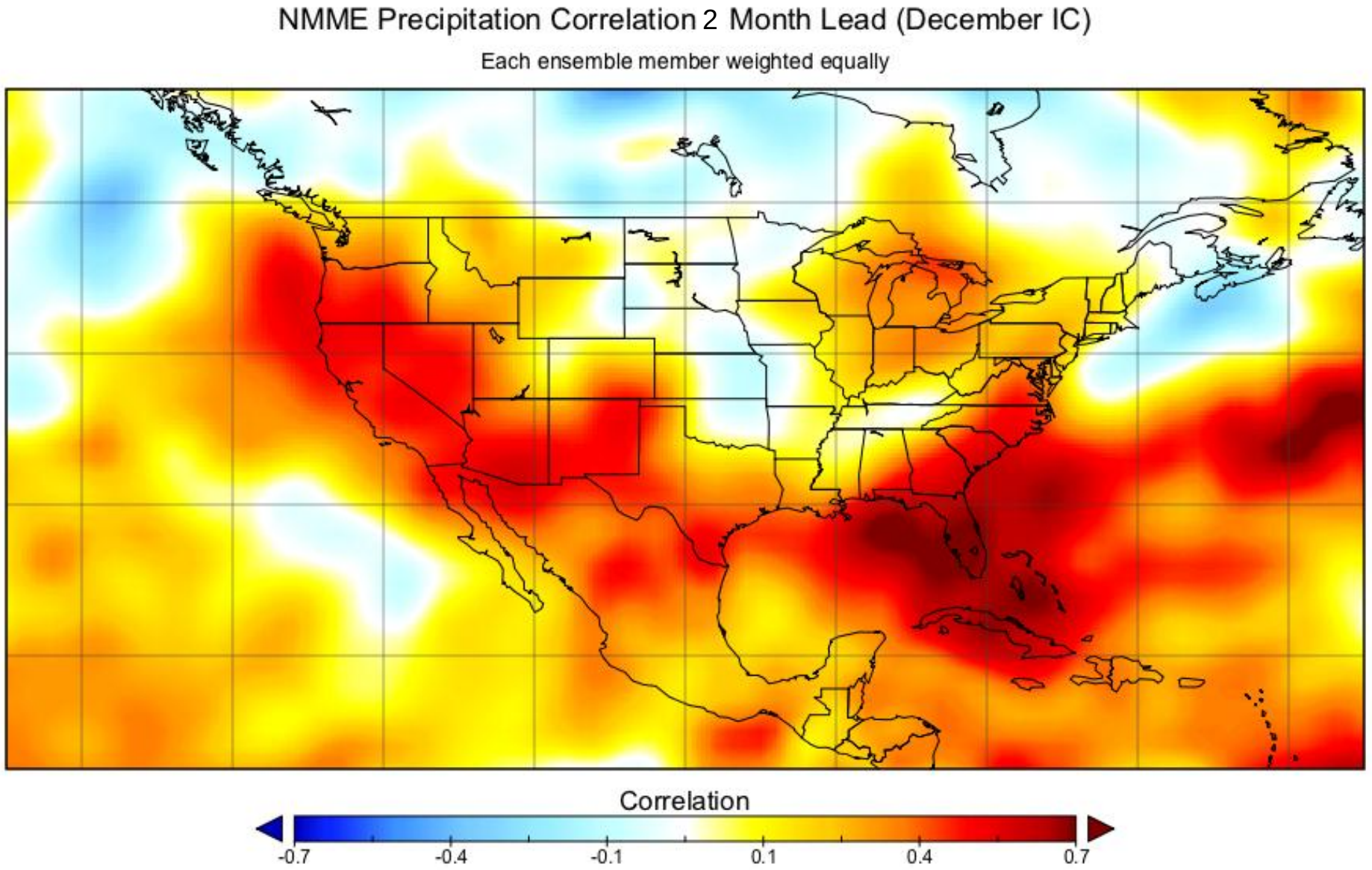


Figure: M. Tippett



Each Ensemble Member from Each Model Weighted Equally – 89 Ensemble Members

July 1 start
DJF prec
forecast
RPSS

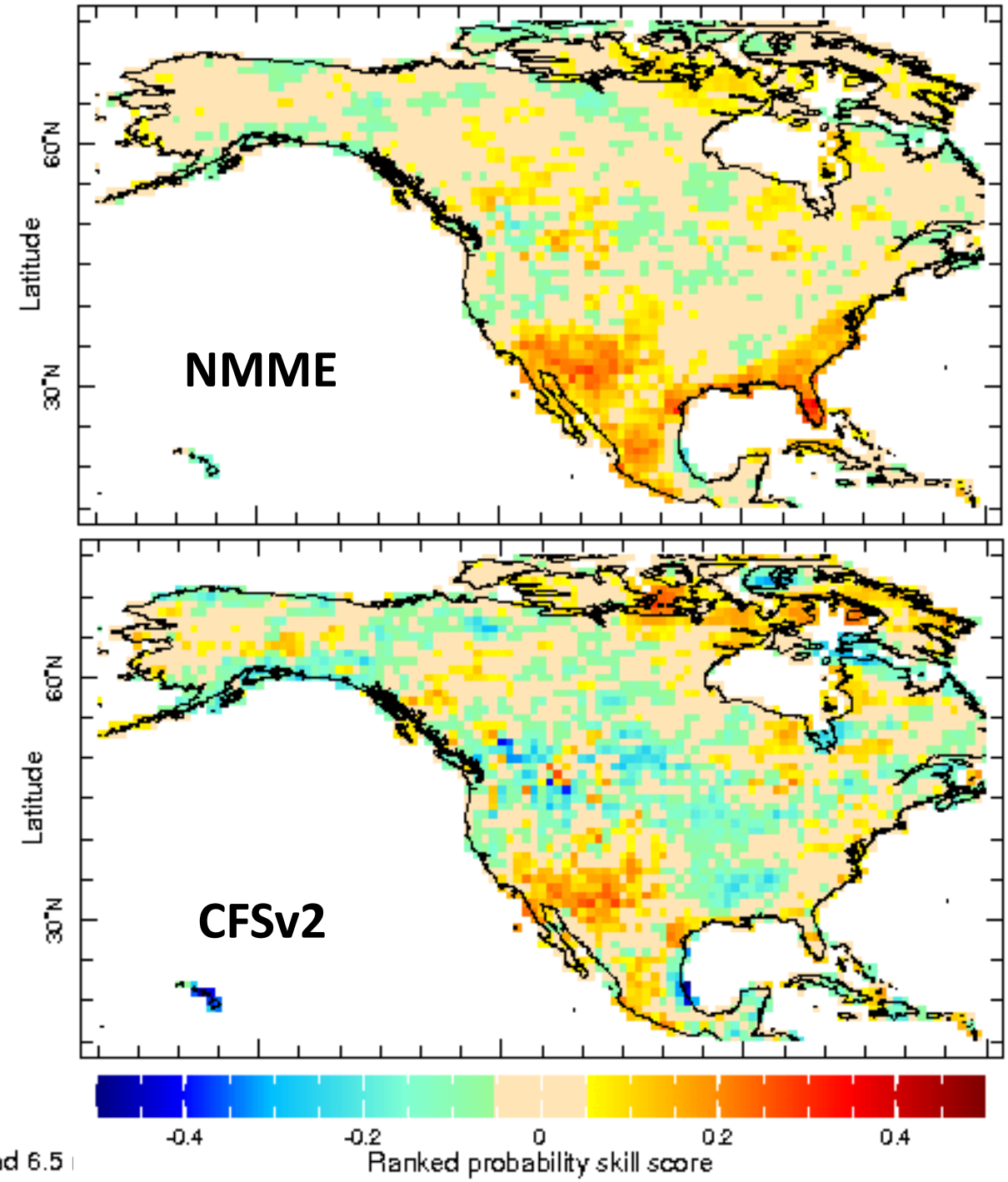


Figure: M. Tippett

Jan 1 start
JJA prec
forecast
RPSS

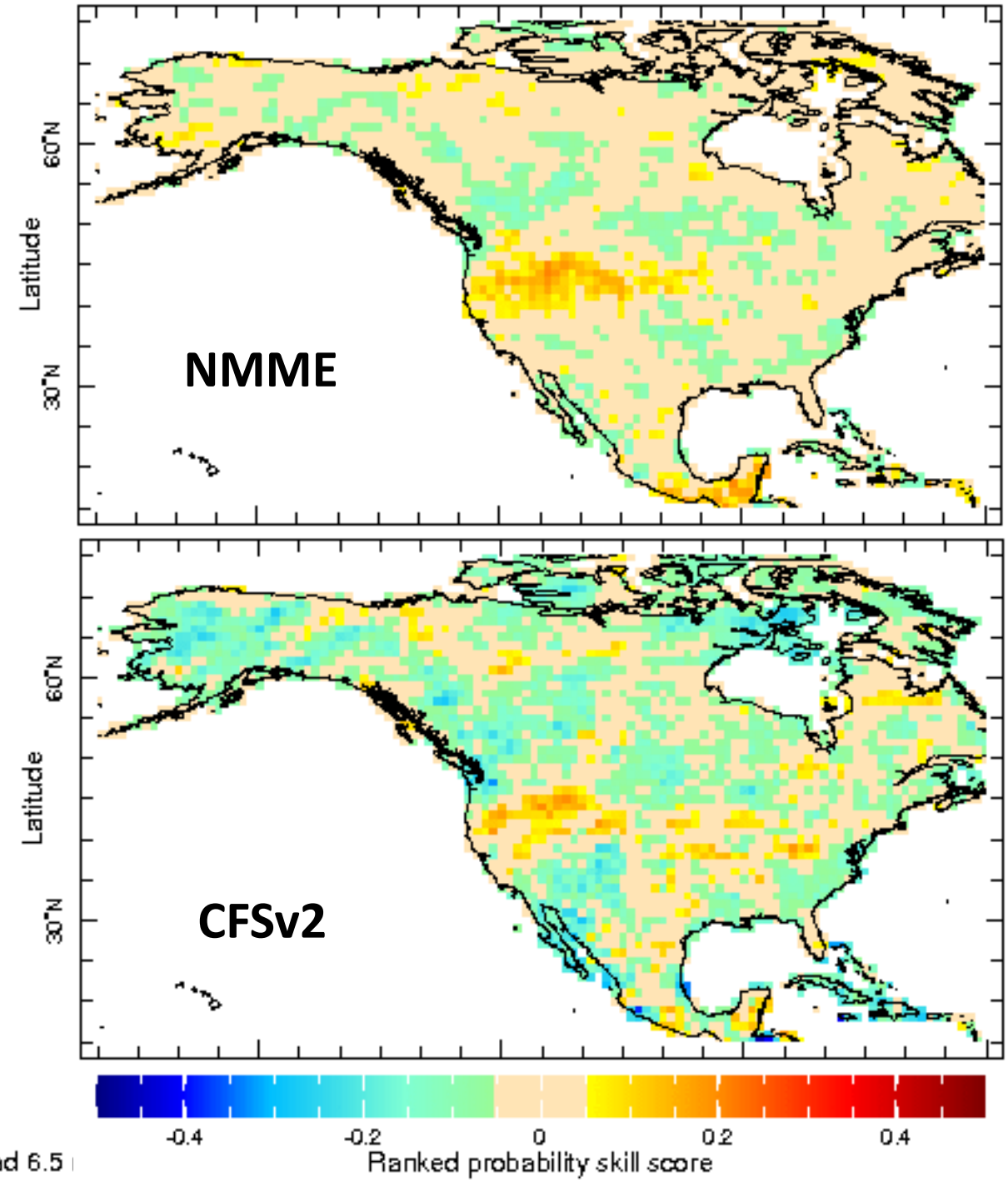
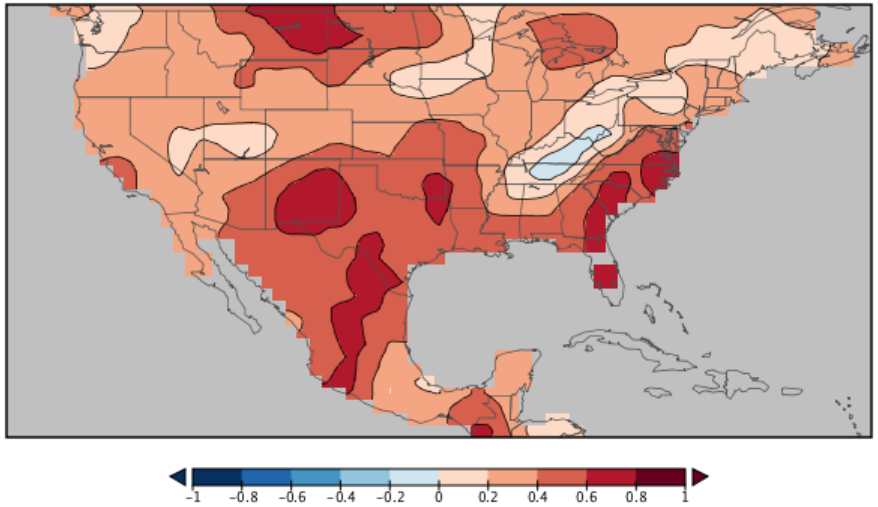


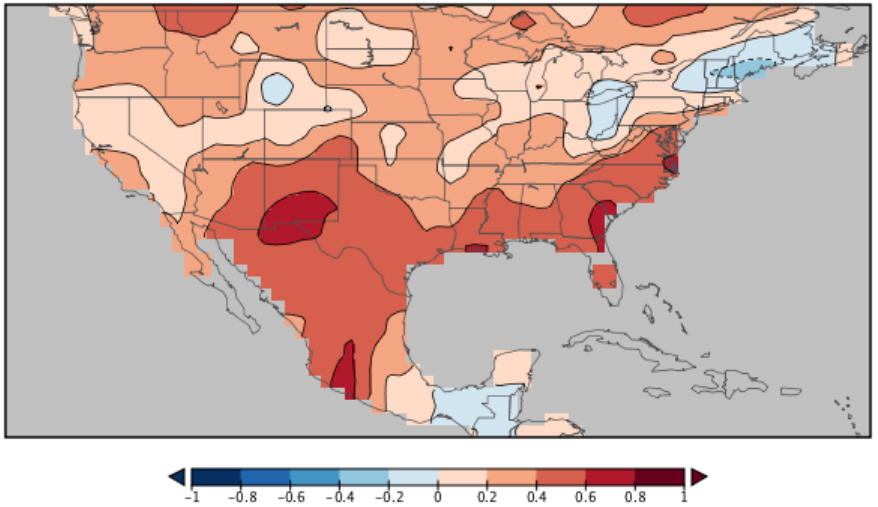
Figure: M. Tippett

Precipitation Anomaly Correlation – Winter Seasons

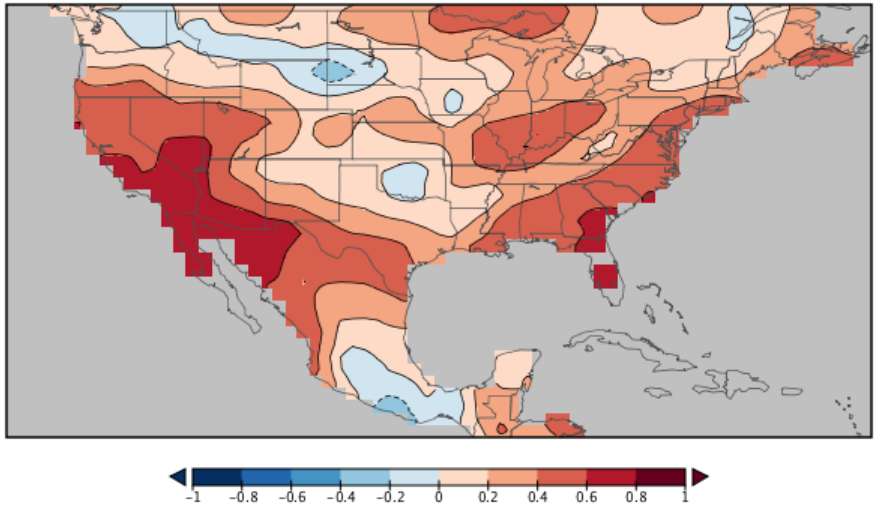
Anomaly Correlation Nov IC, 1.5LT (NDJ)



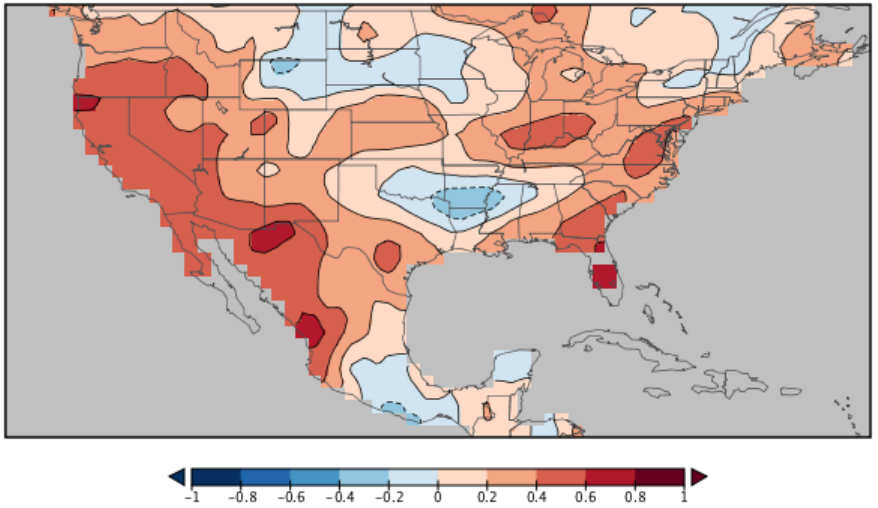
Anomaly Correlation Jun IC, 6.5LT (NDJ)



Anomaly Correlation Feb IC, 1.5LT (FMA)

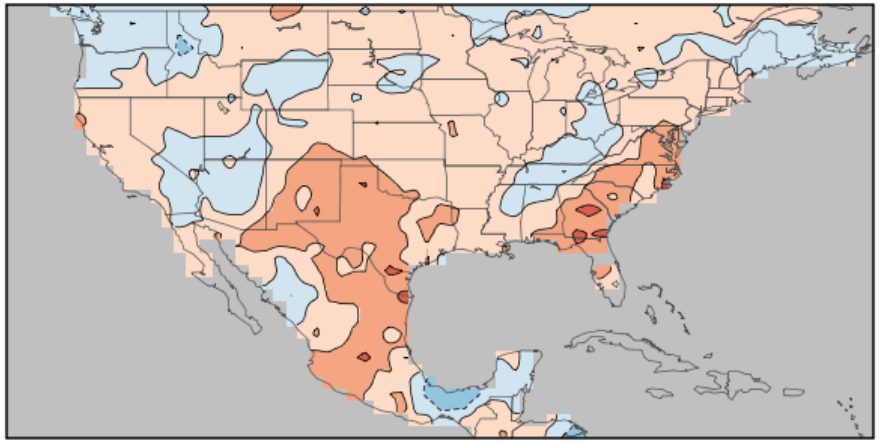


Anomaly Correlation Sep IC, 6.5LT (FMA)

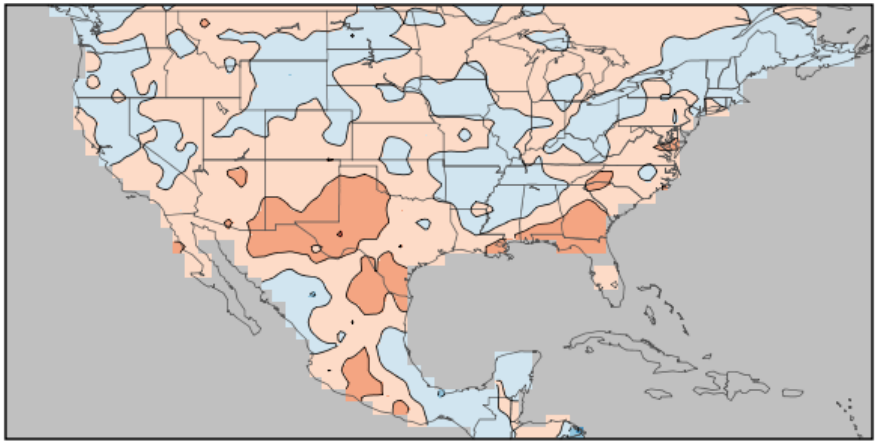


Precipitation RPSS – Winter Seasons

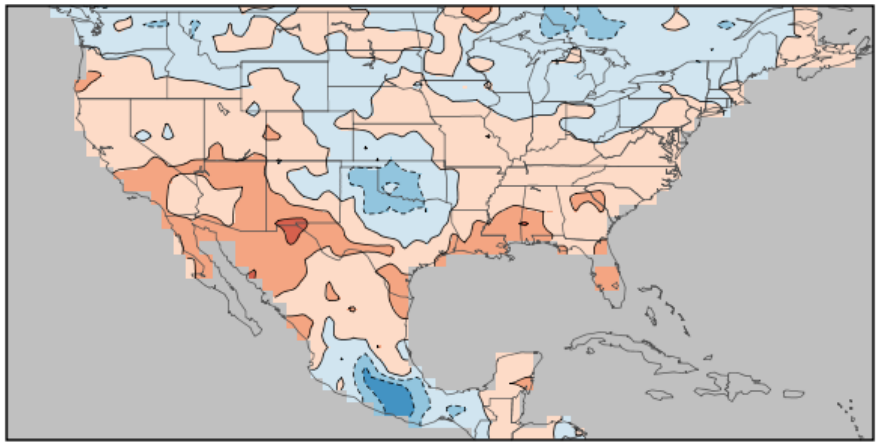
RPSS NovIC 15LT NDJ



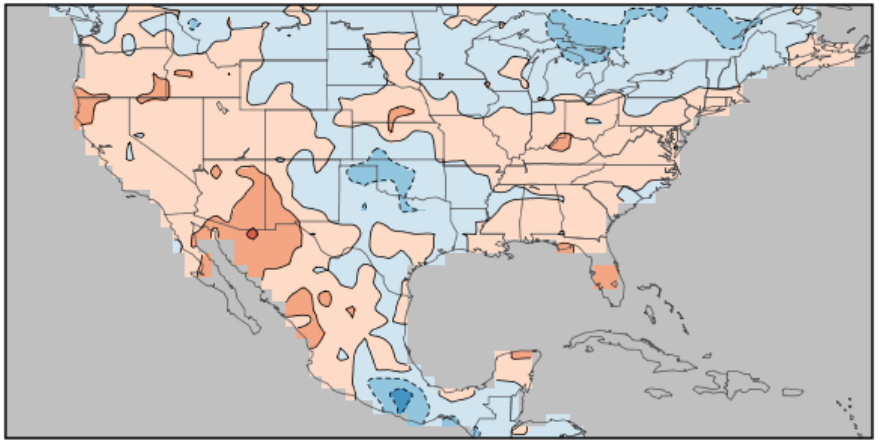
RPSS JunIC 65LT NDJ



RPSS FebIC 15LT FMA

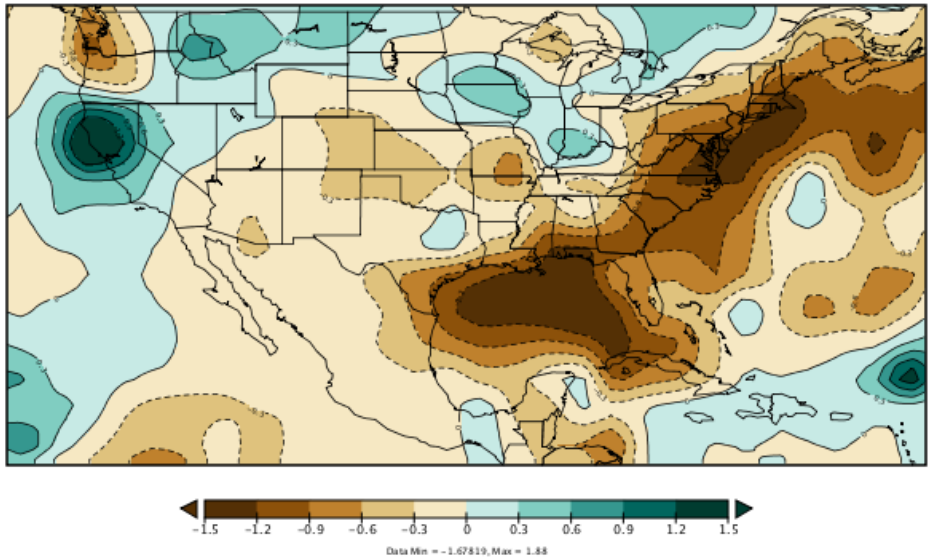


RPSS SepIC 65LT FMA

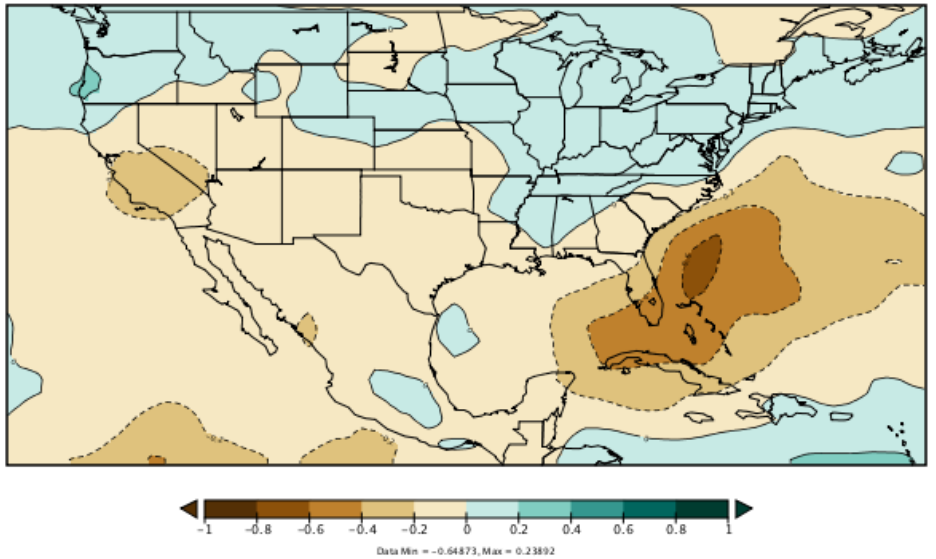


FMA2006 CMAP Precipitation Anomaly vs. All Model, All Ensemble Average FMA2006 (Aug2005 and Dec2005 IC) Precipitation Anomaly (*note color scale change for model images)

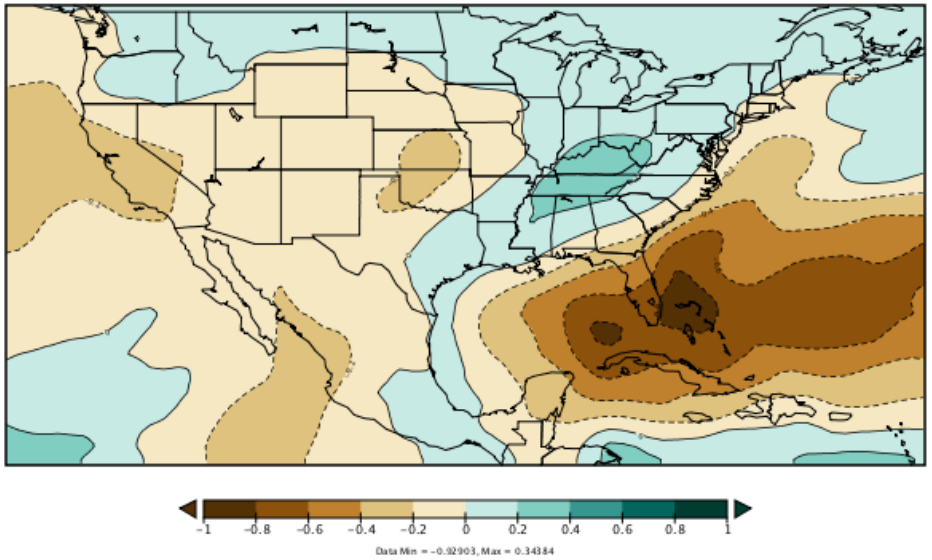
CMAP Precipitaiton Anomaly for FMA 2006



All Model, All Ensemble Average of Aug2005 IC, FMA 2006 Seasonal Average of Precip Anomalies

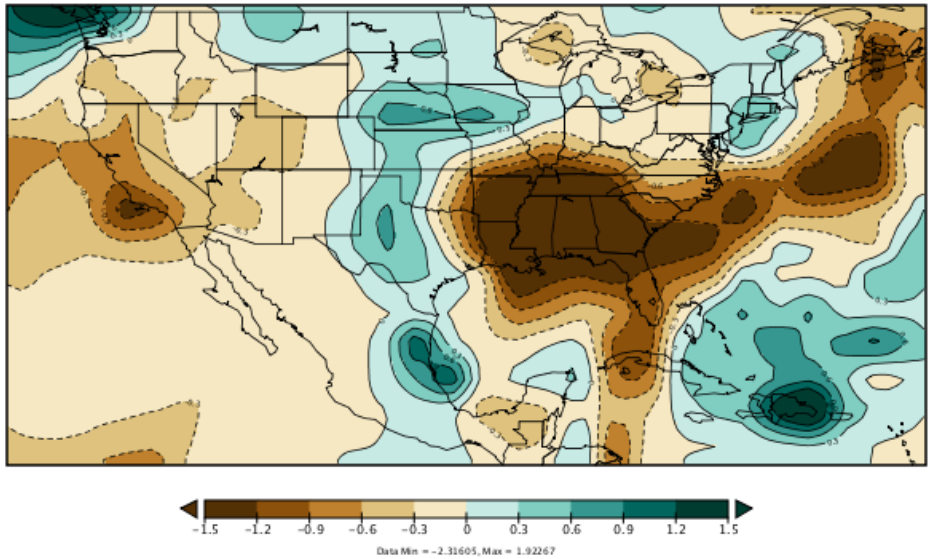


All Model, All Ensemble Average of Dec2005 IC, FMA 2006 Seasonal Average of Precip Anomalies

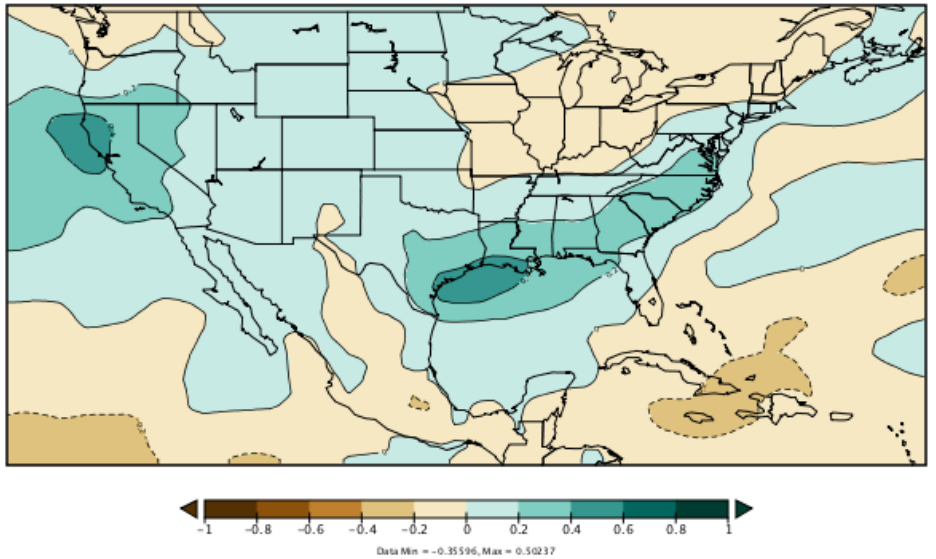


FMA2007 CMAP Precipitation Anomaly vs. All Model, All Ensemble Average FMA2007 (Aug2006 and Dec2006 IC) Precipitation Anomaly (*note color scale change for model images)

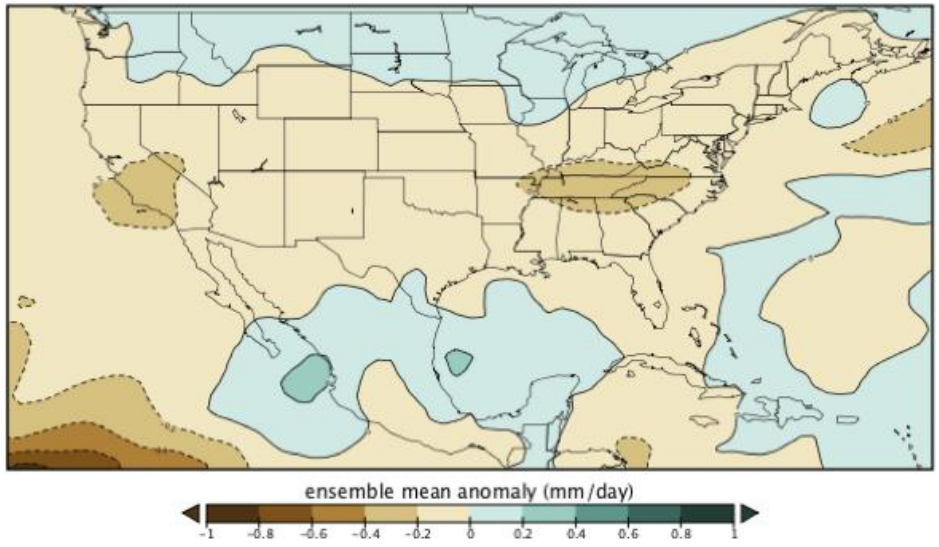
CMAP Precipitaiton Anomaly for FMA 2007



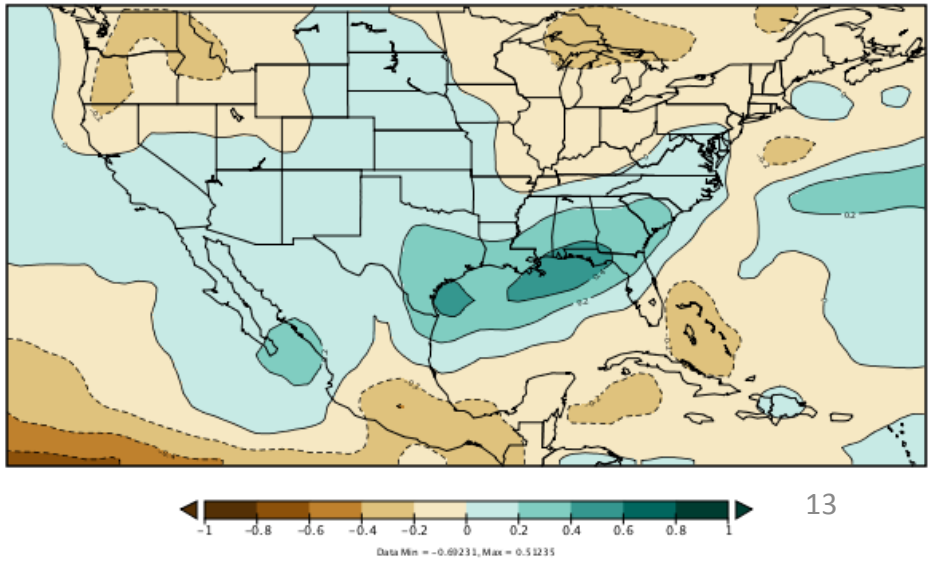
All Model, All Ensemble Average of Aug2006 IC, FMA 2007 Seasonal Average of Precip Anomalies



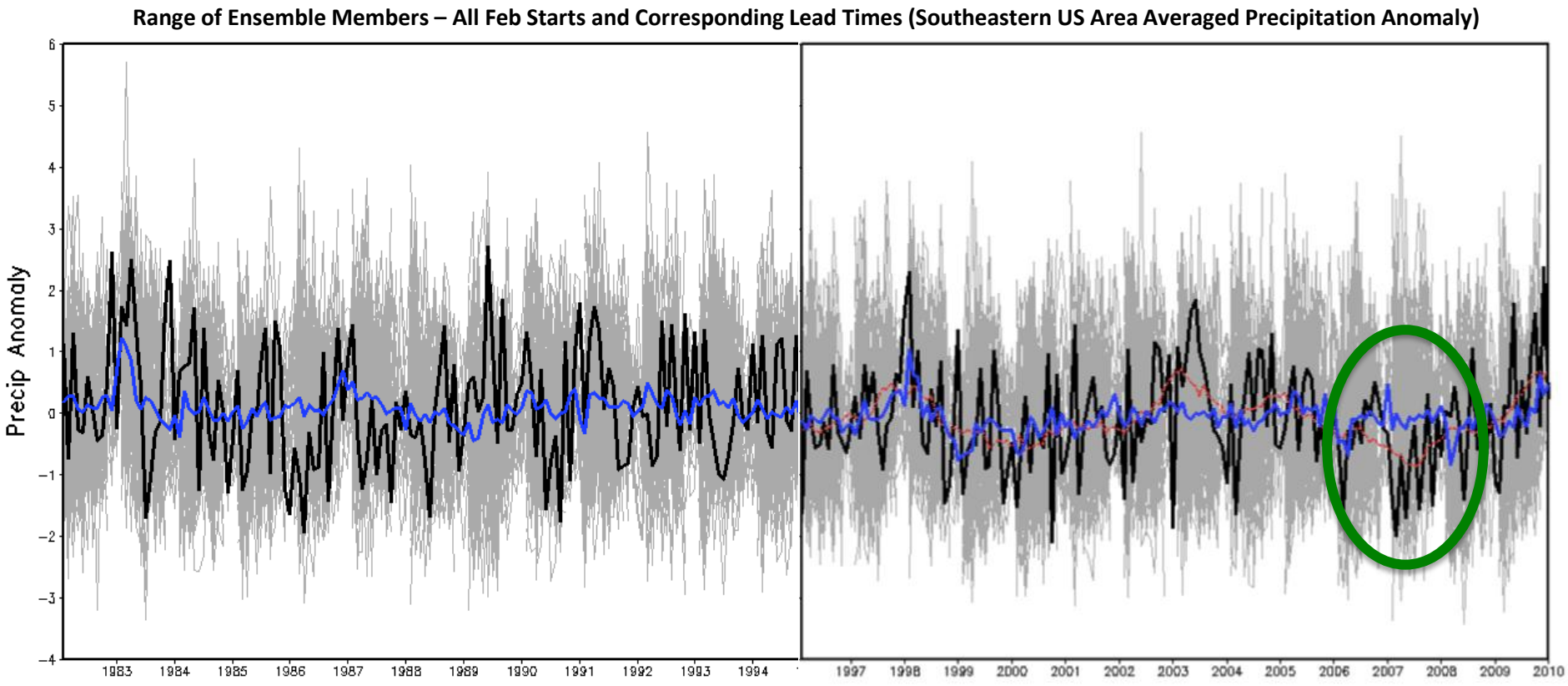
Prec_Feb2007IC_1.5LT_FMA



All Model, All Ensemble Average of Dec2006 IC, FMA 2007 Seasonal Average of Precip Anomalies

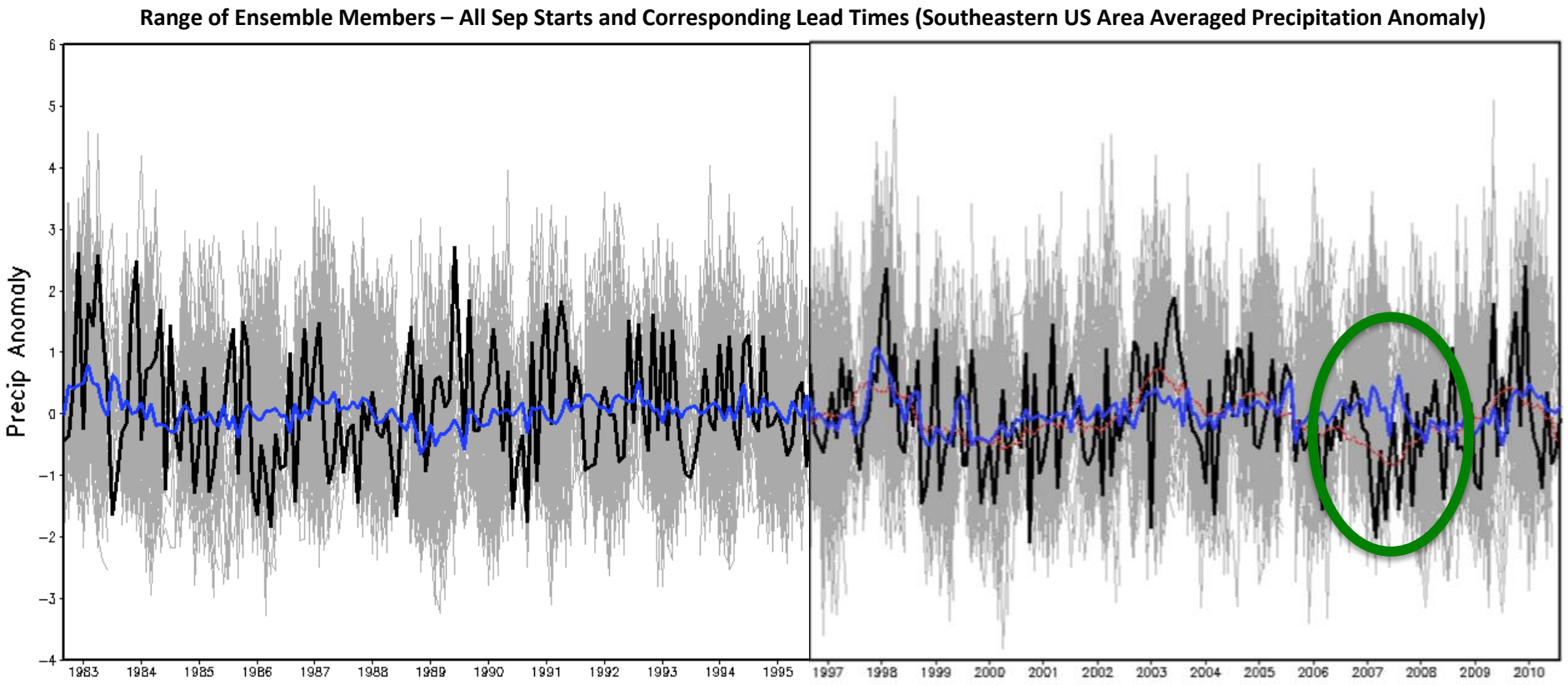


NMME Ensemble Range in SEUS, Precipitation Anomalies, Feb Starts



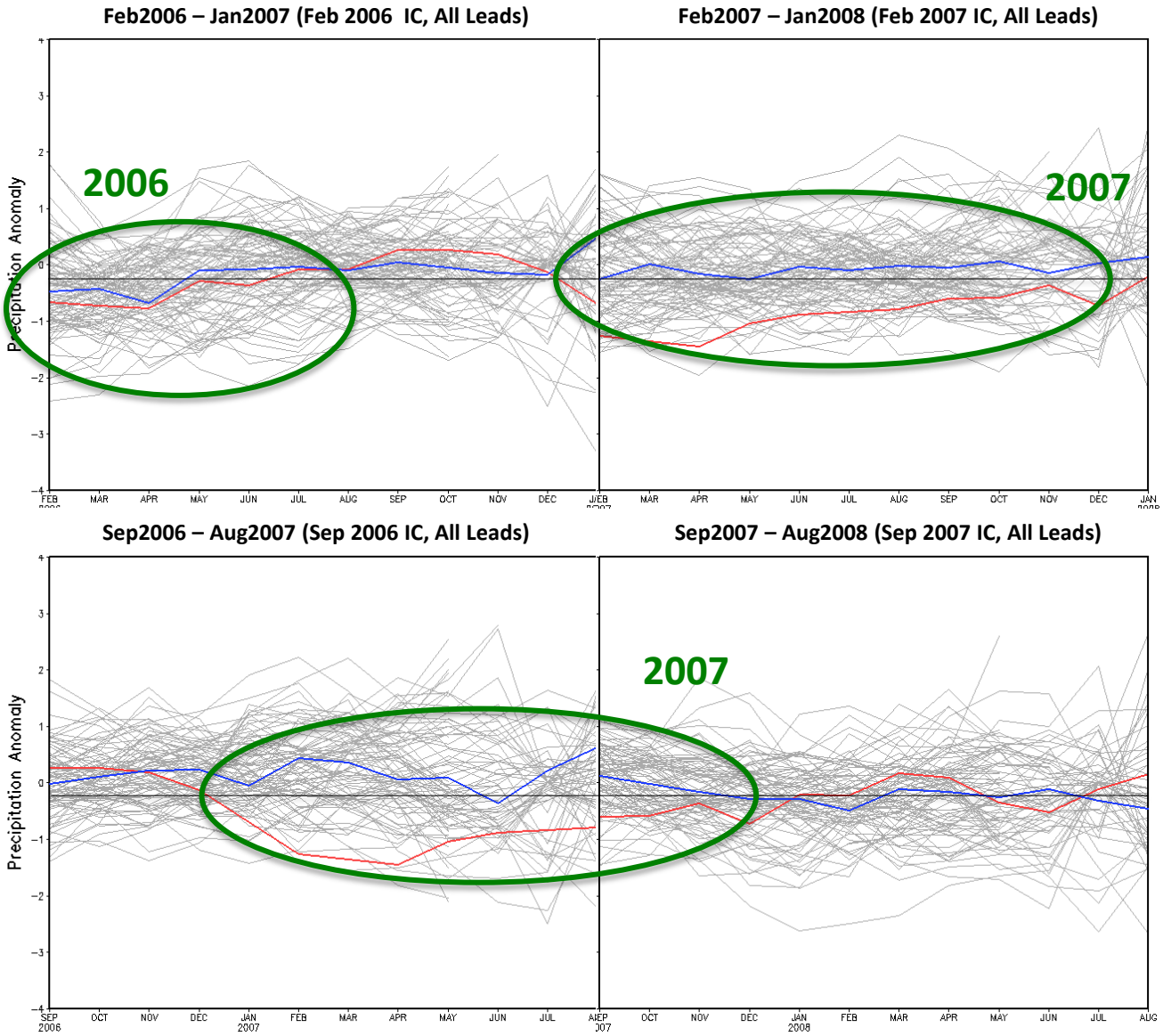
Blue: NMME Ensemble Mean
Black: Observations
Gray: Ensemble Members
Red: Observations with 6pt smoother

NMME Ensemble Range in SEUS, Precipitation Anomalies, Sep Starts



Blue: NMME Ensemble Mean
Black: Observations
Gray: Ensemble Members
Red: Observations with 6pt smoother

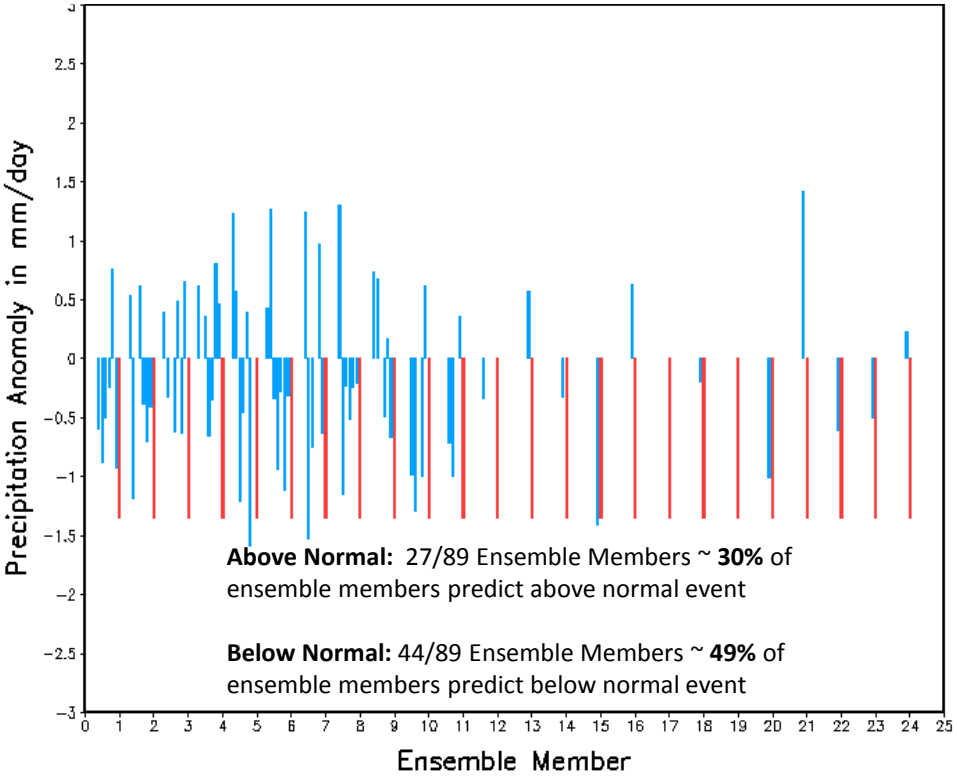
2006-2007 Drought Comparison using Feb and Sep starts



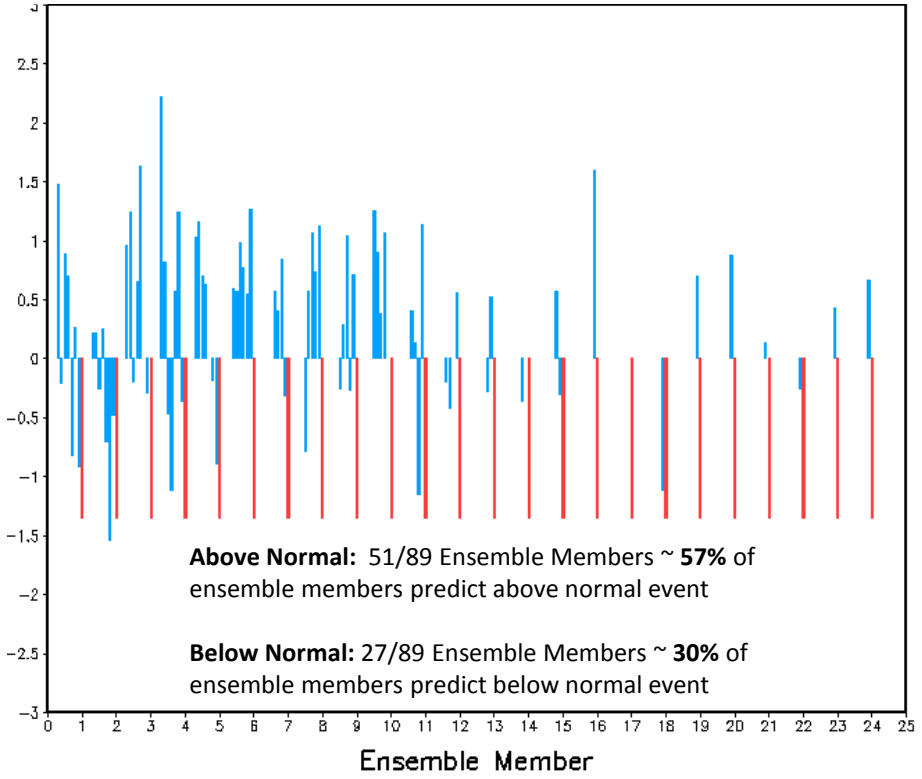
Blue: NMME Ensemble Mean
Red: Observations
Gray: Ensemble Members

FMA2007 Ensemble Member Results versus Observations (Above and Below Normal Terciles Shown, Neutral Events Masked out)

FMA2007 NMME Ensemble Members vs. Obs, 1.5 Lead FebIC



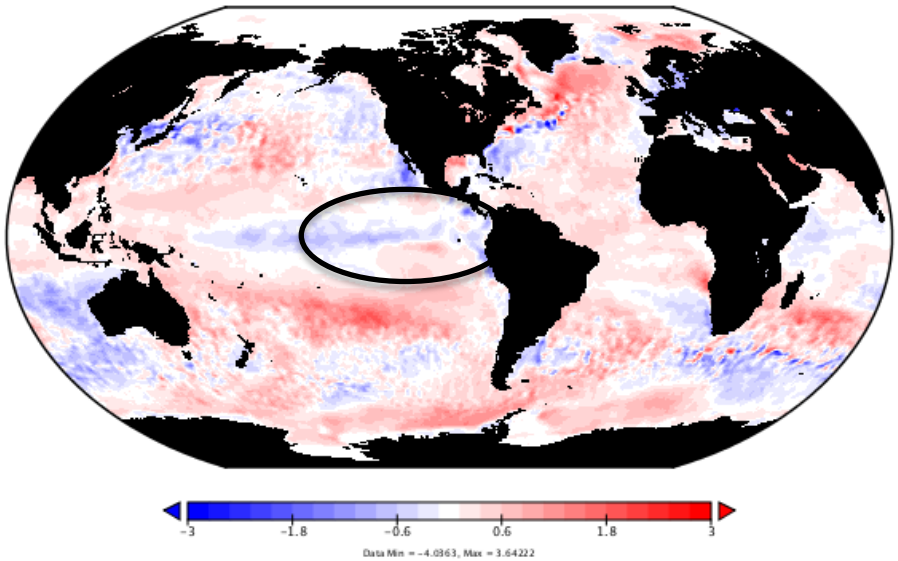
FMA2007 NMME Ensemble Members vs. Obs, 6.5 Lead SepIC



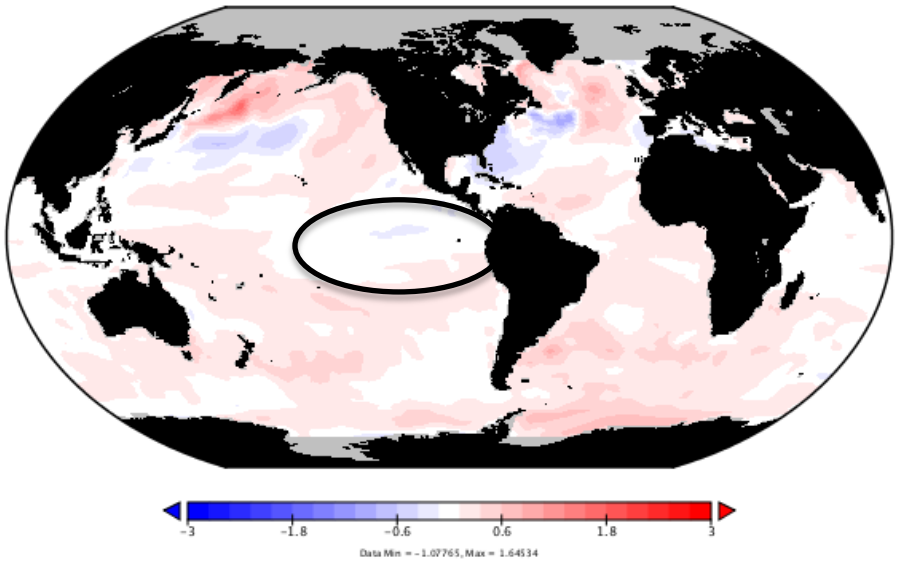
Red Bars: **Observed Precipitation Anomaly**
Blue Bars: **Ensemble Member Precipitation Anomaly (Above and Below normal terciles only)**

FMA2006 NCDC SST Anomaly vs. All Model, All Ensemble Average FMA2006 (Aug2005 and Dec2005 IC) SST Anomaly

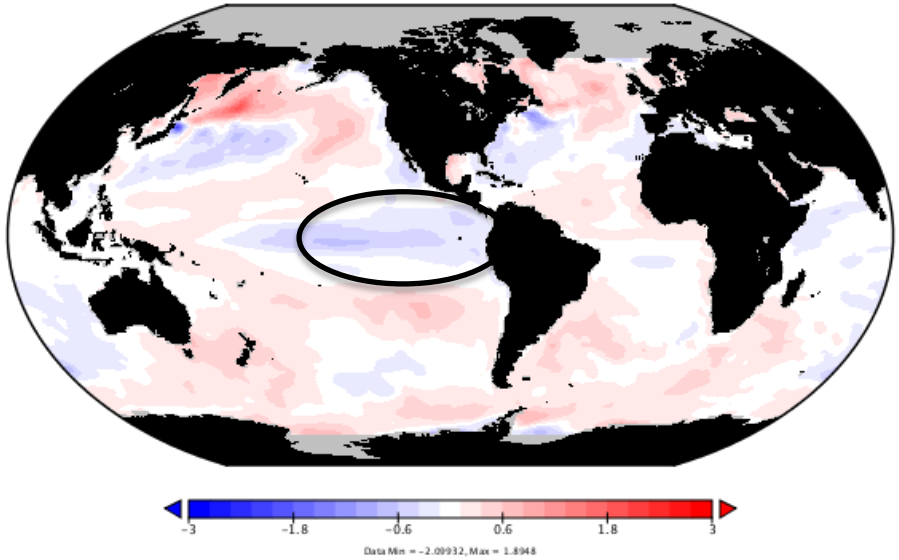
NCDC SST Anomaly, FMA2006 Seasonal Average



All Model, All Ensemble Average; August 2005 IC, FMA 2006 Seasonal Average SST Anomaly

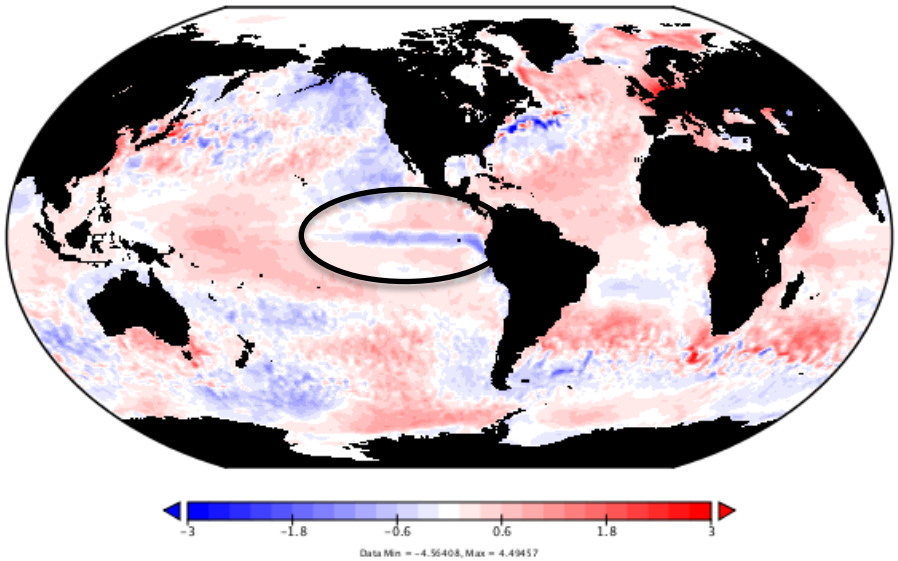


All Model, All Ensemble Average; December 2005 IC, FMA 2006 Seasonal Average SST Anomaly

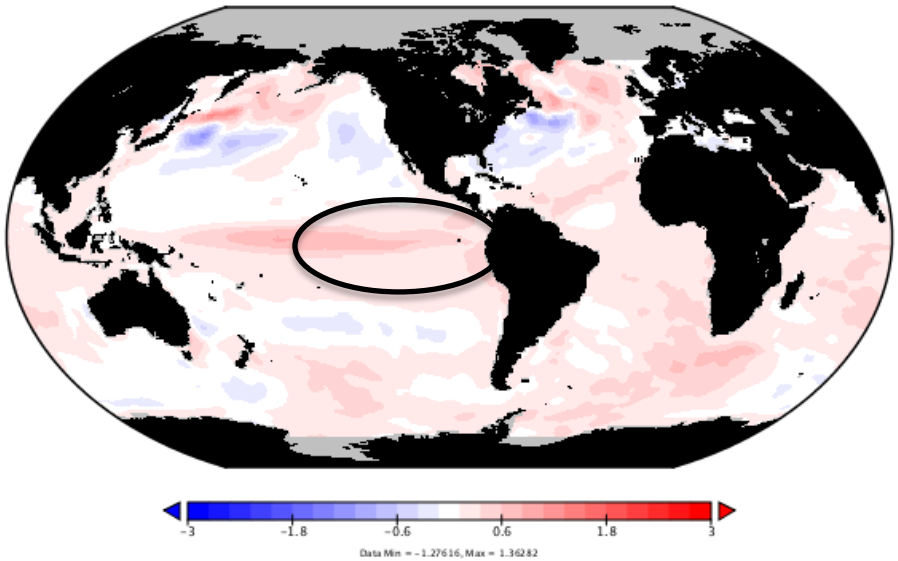


FMA2007 NCDC SST Anomaly vs. All Model, All Ensemble Average FMA2007 (Aug2006 and Dec2006 IC) SST Anomaly

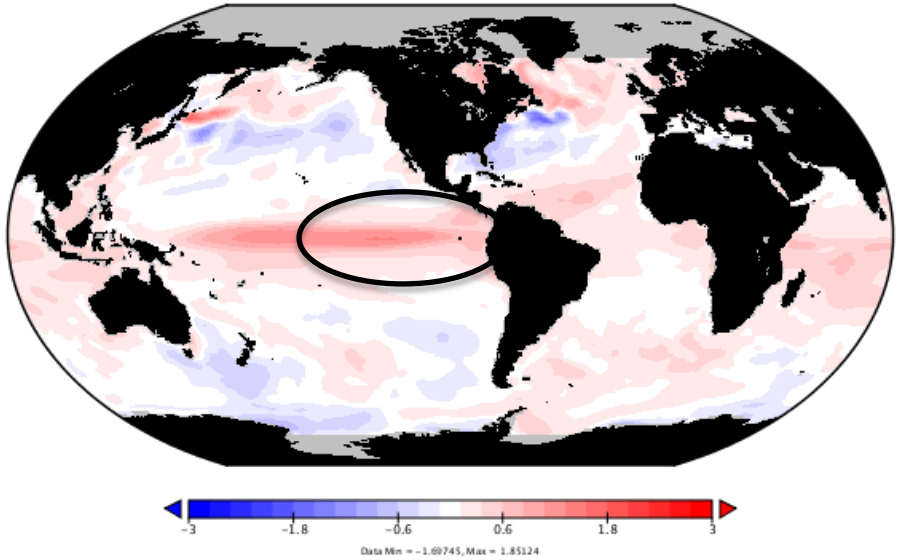
NCDC SST Anomaly, FMA2007 Seasonal Average



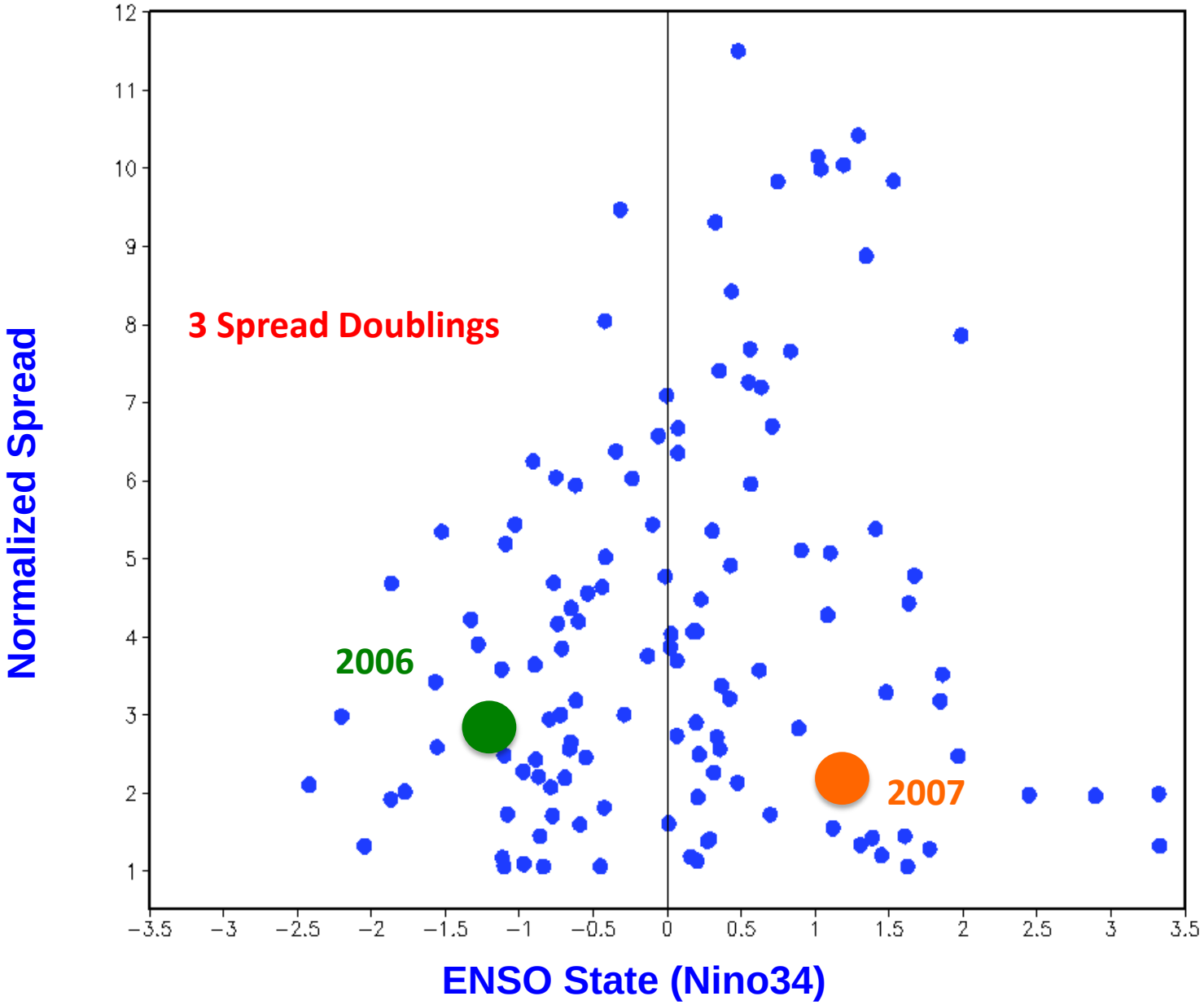
All Model, All Ensemble Average; August 2006 IC, FMA 2007 Seasonal Average SST Anomaly



All Model, All Ensemble Average; December 2006 IC, FMA 2007 Seasonal Average SST Anomaly



Idealized Predictability



Concluding Remarks

- **Relative Success in JFM 2006**
- **Relative Failure in JFM 2007**
- **Models Argue for Suggest Significant Predictability Due to ENSO, But**
- **Too Robustly Linked to Tropical Pacific?**
- **2007 Failure Linked to Tropical Pacific Failure?**
- **Land Initialization – Feedbacks?**