



Joint meeting



ENSO Recent Evolution and Outlook

Dr. Leng SUN

Beijing Climate Center, CMA
8-9 November 2016, Ulaanbaatar, Mongolia



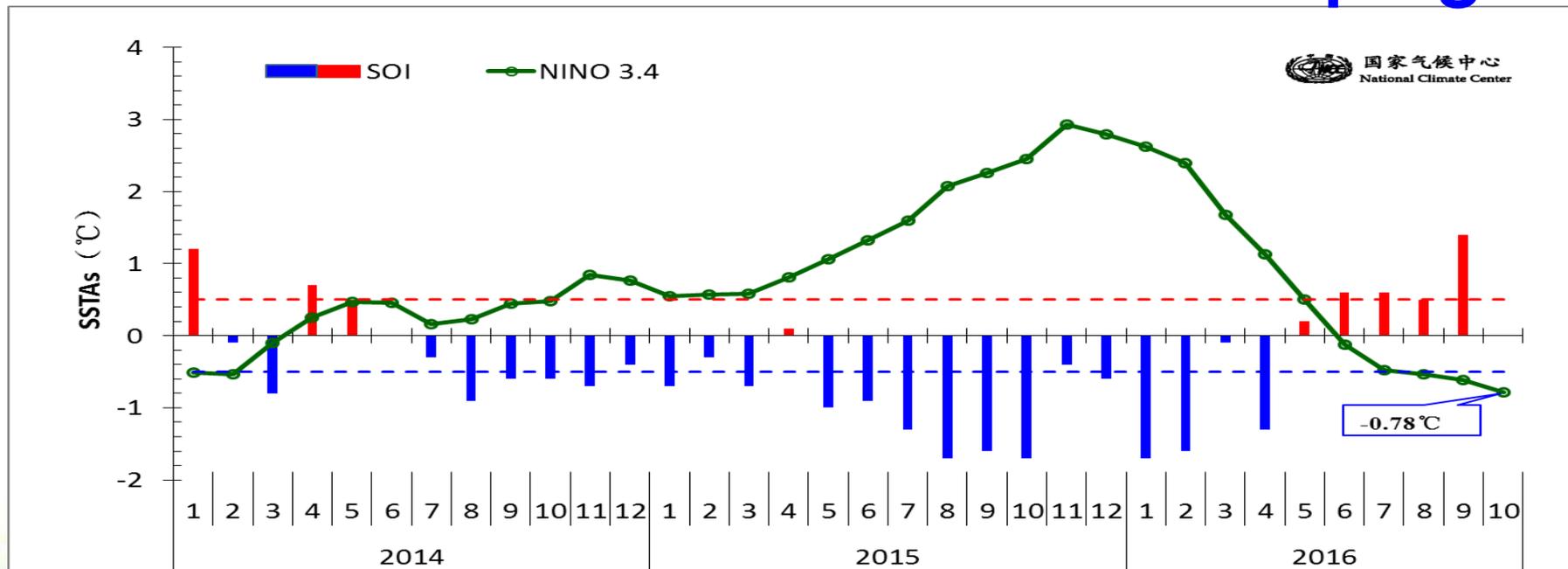


Outlines

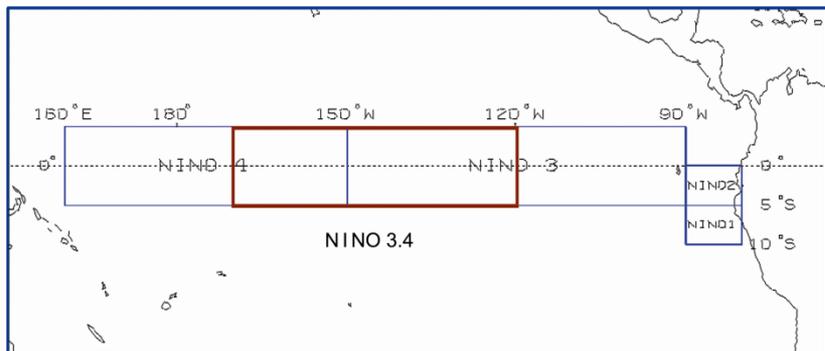
- 1. The current ENSO status and other related external forcing monitoring**
- 2. Diagnostic analysis**
- 3. Model predictions**
- 4. Summary**



A Weak La Niña Event is Developing



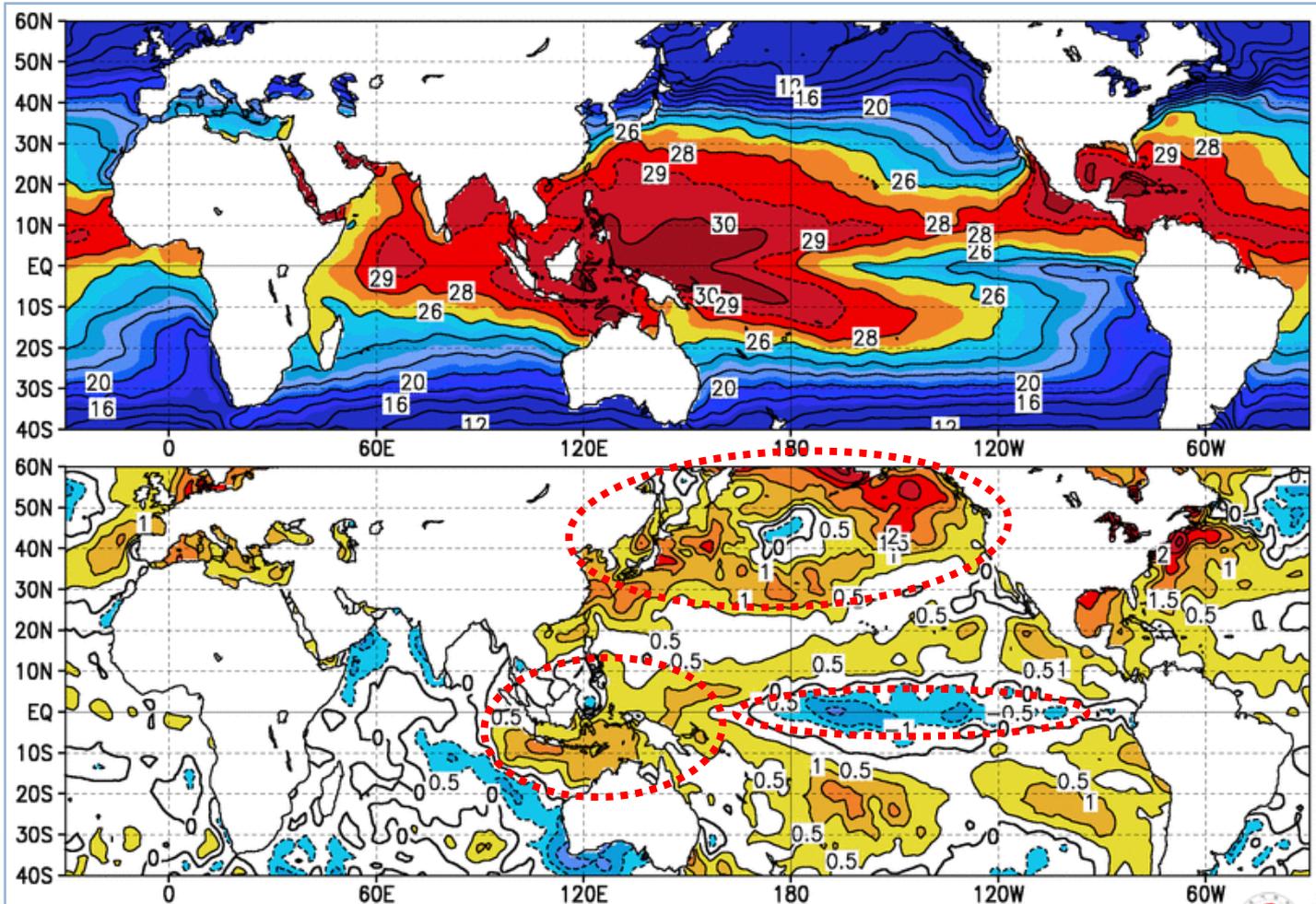
Monthly indices of Niño 3.4 (unit: °C) and SOI evolution from Jan. 2014 to Oct. 2016



El Niño (La Niña) event: which is characterized by a positive(negative) sea-surface temperature departure from normal in NINO 3.4 greater (less) than or equal to 0.5°C (-0.5°C) for at least 6 consecutive months (allowing below (above) 0.5°C (-0.5°C) for only one month) .



Monthly Mean SSTs & Anomalies, Oct 2016

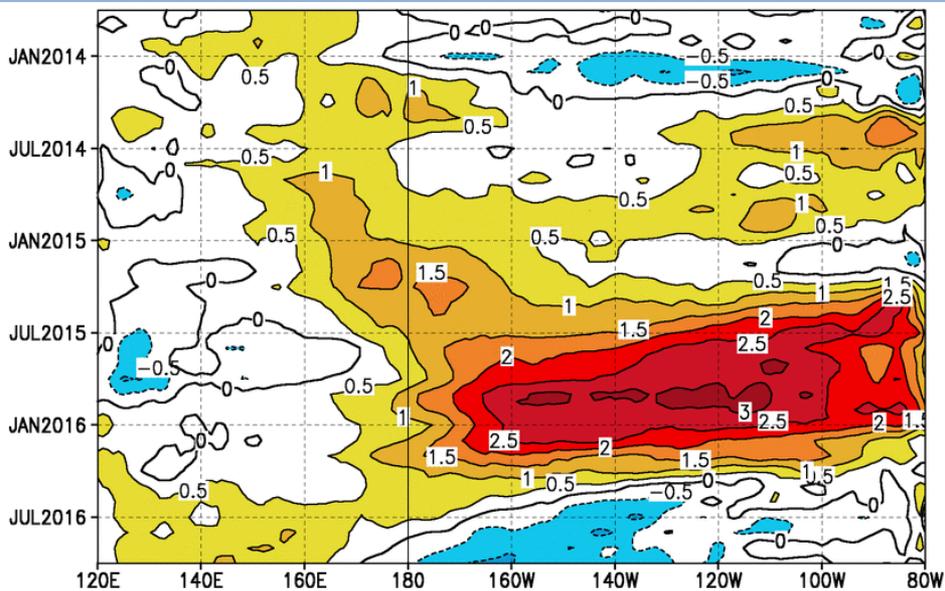


月平均海表温度(上)及距平(下) (°C) 2016.10
Monthly Mean Sea Surface Temperatures (top) and Anomalies (bottom)

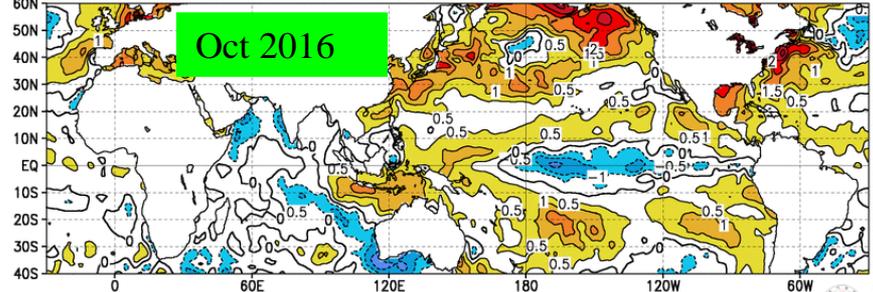
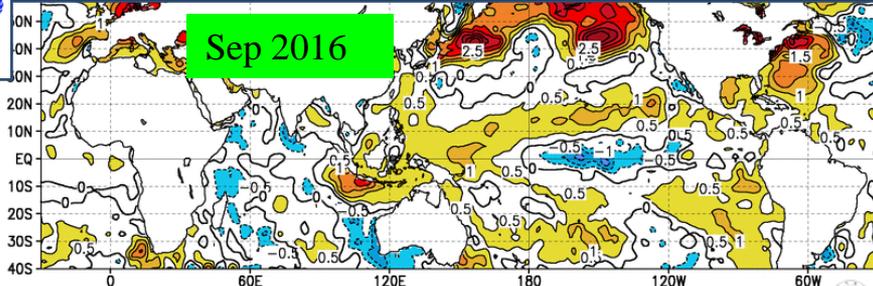
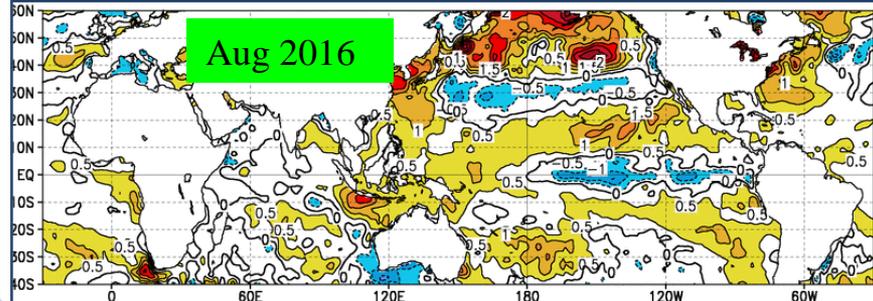
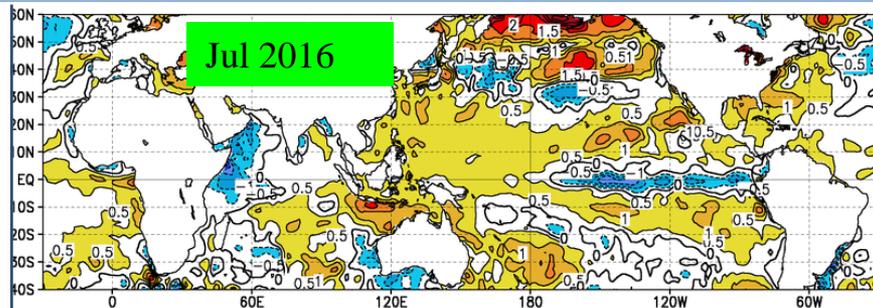




SSTAs Evolution

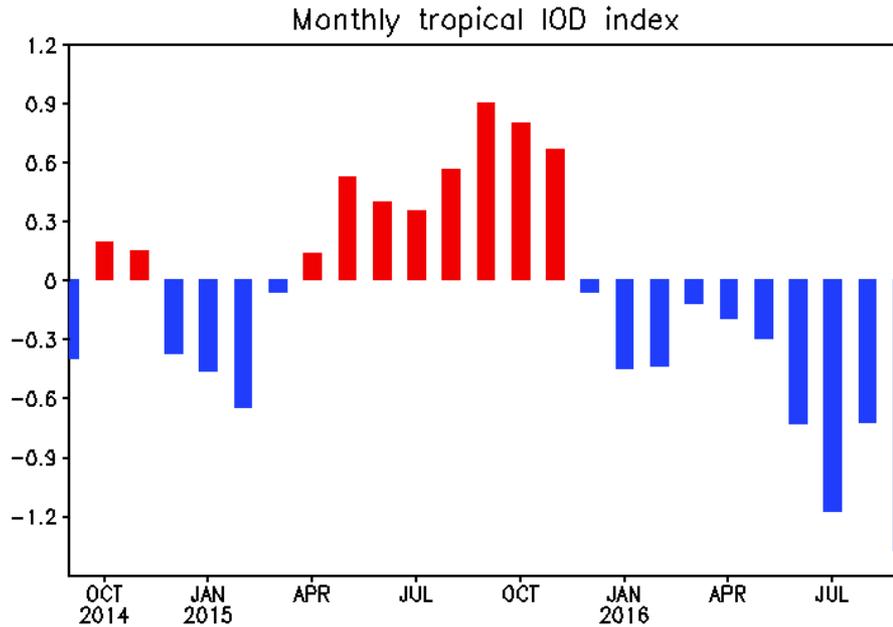


赤道太平洋海表温度(上)及距平(下)时间-经度剖面(°C)
Time-longitude Section of Monthly Mean Equatorial SSTs (top)
and Anomalies (bottom)



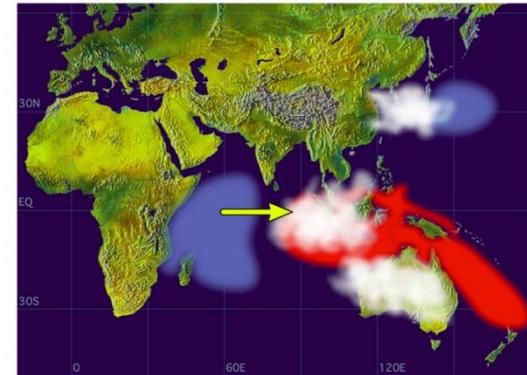


Indian Ocean Dipole (IOD)



Climate Monitoring Division/NCC/CMA

Negative Dipole Mode

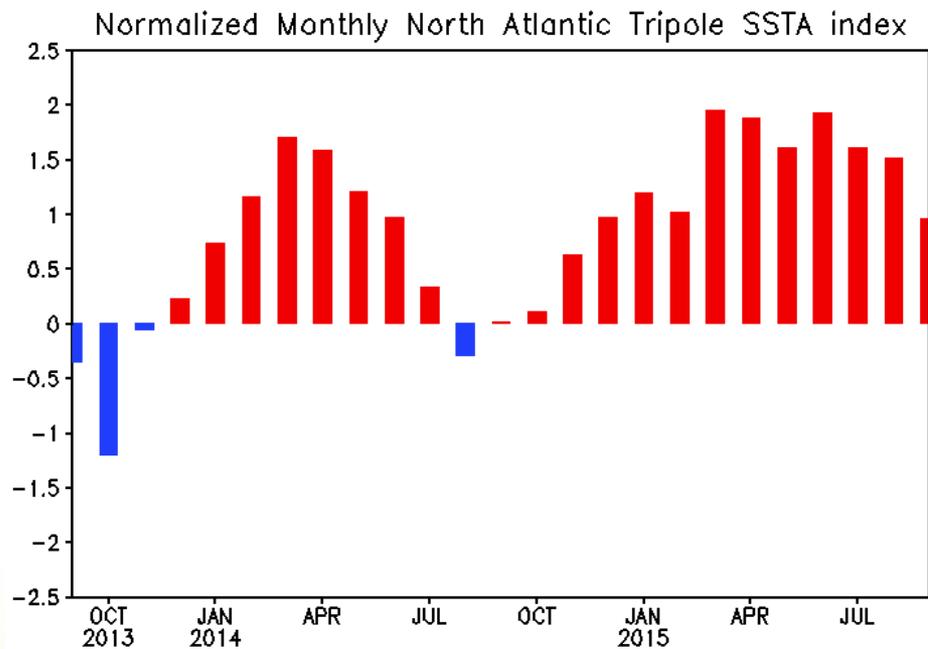


(from JAMSTEC)



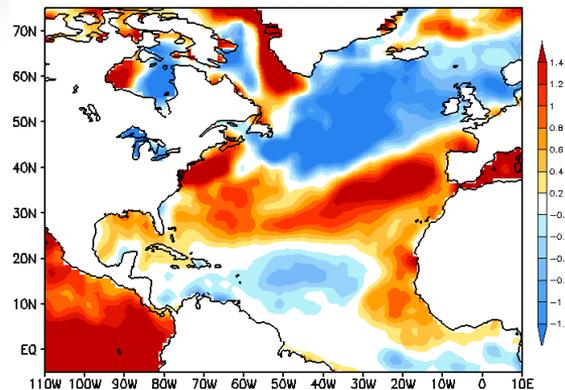


North Atlantic Tripole(NAT)



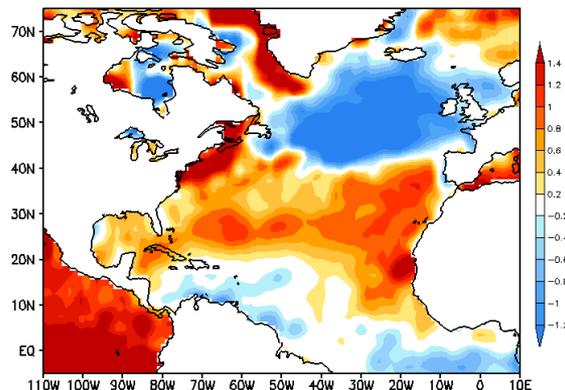
Climate Monitoring Division/NCC/CMA

SSTA over North Atlantic Ocean 2015-07



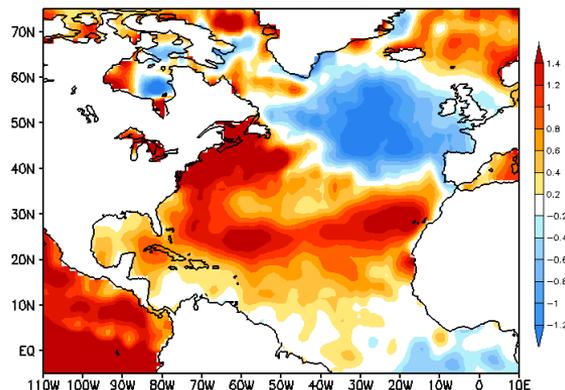
Climate Monitoring Division/NCC/CMA

SSTA over North Atlantic Ocean 2015-08



Climate Monitoring Division/NCC/CMA

SSTA over North Atlantic Ocean 2015-09



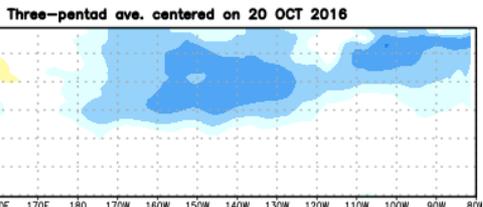
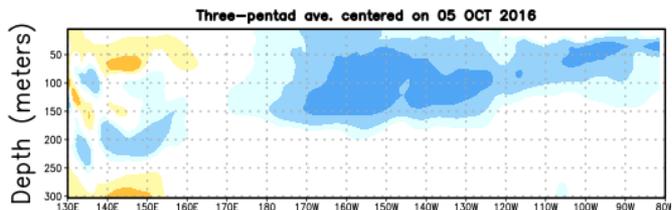
Climate Monitoring Division/NCC/CMA





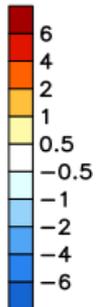
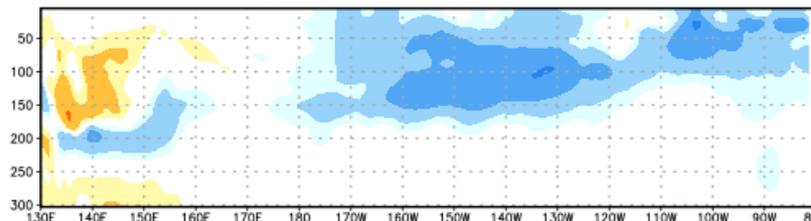
Equatorial Pacific Depth-Longitude Section of Monthly Mean Ocean Temperature Anomalies Evolution

Oct



EQ. Subsurface Temperature Anomalies (deg C)

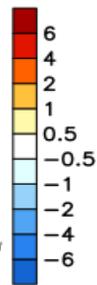
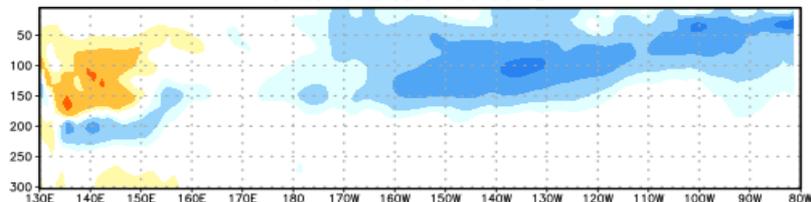
Pentad centered on 25 OCT 2016



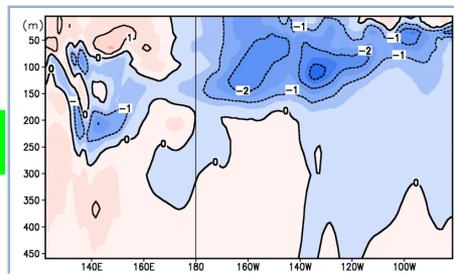
(from CPC)

EQ. Subsurface Temperature Anomalies (deg C)

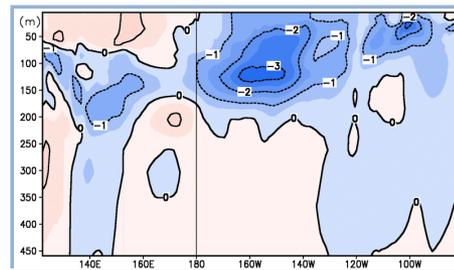
Pentad centered on 30 OCT 2016



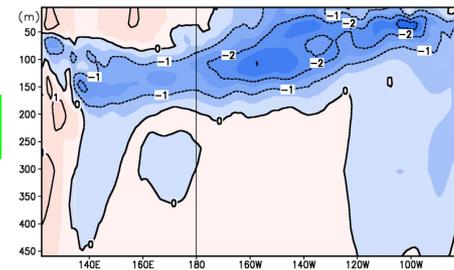
Sep



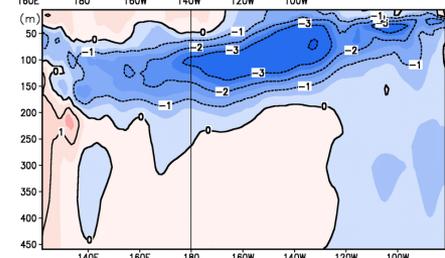
Aug



Jul



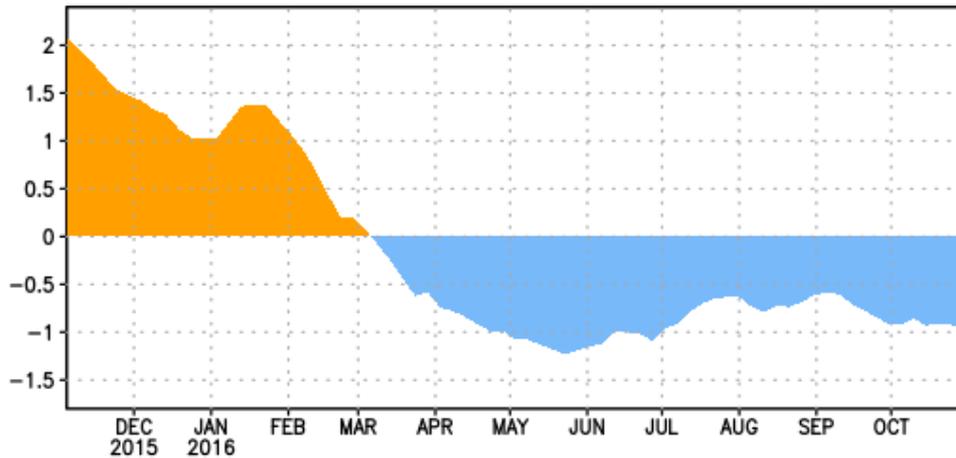
Jun





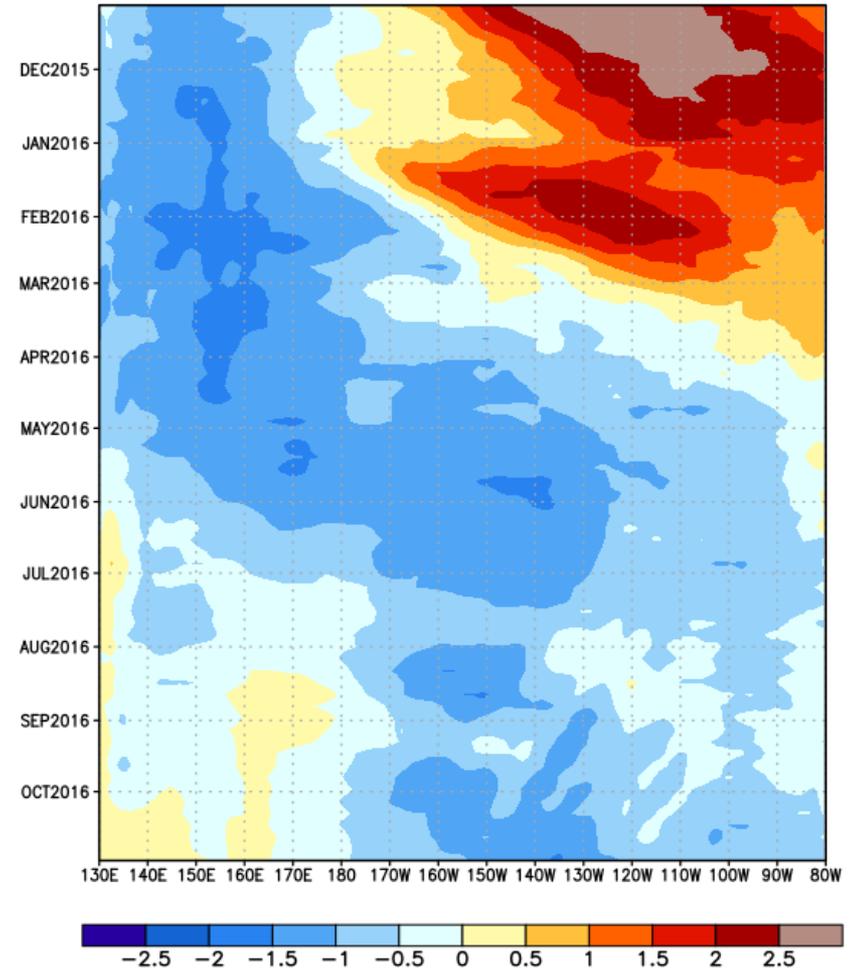
Central and Eastern Equatorial Pacific Upper-Ocean (0-300 m) Weekly Heat Content Evolution

EQ. Upper-Ocean Heat Anoms. (deg C) for 180-100W



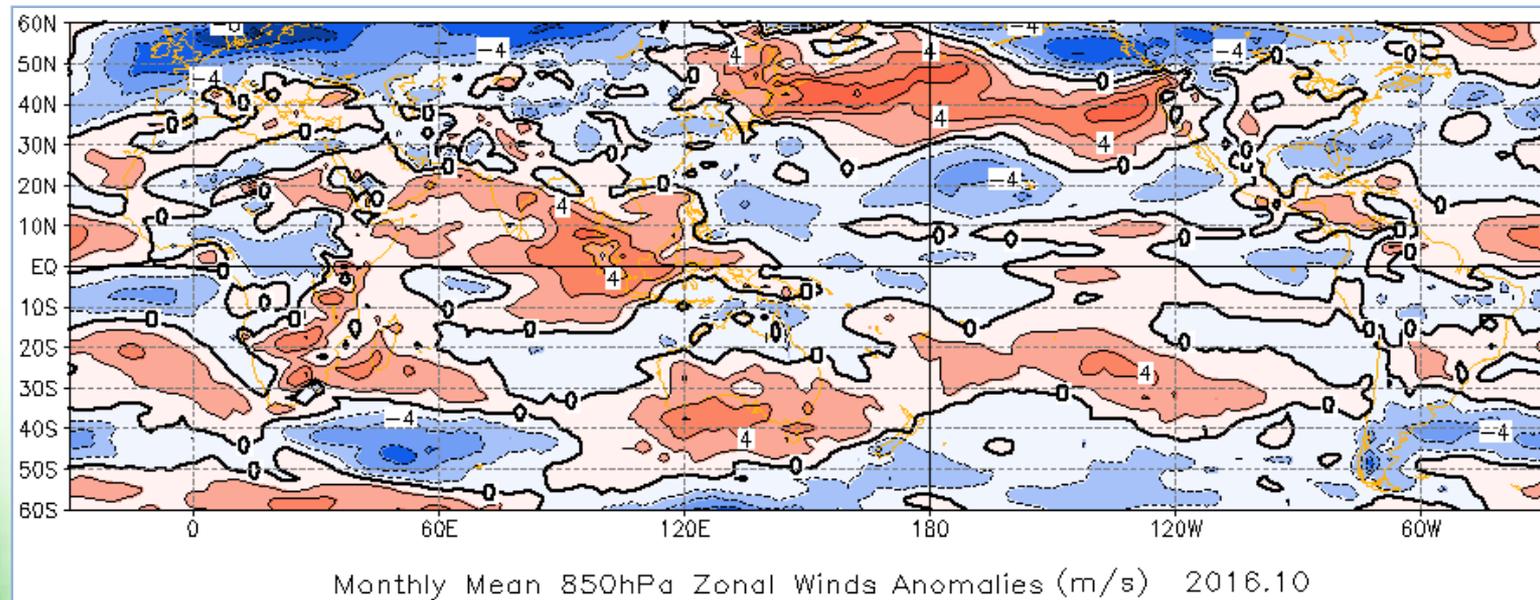
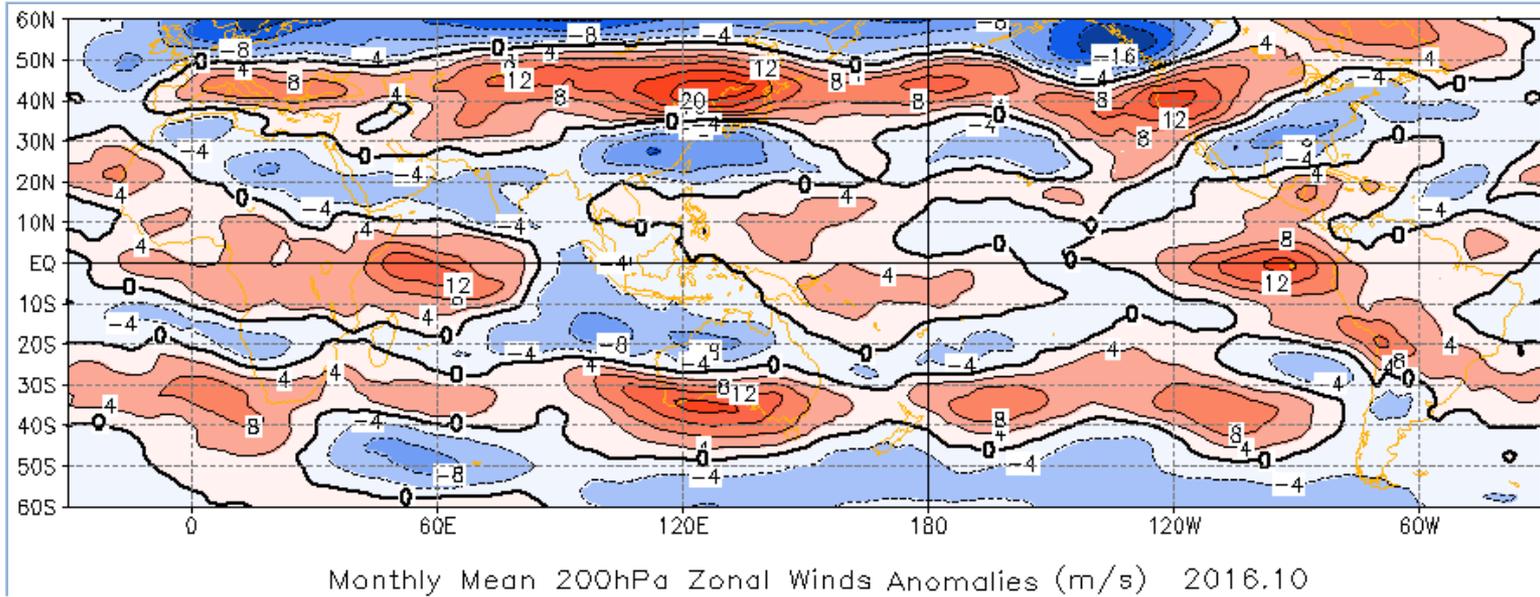
(from CPC)

EQ. Upper-Ocean Heat Anoms. (deg C)



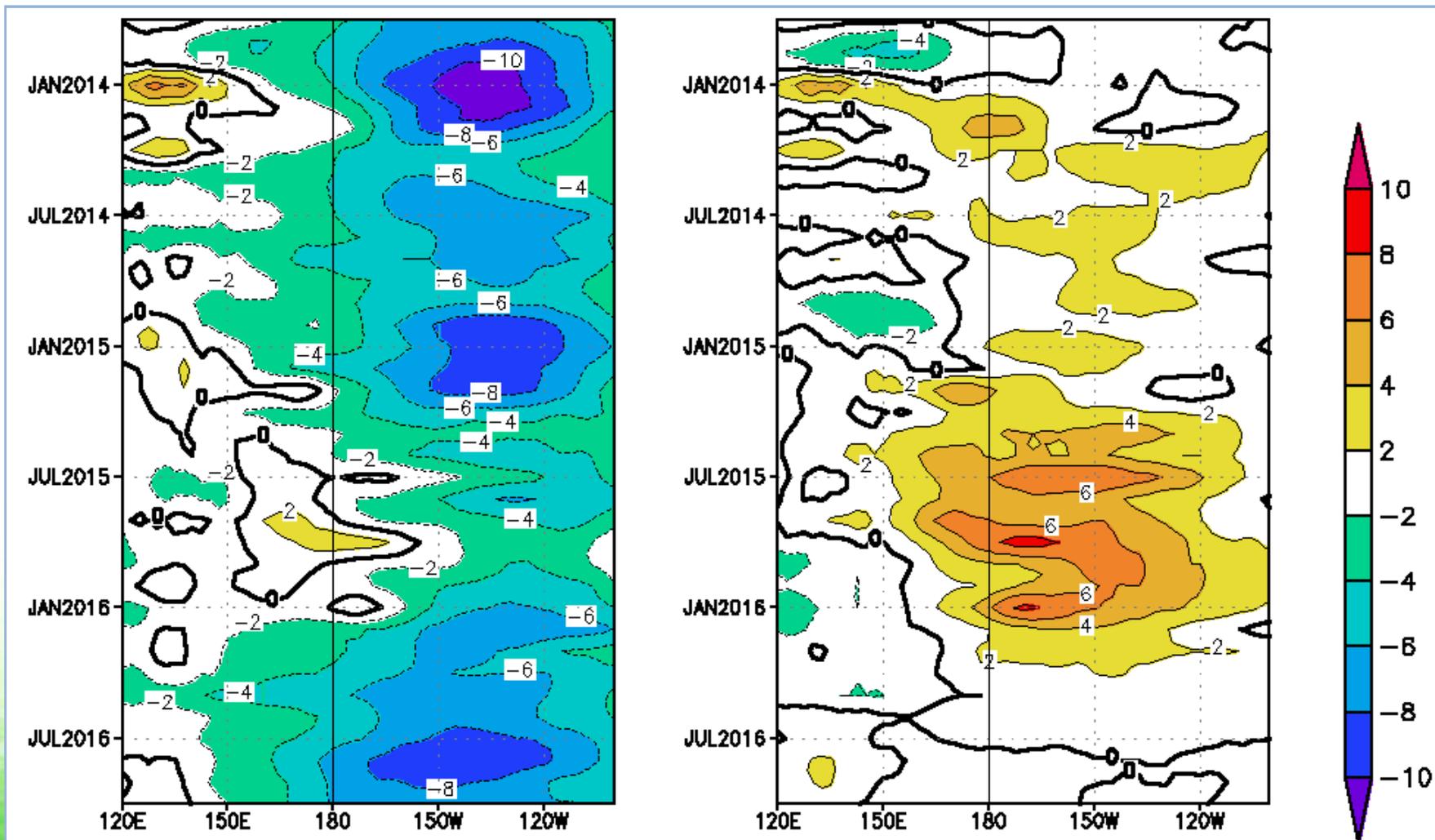


Zonal Wind Anomalies





850hPa Zonal Wind Evolution

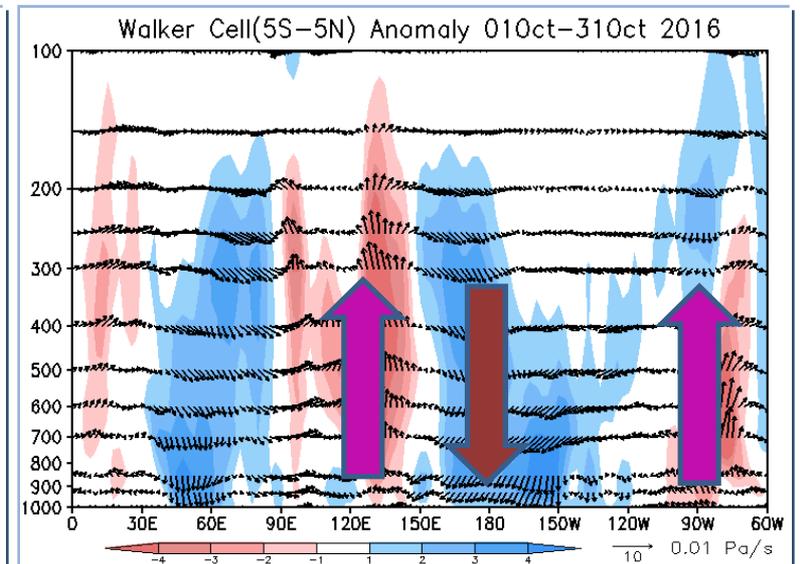
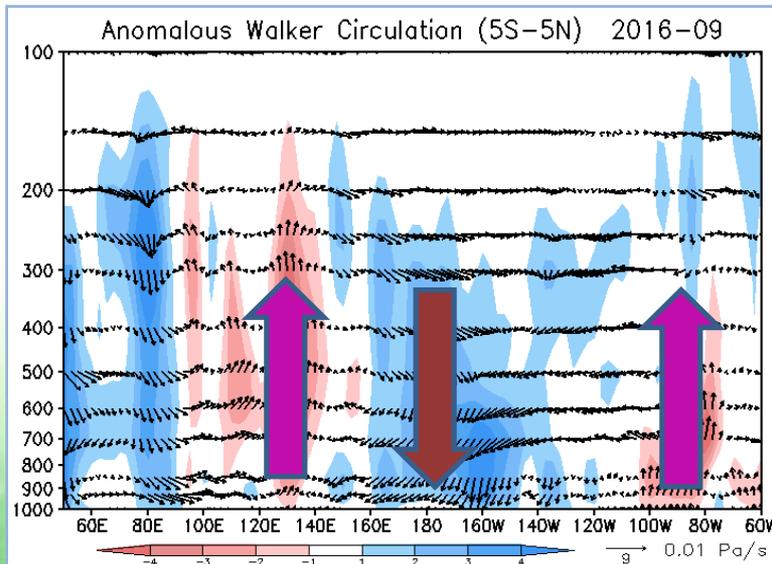
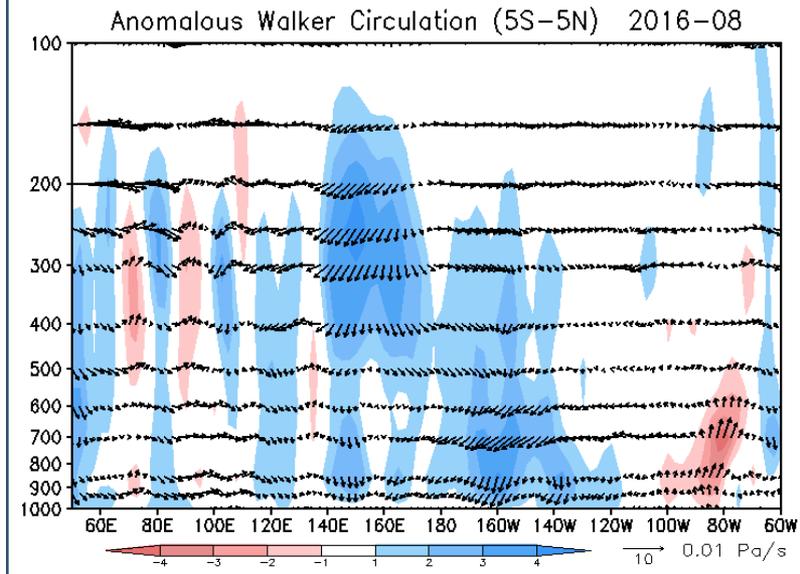
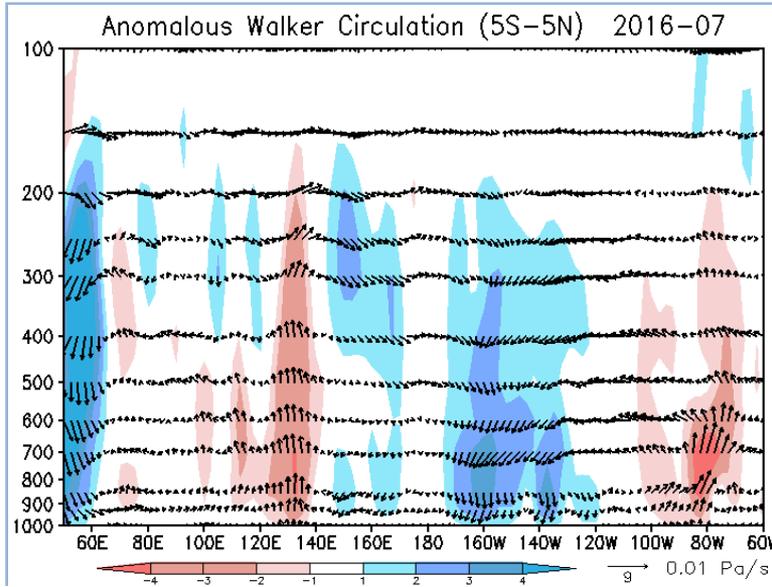


赤道太平洋 850hPa 纬向风(左)及距平(右) 时间-经度剖面 (m/s)

Time-longitude Section of 850hPa Equatorial Zonal Winds (left) and Anomalies (right)

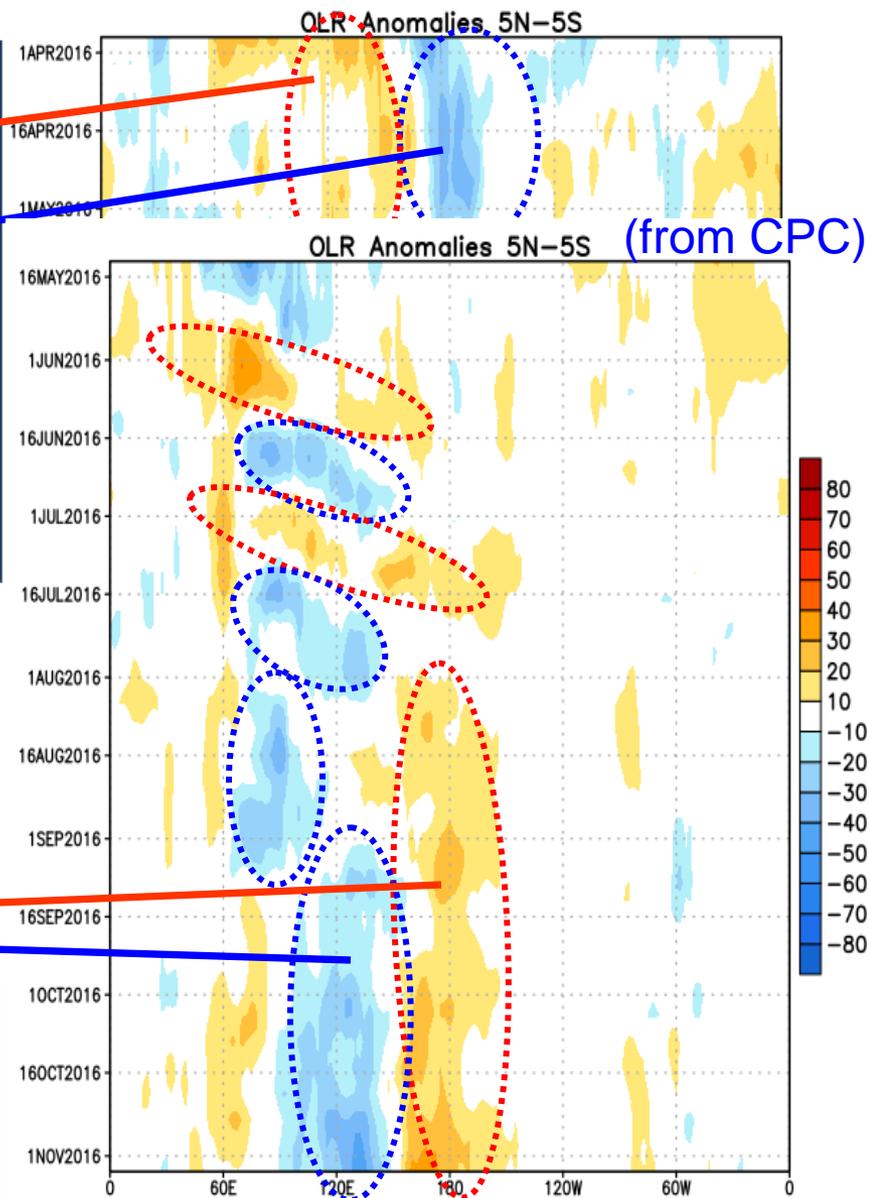
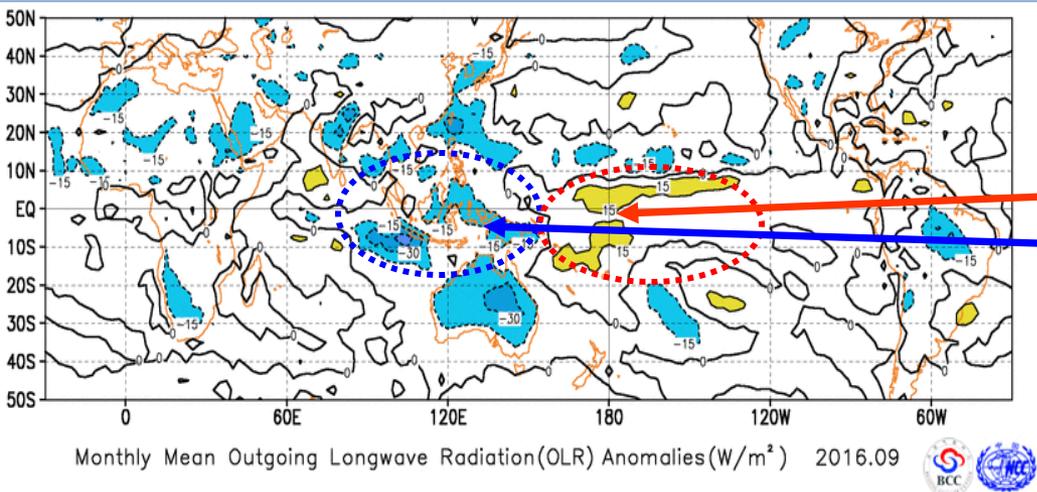
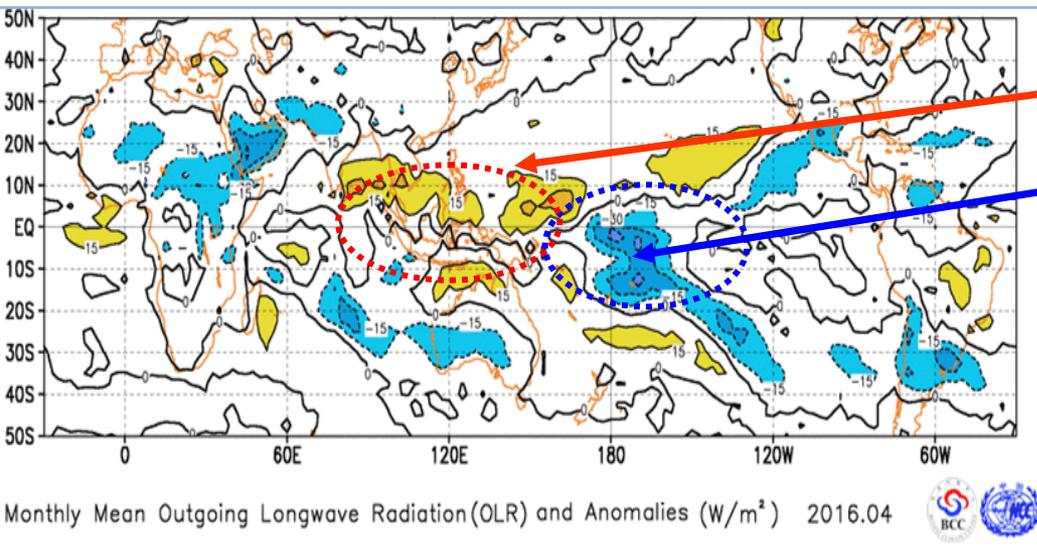


Walker circulation



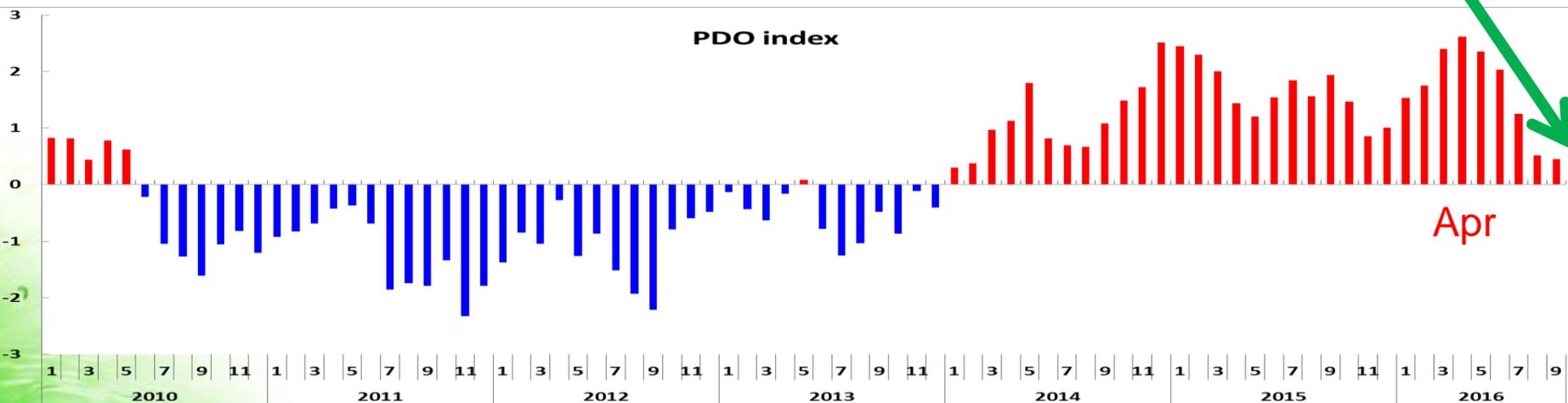
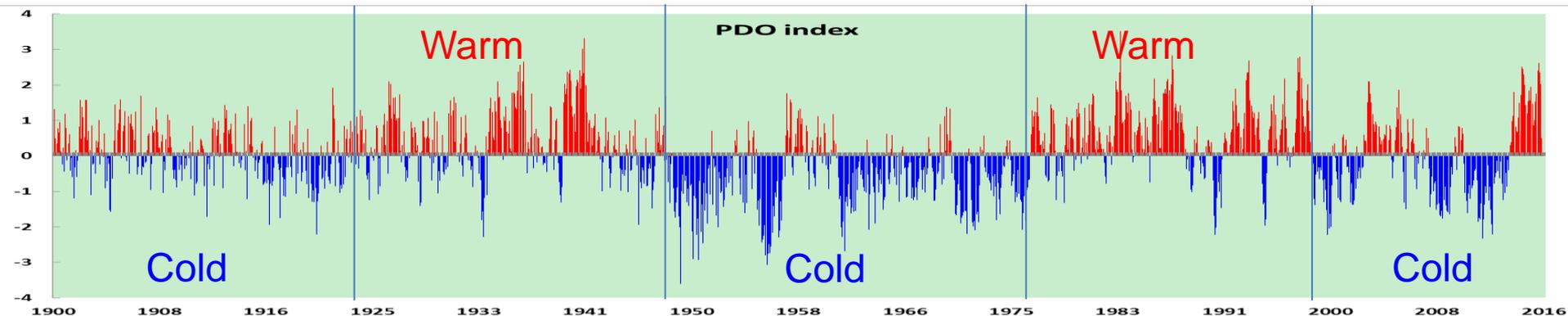


Outgoing Longwave Radiation (OLR) Anomalies





Pacific Decadal Oscillation Index Evolution

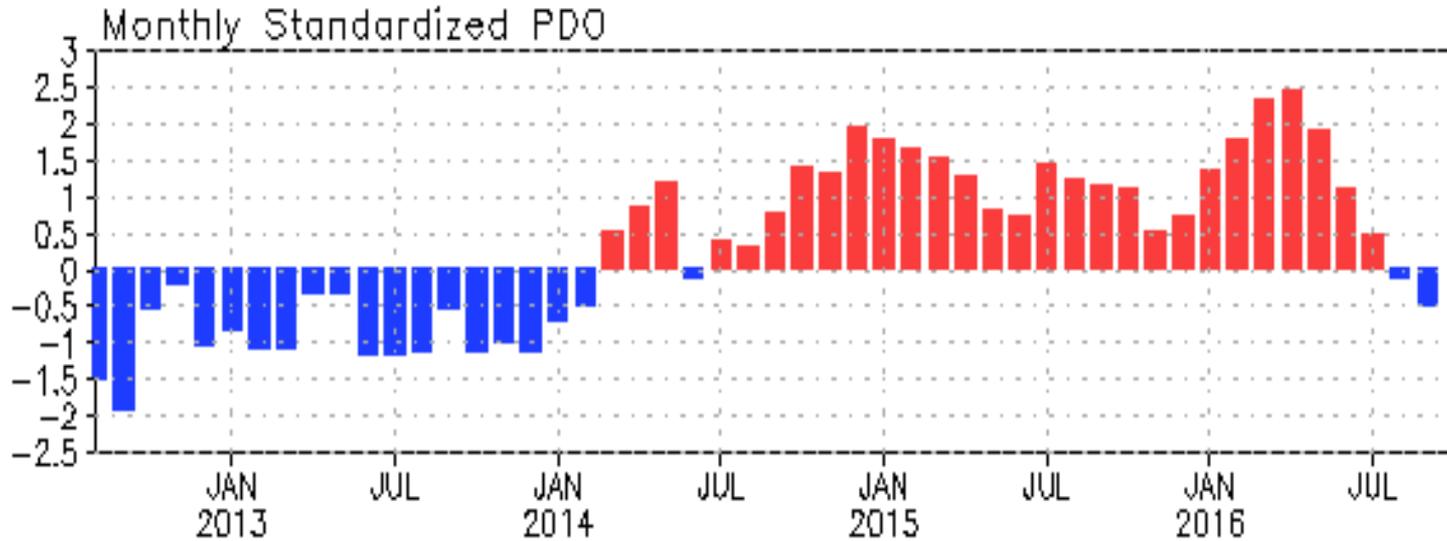


(data from JISAO)
Derived from
OI.v2 SST fields

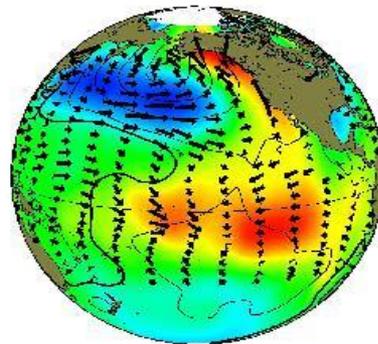




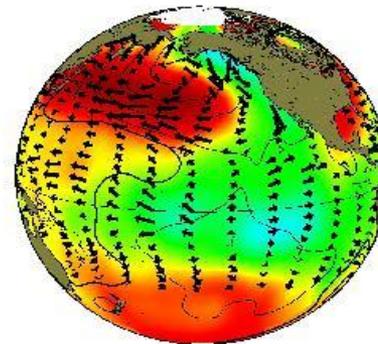
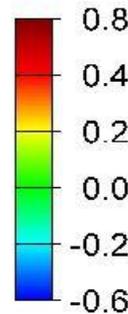
Pacific Decadal Oscillation Index Evolution



(from CPC)
Derived from
monthly ERSST
v3b fields



warm phase



cool phase

It differs slightly
from that of
OI.v2 SST,
JISAO





Outlines

1. The current ENSO status and other related external forcing monitoring
2. Diagnostic analysis
3. Model predictions
4. Summary



Seasonal Features of La Niña events (1951-2016)

| | | MAM | JJA | SON | DJF |
|------------------|-------|------------|------------|------------|-------------|
| NINO 3.4 (14) | Onset | 3 0/1/2 | 7 2/3/2 | 3 1/2/0 | 1 0/1/0 |
| | End | 7 2/2/3 | 3 3/0/0 | 0 | 4 0/2/2 |
| | Peak | 0 | 0 | 3 0/1/2 | 11 6/5/0 |



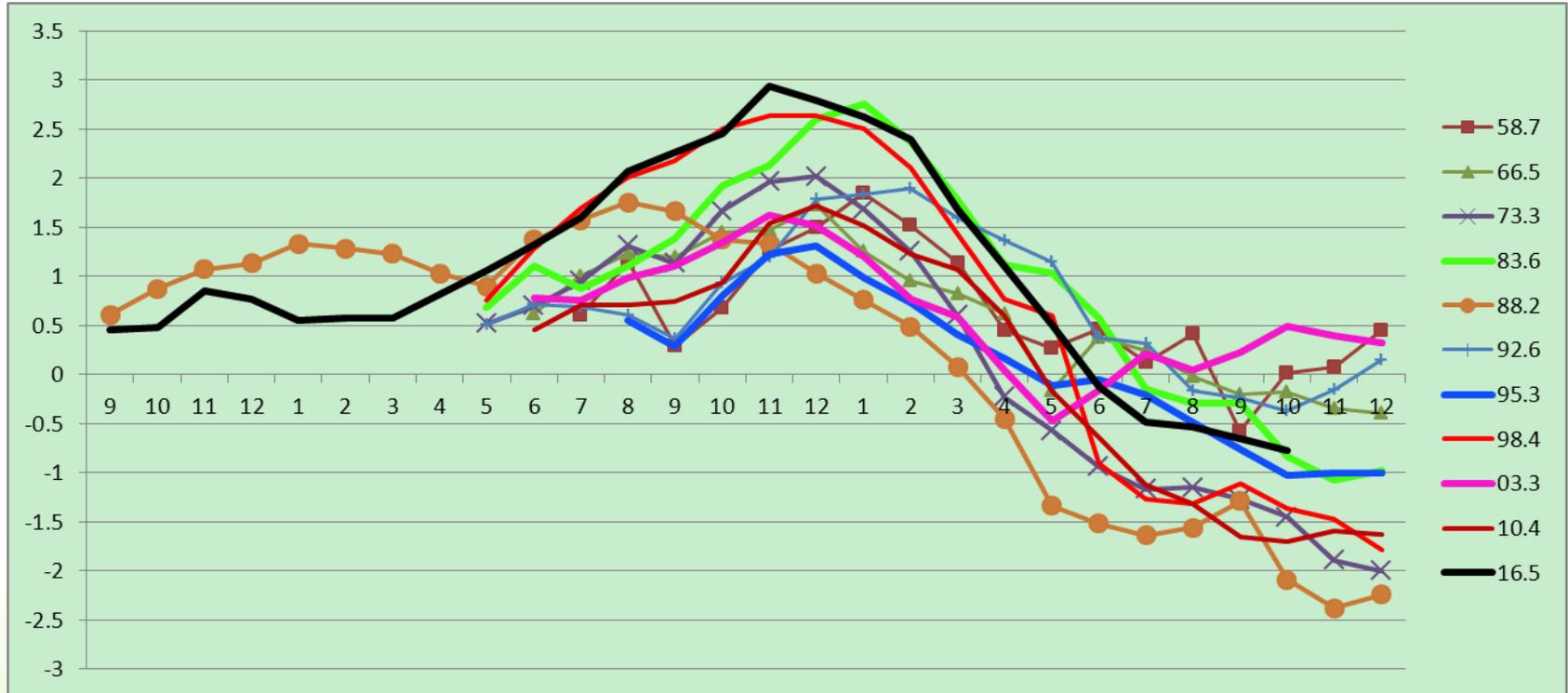
50% La Niña development in the same year following the moderate to strong El Niño

| El Niño | La Niña or not |
|-----------|----------------|
| 57.7-58.7 | no |
| 65.6-66.5 | no |
| 72.5-73.3 | |
| 82.5-83.6 | no |
| 86.9-88.2 | |
| 91.5-92.6 | no |
| 94.8-95.3 | |
| 97.5-98.4 | |
| 02.6-03.3 | no |
| 09.6-10.4 | |





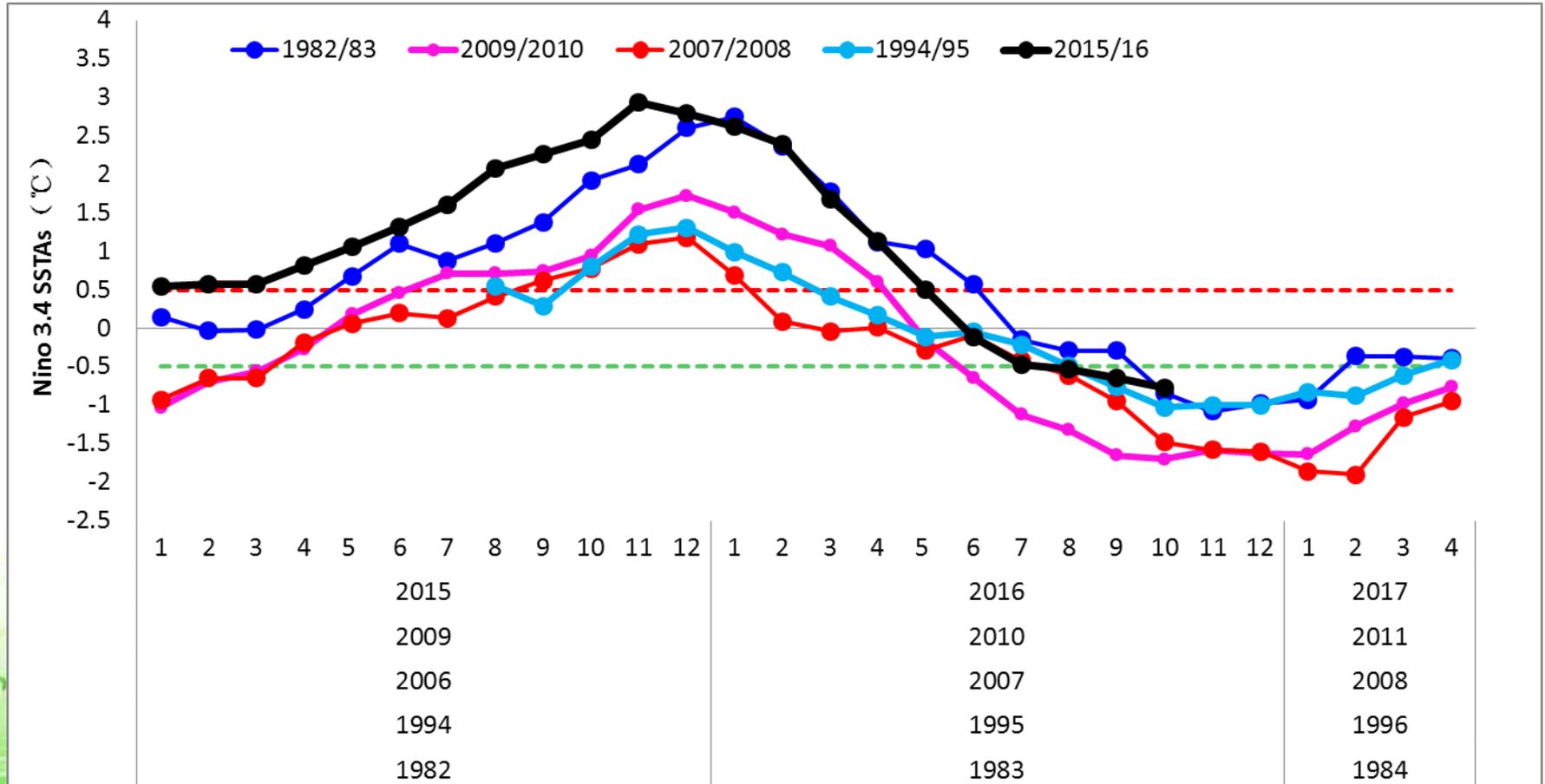
Nino 3.4 SST Anomalies(°C)



- La Niña developed in the same year after the strong or very strong El Nino events, except for 82/83 event.



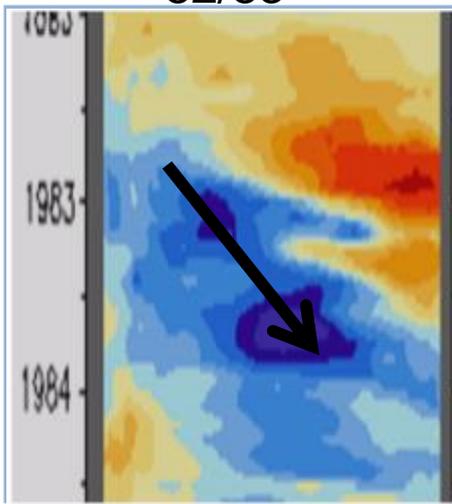
Nino 3.4 SST Anomalies(°C)



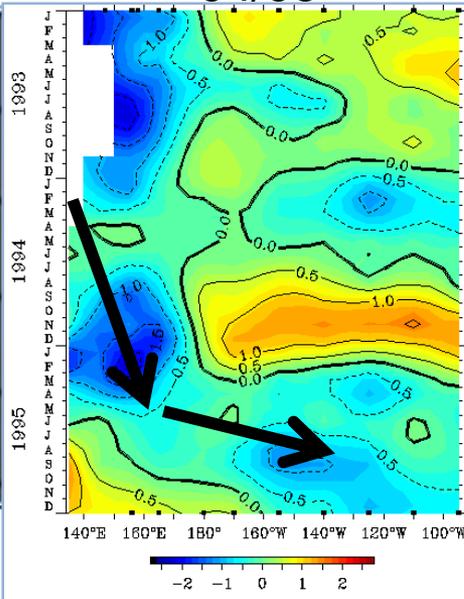


Sub-Surface Temperature Departures(°C) Evolution

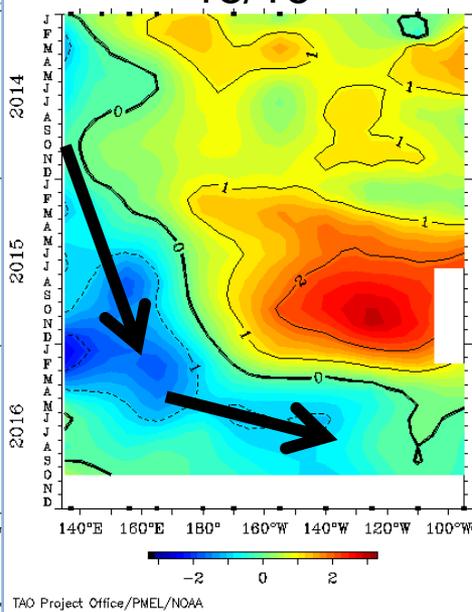
82/83



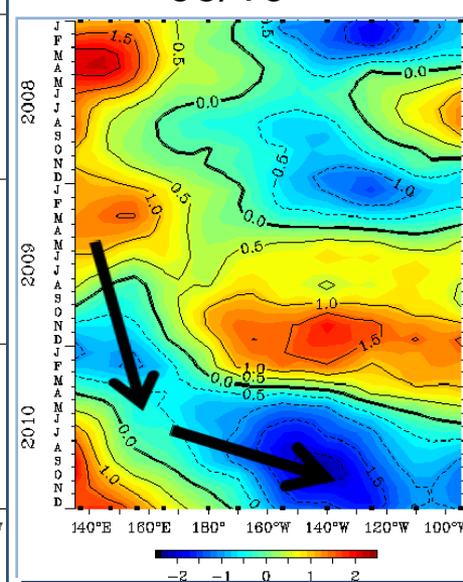
94/95



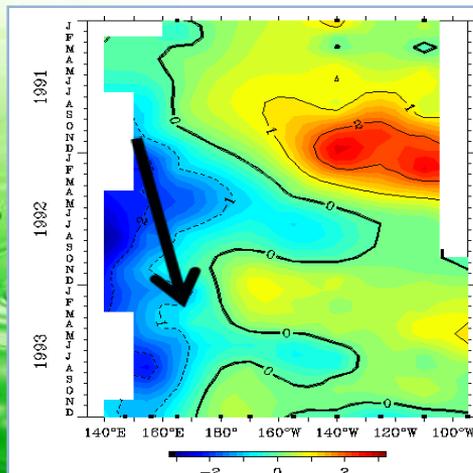
Monthly Depth 2°S to 2°N Average
Depth Average Temperature Anomalies (0/300m, °C)



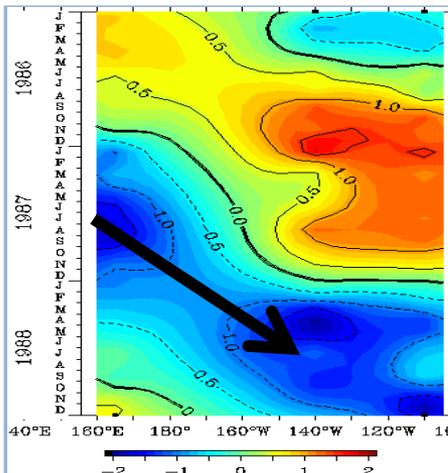
09/10



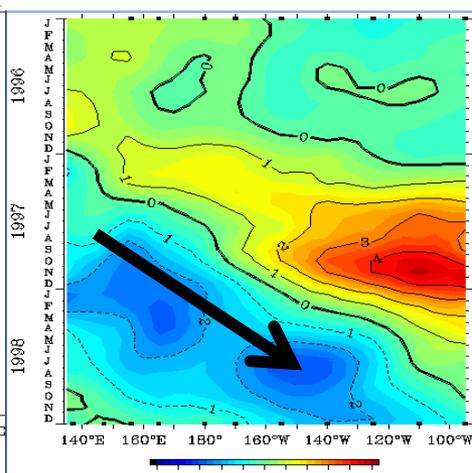
91/92



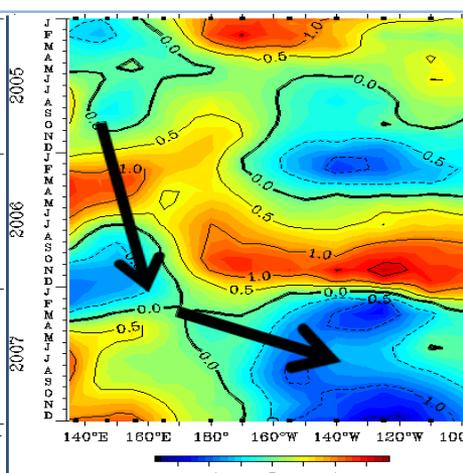
87/88



97/98



06/07





Walker circulation

Jun

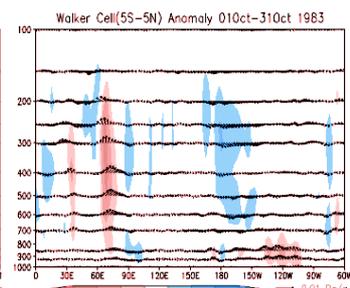
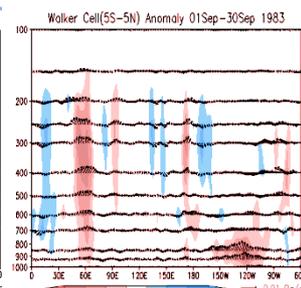
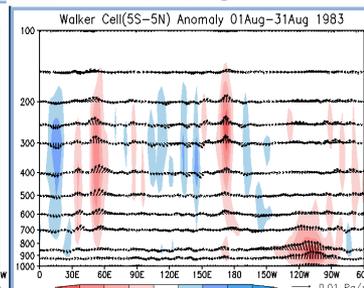
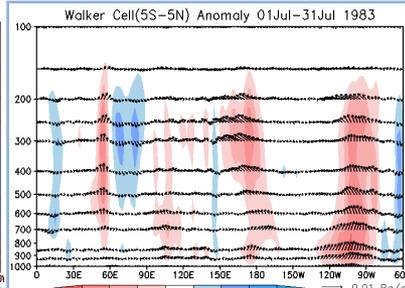
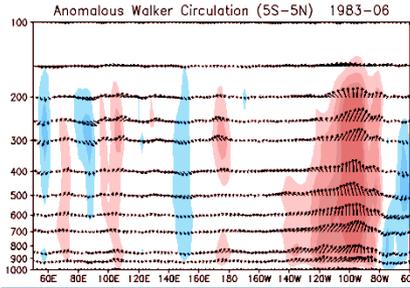
Jul

Aug

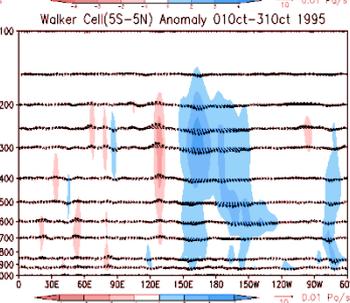
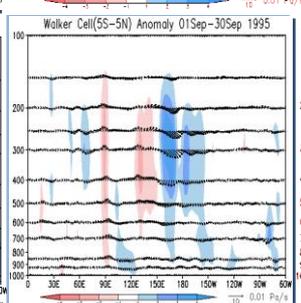
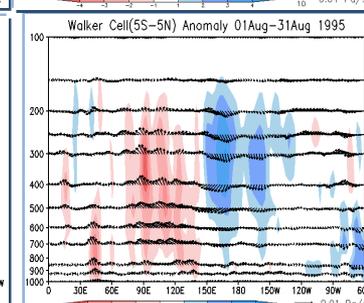
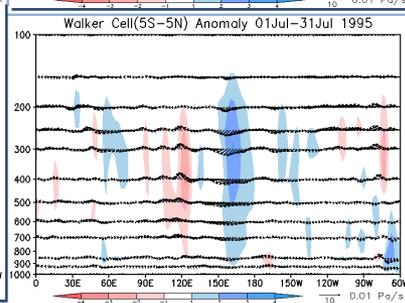
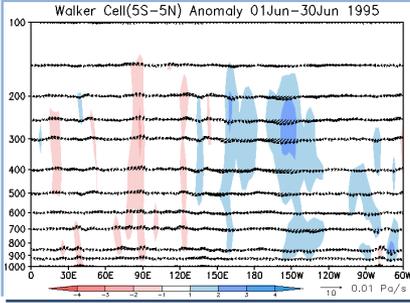
Sep

Oct

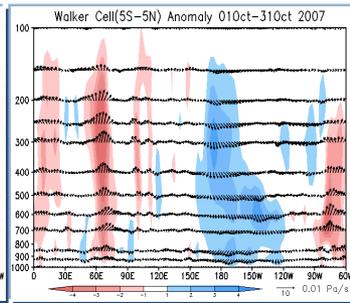
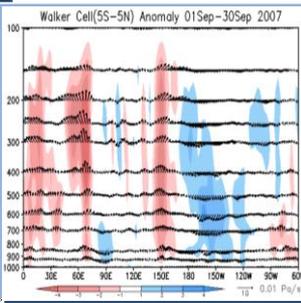
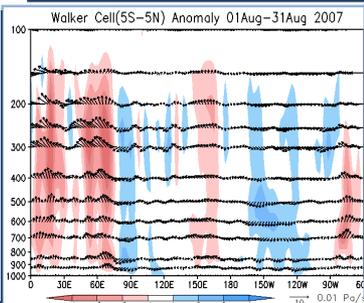
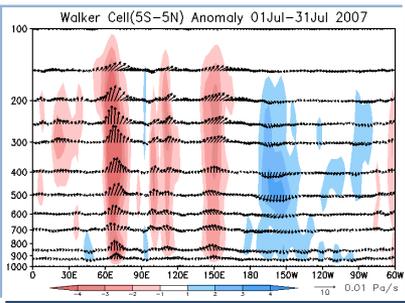
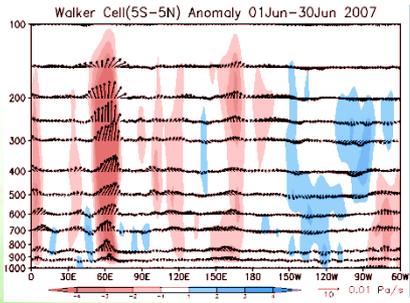
1983



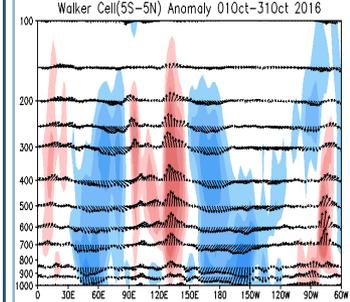
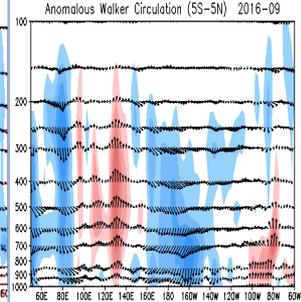
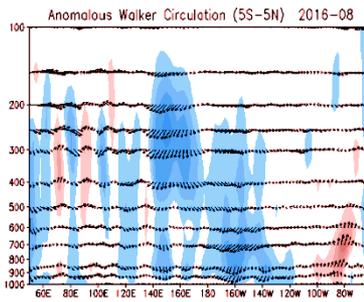
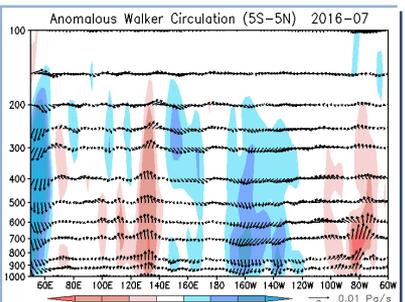
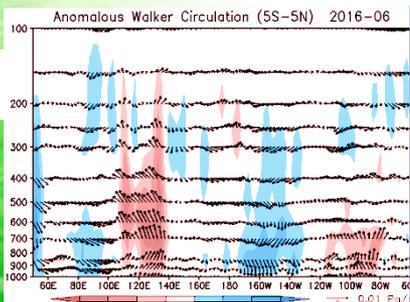
1995



2007



2016



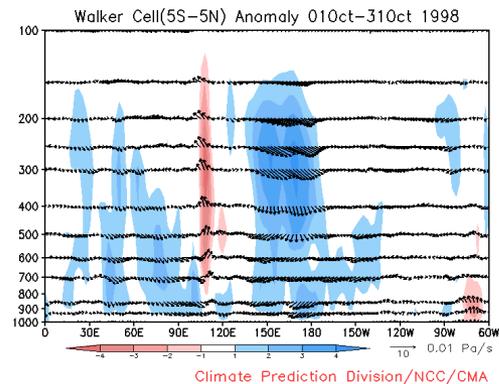
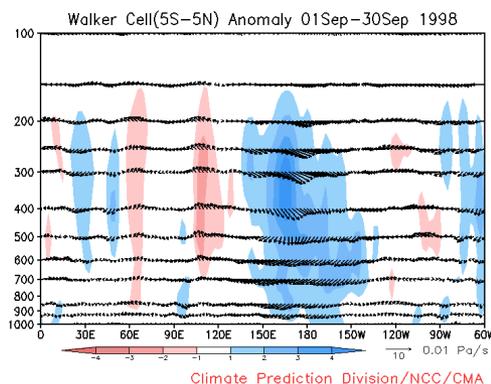
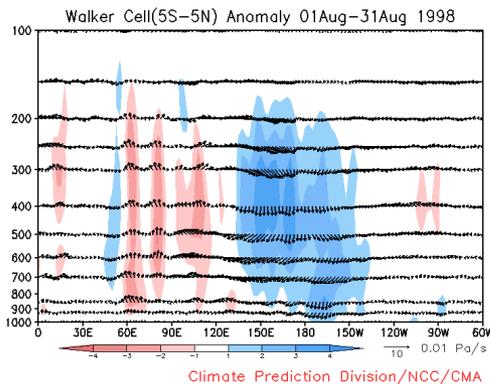


Walker circulation

Aug

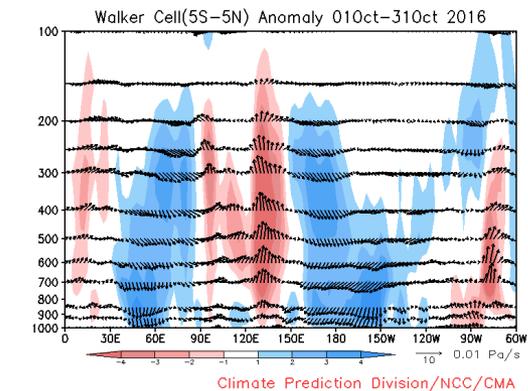
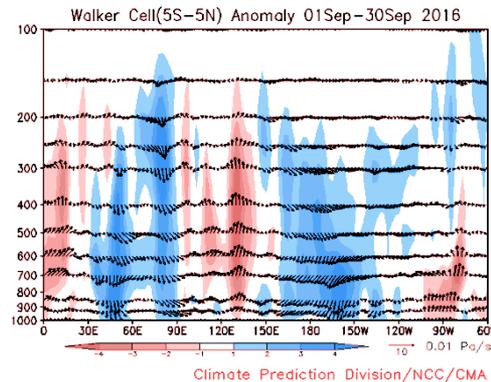
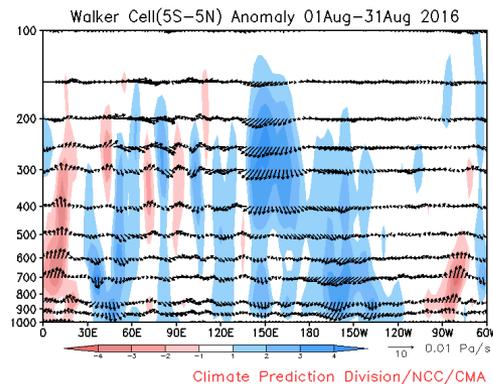
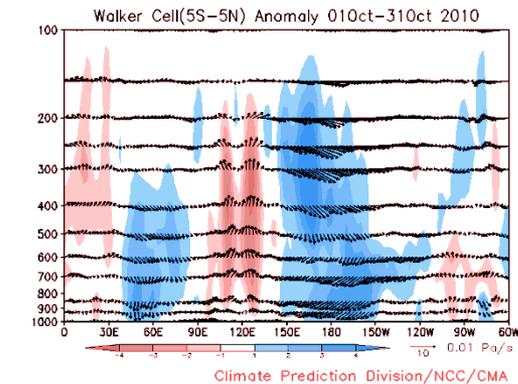
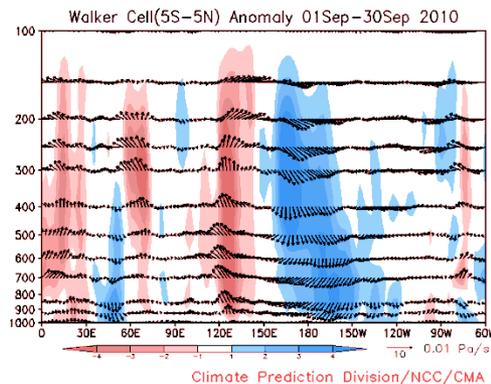
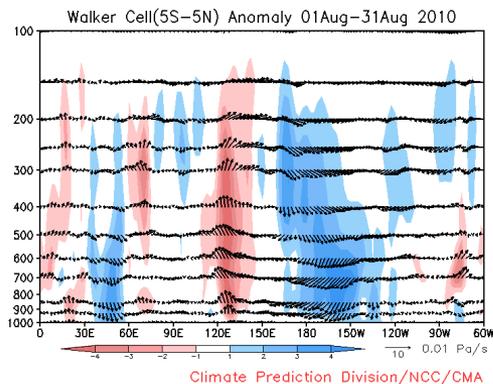
Sep

Oct



1997/
1998

2009/
2010



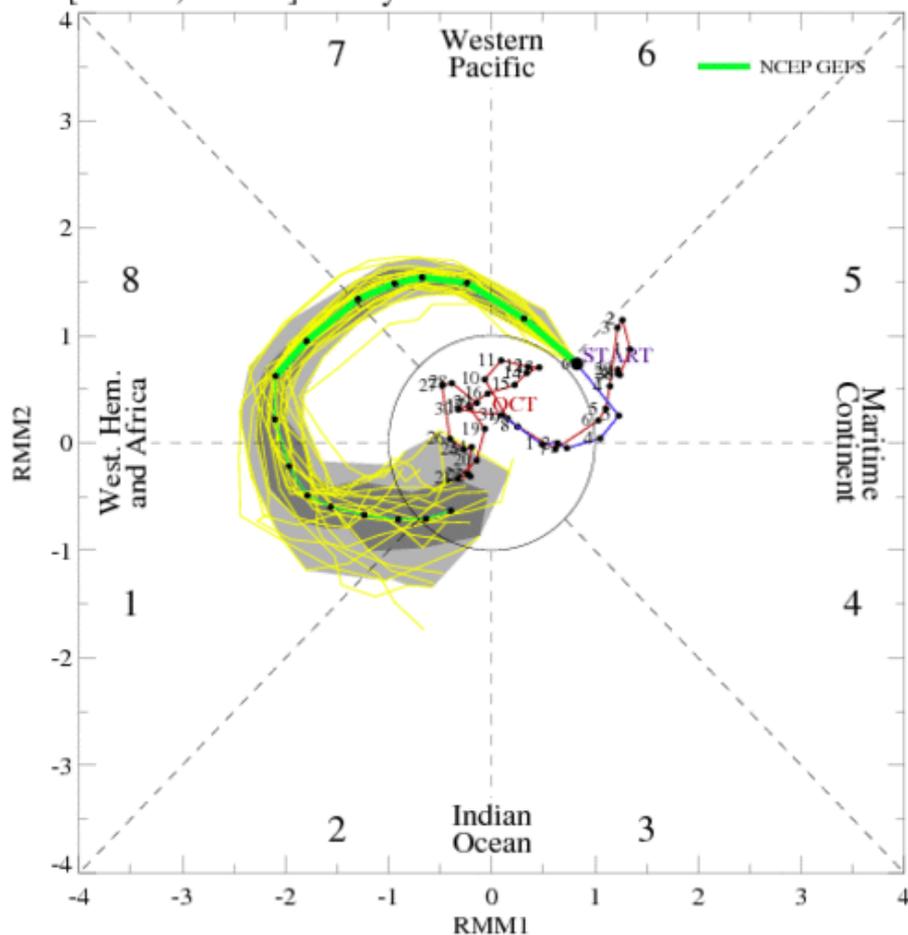
2015/
2016



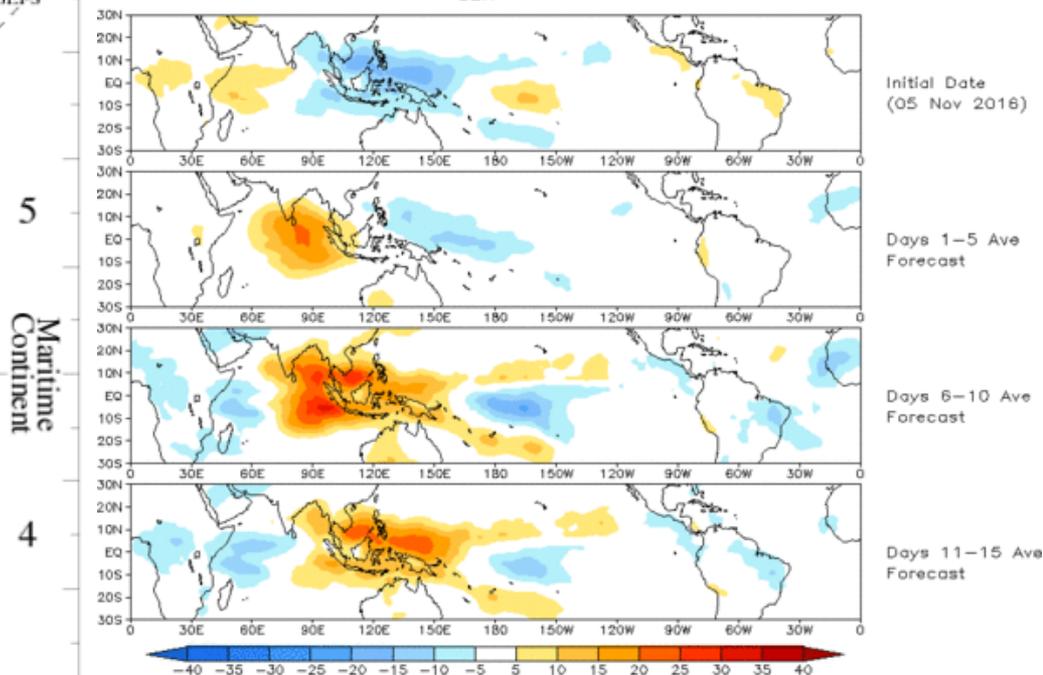


MJO and related Spatial OLR Anomalies

[RMM1, RMM2] 15-day forecast for 07Nov2016 to 21Nov2016



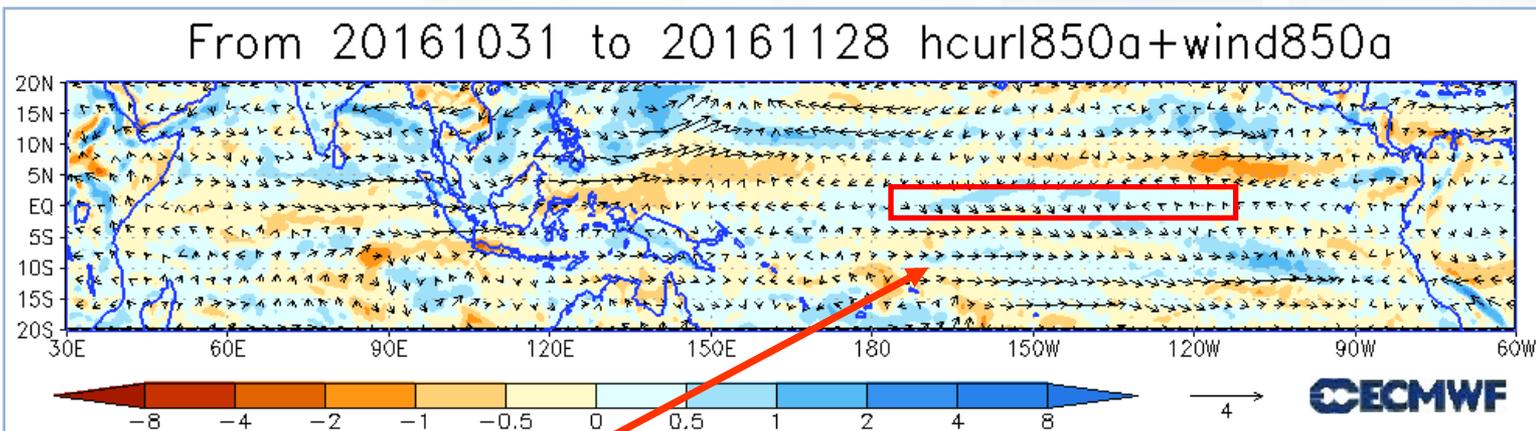
Prediction of MJO-related anomalies using GEFS operational forecast
Initial date: 05 Nov 2016
OLR





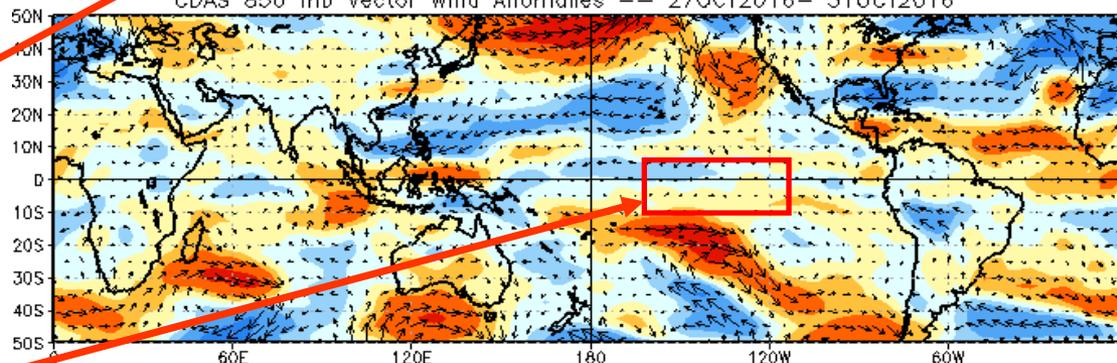
Wind Anomalies

From 20161031 to 20161128 hcurl850a+wind850a



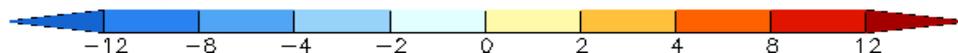
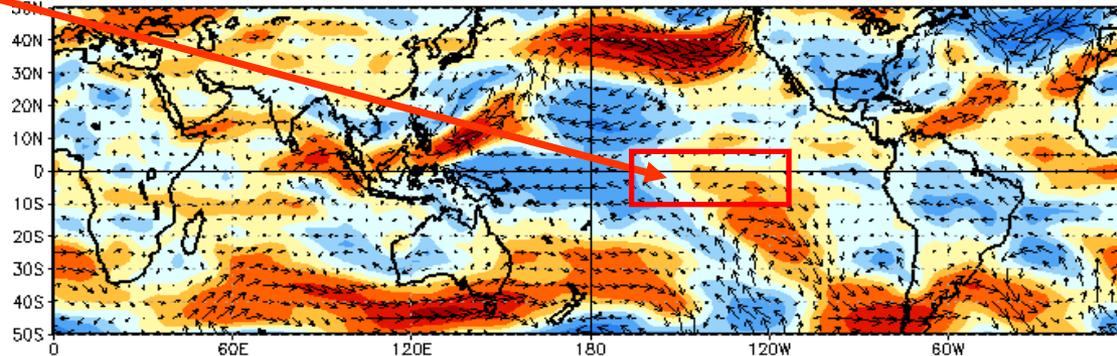
异常东风控制Niño3.4区

CDAS 850 mb Vector Wind Anomalies -- 27OCT2016- 31OCT2016



异常西风控制Niño3.4区

CDAS 850 mb Vector Wind Anomalies -- 01NOV2016-05NOV2016



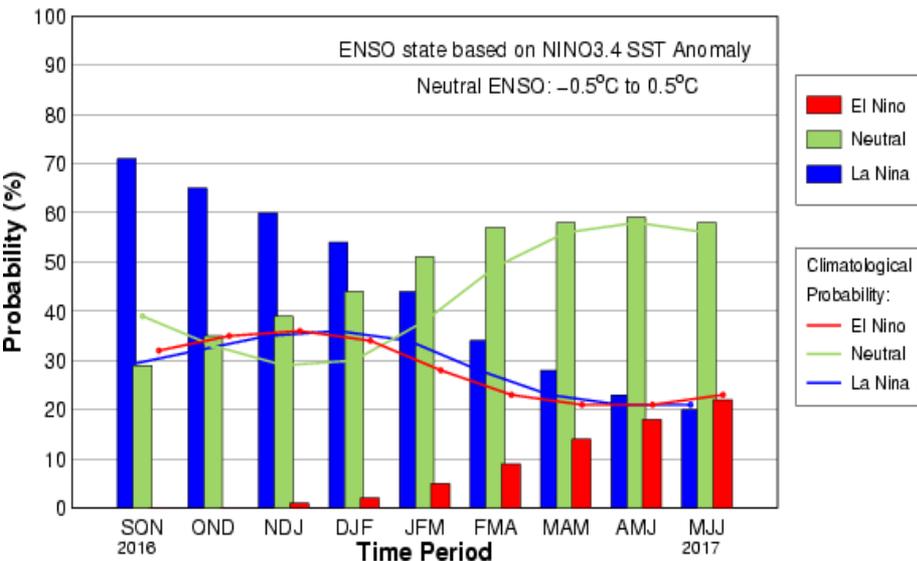


Outlines

1. The current ENSO status and other related external forcing monitoring
2. Diagnostic analysis
3. Model predictions
4. Summary



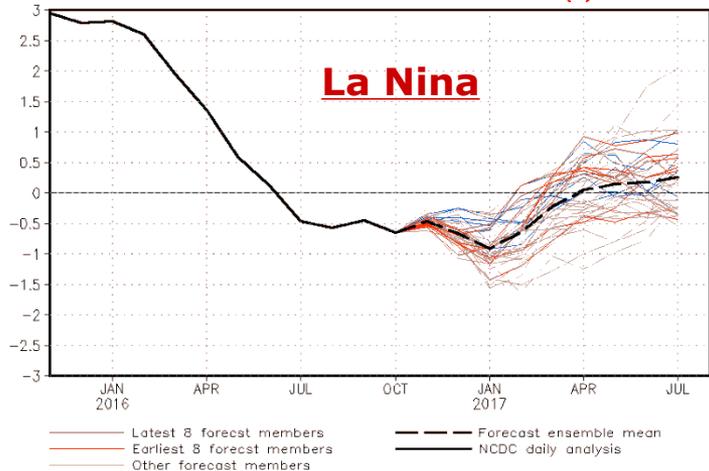
Early-Oct CPC/IRI Official Probabilistic ENSO Forecast



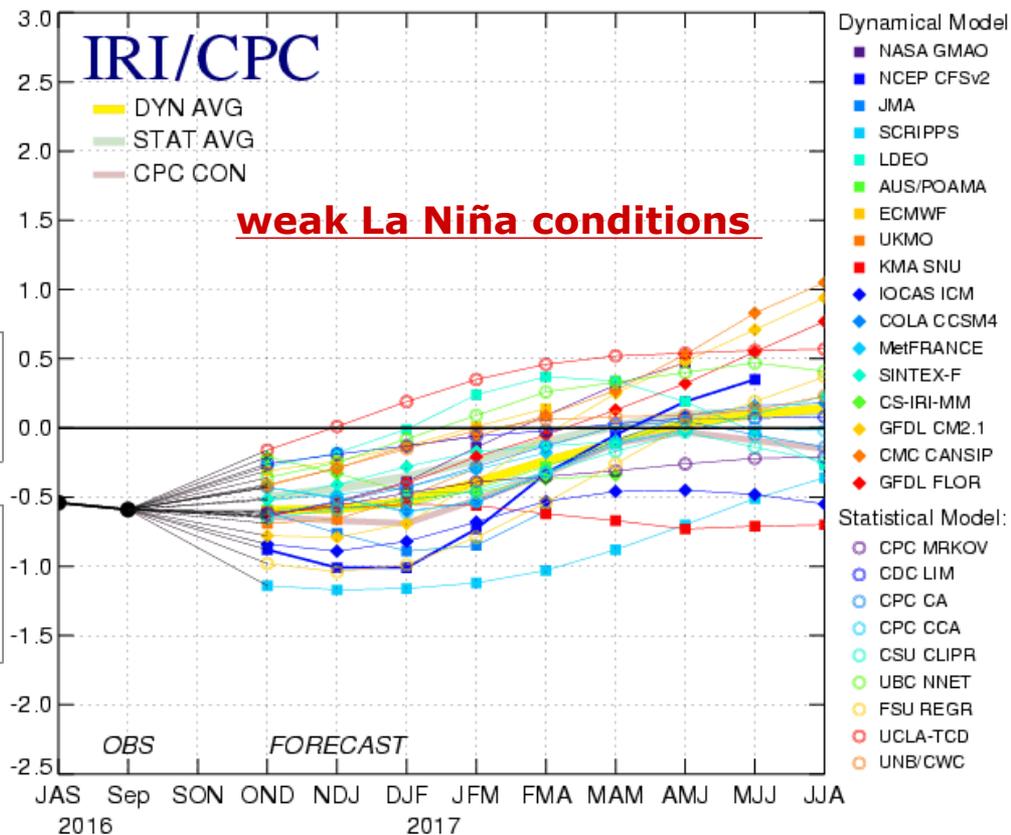
Last update: Tue Nov 1 2016
Initial conditions: 21Oct2016-30Oct2016



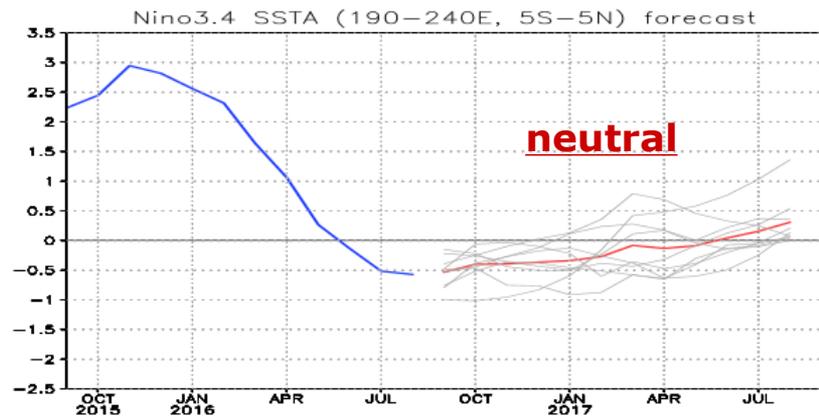
CFSv2 forecast Nino3.4 SST anomalies (K)



Mid-Oct 2016 Plume of Model ENSO Predictions

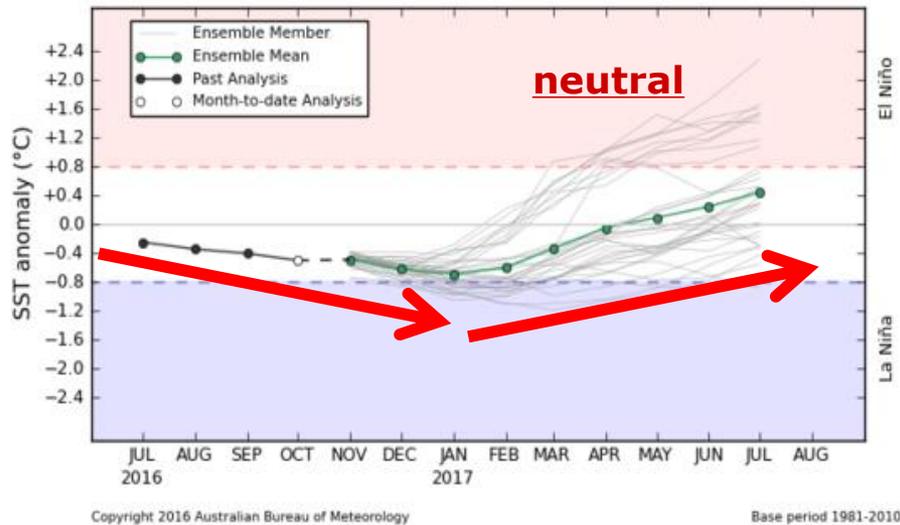


Frontier

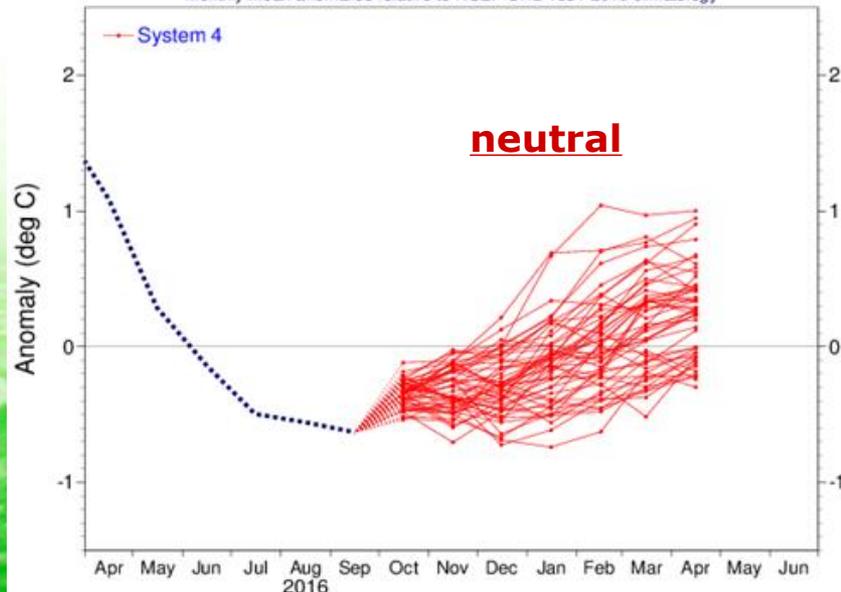




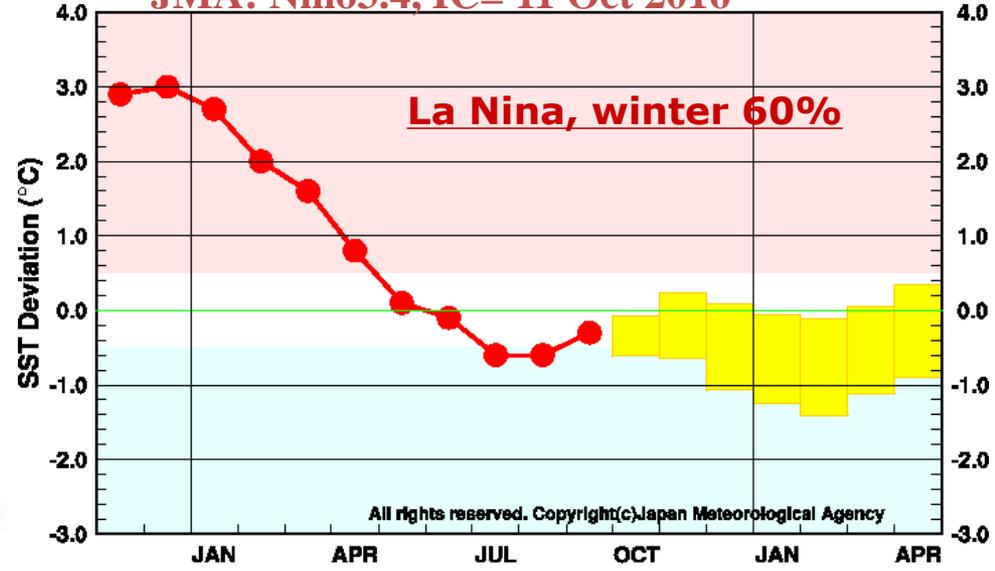
BOM POAMA monthly mean NINO34 - Forecast Start: 23 OCT 2016



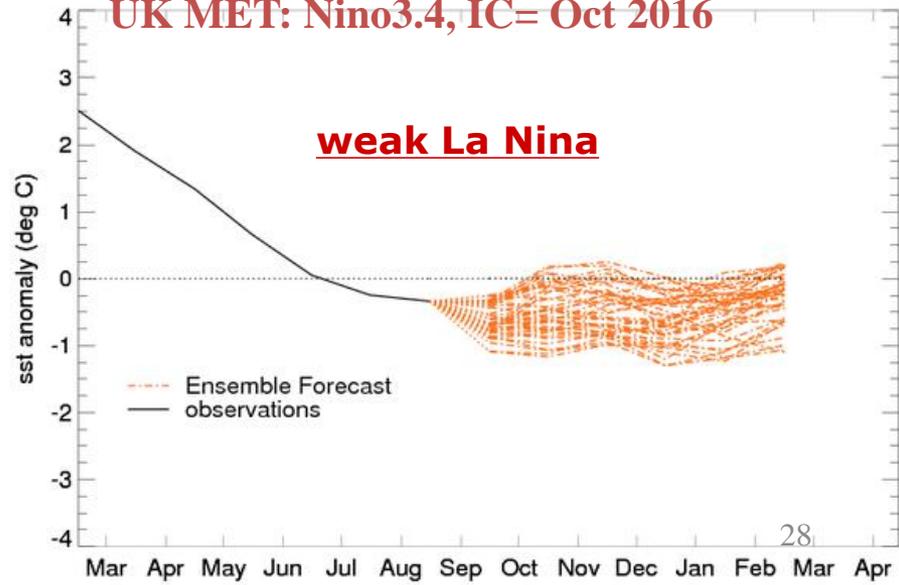
ECMWF
NINO3.4 SST anomaly plume
ECMWF forecast from 1 Oct 2016
Monthly mean anomalies relative to NCEP OIv2 1981-2010 climatology



JMA: Nino3.4, IC= 11 Oct 2016



UK MET: Nino3.4, IC= Oct 2016

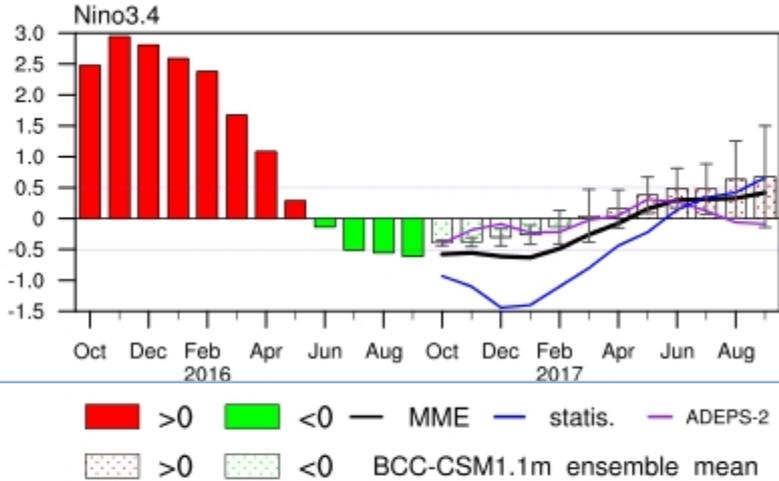




BCC

ENSO SST Indices (K): BCC SEMAP2.0 forecast

Monitor (OISST): 201510-201609; Forecast: 201610-201709



IAP, CAS

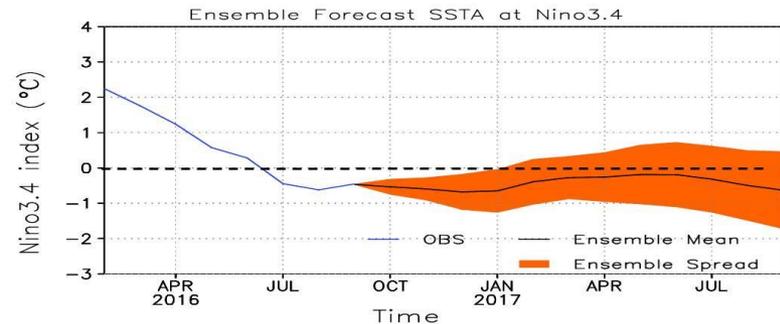
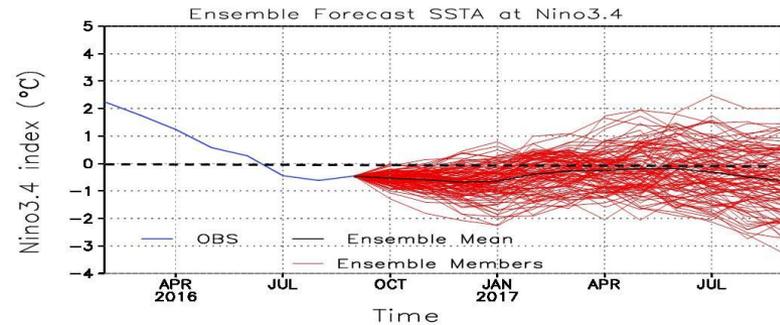


图3 Nino3.4指数预报：（上）100个预报样本；（下）预报样本离散度。黑线为集合样本均值预报
 Fig.3 Forecasted Nino3.4 index: (top) 100 ensemble members, and (below) ensemble spread. The black line is the ensemble-mean forecast.



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Summary

- After the strong 2015/16 El Niño event, sea surface temperatures (SSTs) decreased gradually across most of the central and eastern Pacific. Since mid-April 2016, near-to-below average SSTs had expanded westward toward the Date Line.
- In August, the Niño 3.4 index was -0.53°C which exceeded La Niña thresholds. **La Niña conditions are present in the equatorial Pacific.**
- However, the oceanic and atmospheric monitoring data fluctuations bring uncertainty in speed and strength of La Niña development.





Summary

–The weak anomalous easterlies and westerlies alternated with each other in most of the central and eastern equatorial Pacific, which resulted in the slow development of negative SST anomalies (SSTAs).

–Below-average subsurface temperatures have decreased in fluctuation in most of the equatorial Pacific since late May, while strengthened slightly near and east of the International Date Line since mid-September.

•A weak La Niña event is expected to possibly form during the winter 2016/17.





On behalf of all BCC colleagues

Thank You!

