

**JMA/TCC Training Seminar**

# **Basic Operation of ITACS**

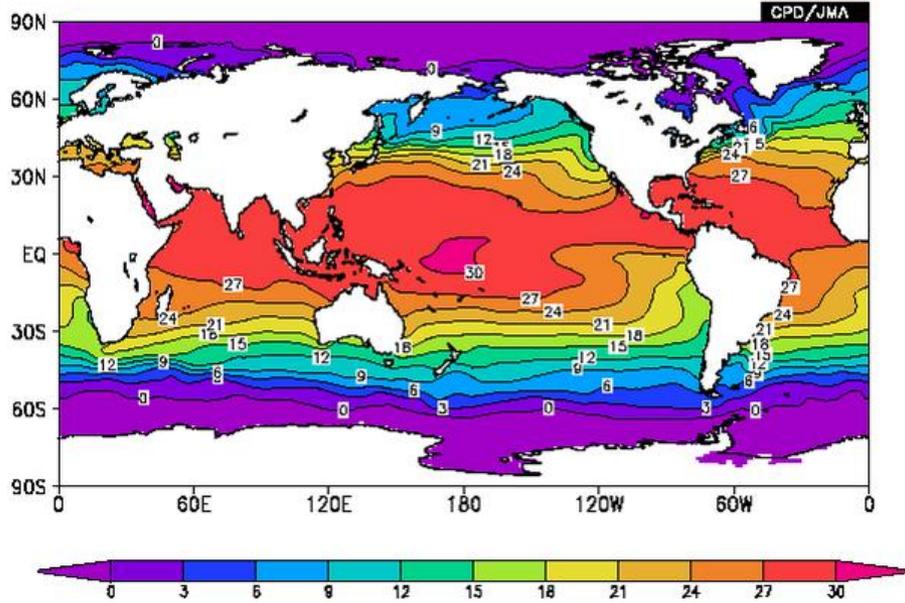
## **Statistical analysis using ITACS**

**December 2, 2009**

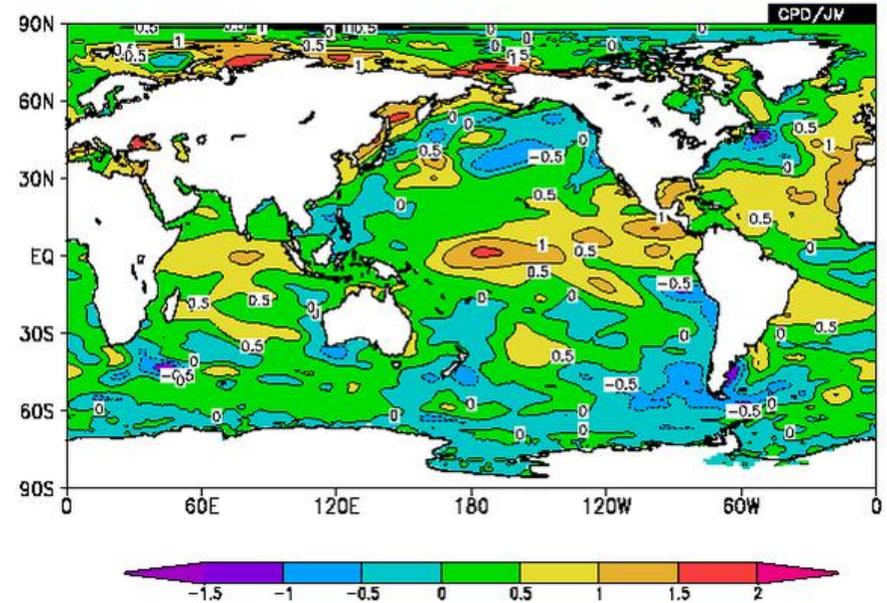
**Shingo Ushida**  
**Climate Prediction Division, JMA**

# Step 1: Sea Surface Temperature (SST)

DATA1 SST t HIST lat = -90:90 lon = 0:360 level = 1:1  
time = 2009100100:2009100100 ave = 1MONTH



DATA1 SST t ANOM lat = -90:90 lon = 0:360 level = 1:1  
time = 2009100100:2009100100 ave = 1MONTH



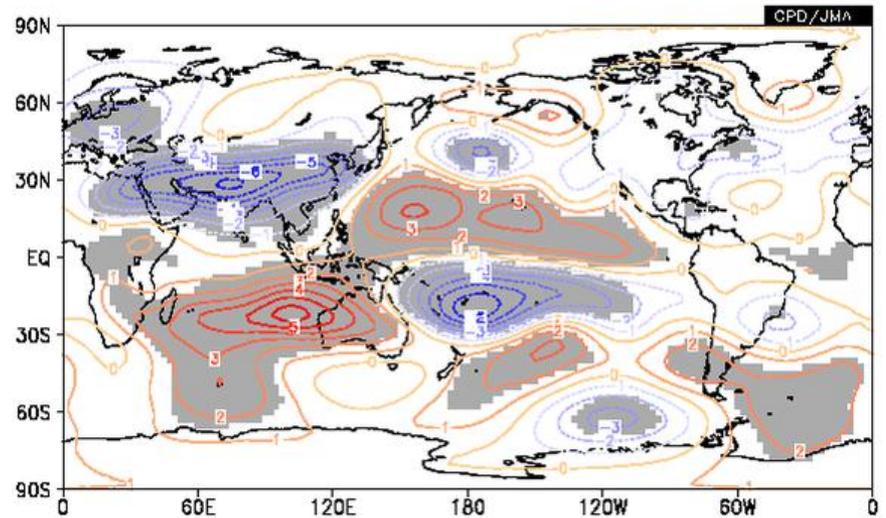
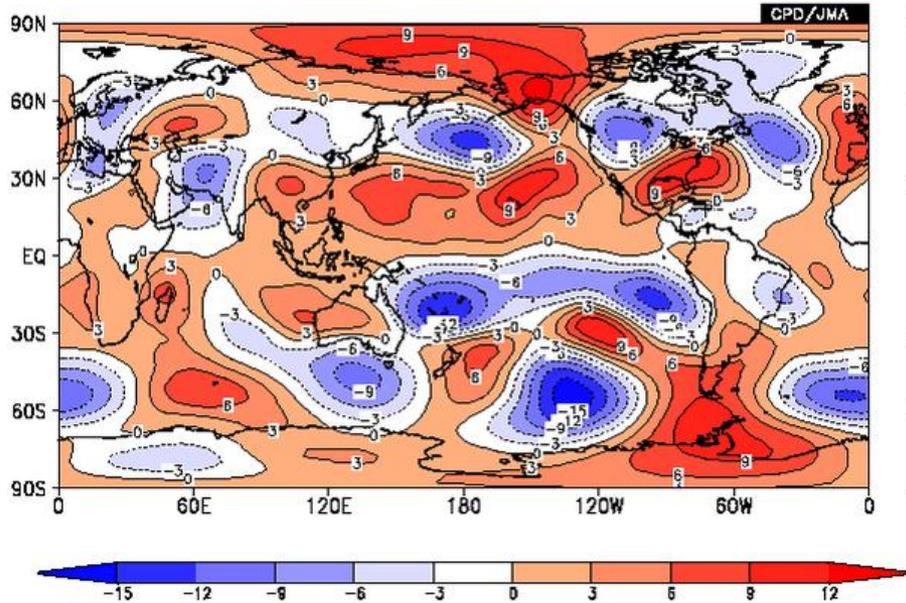
First of all, let's try to make a map of sea surface temperature (SST) in this October (left). Then to see a feature of the distribution of SST please make a map of SST anomaly in the same month (right).

## Step 2: 200hPa stream function

DATA1 JRA-JCDAS psi23 ANOM lat = -90:90 lon = 0:360 level = 10:10  
time = 2009100100:2009100100 ave = 1MONTH

DATA1 JRA-JCDAS psi23 ANOM lat = -90:90 lon = 0:360 level = 10:10  
time = 1979100100:2009100100 ave = 1MONTH

DATA2 INDEX NINO\_3 HIST lat = -90:90 lon = 0:360 level = 1:1  
time = 1979100100:2009100100 ave = 1MONTH analysis method = REGRESSION\_COEFFICIENT

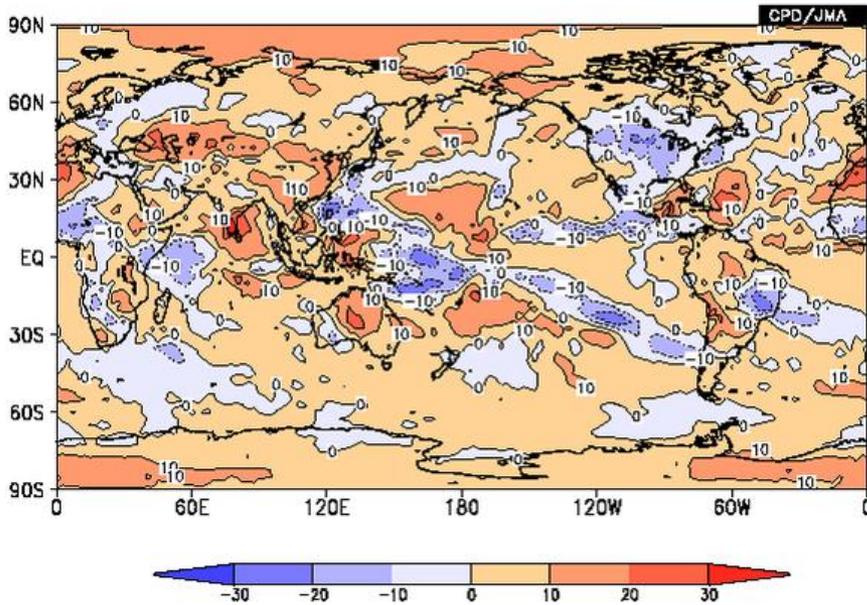


What atmospheric condition was observed in October 2009? Please make a map of 200hPa stream function anomaly (left). What feature can we see from the map?

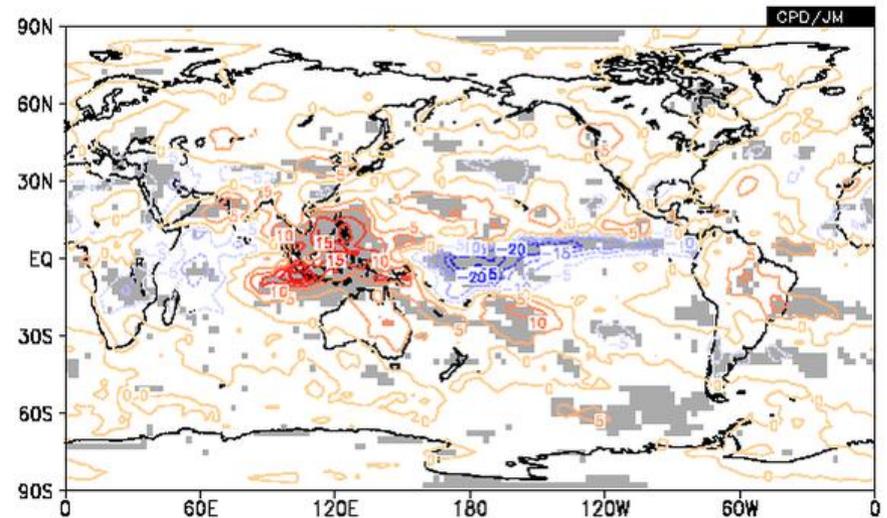
Let's make a map of the linear regression coefficient of 200hPa stream function anomaly regressed NINO.3 index in October to investigate the relationship between ENSO and atmospheric circulation (right).

## Step 3: Outgoing Longwave Radiation (OLR)

DATA1 SAT olr ANOM lat = -90:90 lon = 0:360 level = 1:1  
time = 2009100100:2009100100 ave = 1MONTH



DATA1 SAT olr ANOM lat = -90:90 lon = 0:360 level = 1:1  
time = 1979100100:2009100100 ave = 6MONTH  
years = 1982,1986,1987,1991,1997,2002.  
DATA2 SAT olr ANOM lat = -90:90 lon = 0:360 level = 1:1  
time = 1979100100:2009100100 ave = 31MONTH analysis method = SIGNIFICANCE\_TEST

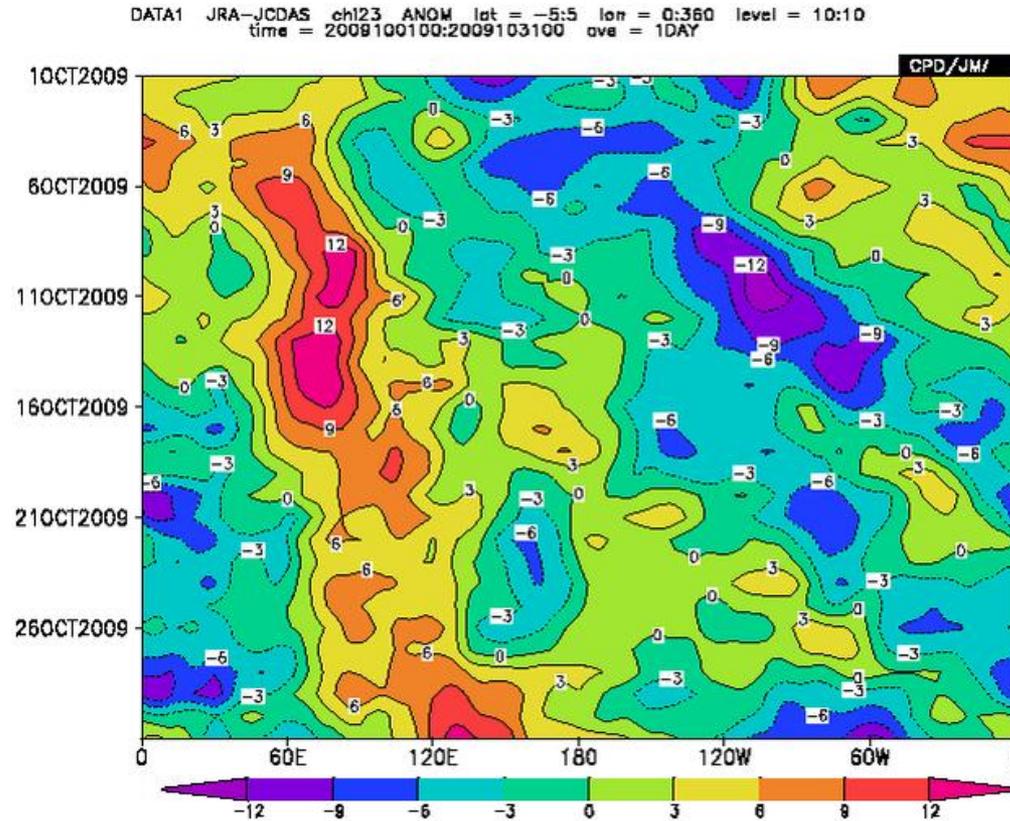


Here let's see convective activities in this October using Outgoing Longwave Radiation (OLR). Please make a map of OLR anomaly in Oct.2009 (left).

Negative anomalies show enhanced convective activities (positive anomalies show suppressed convective anomalies.) Where enhanced / suppressed convective activities were observed?

Let's compare observed distribution to a composite pattern of El Niño (1982, 1986, 1987, 1991 and 2002) (right). Gray shadings show difference between the composite patterns associated with El Niño events and climatology (averaged from 1979 to 2009) are statistically significant at 95% level.

## Step 4: 200hPa velocity potential anomaly time cross-section



In the step3 we see the monthly averaged convective activities by OLR. Then let's show daily variation of convective activities in Oct.2009 by 200hPa velocity potential anomaly time cross-section along the equator.

How should we see the chart? What kind of climatological phenomenon does this map show?

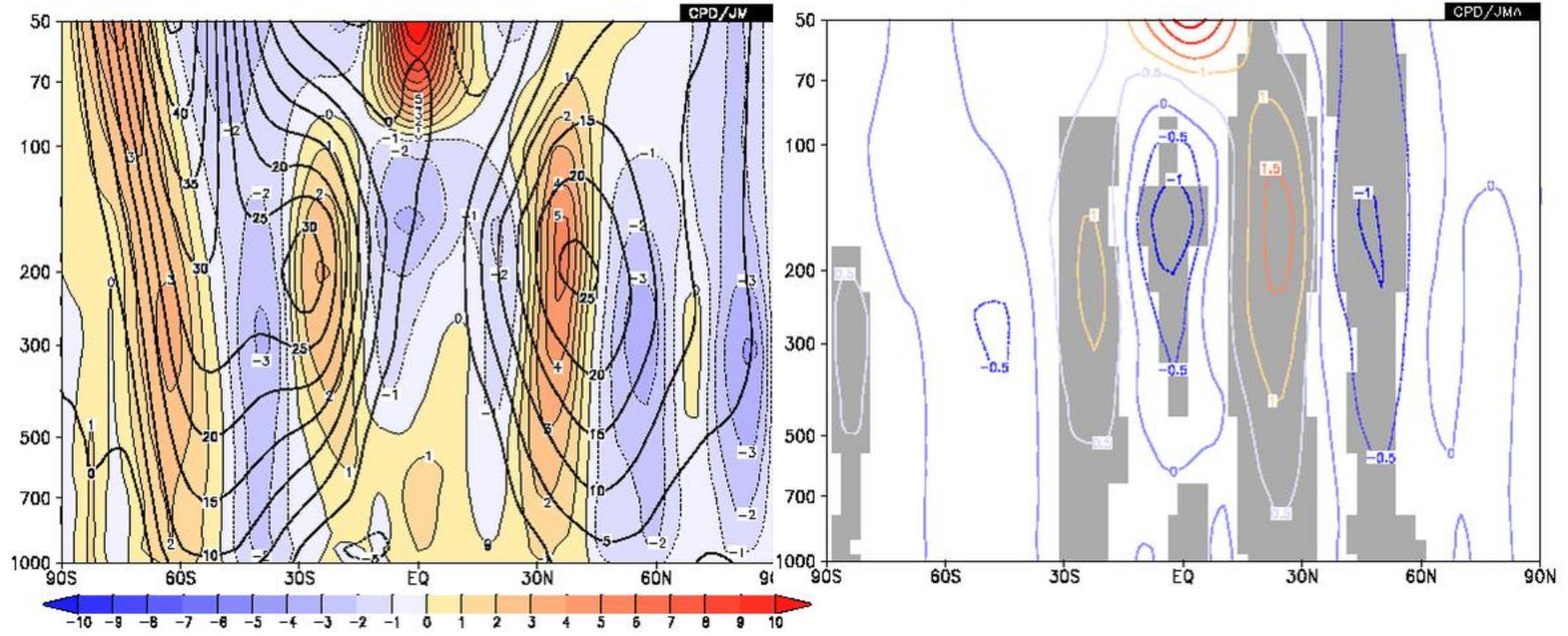
# Step 5: zonal mean wind and its anomaly latitude-height cross-section

DATA1 JRA-JCDAS u23 ANOM lat = -90:90 lon = 0:360 level = 1:14  
time = 2009100100:2009100100 ave = 1MONTH

DATA2 JRA-JCDAS u23 NORM lat = -90:90 lon = 0:360 level = 1:14  
time = 2009100100:2009100100 ave = 1MONTH analysis method = DATA1\_D

DATA1 JRA-JCDAS u23 ANOM lat = -90:90 lon = 0:360 level = 1:14  
time = 1979100100:2009100100 ave = 1MONTH

DATA2 INDEX NINO.3 HIST lat = -90:90 lon = 0:360 level = 1:1  
time = 1979100100:2009100100 ave = 1MONTH analysis method = REGRESSION\_COEFFICIENT



Here let's confirm the Hemispheric-scale feature of the jet stream making zonal mean wind field.

Please make a map of zonal mean wind and its anomaly latitude-height cross-section in Oct.2009 (left).

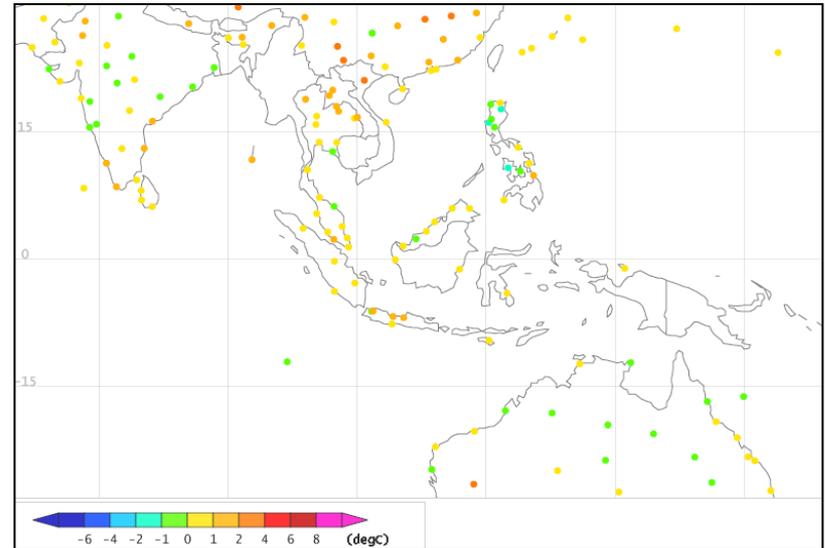
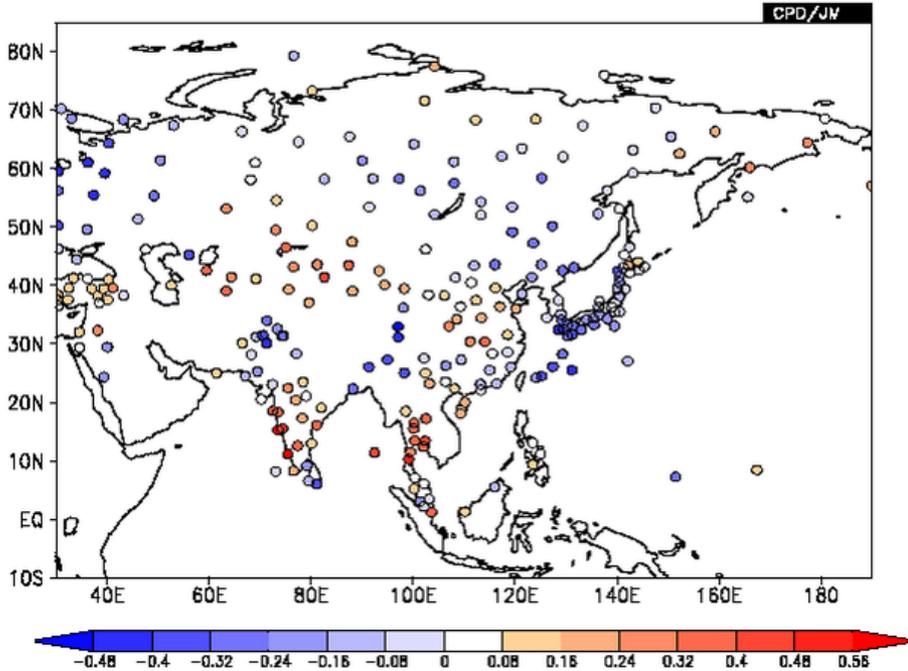
Then make a map of the linear regression coefficient of zonal mean wind regressed by NINO.3 index.

Can we make sure that their features observed in Oct.2009 are consistent with the features of El Nino events?

# Step 6-1: Surface Temperature and Precipitation

DATA1 CLIMAT tt HIST lat = -10:85 lon = 30:190 level = f:1  
time = 1979100100:2009100100 ave = 1MONTH

DATA2 INDEX NINO.3 HIST lat = -90:90 lon = 0:360 level = 1:1  
time = 1979100100:2009100100 ave = 1MONTH analysis method = CORRELATION\_COEFFICIENT



ITACS can use monthly world climate data derived from CLIMAT messages via the GTS line from WMO.

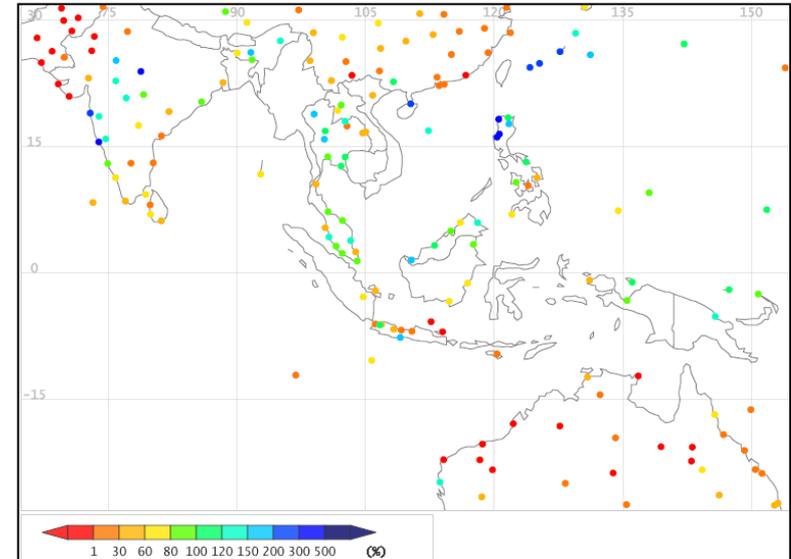
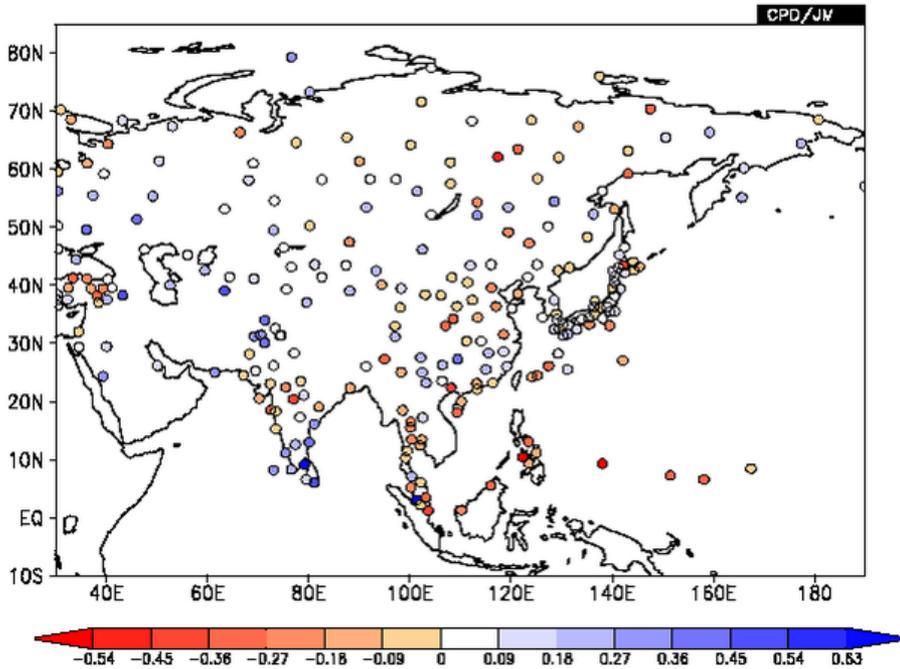
Let's make a map of the linear regression coefficient of surface temperature regressed by NINO.3 index (left).

Can we say that the distribution of linear regression coefficient is like observed surface temperature (right)?

## Step 6-2: Surface Temperature and Precipitation

DATA1 CLIMAT rr HIST lat = -10:85 lon = 30:190 level = 1:1  
time = 1979100100:2009100100 ave = 1MONTH

DATA2 SAT air HIST lat = 10:20 lon = 110:140 level = 1:1  
time = 1979100100:2009100100 ave = 1MONTH analysis method = CORRELATION\_COEFFICIENT

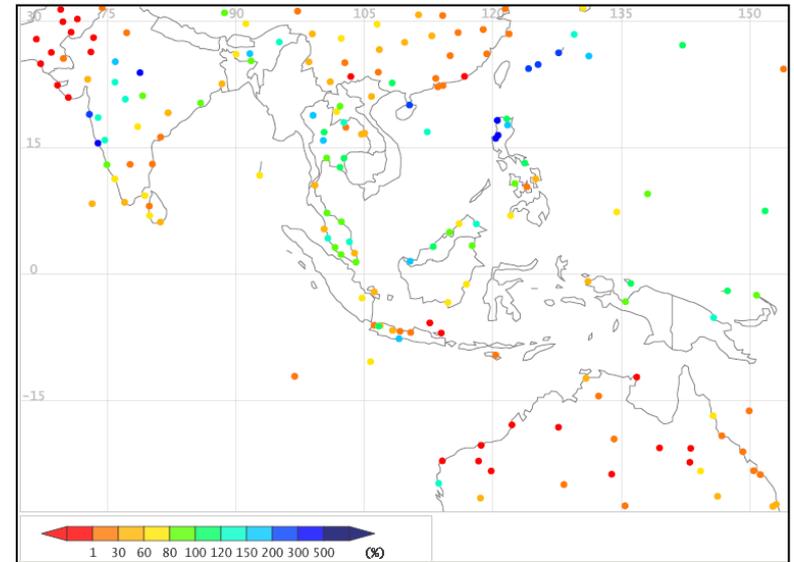
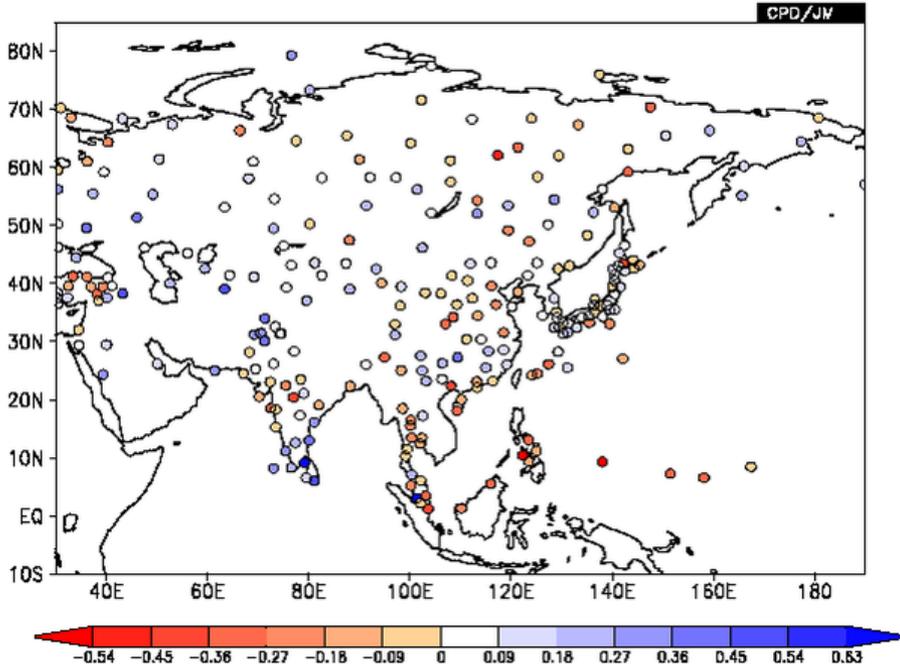


Then please make a map of the linear regression coefficient of surface precipitation regressed by NINO.3 index (left). For showing precipitation distribution blue should mean positive anomaly (much rainy), so you should change "Color Table" in Graphic Option form.

## Step 6-3: Surface Temperature and Precipitation

DATA1 CLIMAT rr HIST lat = -10:85 lon = 30:190 level = 1:1  
time = 1979100100:2009100100 ave = 1MONTH

DATA2 SAT air HIST lat = 10:20 lon = 110:140 level = 1:1  
time = 1979100100:2009100100 ave = 1MONTH analysis method = CORRELATION\_COEFFICIENT



In step3 we have learned that negative OLR anomalies were clearly seen around the Philippines in the last October. And the feature is not consistent with ordinary El Niño events.

Then please make a map of the linear regression coefficient of surface precipitation regressed by OLR anomalies averaged around the Philippines.

Please note that where the linear regression coefficient is opposite to observed precipitation, climatological relationship that the linear regression coefficient shows is consistent with this October.

# Step 7: USER\_INPUT

You can use a data file save as text file on your PC. Please use data files you brought.

## e.g. Regression between precipitation and zonal wind

Set the parameter as below

data1						
dataset	element	data type	area	level	average period	show period
JRA-JCDAS	U Zonal wind(m/s)	HIST	ASIA Lat: -10 - 85 Ave <input type="checkbox"/> Lon: 30 - 190 Ave <input type="checkbox"/>	200 hPa 200 hPa	Year average Ave <input type="checkbox"/>	RANGE 1979 - 2009 07 - 07

analysis method : REGRESSION\_COEFFICIENT

data2					
dataset	element	input txt	average period	lag	significance
USER INPUT	UPLOAD TXT SD <input type="checkbox"/>	参照 upload	Year average Ave <input type="checkbox"/>	0 YEAR	90%(two side)

1 Click the button and choose an appropriate file

2 Then click the upload button so that the chosen file is uploaded.

3 And "input txt" will change as below

