

Review of 2011 Global Monsoons

(during DJF 2010/11 & JJA 2011 Monsoon seasons)

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& The Global Monsoon Monitoring Team at the
Climate Prediction Center/NCEP

http://www.cpc.ncep.noaa.gov/products/Global_Monsoons/Global-Monsoon.shtml

- Global monsoon monitoring began at CPC ~ Summer 2008.
- The team is led by Song yang
- others in the team are:
 - Wei Shi (North American monsoon)
 - Song Yang (Vivian Silva/Vernon Kousky -have left: South American Monsoon)
 - Muthuvel Chelliah (Asian/Indian/Australian Monsoons)
 - Wassila Thaio (African/Sahel)
- Every Monday around 1:00PM EST, the team issues weekly updates of the various monsoons around the globe (released on CPC website as well as via email to large email groups)
 - weekly updates are mainly using CPC's precipitation data sets (*next slide*) and also using NCEP/NCAR CDAS reanalysis data sets.
 - Spatial maps of last 90 days, last 30 days, and last 7 days precipitation maps are shown for each of the monsoon regions and are discussed.
 - Time series of rainfall for 5x5 degree land area boxes and last 7 days mean CDAS circulation maps also shown.
 - NCEP/GFS Model's rainfall forecast maps for the upcoming weeks 1 and 2 also presented.
- In the last five years, towards the global monsoon review presentations, we (mainly Viviane Silva) have presented posters at this workshop.

Various Precipitation Data Sets Used here (All Precip data questions go to Ping Ping ☺)

- **PREC/L** - gauge based precipitation over land only - (from GTS & delayed data sets: CAMS+GHCN) – (1949-...) Monthly (1 X 1 degree)
- **CAMS-OPI** : Combined CAMS (Gauge reports from GTS) & OLR based Precipitation Index over land & ocean (1979-...) (2.5 X 2.5 degrees)
- **Unified** daily Global gridded precipitation (1979-..) 1/8 degree over US, 1/2 degree elsewhere

Here, rainfall data sets/maps from various countries are shown, when available (Australia, India, etc.)

CPC's ENSO index

http://www.cpc.ncep.noaa.gov/products/analysis_monitoring/ensostuff/ensoyears.shtml

<u>Year</u>	<u>DJF</u>	JFM	FMA	MAM	AMJ	MJJ	<u>JJA</u>	JAS	ASO	SON	OND	NDJ
.....												
.....												
<u>2010</u>	1.7	1.5	1.2	0.8	0.3	-0.2	-0.6	-1.0	-1.3	-1.4	-1.4	-1.4
<u>2011</u>	-1.3	-1.2	-0.9	-0.6	-0.2	0.0	0.0					

Atmospheric and Nino SST conditions during DJF 2010/11 & JJA 2011

DJF 2010/11

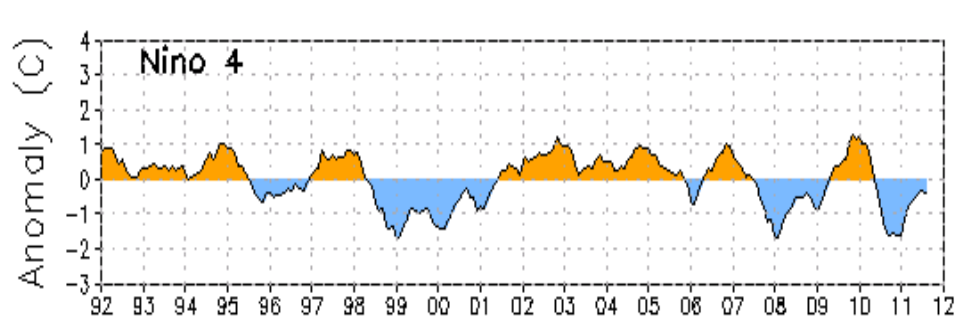
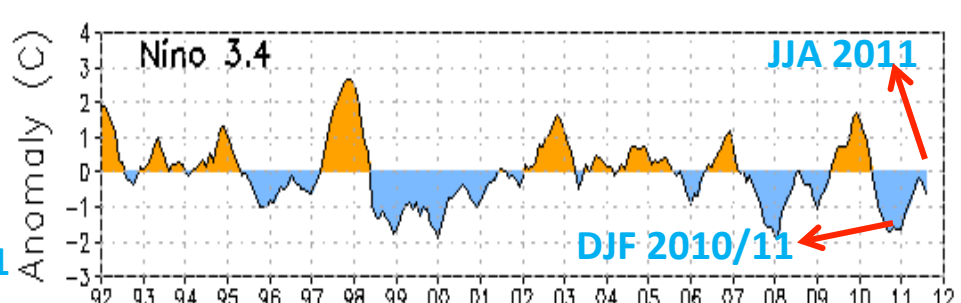
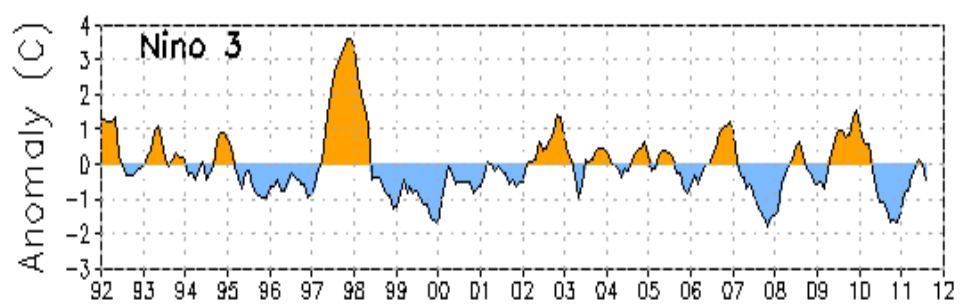
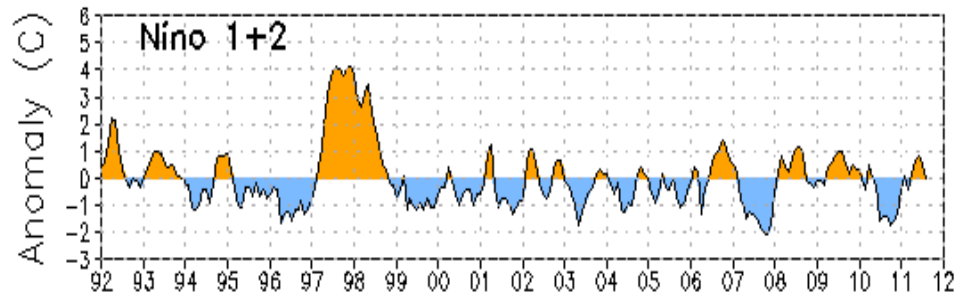
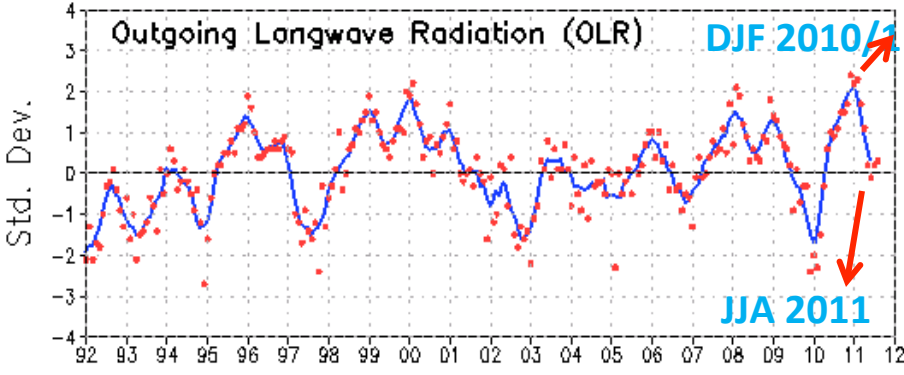
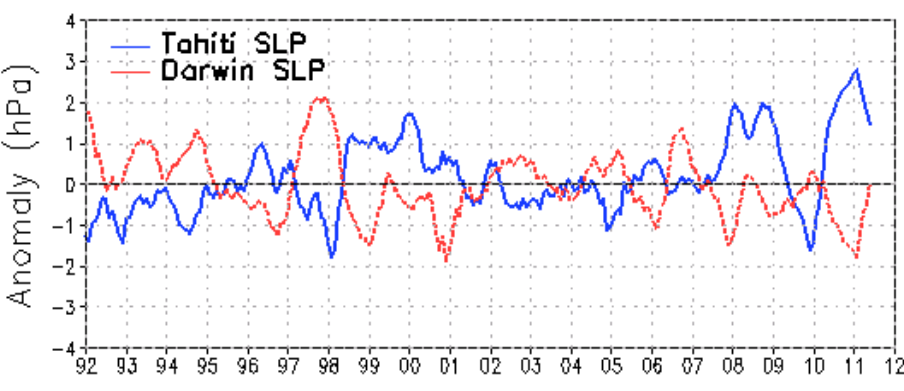
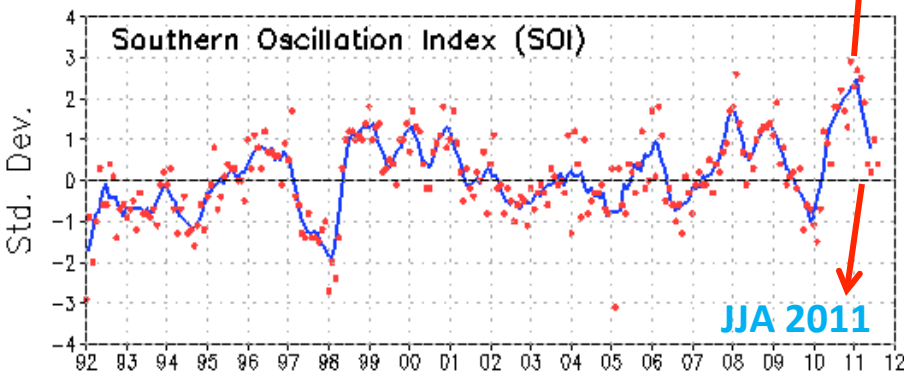
JJA 2011

DJF 2010/11

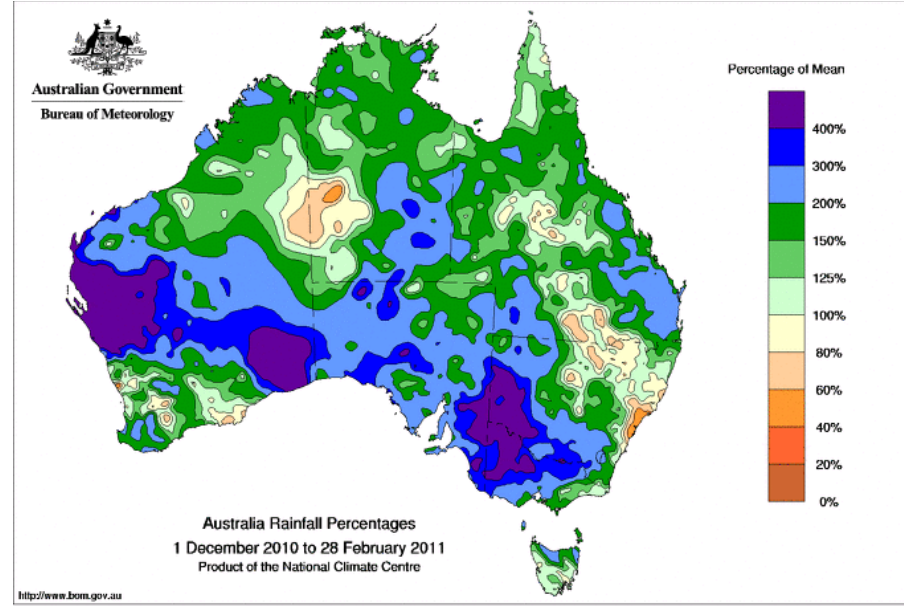
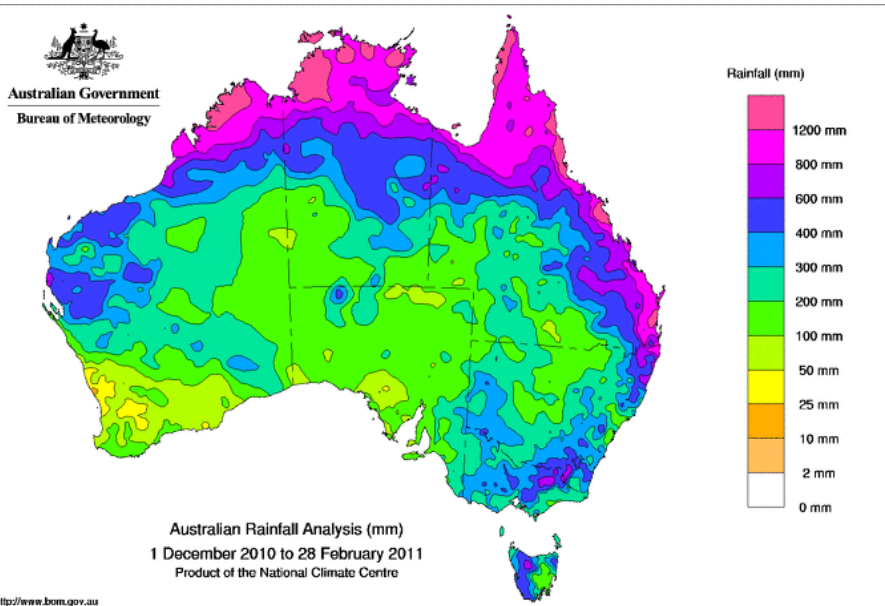
JJA 2011

JJA 2011

DJF 2010/11

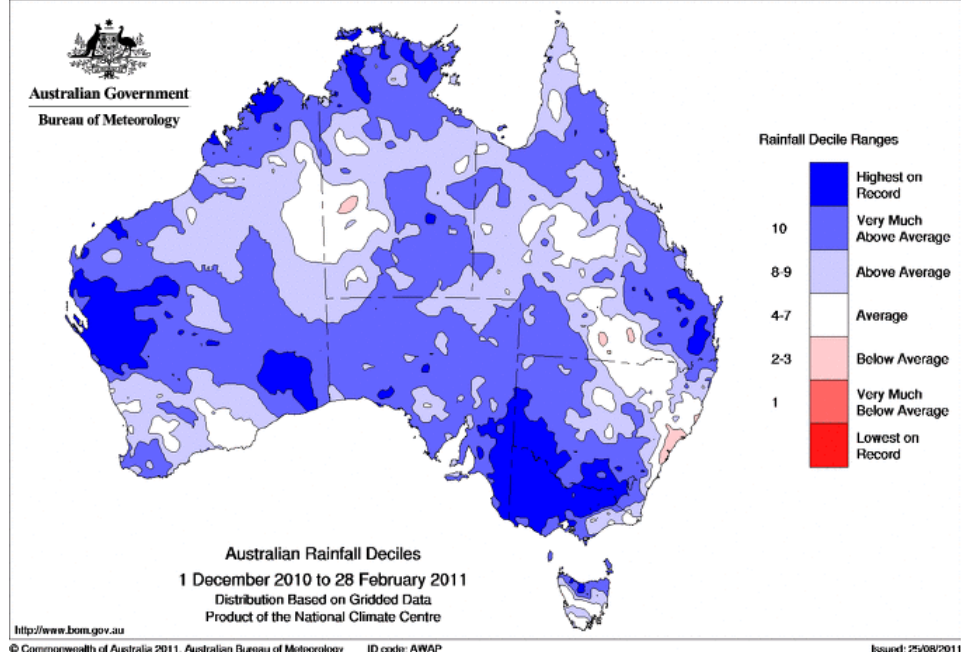


Data updated through August 2011

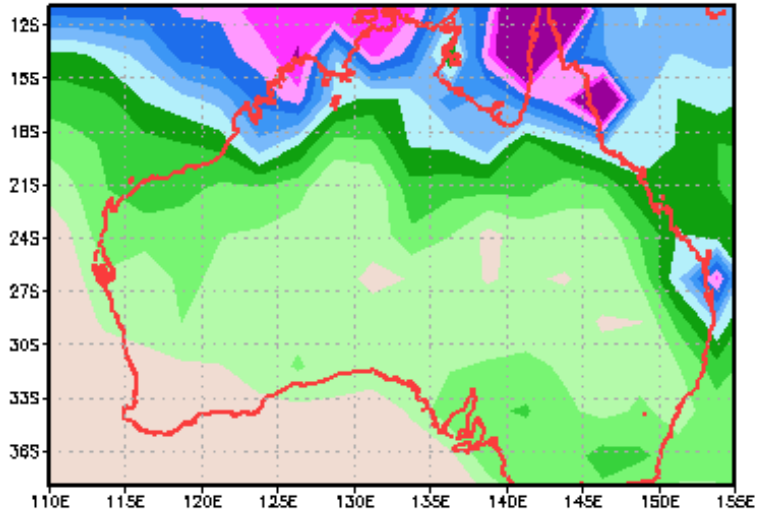


HighLights: (ABOVE NORMAL RAINFALL)

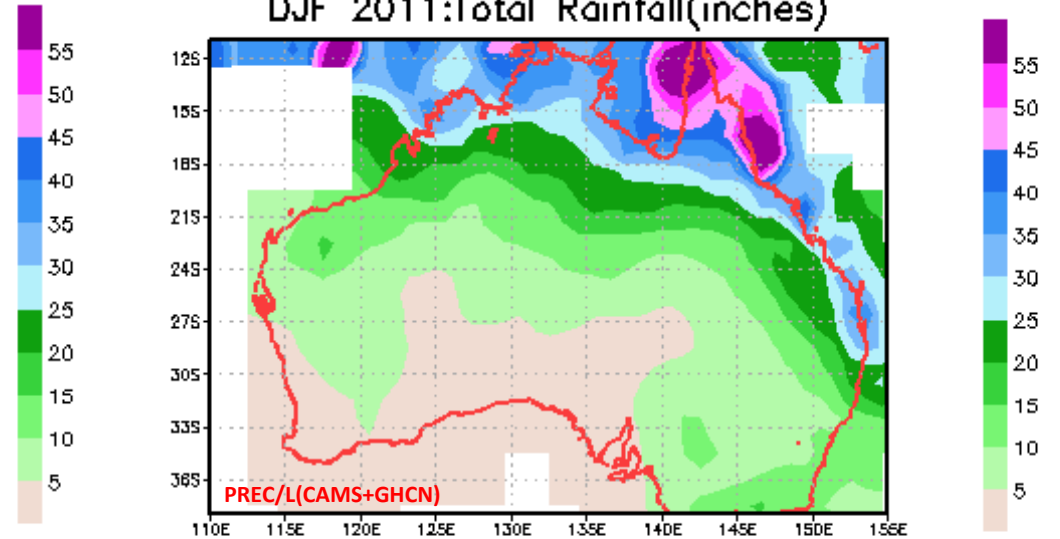
- **Second Wettest Summer(DJF) on record** (1st wettest was: 1973/74).
- **Significant rainfall and flooding occurred** over large parts of eastern and northern Queensland floods in early January 2011
- **All States and Territories of Australia** recorded above average rainfall amounts [one rarely sees the whole country(here continent) experience above normal conditions, especially rainfall.]



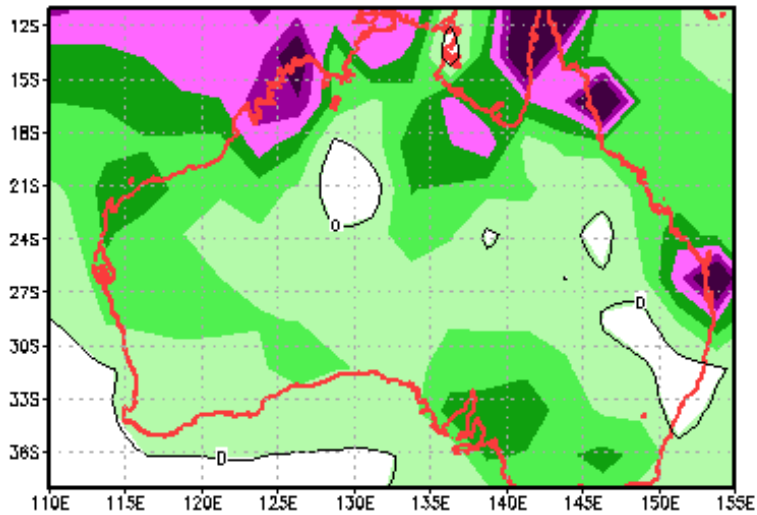
DJF 2011:CAMS-OPI P (inches)



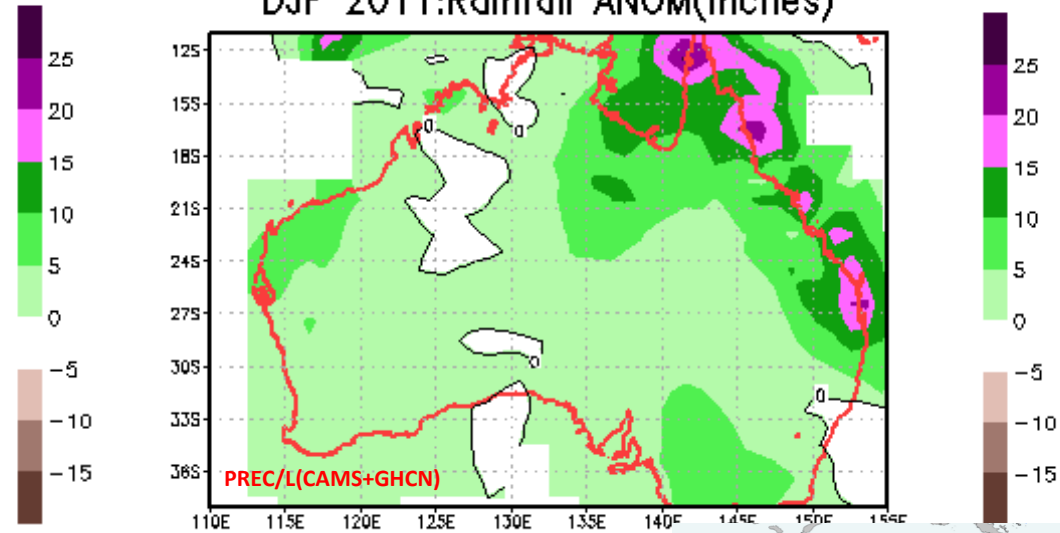
DJF 2011:Total Rainfall(inches)



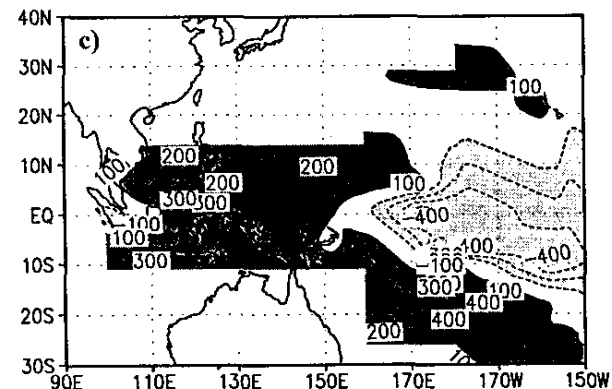
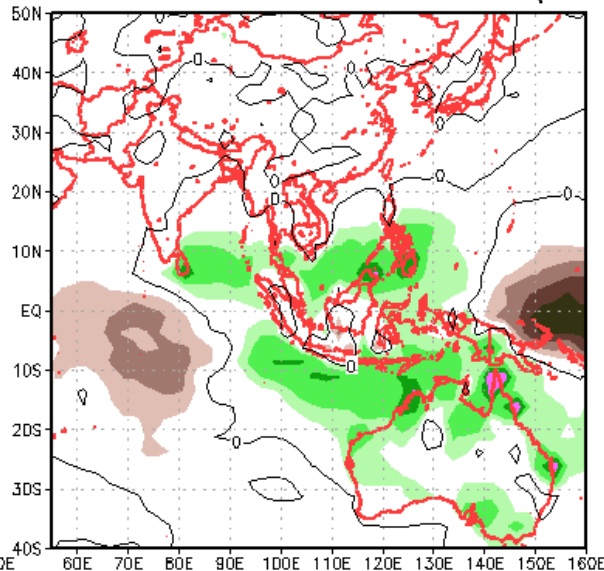
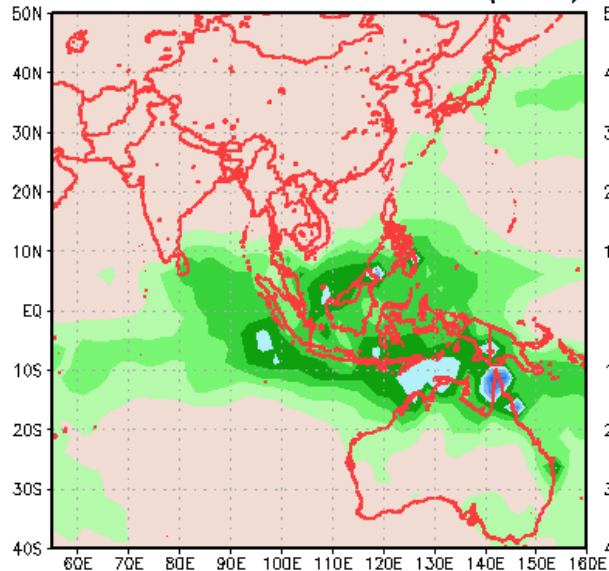
DJF 2011:CAMS-OPI P ANOM(inches)



DJF 2011:Rainfall ANOM(inches)

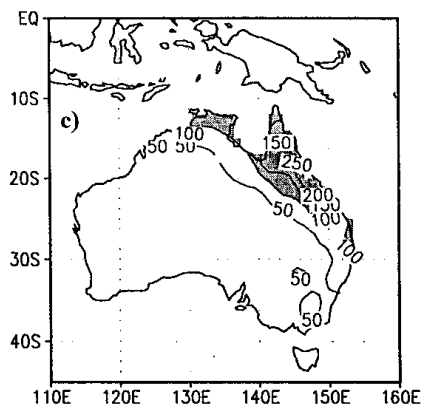


DJF 2011:CAMS-OPI P (inch) DJF 2011:CAMS-OPI P ANOM(inch)

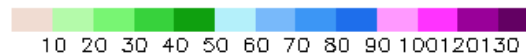
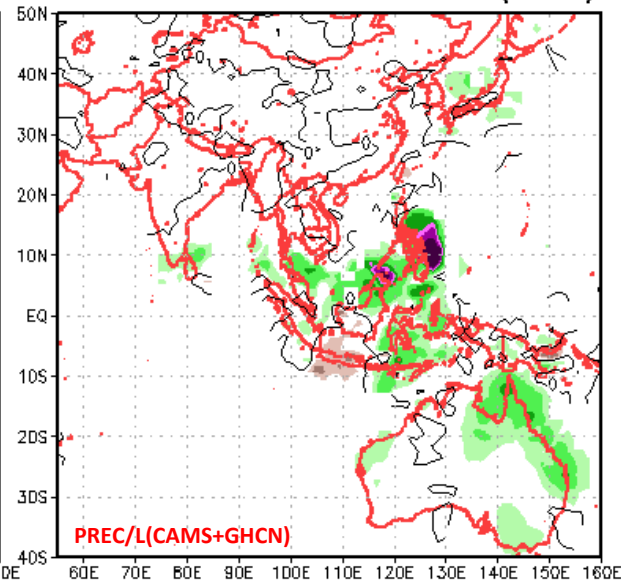
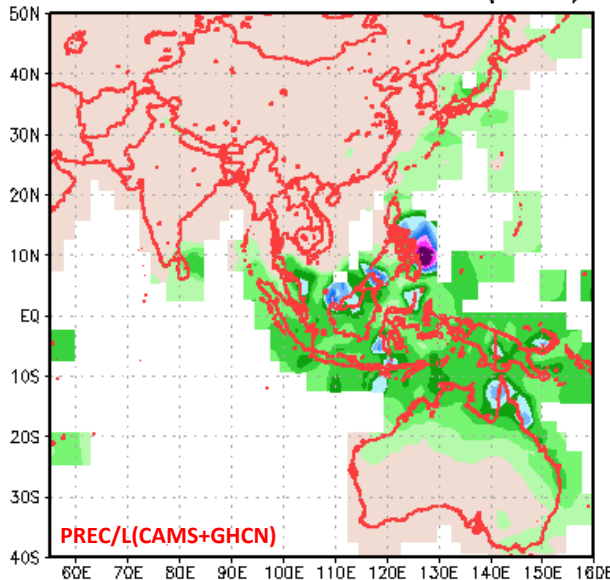


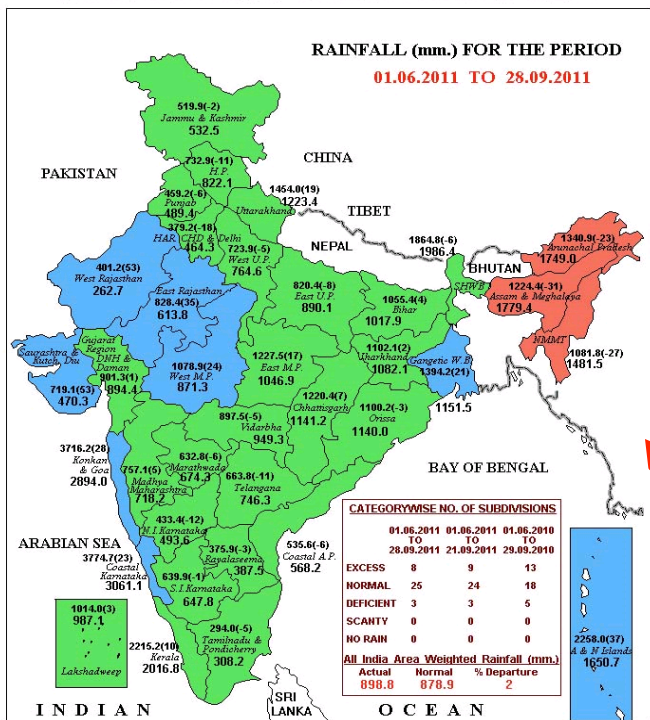
DJF 2011:Total Rainfall(inch)

DJF 2011:Rainfall ANOM(inch)



COLD
(high SOI)





IMD; Long Lead Seasonal Forecast for 2011 Summer Monsoon Rain fall over India:

i) Southwest Monsoon Season Rainfall over the country as a whole for the 2011 southwest monsoon season (June to September) is most likely to be below normal (90-96% of LPA).

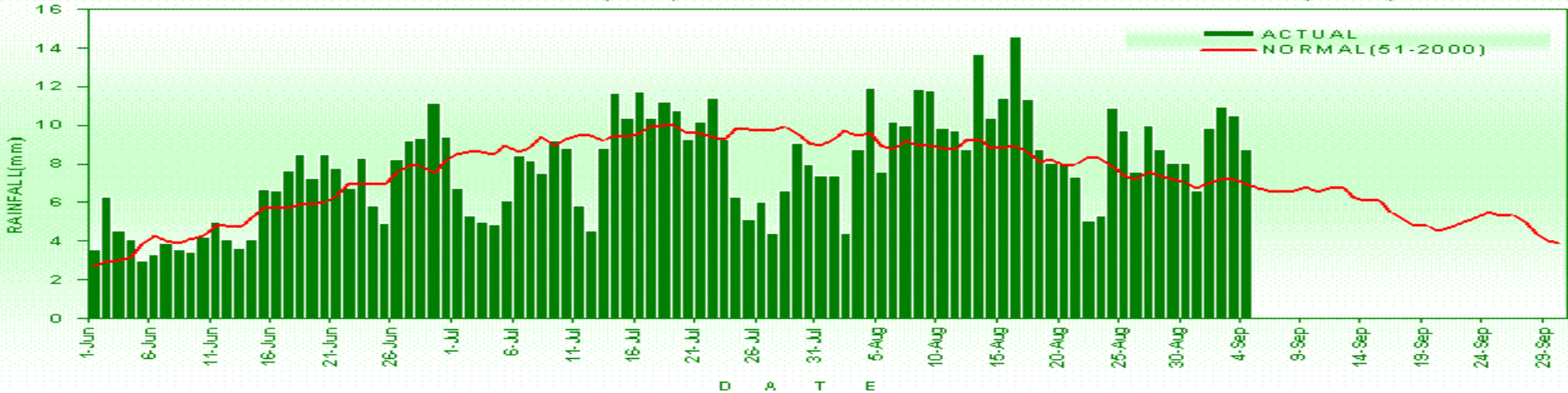
ii) Quantitatively, monsoon season rainfall for the country as a whole is likely to be 95% of the long period average with a model error of $\pm 4\%$.

OBSERVED : Total JJAS Seasonal mean Rainfall : **NORMAL**
Monsoon Onset over the Southwest Kerala coast occurred on May 29, 2011 – 3 days prior to Normal Onset date June 1st.

LEGEND: [Blue] EXCESS (+20% OR MORE) [Green] NORMAL (+19% TO -19%) [Red] DEFICIENT [-20% TO -59%]
[Yellow] SCANTY [-60% TO -99%] [Grey] NO RAIN [-100%] [White] NO DATA

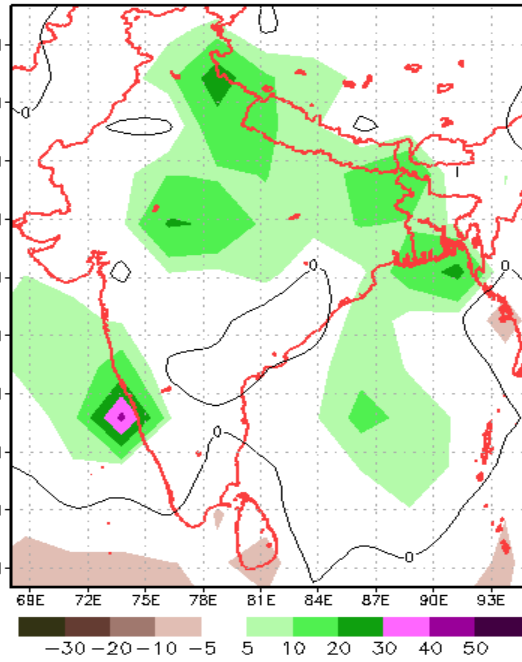
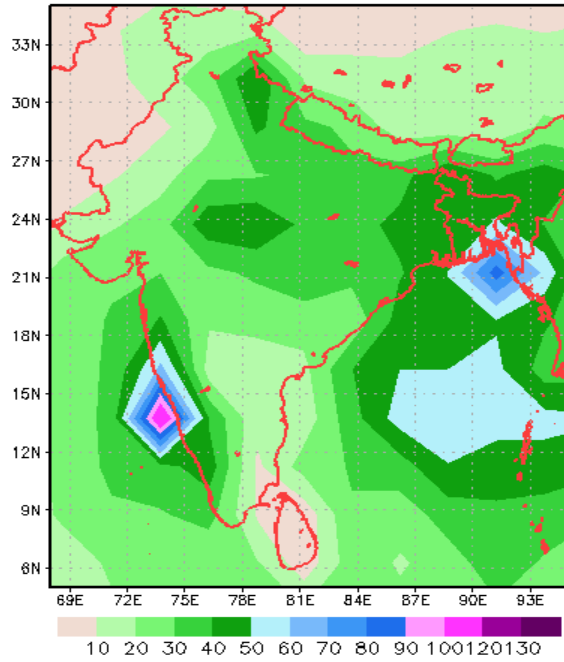
NOTES:
(a) Rainfall figures are based on operational data.
(b) Small figures indicate actual rainfall (mm.), while bold figures indicate Normal rainfall (mm.)
Percentage Departures of Rainfall are shown in Brackets.

DAILY MEAN RAINFALL (mm) OVER THE COUNTRY AS A WHOLE (2011)



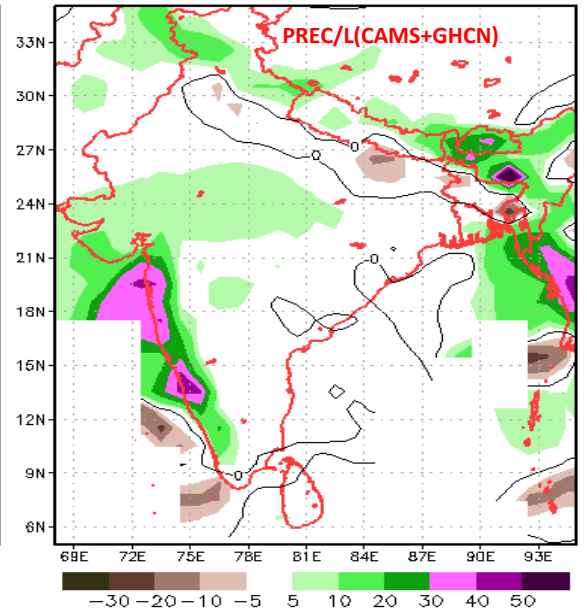
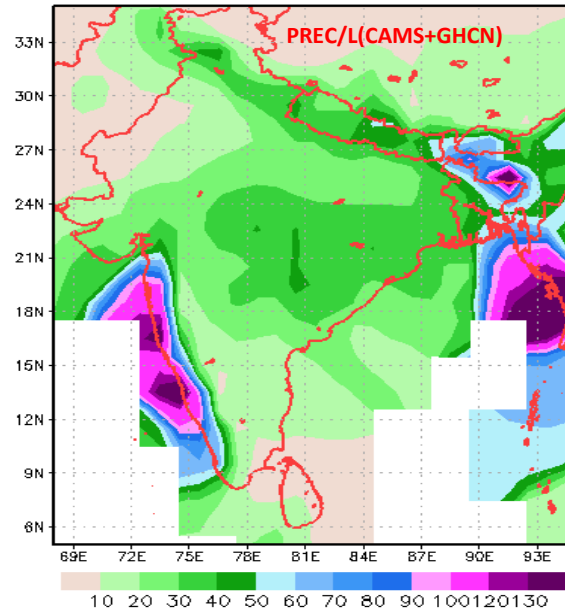
JJA 2011:CAMS-OPI P(inch)

JJA 2011:CAMS-OPI P ANOM(inch)



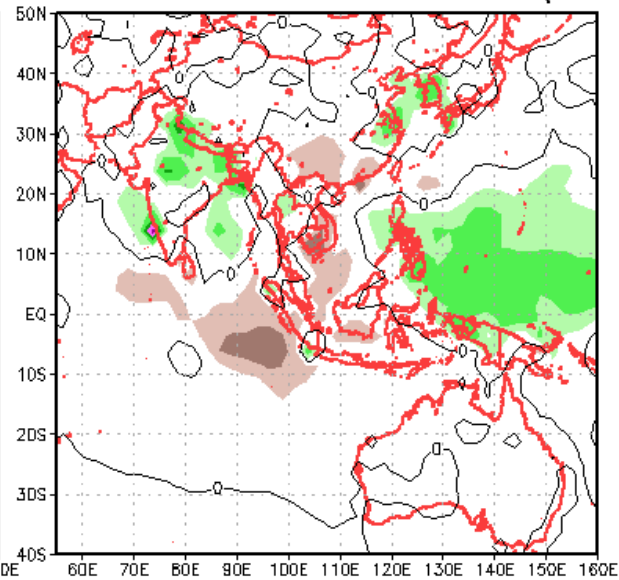
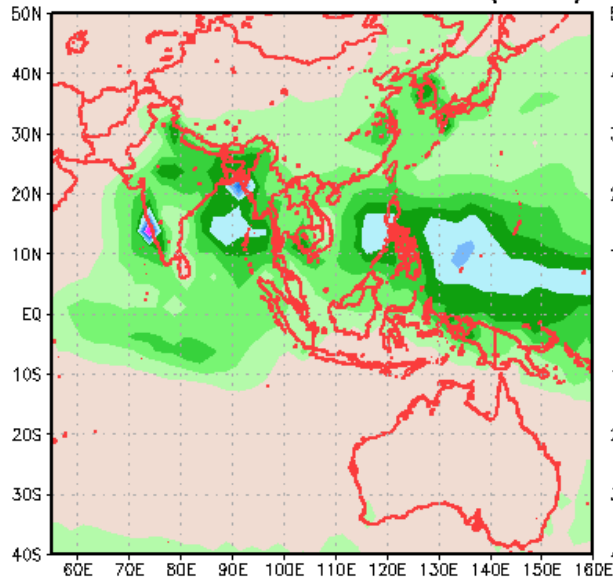
JJA 2011:Total Rainfall(inch)

JJA 2011:Rainfall ANOM(inch)



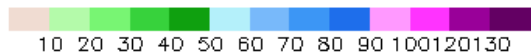
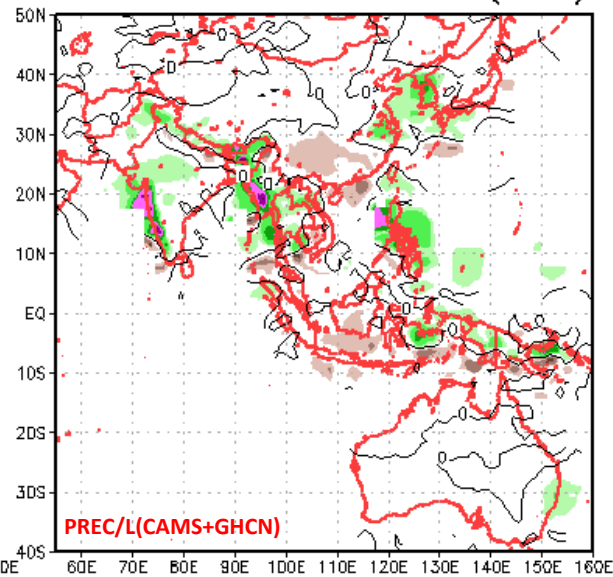
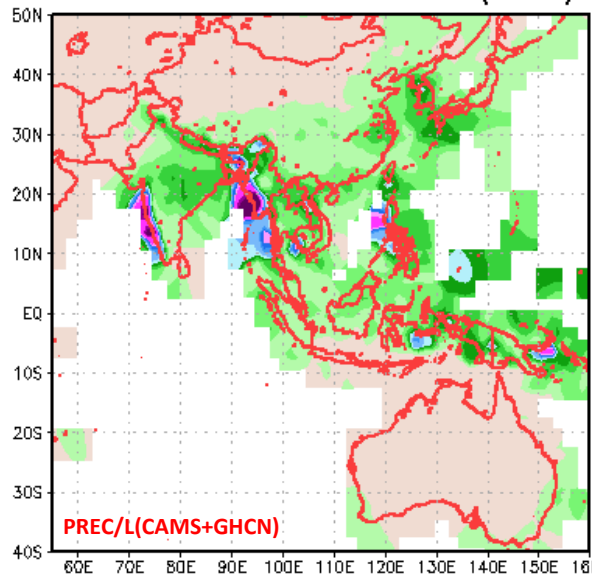
JJA 2011:CAMS-OPI P (inch)

JJA 2011:CAMS-OPI P ANOM(inch)



JJA 2011:Total Rainfall(inch)

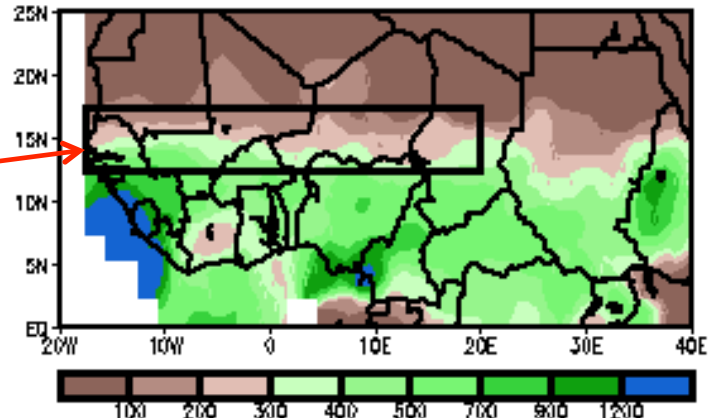
JJA 2011:Rainfall ANOM(inch)



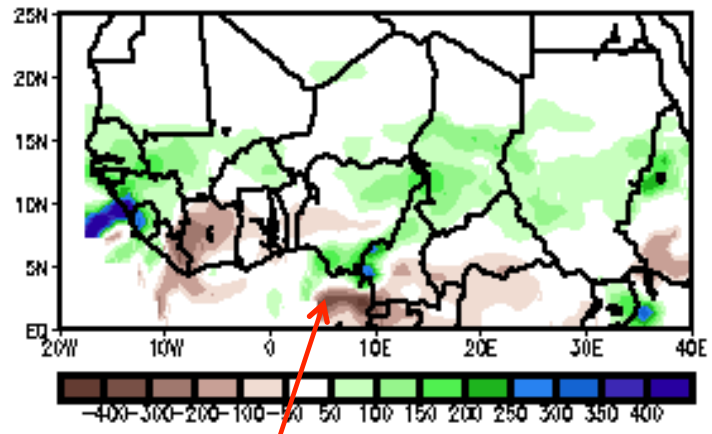
African/Sahel Monsoon JJA 2011

Precipitation June–August 2011

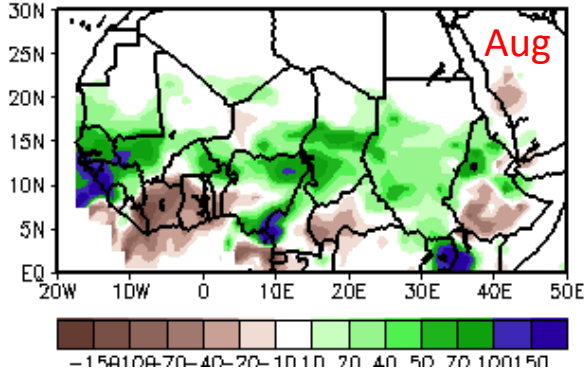
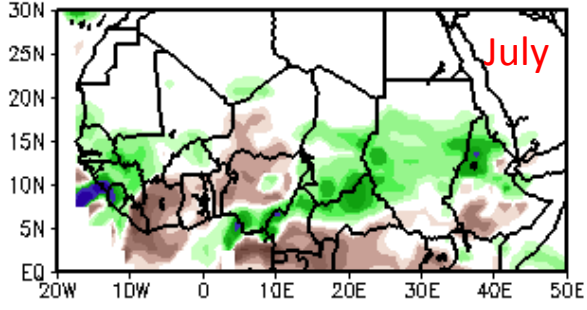
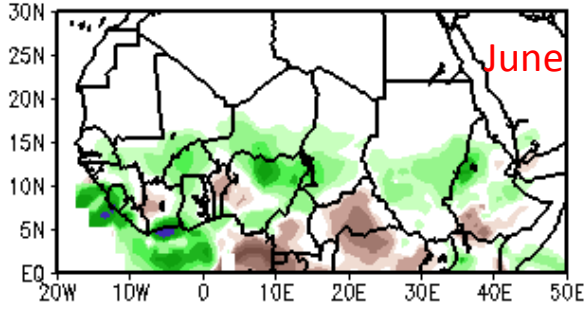
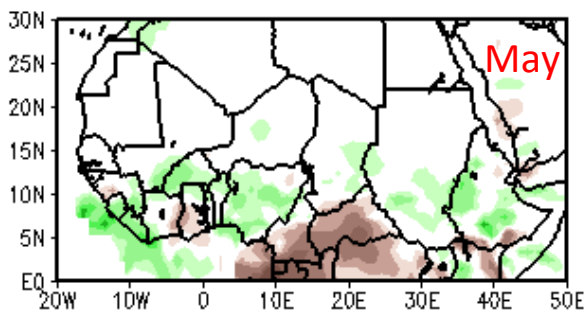
Total



Anomaly



Overall above average rainfall in the Sahel and below average in portions of the Gulf of Guinea region.



4 panels spatial maps are monthly rainfall anomalies from May through Aug 2011.

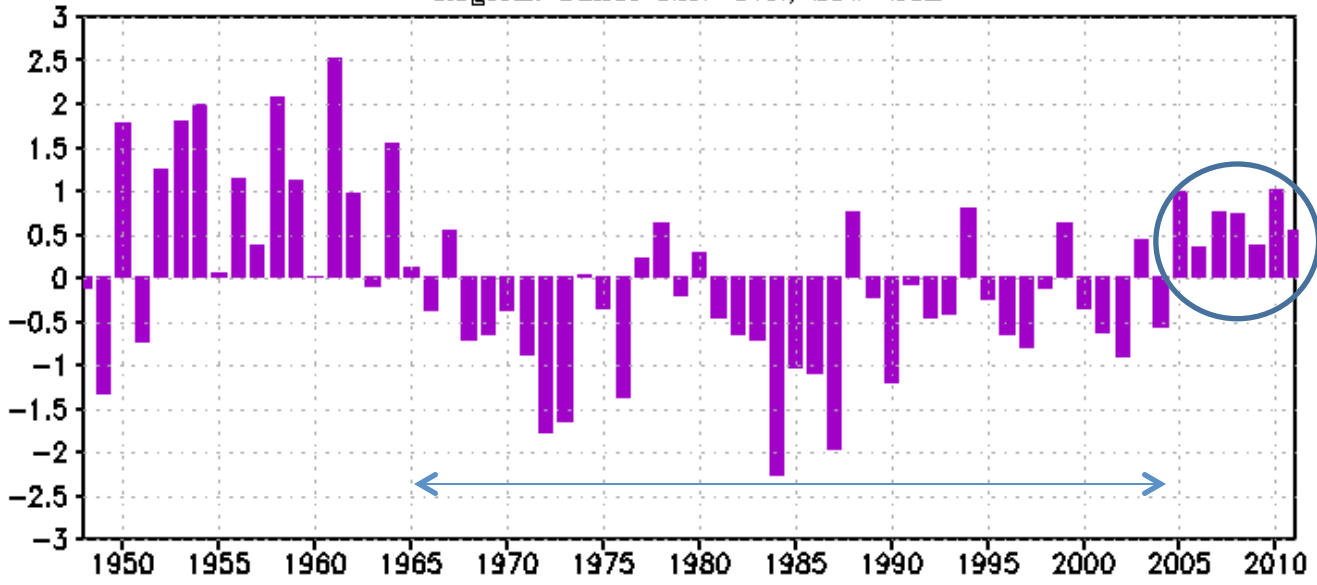
Early onset of the rains in central Sahel in May. Onset delayed in West Africa. However, quick recovery in August 2011.

Contrast between the Sahel and the Gulf of Guinea region more pronounced in Aug 2011. This dipole pattern is part of the decadal variability.

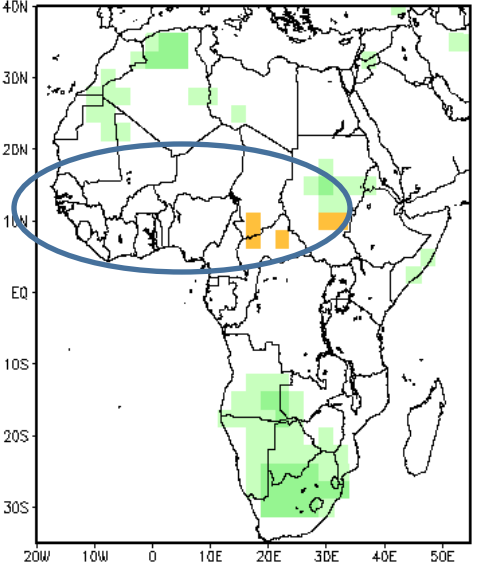


Std. Anom Jun–Aug Chen Precip (1948–2011)

Region: Sahel 12N–17N, 20W–20E

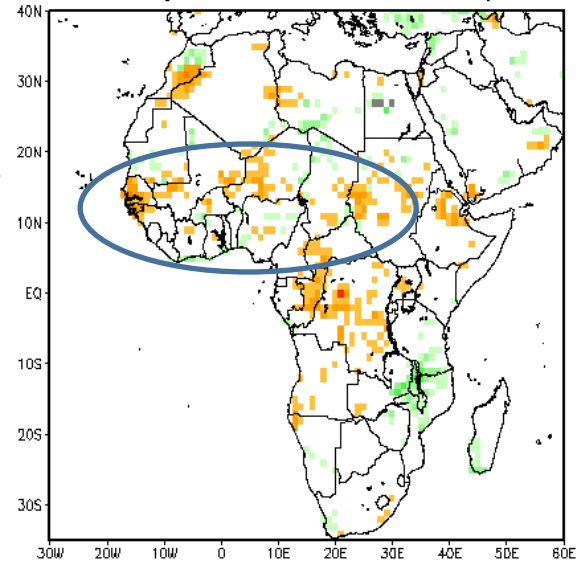


CFS-V1 Depart. Clim. Prob. Forecast X 100
Jun–Aug 2011 Africa Rainfall, 21–30 Apr IC



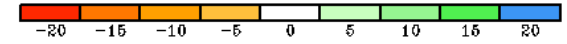
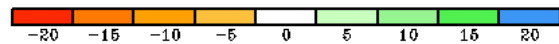
CFS (Ver 1) Model based forecasts for JJA 2011 Africa rainfall based on April 21-30 Initial Conditions. T382 model based CFS Forecasts.

CFS-T382 Depart. Clim. Prob. Forecast X 100
Jun–Aug 2011 Africa Rainfall, Apr IC



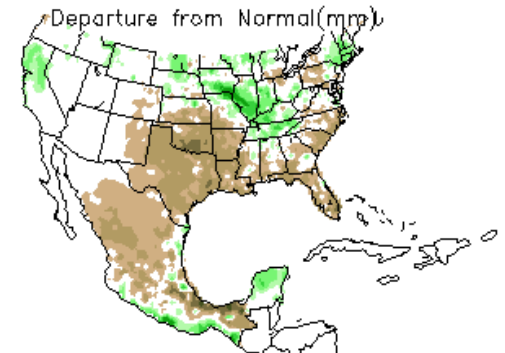
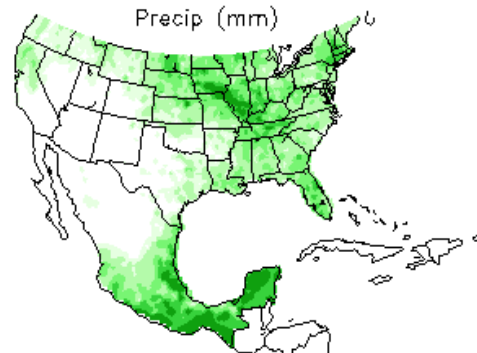
Prediction was challenging. Predictions for JJA 2011, Apr Initial Conditions did not verify.

SST signals were probably very weak at the time.

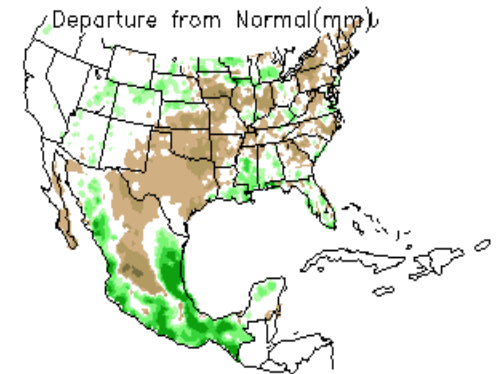
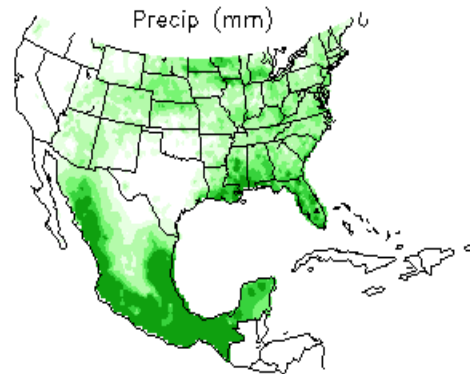


North American Monsoon JJA 2011

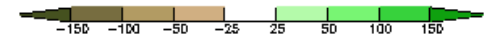
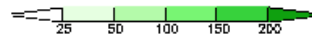
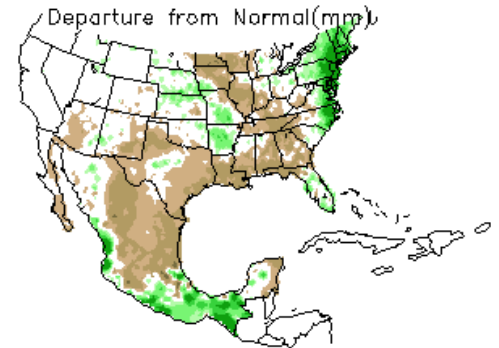
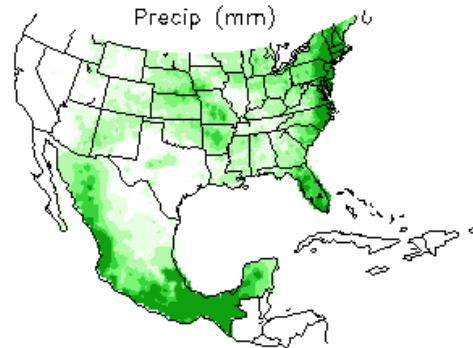
Monthly Accumulation -- June 2011, URD

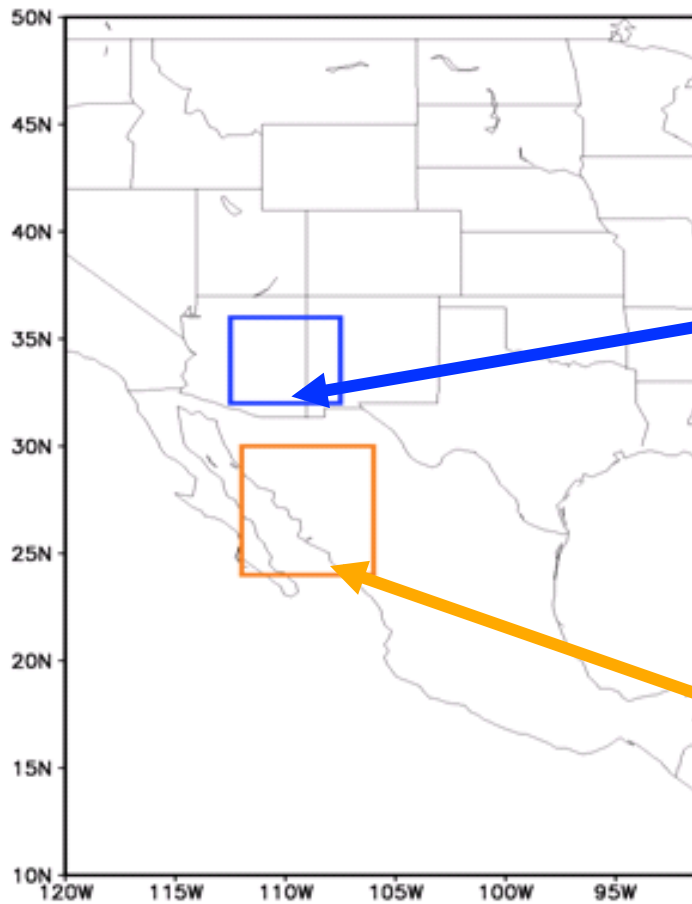


Monthly Accumulation -- July 2011, URD

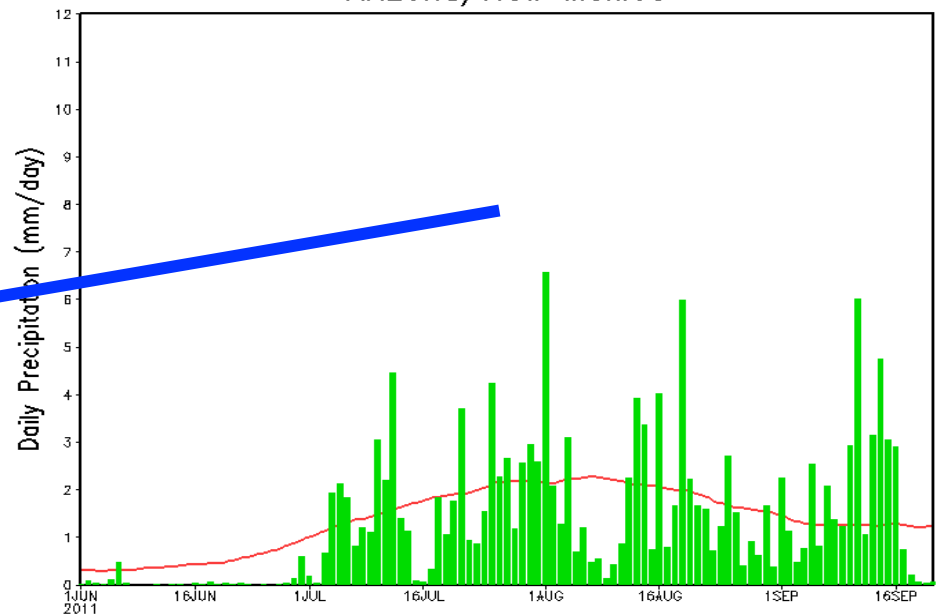


Monthly Accumulation -- August 2011, URD

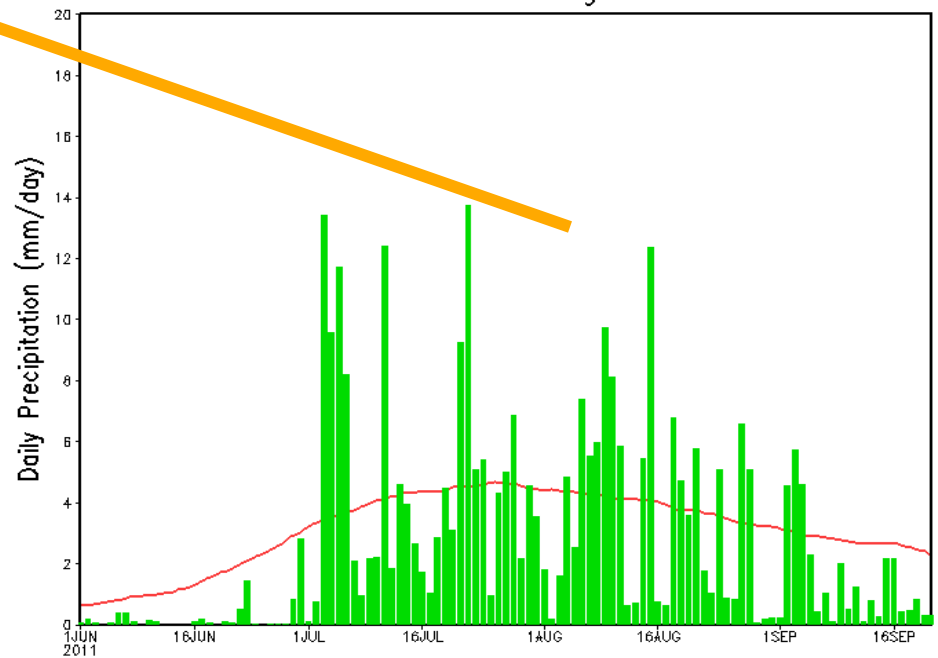




Arizona/New Mexico



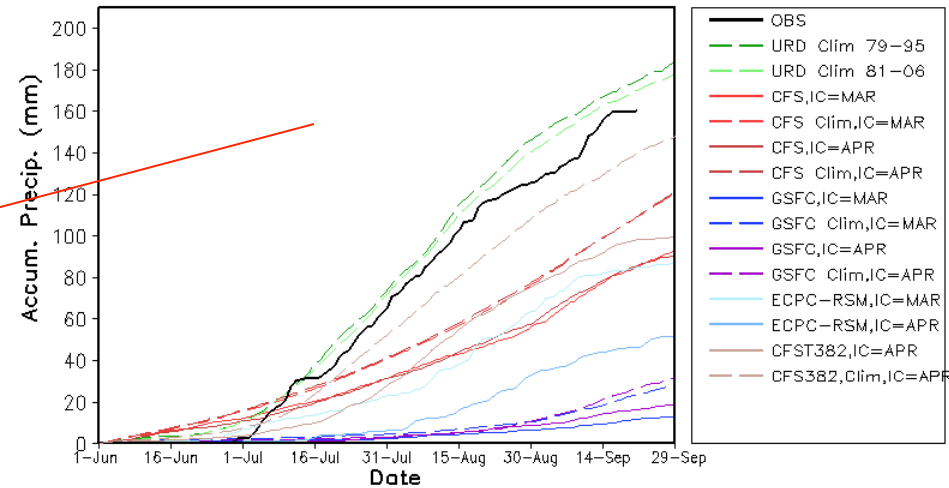
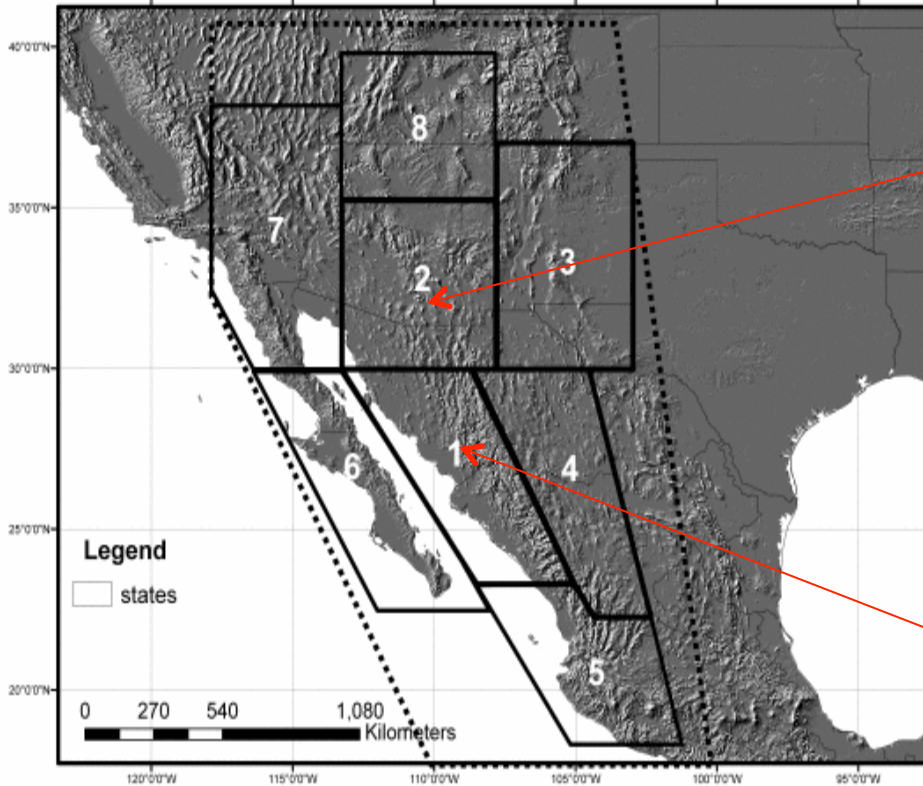
NAM Core Region



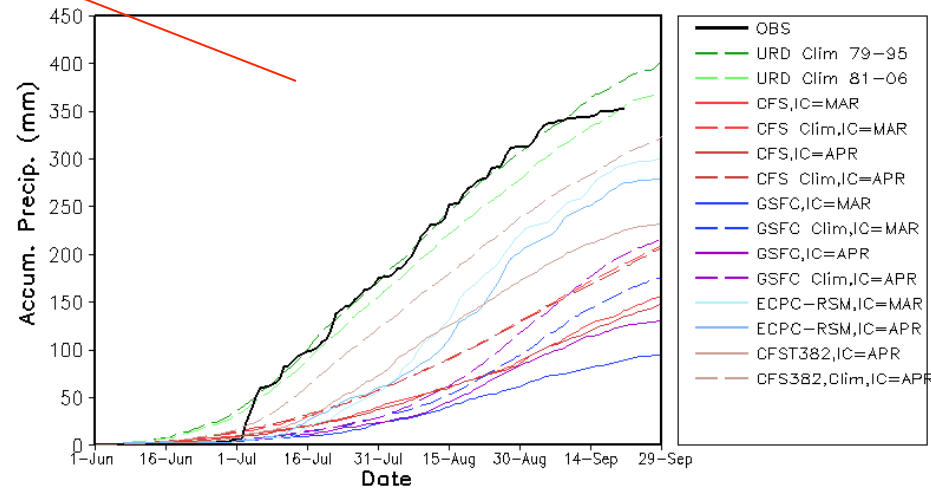
Monsoon Onset: Normal: July 04 (based on rainfall data) in the AZ/NM region (average ~ July 03).

2011 NAME Forecast Forum Zone 2
Accumulated Precipitation

North American Monsoon sub-regional domains

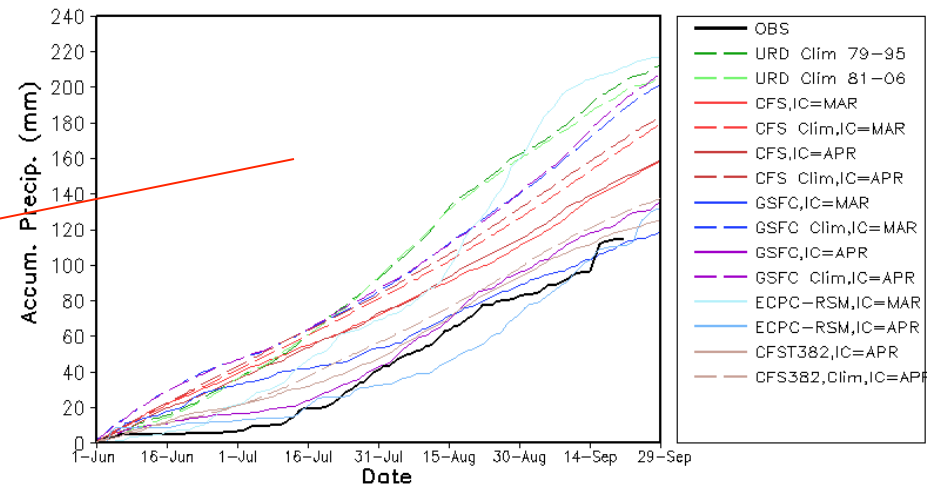
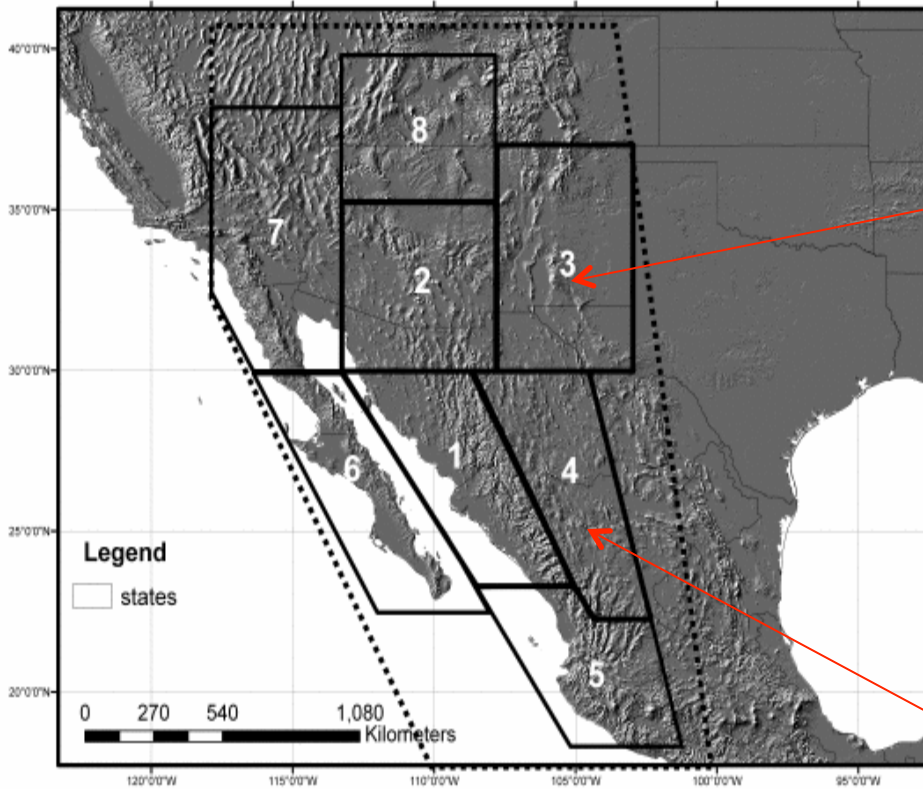


2011 NAME Forecast Forum Zone 1
Accumulated Precipitation

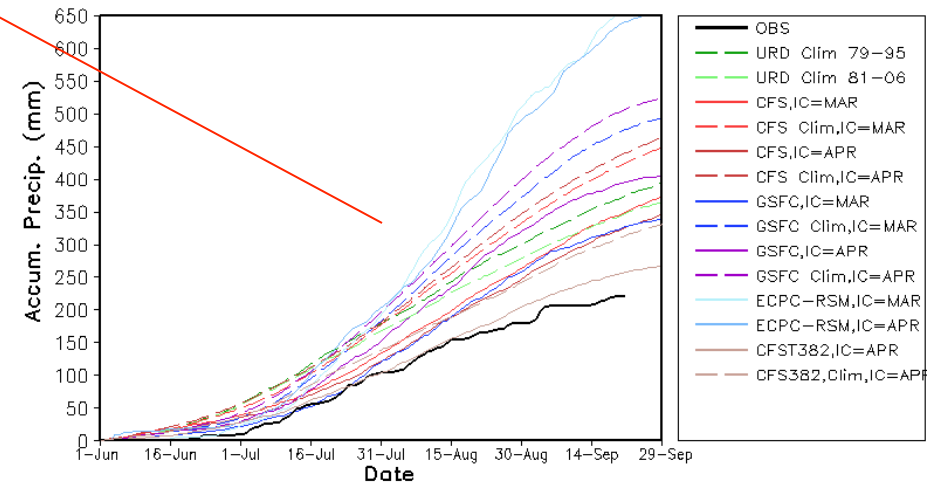


During JJA 2011, southwest US (AZ/NM section) and the core NAM region received overall near-average precipitation; Also 1st three weeks of September brought more rainfall to the region.

North American Monsoon sub-regional domains



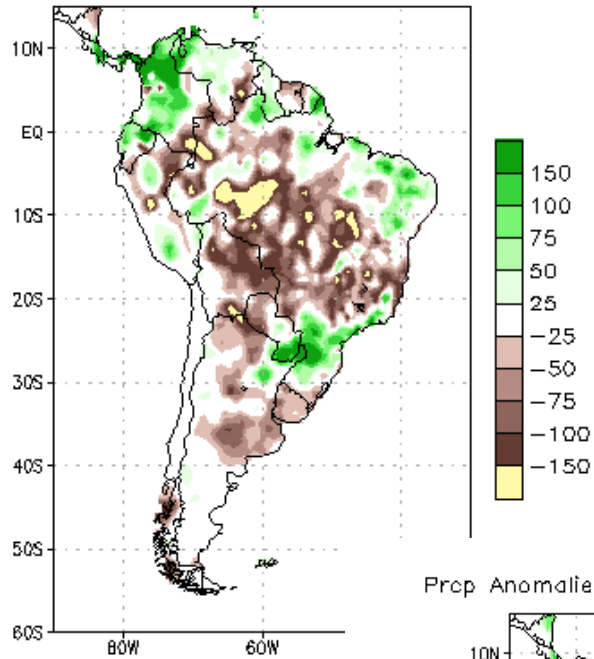
However, the eastern part of the NAM domain has been very dry throughout the season;



South American Monsoon (DJF 2010/2011)

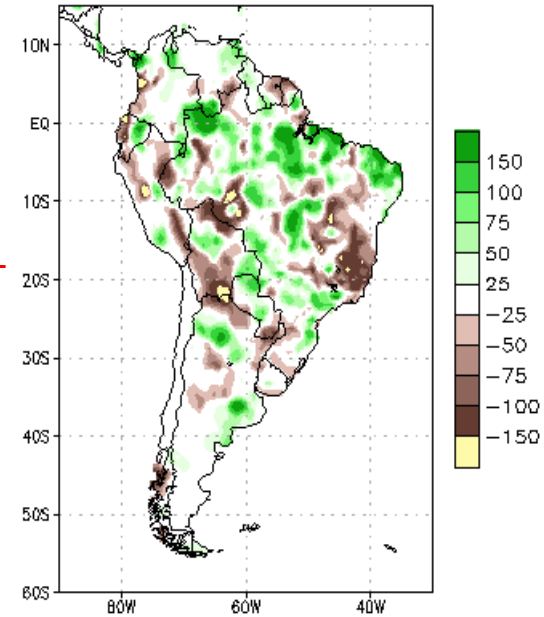
Prpc Anomalies (mm) 27NOV2010–26DEC2010

Dec
2010



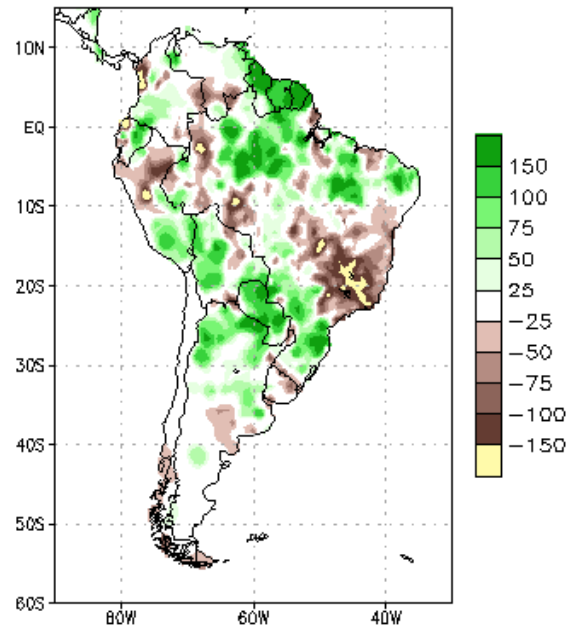
Prpc Anomalies (mm) 01JAN2011–30JAN2011

Jan
2011



Prpc Anomalies (mm) 29.

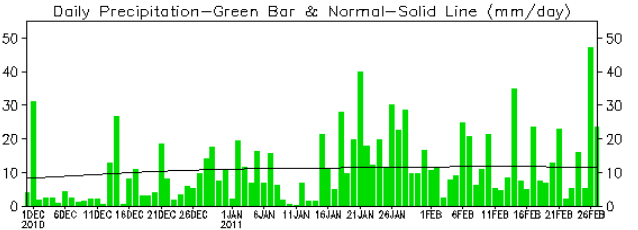
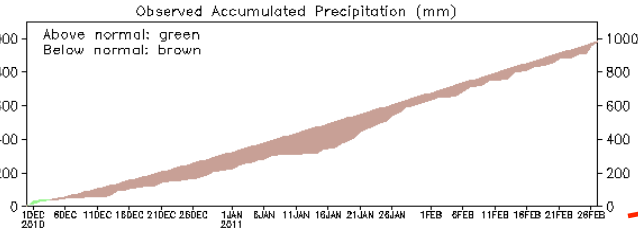
Feb
2011



Recent Evolution: Rainfall

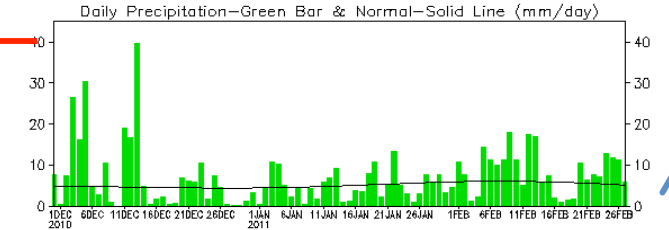
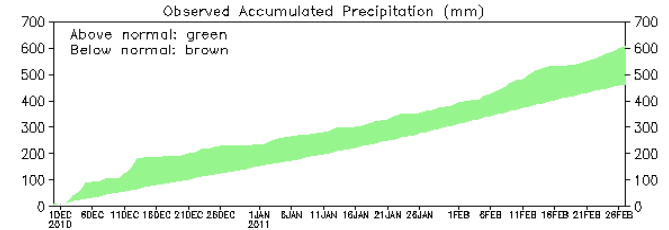
During 90 Days: DJF 2010/2011

(10S–5S, 60W–55W)

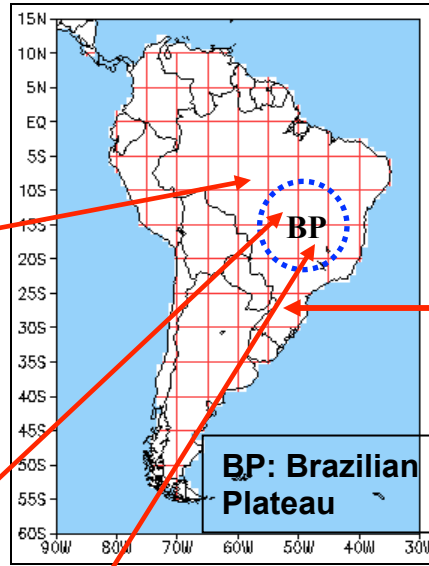


Data Source: CPC (Gauge-Based) Unified Precipitation (Climatology 79–95)
(updated on 00Z27FEB2011)

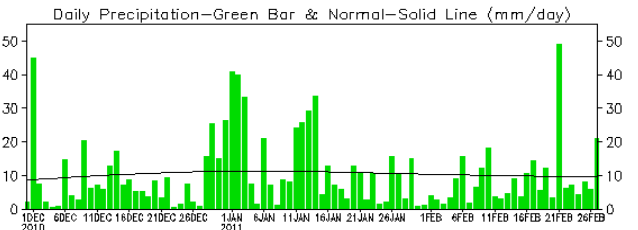
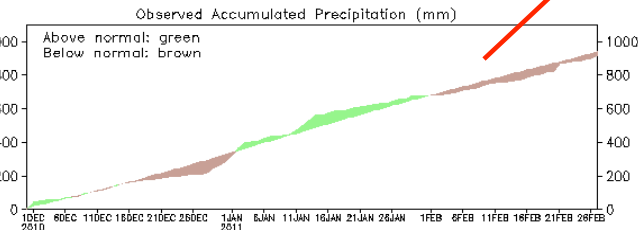
(30S–25S, 55W–50W)



Data Source: CPC (Gauge-Based) Unified Precipitation (Climatology 79–95)
(updated on 00Z27FEB2011)

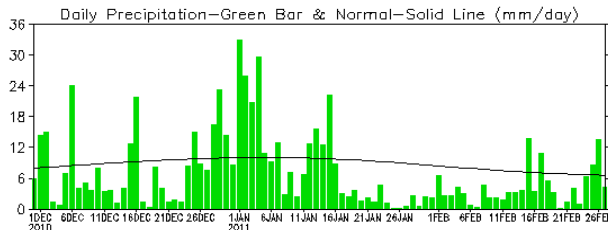
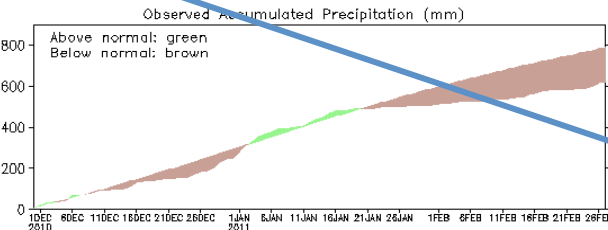


(15S–10S, 55W–50W)



Data Source: CPC (Gauge-Based) Unified Precipitation (Climatology 79–95)
(updated on 00Z27FEB2011)

(20S–15S, 50W–45W)



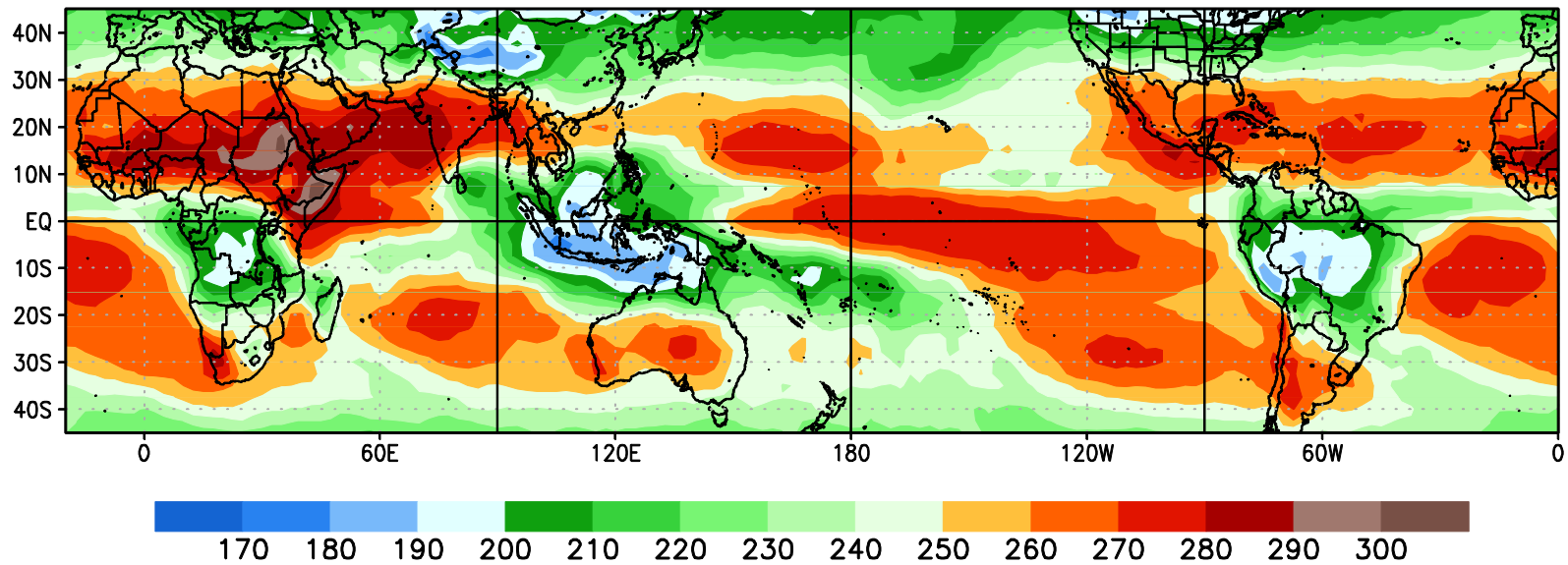
Data Source: CPC (Gauge-Based) Unified Precipitation (Climatology 79–95)
(updated on 00Z27FEB2011)

- During the core monsoon period (Dec 2010 – Feb 2011), 90-day rainfall totals were near or below average over the southern Amazon Basin and the Brazil Plateau but above average in southern Brazil.

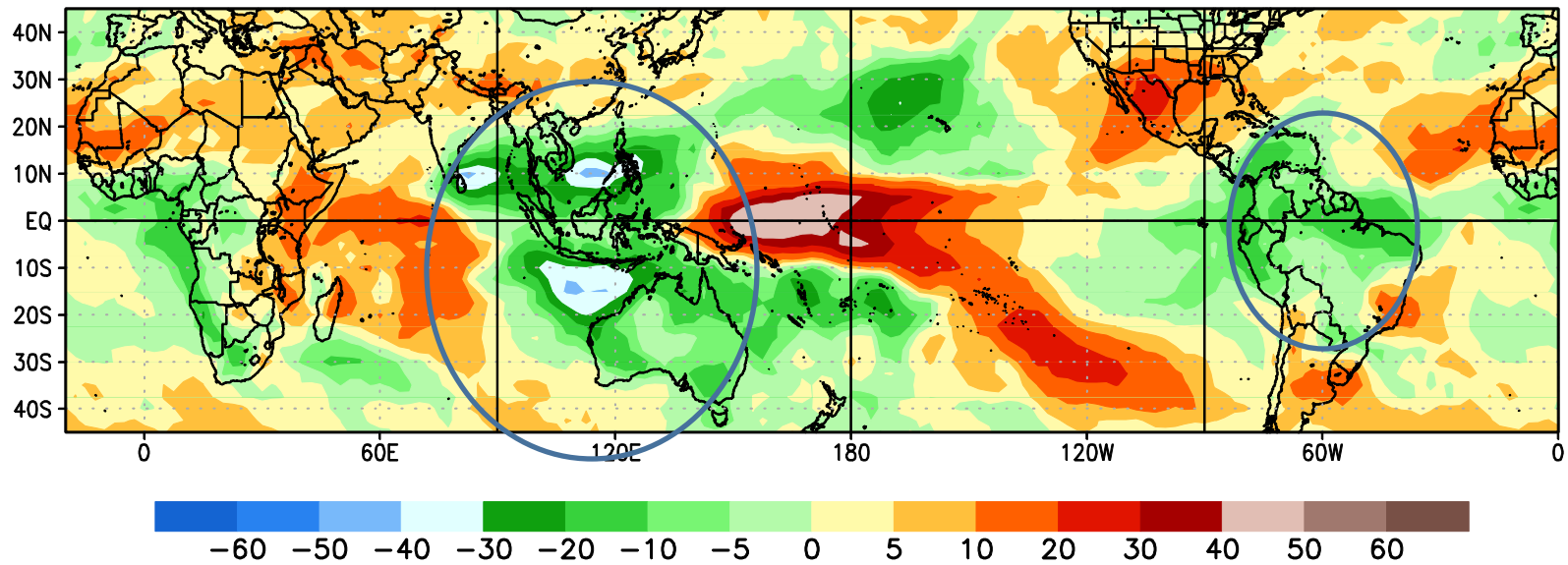
2011 Monsoon Seasons:

- During DJF 2010/2011 season,
 - Australia - above normal (record rainfall, 2nd wettest)
 - Southeast Asia – above normal
 - South America - below normal(? OLR !)
- During JJA 2011 season,
 - Indian subcontinent region - just about normal
 - Southeast Asia, and southern/
southeastern China - below normal,
 - Sahel/Equatorial Africa – above/near normal
 - except for Gulf of Guinea Region where it is below
 - North American monsoon region – near normal.

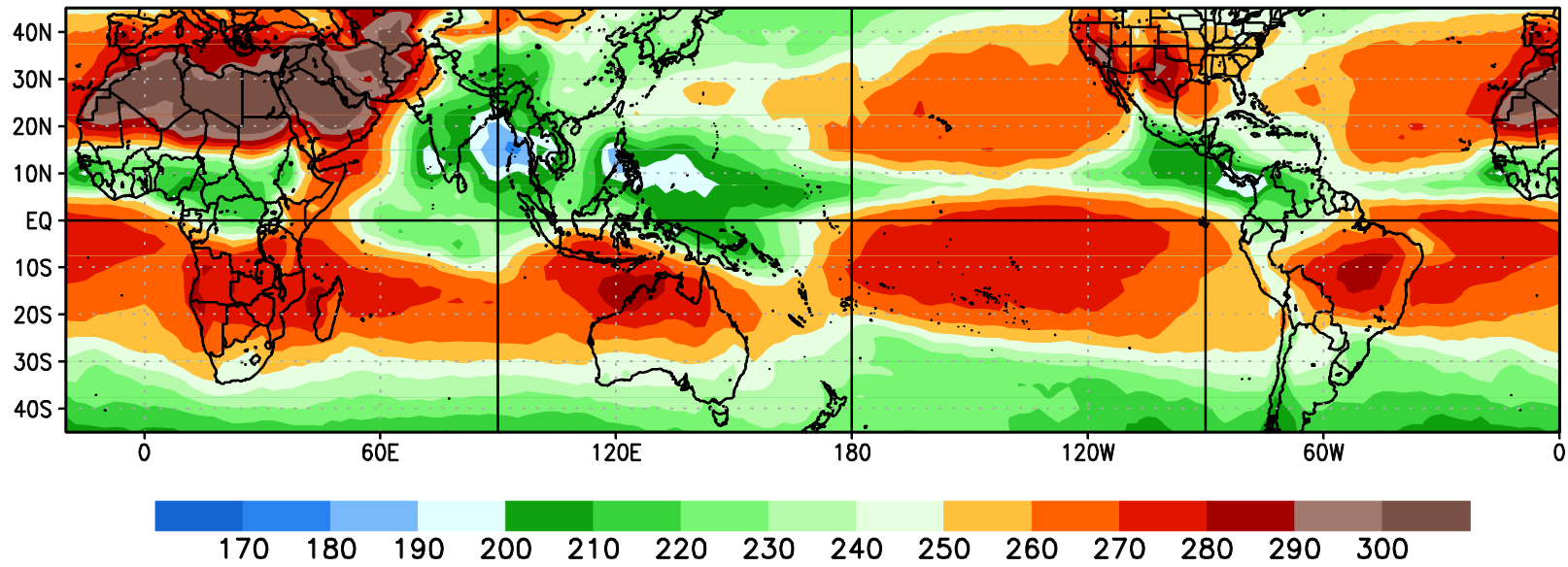
DJF 2010/2011: NOAA/NESDIS OLR



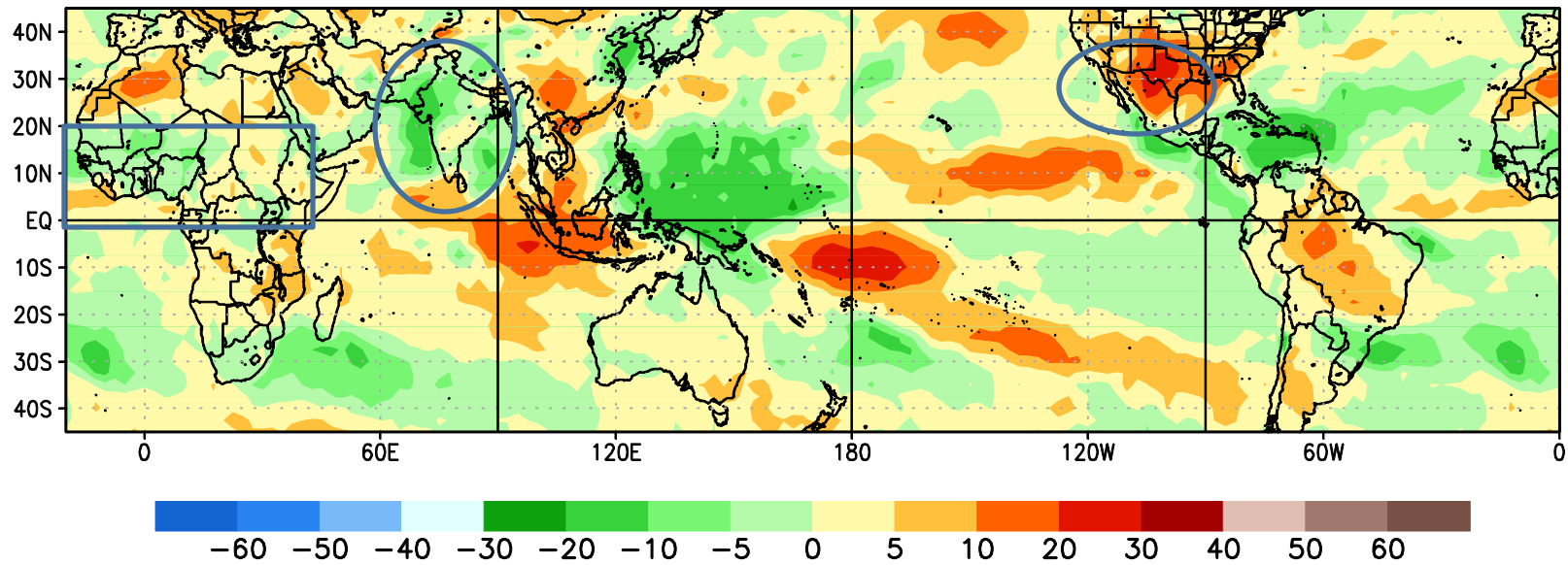
DJF 2010/2011: NOAA/NESDIS OLR ANOM



JJA 2011: NOAA/NESDIS OLR



JJA 2011: NOAA/NESDIS OLR ANOM

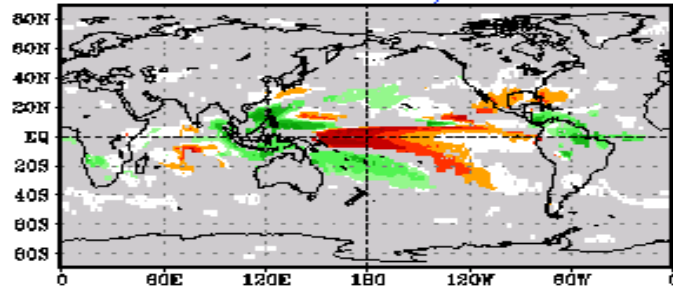




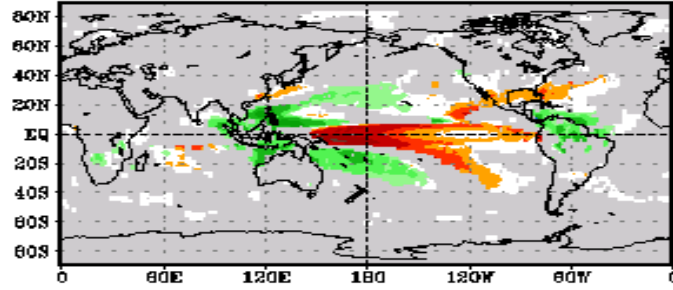
NWS/NCEP

CFS seasonal Prec f

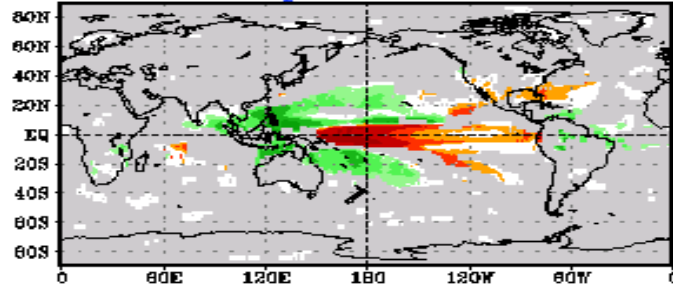
Dec-Jan-Feb 2010/2011



Jan-Feb-Mar 2011



Feb-Mar-Apr 2011



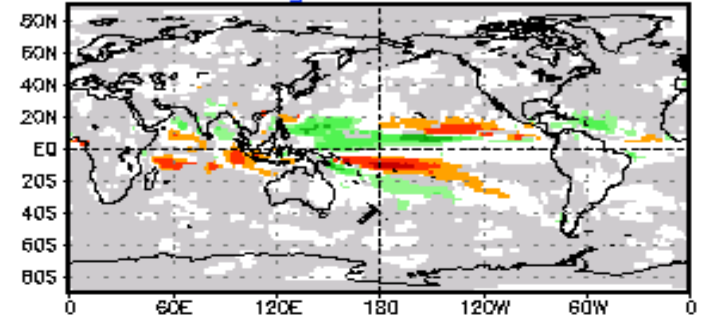
Forecast skill in grey areas is less than 0.8



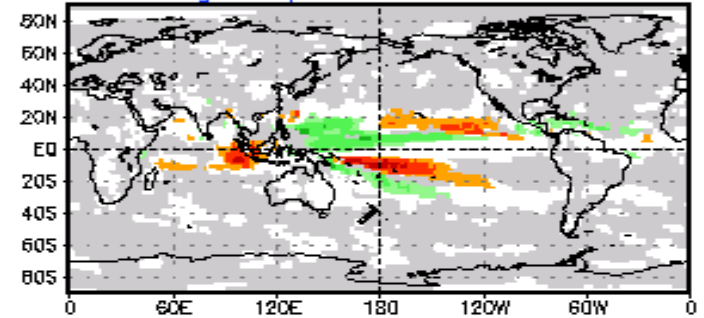
NWS/NCEP/CPC

CFS seasonal

Jun-Jul-Aug 2011



Jul-Aug-Sep 2011



Aug-Sep-Oct 2011

