

# Winter Forecast for 2013–2014 with CFSv2 and NMME

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Emily Becker, and Huug van den Dool**



**Fifth Session of North Eurasian Climate Outlook Forum (NEACOF-5)  
October 28 – November 1, 2013, Moscow**

## **NCEP Climate Forecast System (CFS)**

- Fully coupled ocean-atmosphere-land model
- CFSv1: implemented for operational seasonal forecast at NCEP in 2004 and terminated in November 2012
- CFSv2: operational at NCEP in March 2011
- 10-month forecasts, 4 runs each day
- 40-member ensemble forecast from initial conditions of the latest 10 days, updated on a daily basis

**Available online at**

**<http://www.cpc.ncep.noaa.gov/products/CFSv2/CFSv2seasonal.shtml>**

## **U.S. National Multi-Model Ensemble (NMME)**

- Experimental multi-model seasonal forecasting system
- Coupled models from NCEP, GFDL, NCAR, NASA, and Canada's CMC1 and CMC2
- Extremely effective at quantifying prediction uncertainty
- Better prediction skill than any single model ensemble
- Monthly updates with lead times from 0 to 6 months

**Available online at**

**<http://www.cpc.ncep.noaa.gov/products/NMME/>**

## Hindcasts

Model	Hindcast Period	Ensemble Size	Lead Times
NCEP CFSv2	1982–2009	24	0–9 mon
GFDL-CM2.2	1982–2010	10	0–11 mon
NCAR CCSM3.0	1982–2010	6	0–11 mon
NASA GEOS5	1981–2010	6	0–9 mon
CMC1	1981–2010	10	0–11 mon
CMC2	1981–2010	10	0–11 mon

**Hindcasts are used to evaluate forecast quality based on models' past performance.**

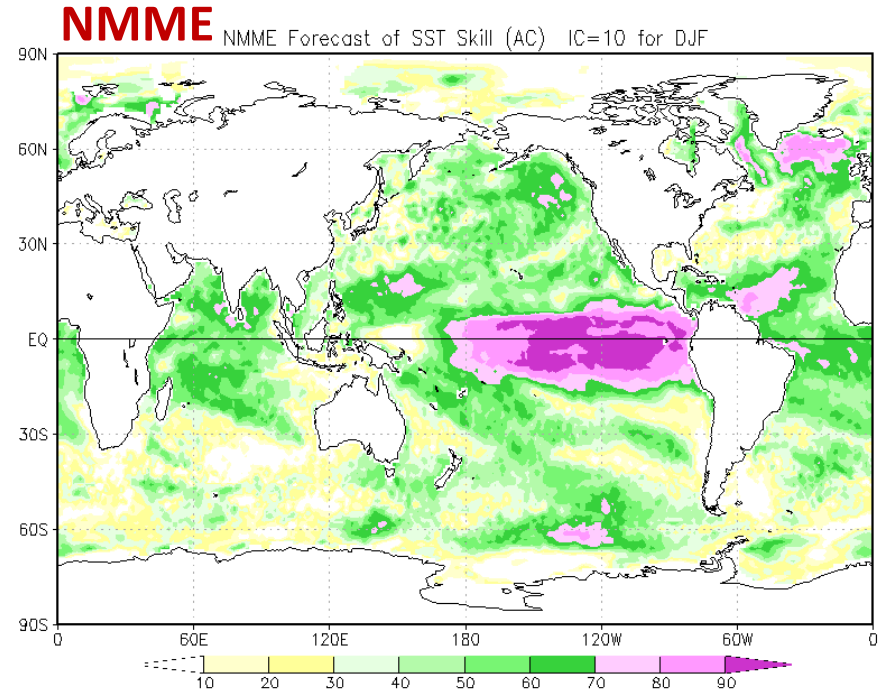
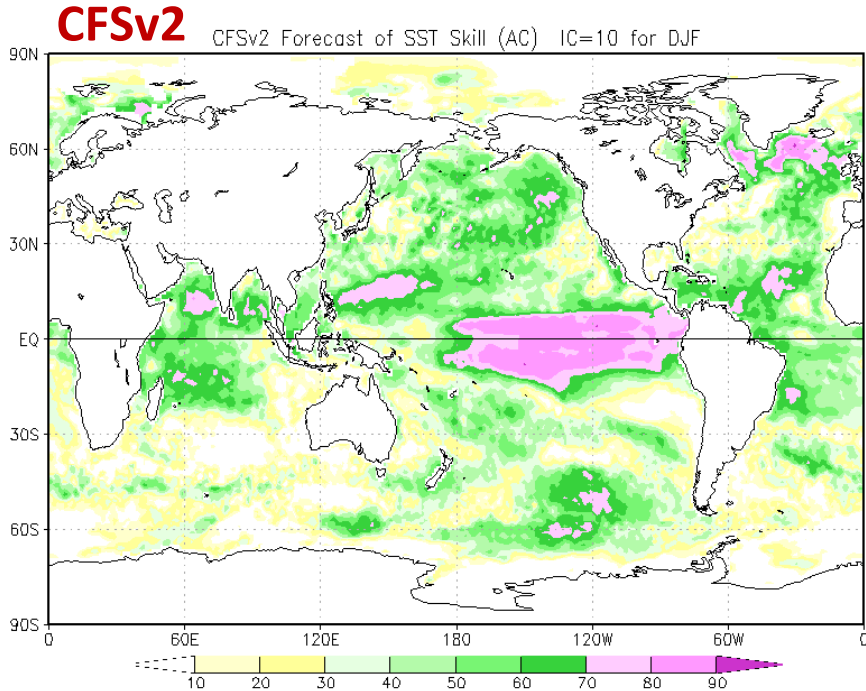
## 2013–2014 Winter Forecast

- ❑ Forecasts of Dec, Jan, and Feb (DJF) seasonal mean anomalies with October initial conditions (IC)
- ❑ ENSO forecast
- ❑ Precipitation and surface air temperature ( $T_{2m}$ )
- ❑ Probability forecasts
- ❑ Comparison between CFSv2 and NMME

# SST

## Forecast Skill for DJF SST: Anomaly Correlation (AC)

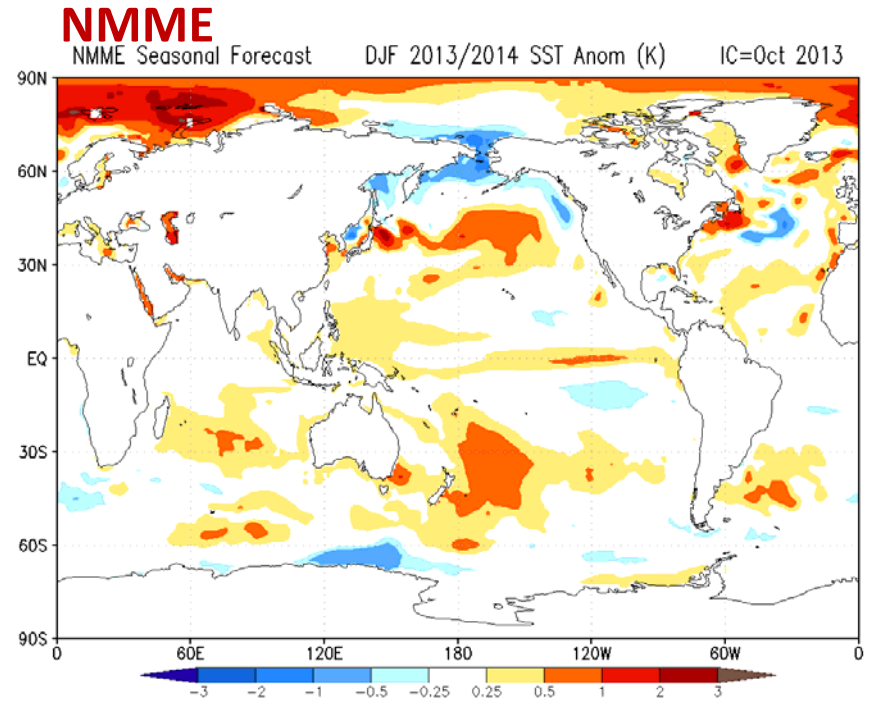
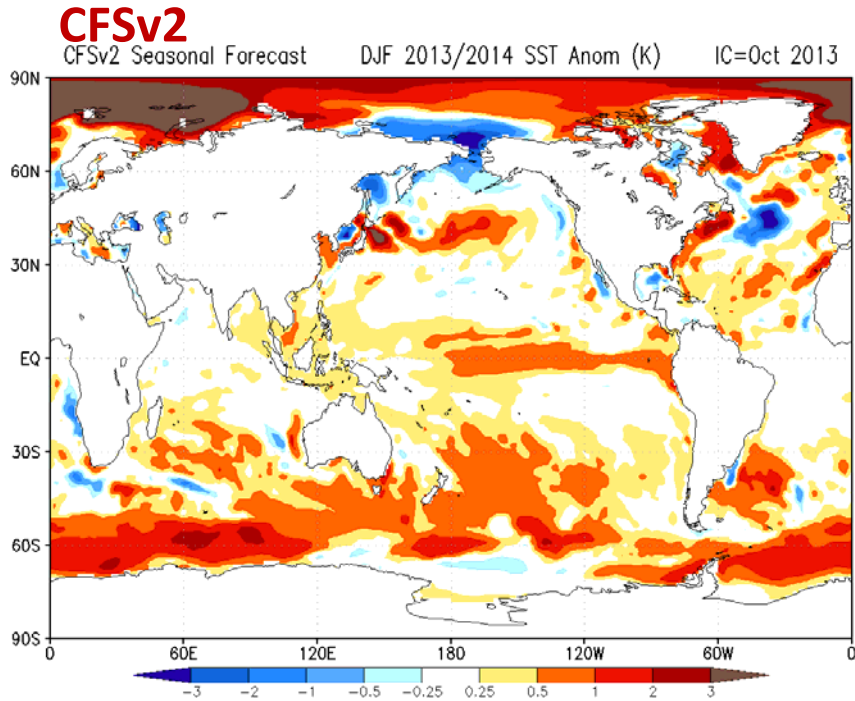
Based on hindcasts ICs: Oct



**NMME: better skill for ENSO forecast**

# SST

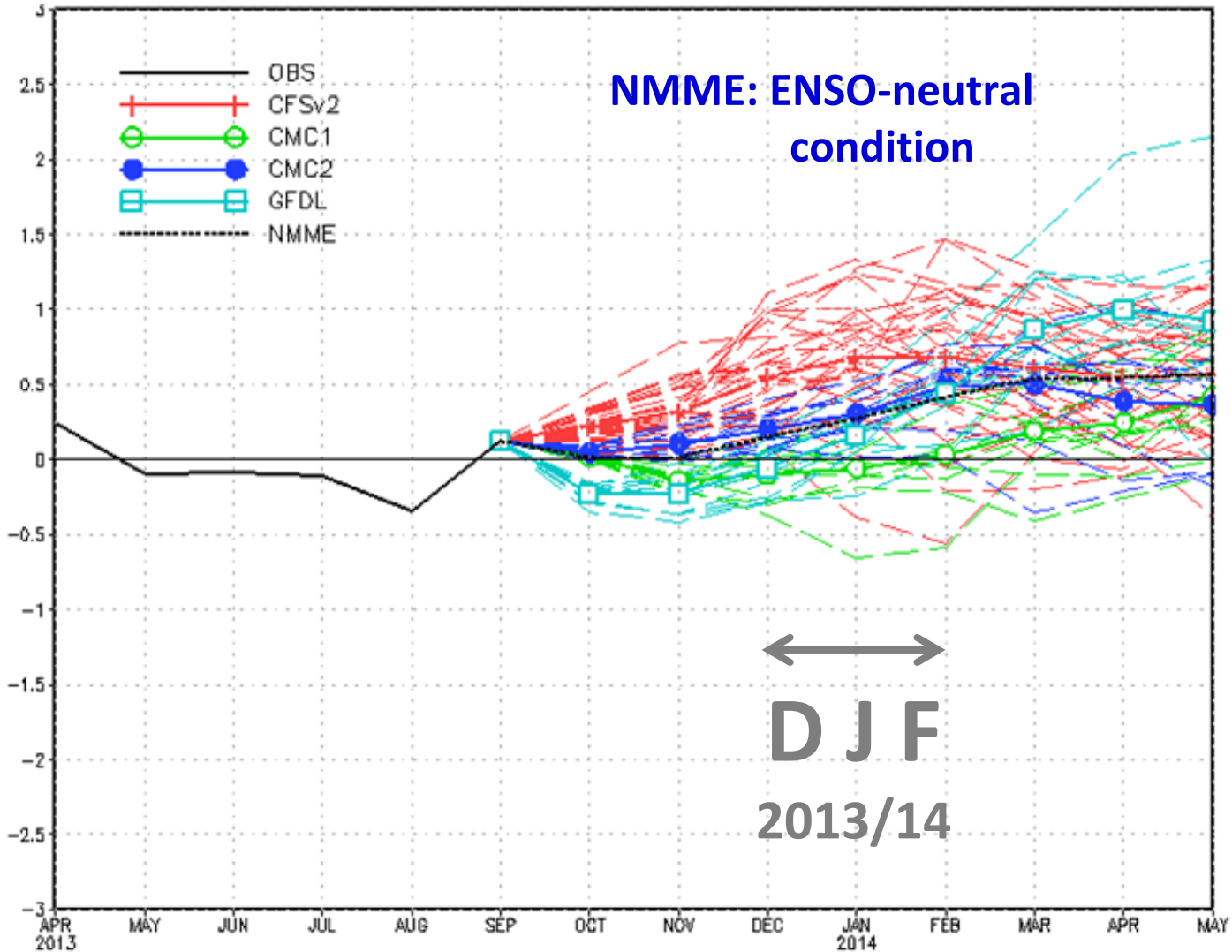
## Seasonal Forecast IC: Oct 2013 DJF 2013/2014 SST Anomaly (K)



**CFSv2: warmer SST anomalies**

# SST

## NMME Seasonal Forecast IC: Oct 2013 Niño 3.4 SST Plumes (K)

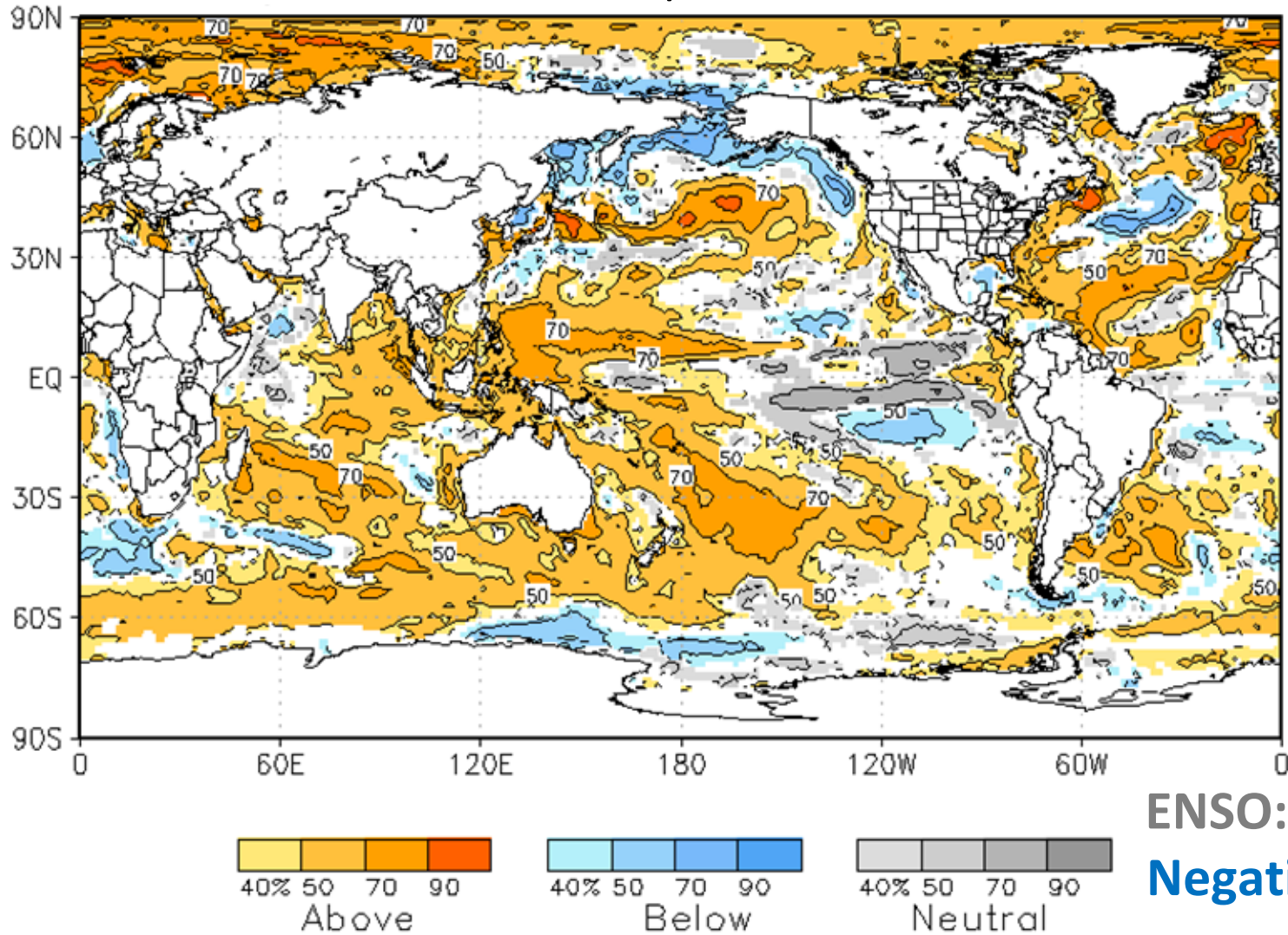


**Nino 3.4 SST: GFSv2 > NMME**



# SST

NMME Probability Forecast IC: Oct 2013  
DJF 2013/2014 SST

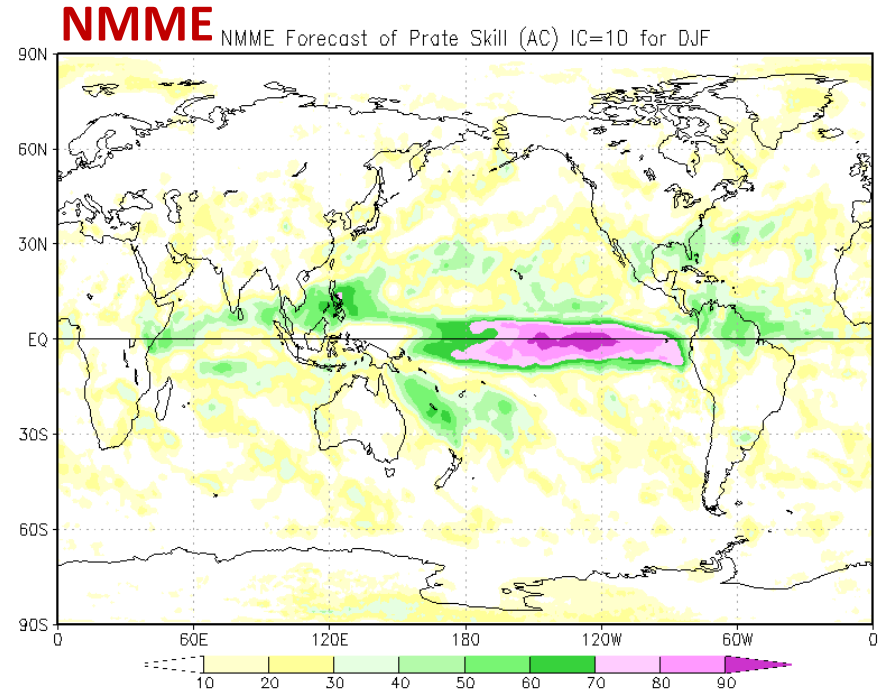
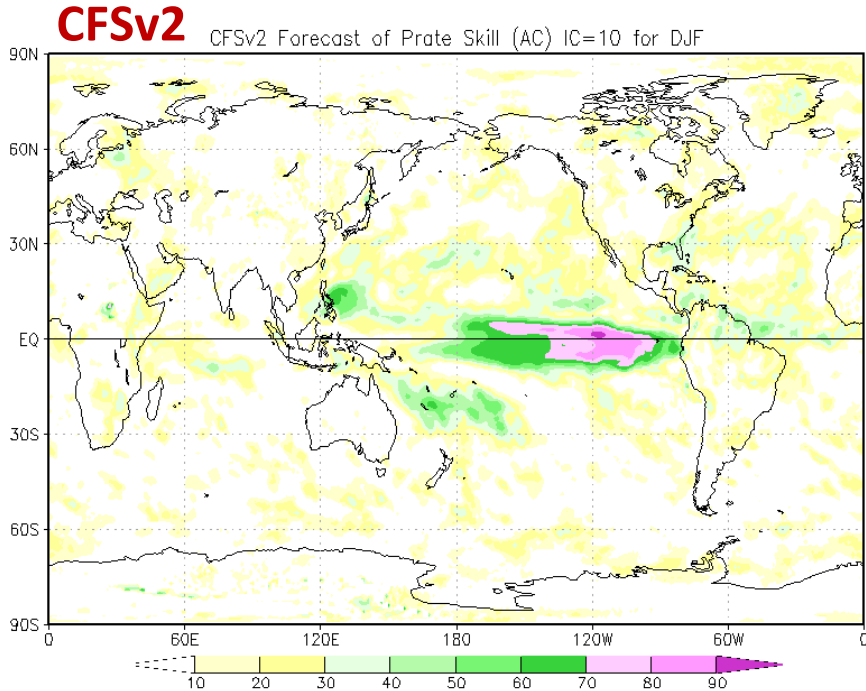


**Warmer SST: WP warm pool, N. Atlantic, Arctic Ocean, and S. Oceans**

# Prcp

## Forecast Skill for DJF Prcp: Anomaly Correlation (AC)

Based on hindcasts      ICs: Oct



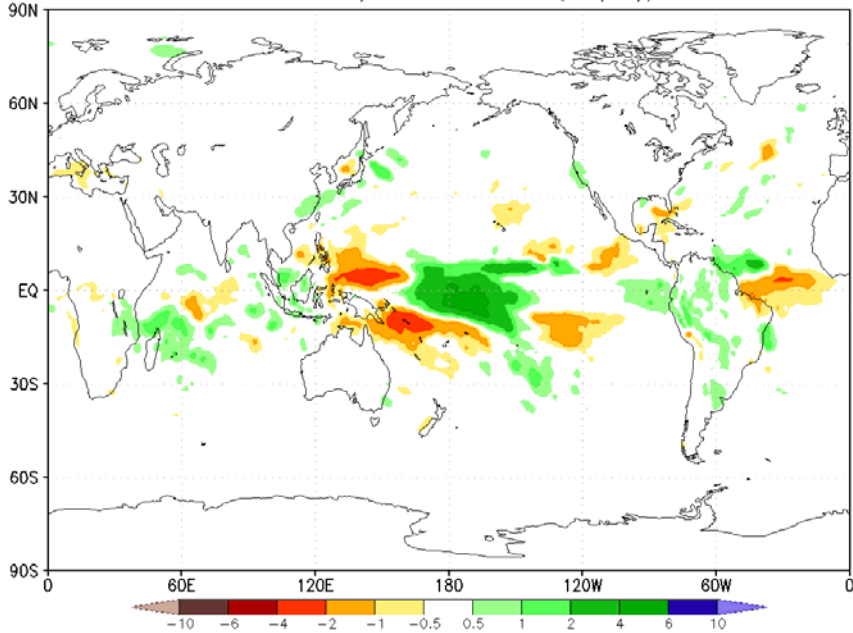
**NMME: better skill for tropical precipitation forecast**

# Prcp

## Seasonal Forecast IC: Oct 2013 DJF 2013/2014 Prec Anomaly (mm/day)

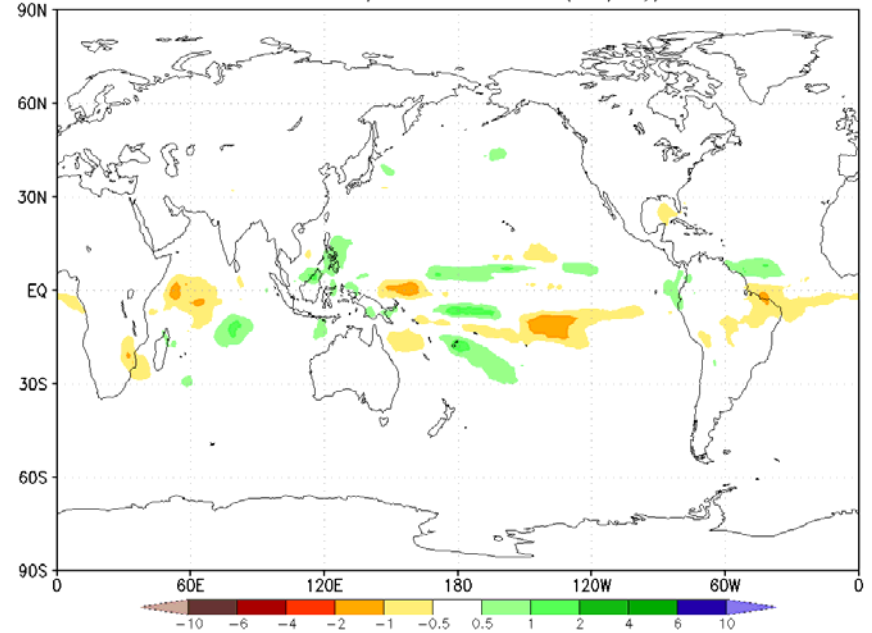
**CFSv2**

CFSv2 Forecast DJF 2013/2014 PRCP Anom (mm/day) IC=Oct 2013



**NMME**

NMME Forecast DJF 2013/2014 PRCP Anom (mm/day) IC=Oct 2013



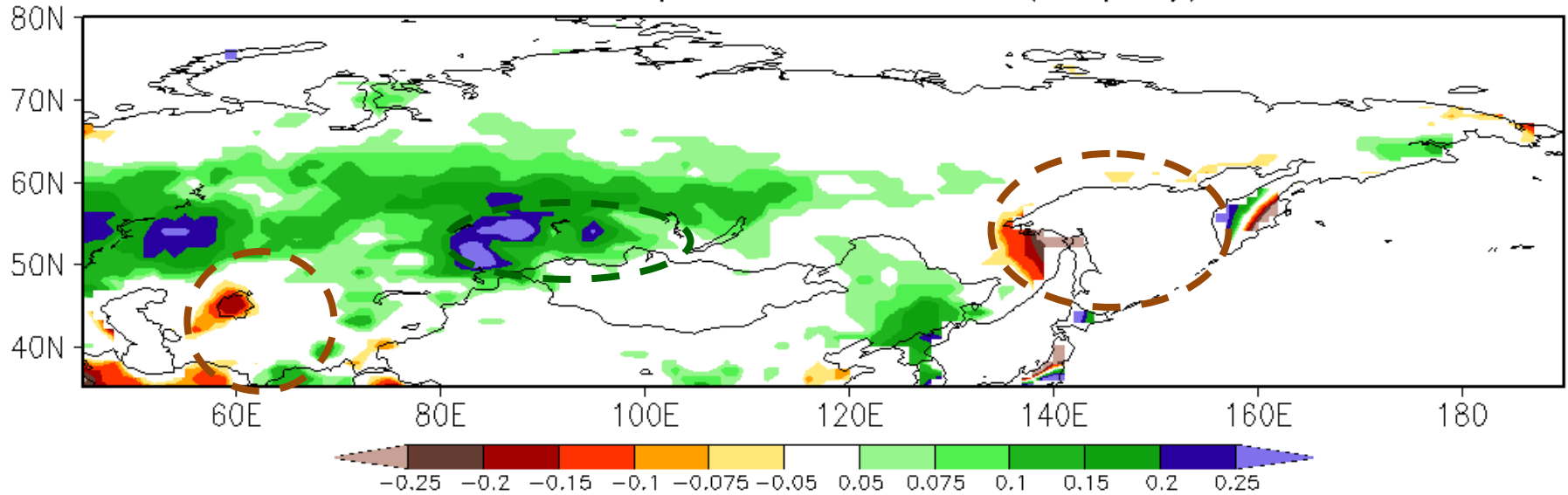
# Prcp

# North Eurasia

CFSv2 Forecast

DJF 2013/2014 PRCP Anom (mm/day)

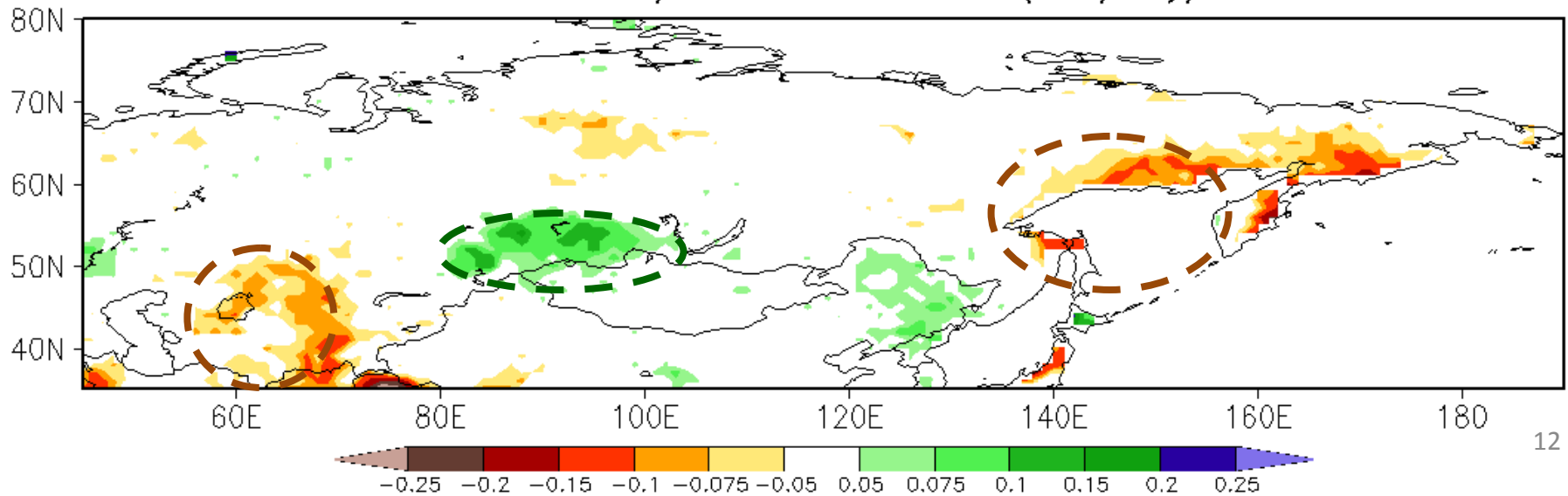
IC=Oct 2013



NMME Forecast

DJF 2013/2014 PRCP Anom (mm/day)

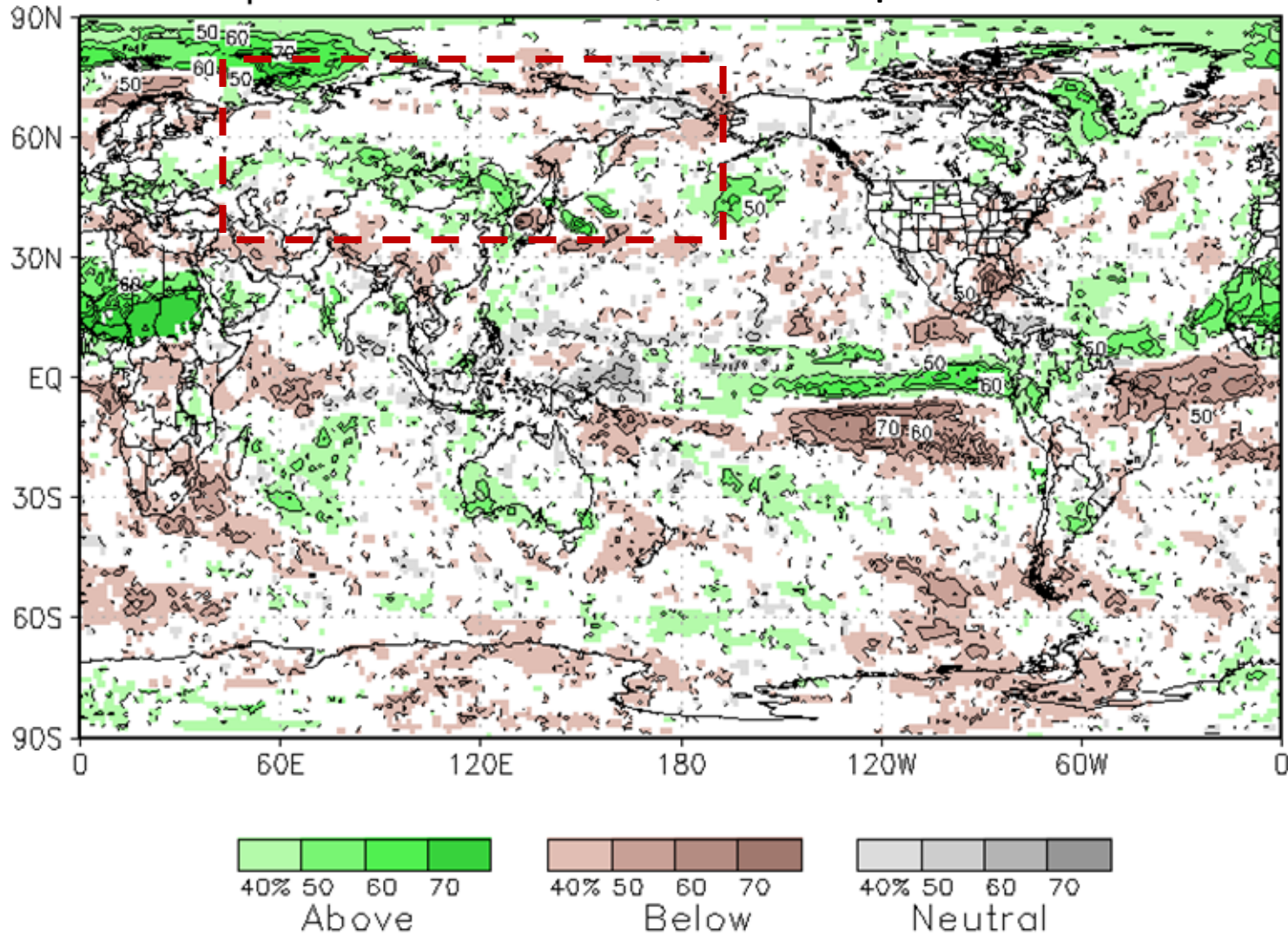
IC=Oct 2013





# Prcp

## NMME Probability Forecast IC: Oct 2013 DJF 2013/2014 Prcp



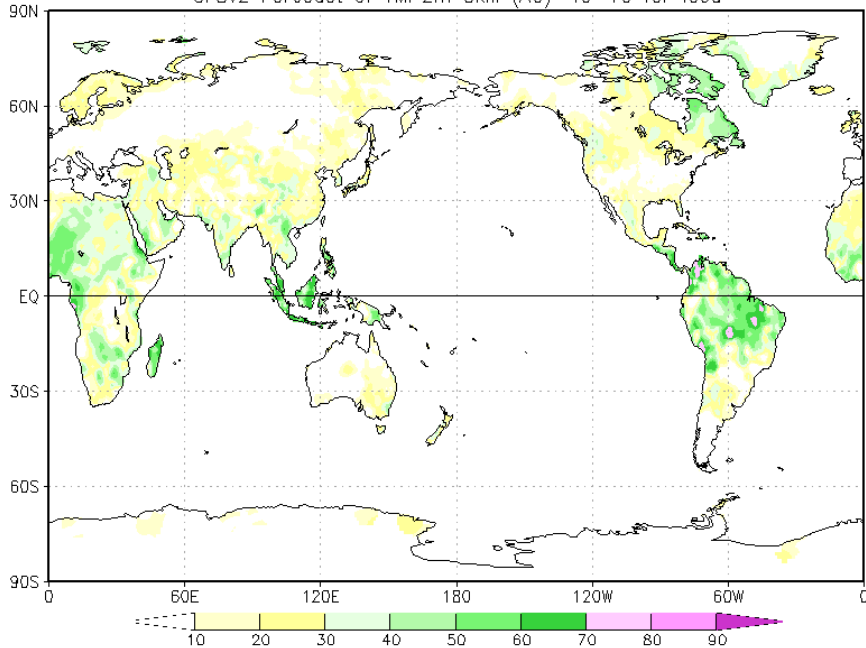
# T<sub>2m</sub>

## Forecast Skill for DJF T<sub>2m</sub>: Anomaly Correlation (AC)

Based on hindcasts ICs: Oct

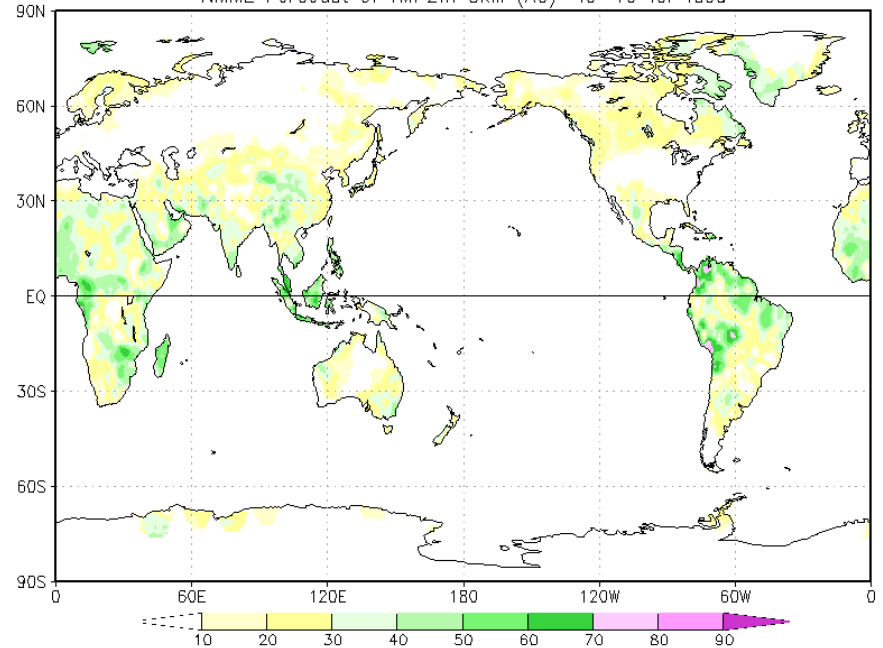
**CFSv2**

CFSv2 Forecast of TMP2m Skill (AC) IC=10 for fsea



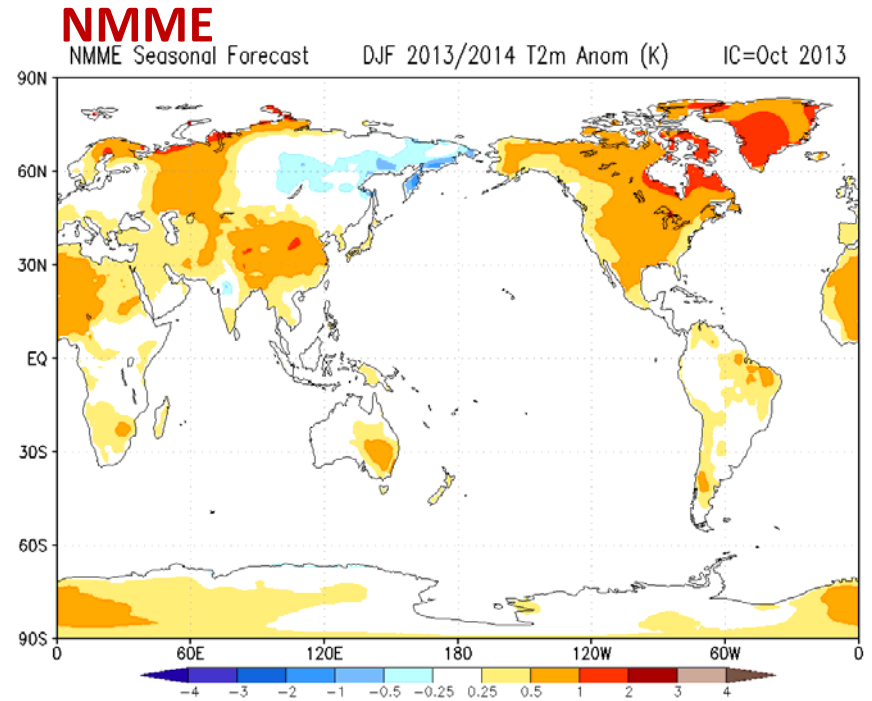
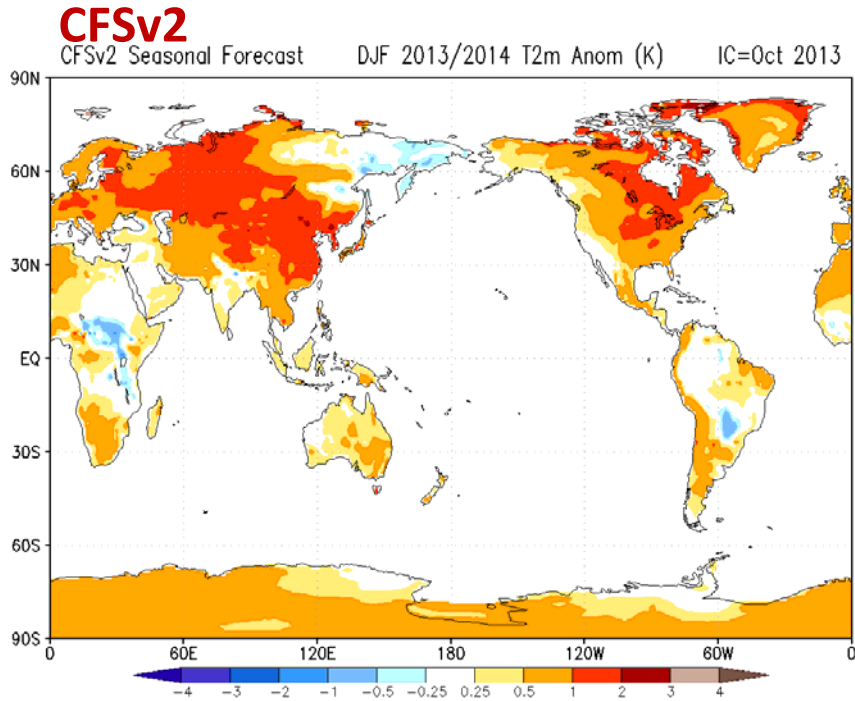
**NMME**

NMME Forecast of TMP2m Skill (AC) IC=10 for fsea



# T<sub>2m</sub>

## Seasonal Forecast IC: Oct 2013 DJF 2013/2014 T<sub>2m</sub> Anomaly (K)



**Warming over most of global land**

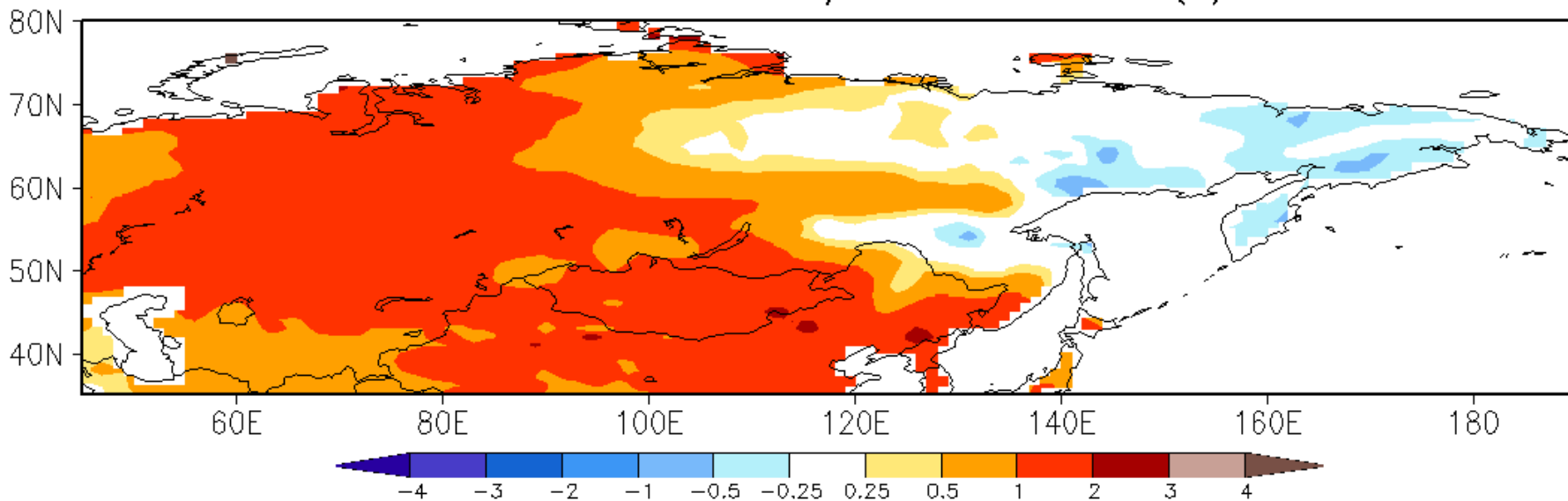
# T<sub>2m</sub>

## North Eurasia

CFSv2 Seasonal Forecast

DJF 2013/2014 T2m Anom (K)

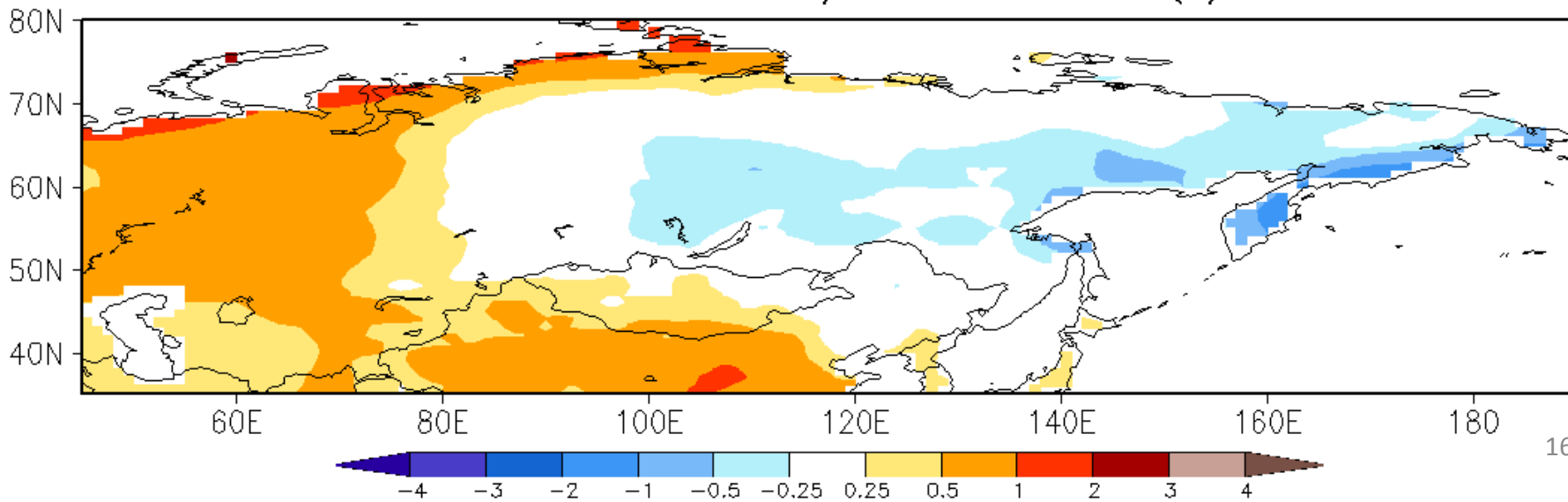
IC=Oct 2013



NMME Seasonal Forecast

DJF 2013/2014 T2m Anom (K)

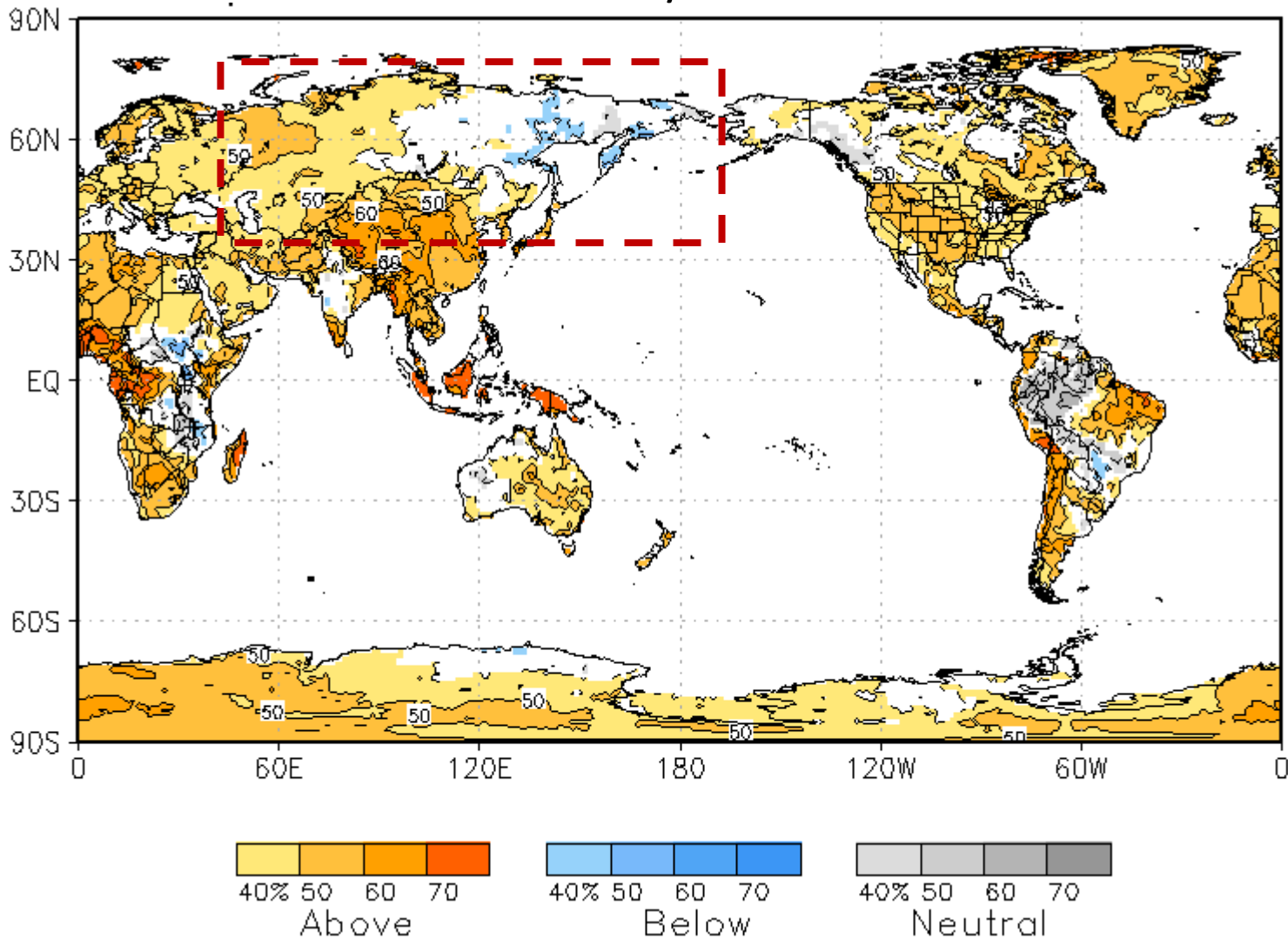
IC=Oct 2013





# T<sub>2m</sub>

## NMME Probability Forecast IC: Oct 2013 DJF 2013/2014 T<sub>2m</sub>

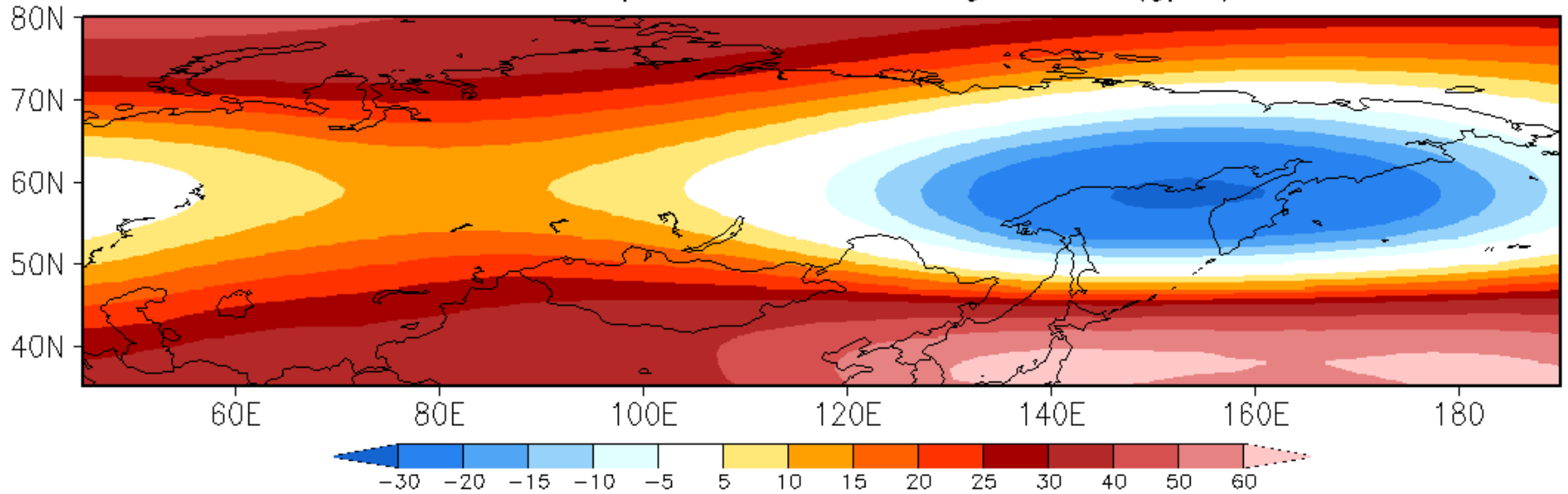


# Z<sub>200</sub>

CFSv2 Forecast

DJF 2013/2014 200-hPa Hgt Anom (gpm)

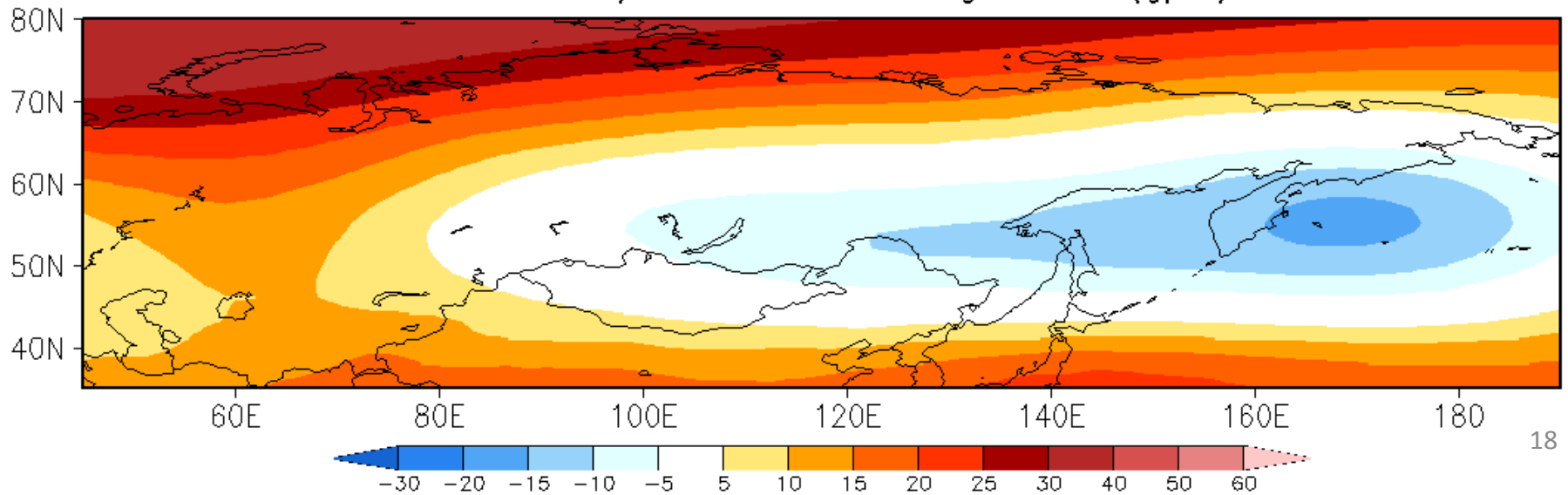
IC=Oct 2013



NMME Forecast

DJF 2013/2014 200-hPa Hgt Anom (gpm)

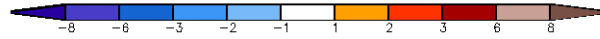
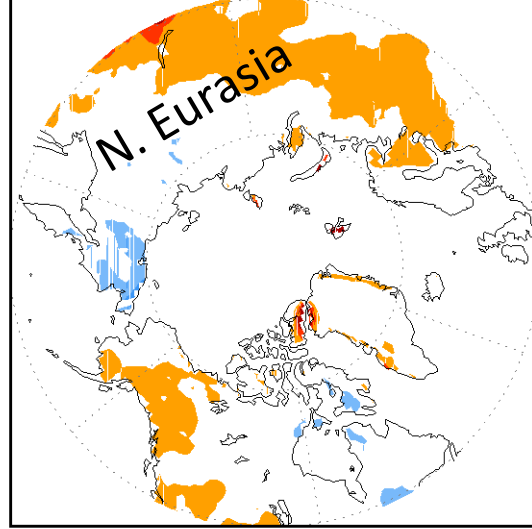
IC=Oct 2013



# CFSv2 Updates DJF 2013/2014

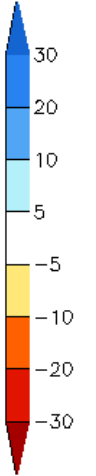
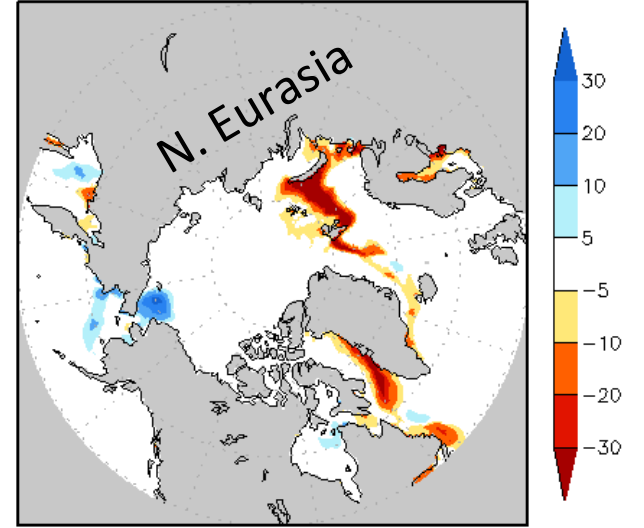
## T<sub>2m</sub> Anomaly

Dec-Jan-Feb 2013/2014 Initial conditions: 100Oct2013-190Oct2013



## Sea Ice Anomaly

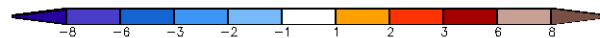
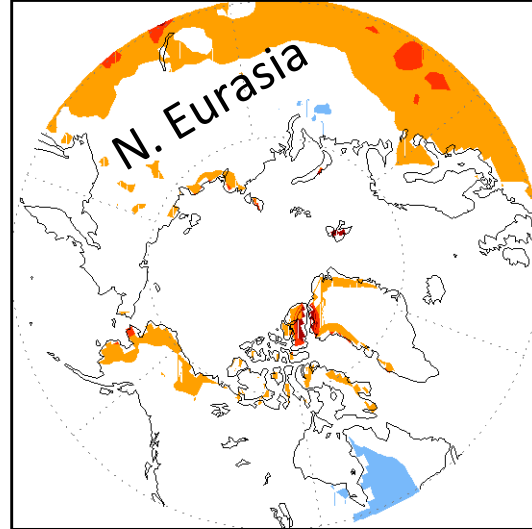
Anomalies



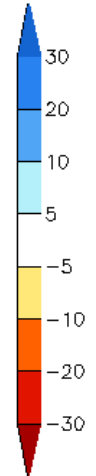
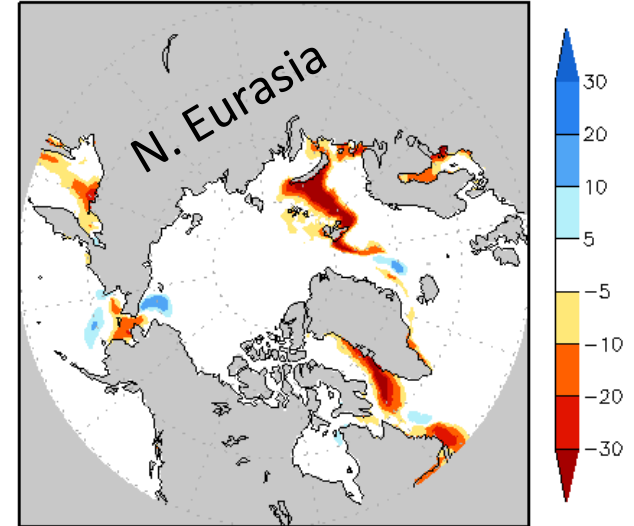
## Latest Forecast

ICs: 19-28 Oct 2013

Dec-Jan-Feb 2013/2014 Initial conditions: 190Oct2013-280Oct2013



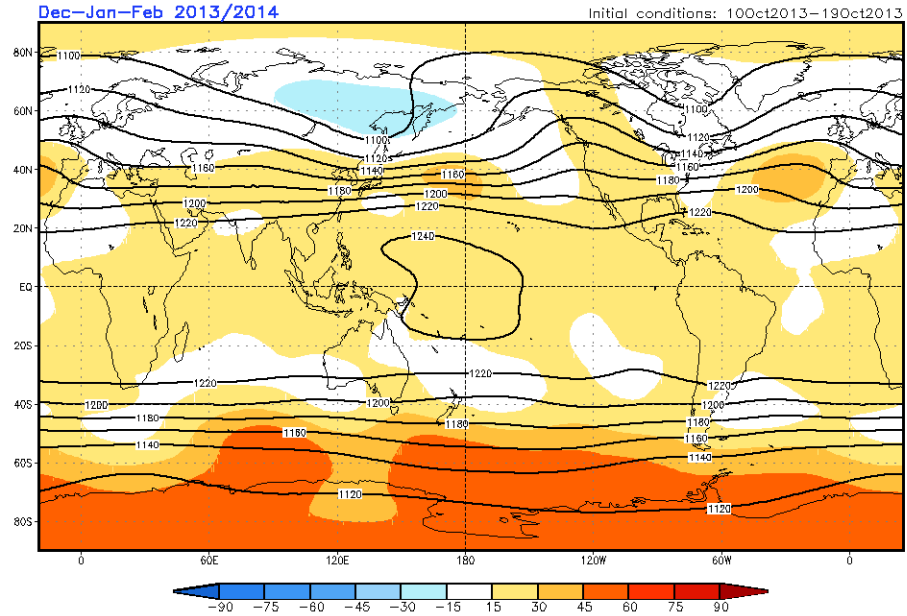
Anomalies



# CFSv2 Updates DJF 2013/2014

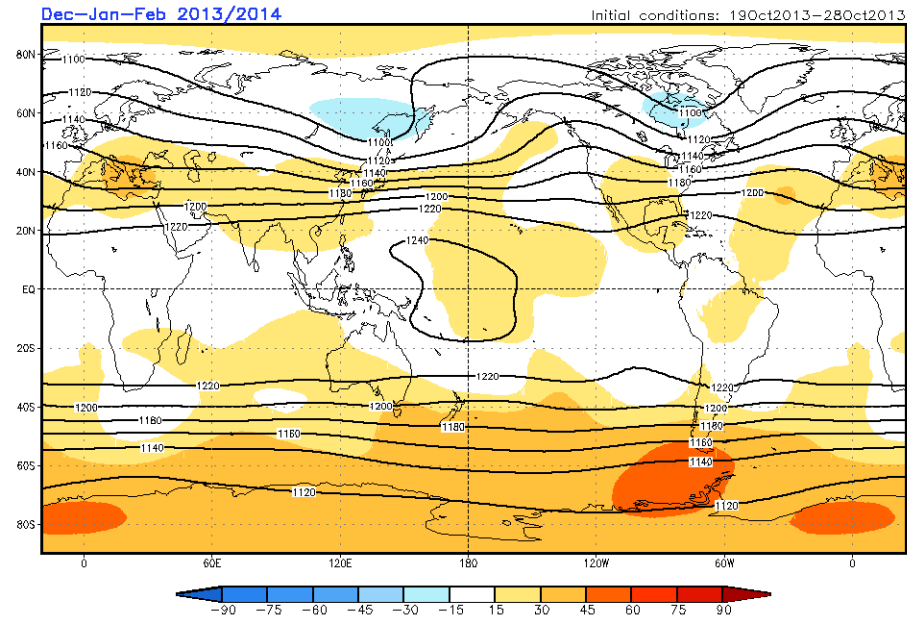
ICs: 10–19 Oct 2013

## Z<sub>200</sub> Total and Anomaly



## Latest Forecast

ICs: 19–28 Oct 2013



# Summary

To some degree, the CFSv2 and NMME seasonal forecasts are consistent with each other.

