Exercise

# Preparation for presentation

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17 November 2016, 11:20-12:30, 14:00-16:00

# Presentation Slides

Make a presentation on findings from your exercise.

Contents:

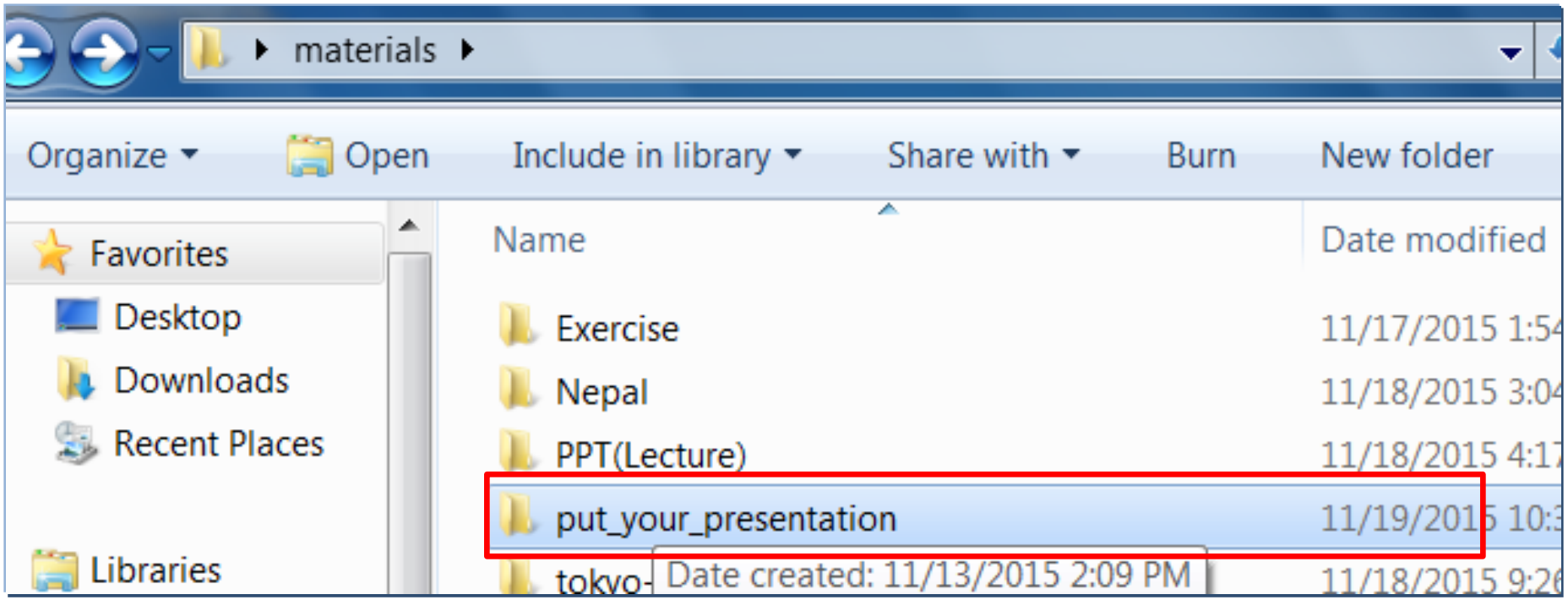
1. statistical relationship between ***precipitation and/or temperature in your country*** and ***primary modes of variability***.
2. Statistical relationship between ***primary mode of variability*** and ***atmospheric circulation***.
3. ***Causal explanation*** for the statistical relationship 1 and 2.

Other points:

- At the beginning of the presentation, please introduce climatic features of your country.

Please save your presentation file at
**Shares > put_your_presentation**

File name is “country name”.pptx

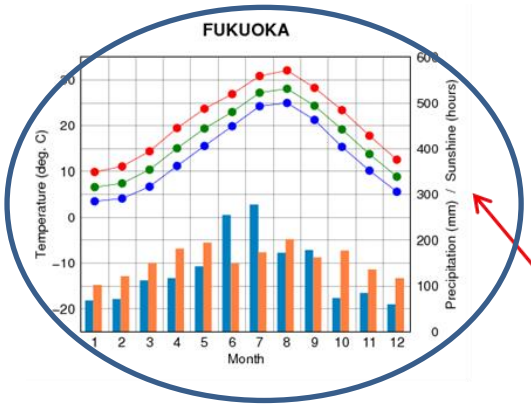


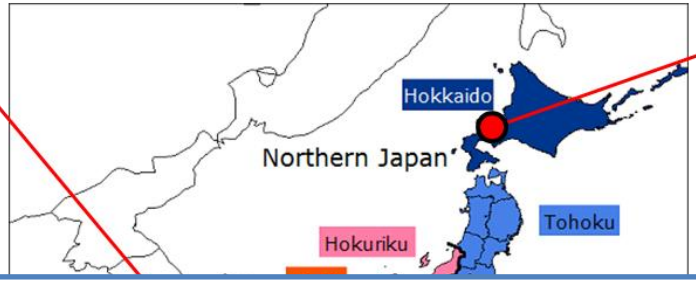
# Sample of presentation material

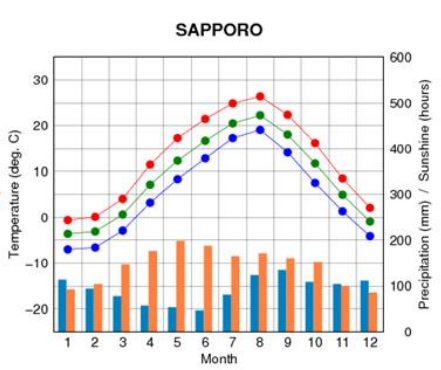
- Station is Fukuoka in Japan.
- Month is January.
- Selected mode is NINO.3 SST index.

You can arrange station, month (or season) and primary modes.

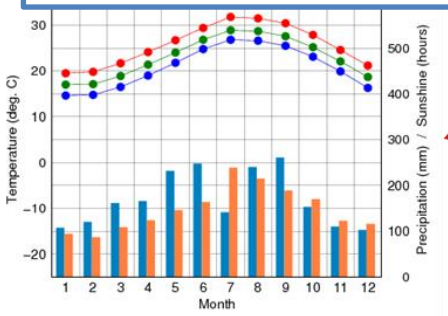
# Climate of Japan

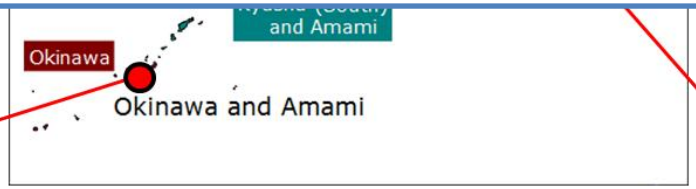


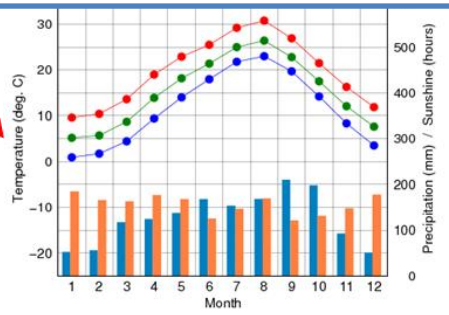




Tell us about climatic features of your country (free form)



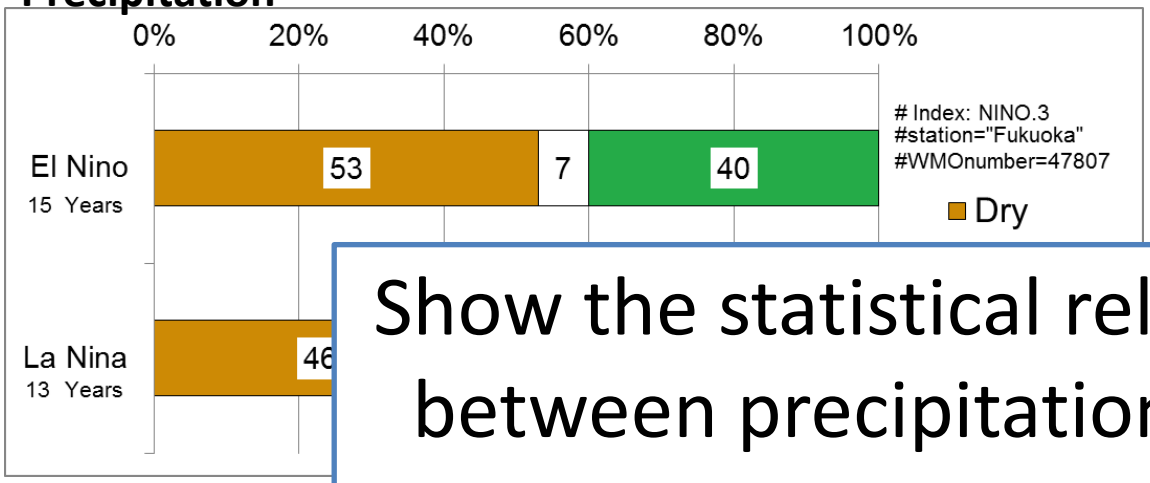




Japan has four distinct seasons with a climate ranging from subarctic in the north to subtropical in the south. Conditions are different between the Pacific side and the Sea of Japan side. In winter (DJF), the winter monsoon (northwesterly winds) bring heavy snowfall to Japan's Sea of Japan side and sunny weather to its Pacific side. The summer monsoon (southwesterly winds) bring the rainy season in early summer.

# ENSO and climate at Fukuoka station (Japan)

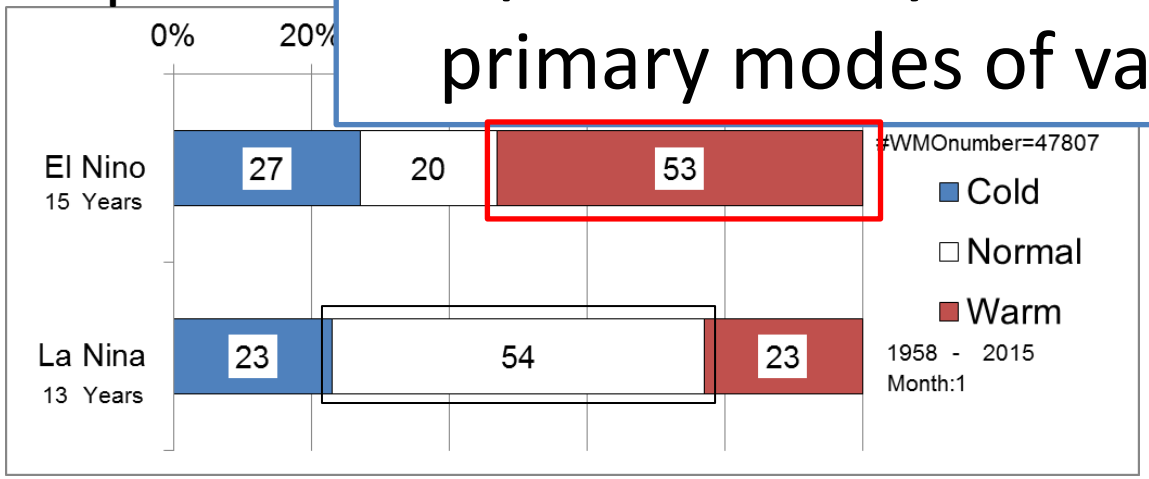
| Station | Index | Month |
|---|---|---|
| Fukuoka (Japan) | NINO.3 (El Nino/La Nina) | January |

**Precipitation**




Show the statistical relationship between precipitation and/or temperature in your country and primary modes of variability

**Temperature**



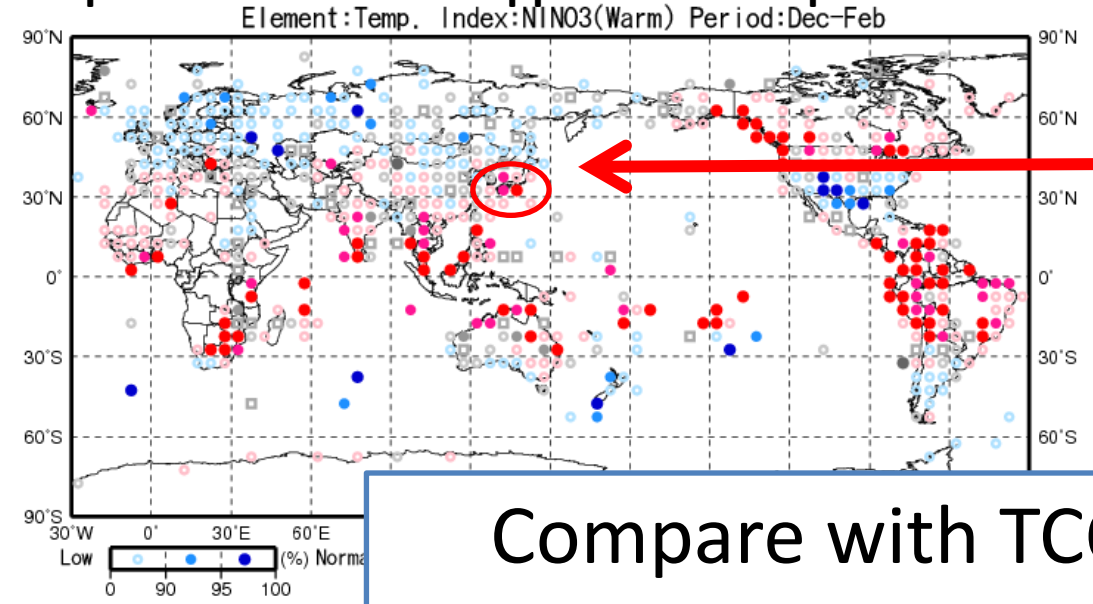

**There is no tendency of precipitation associated with January.**

**“Warm” tendency associated with El Nino condition.**

**There is “Normal” tendency associated with La Nina condition.**

# Temperatures in the ENSO events

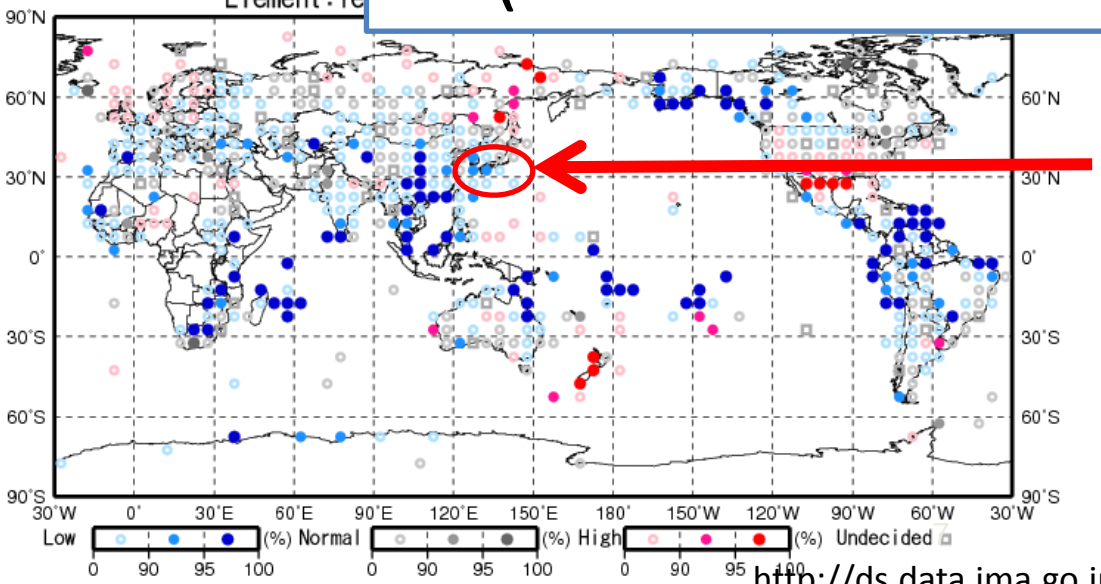
**Temperature anomalies appeared in the past El Niño events**




**There is “High temperature” tendency associated with El Nino condition not only at Fukuoka station but also around Fukuoka.**

Compare with TCC product (additional slide if needed)

**Precipitation anom**

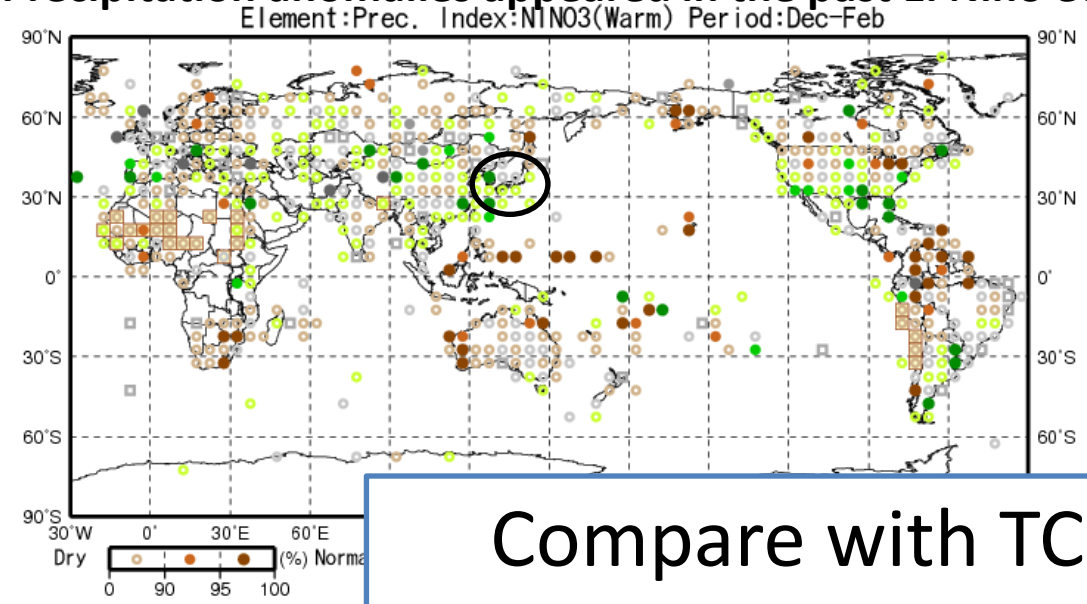



**There is a little “Low temperature” tendency associated with La Nina condition around Fukuoka.**

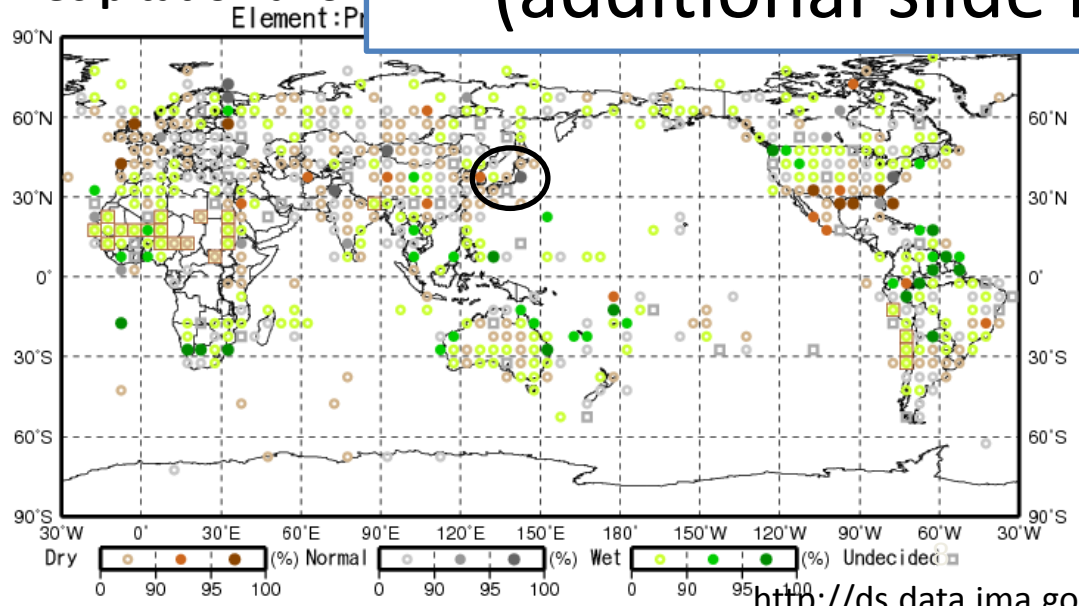
http://ds.data.jma.go.jp/gmd/tcc/tcc/products/climate/ENSO/month.html

# Precipitations in the ENSO events

**Precipitation anomalies appeared in the past El Niño events**




**Precipitation anom**



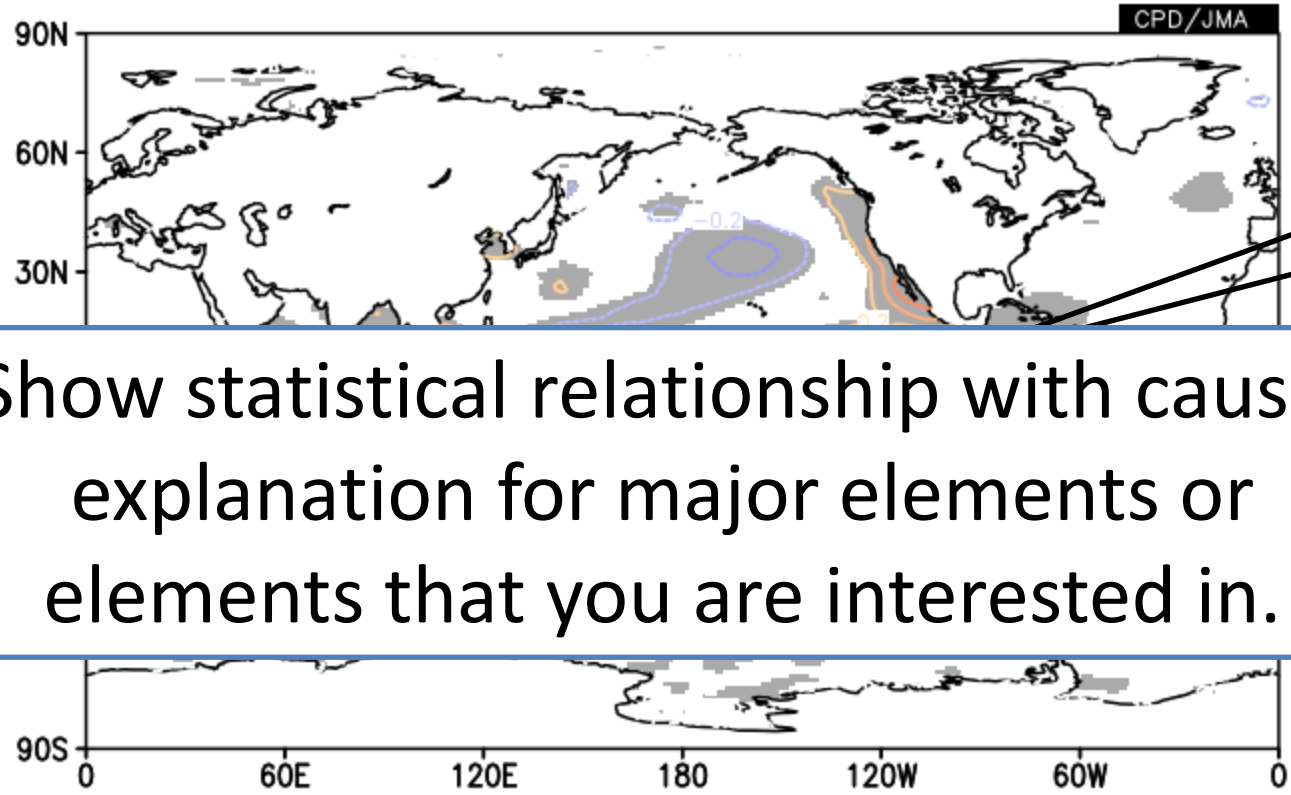

**There is little tendency of precipitation associated with ENSO around Japan.**
**The statistical relationship between precipitation and ENSO at Fukuoka station is consistent with this results.**

Compare with TCC product (additional slide if needed)

http://ds.data.jma.go.jp/gmd/tcc/tcc/products/climate/ENSO/month.html

# Sea Surface Temperature

- In the El Nino phase, positive SST anomalies were seen over the central to eastern Pacific, and negative SST anomalies were seen over the western Pacific.
- The relationship described above is opposite in the La Nina phase.




Show statistical relationship with causal explanation for major elements or elements that you are interested in.

Regression coefficients of SST onto NINO.3 SST indices (Jan.)

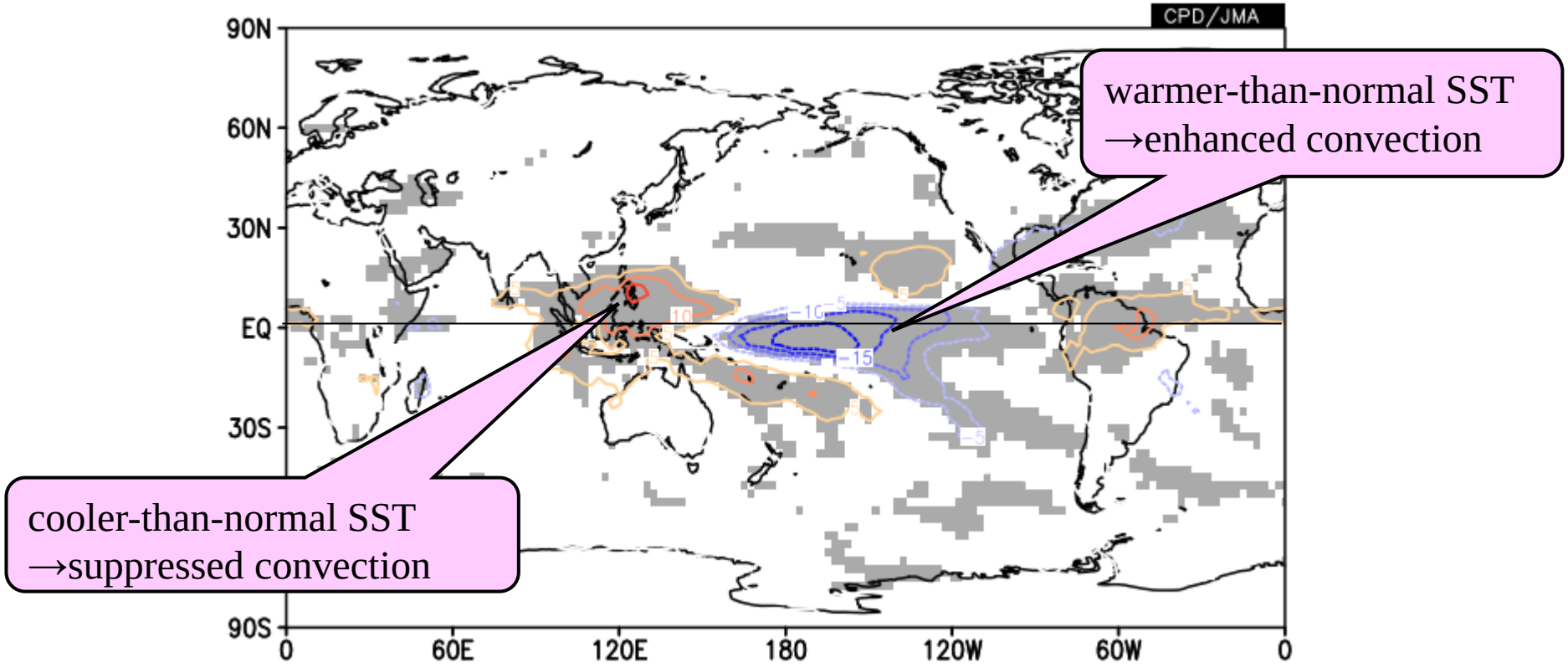
The base period for the analysis is 1958 – 2012. This is drawn by the ITACS.

Contour: regression coefficients

Gray shade: the area where regression coefficient is significant at 95% confidence level by t-testing

# Convective Activity

- In the El Nino phase, convective activity is enhanced over the central to eastern equatorial Pacific, and suppressed over and around the Maritime Continent in response to the east-west contrast of SST anomalies over the equatorial Pacific.




Regression coefficients of OLR onto NINO.3 SST indices (Jan.)

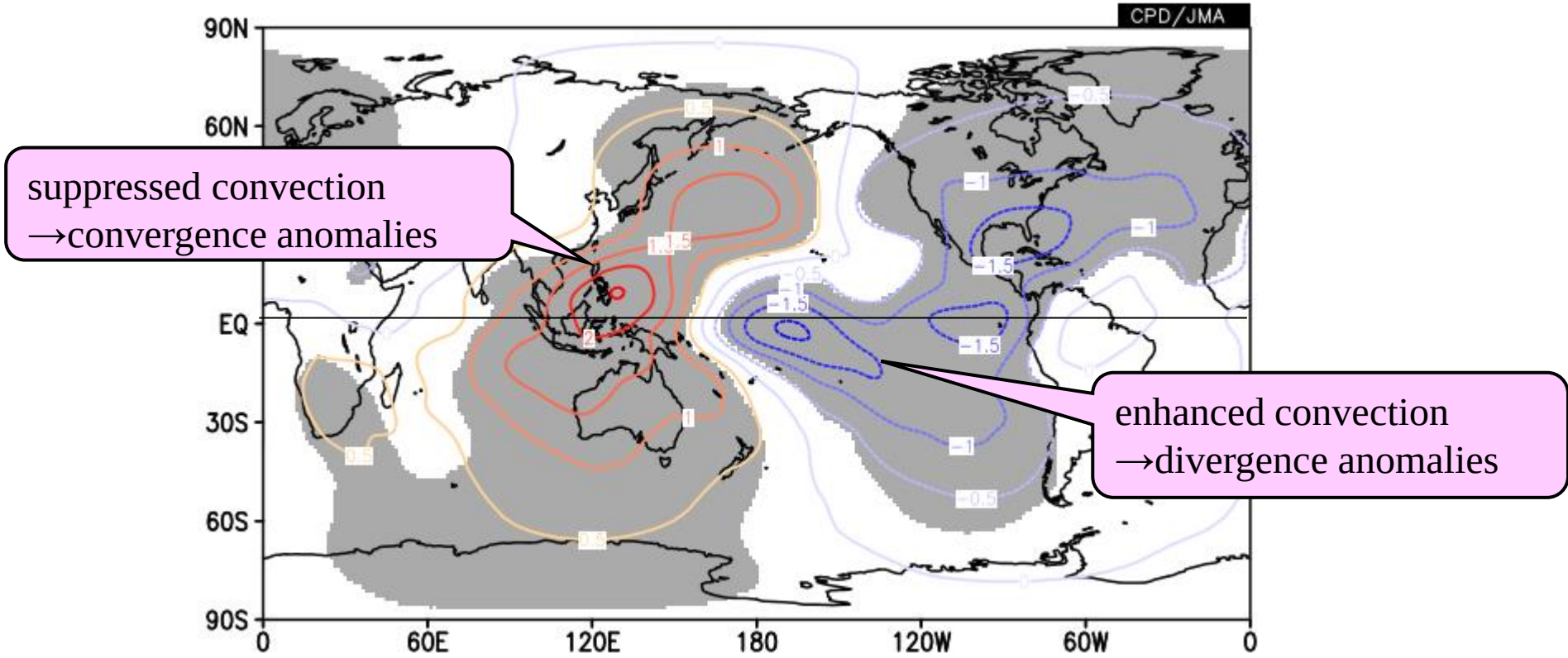
The base period for the analysis is 1979 – 2012. This is drawn by the ITACS.

Contour: regression coefficients

Gray shade: the area where regression coefficient is significant at 95% confidence level by t-testing

# Upper-level Divergence/Convergence

- In the El Nino phase, large-scale divergence anomalies were seen central to eastern Pacific, and large-scale convergence anomalies were seen over the Maritime Continent.




Regression coefficients of 200-hPa velocity potential onto NINO.3 SST indices (Jan.)

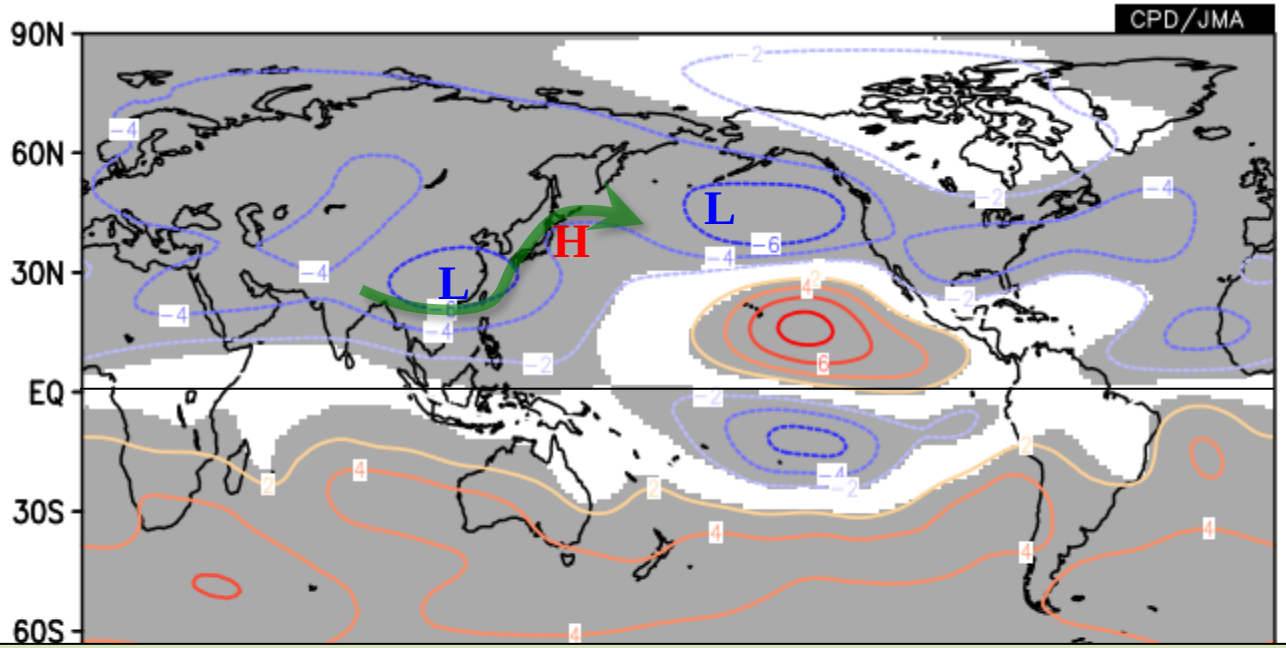
The base period for the analysis is 1958 – 2012. This is drawn by the ITACS.

Contour: regression coefficients

Gray shade: the area where regression coefficient is significant at 95% confidence level by t-testing

# Upper-level Circulation

- In the El Nino phase, cyclonic anomalies centered over southeastern China and anticyclonic anomalies to the east of Japan, as a result of the convergence anomalies over the Maritime Continent and Rossby wave propagation.
- This induces barotropic anticyclone to the east of Japan as well as anomalous southwesterly warm air advection which leads to enhanced extratropical cyclone activity.




Regression coefficients of 200-hPa stream function onto NINO.3 SST indices (Jan.)

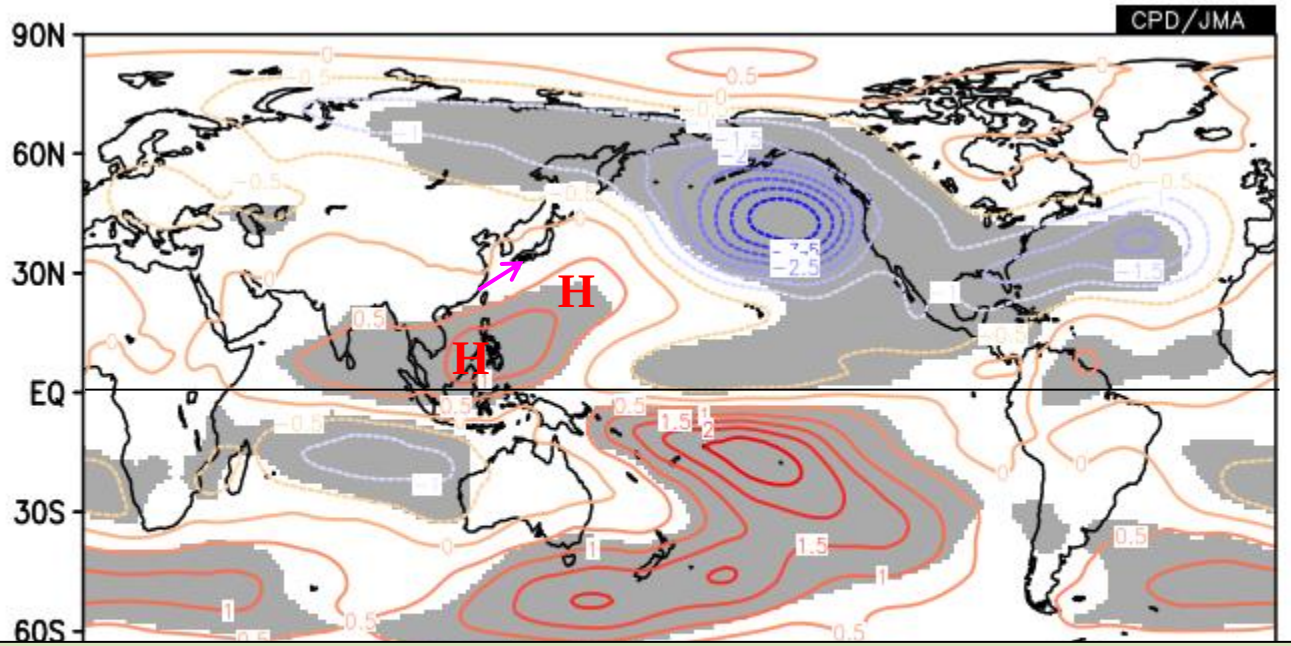
The base period for the analysis is 1958 – 2012. This is drawn by the ITACS.

Contour: regression coefficients

Gray shade: the area where regression coefficient is significant at 95% confidence level by t-testing

# Low-level Circulation

- In the El Nino phase, anticyclonic anomalies develop centered over the Philippines and to the east of Japan in response to convection anomalies and upper-tropospheric circulation.
- This induces anomalous warm and wet air advection toward Japan, and leads to weaker northwestern winter monsoon.




Regression coefficients of 850-hPa stream function onto NINO.3 SST indices (Jan.)

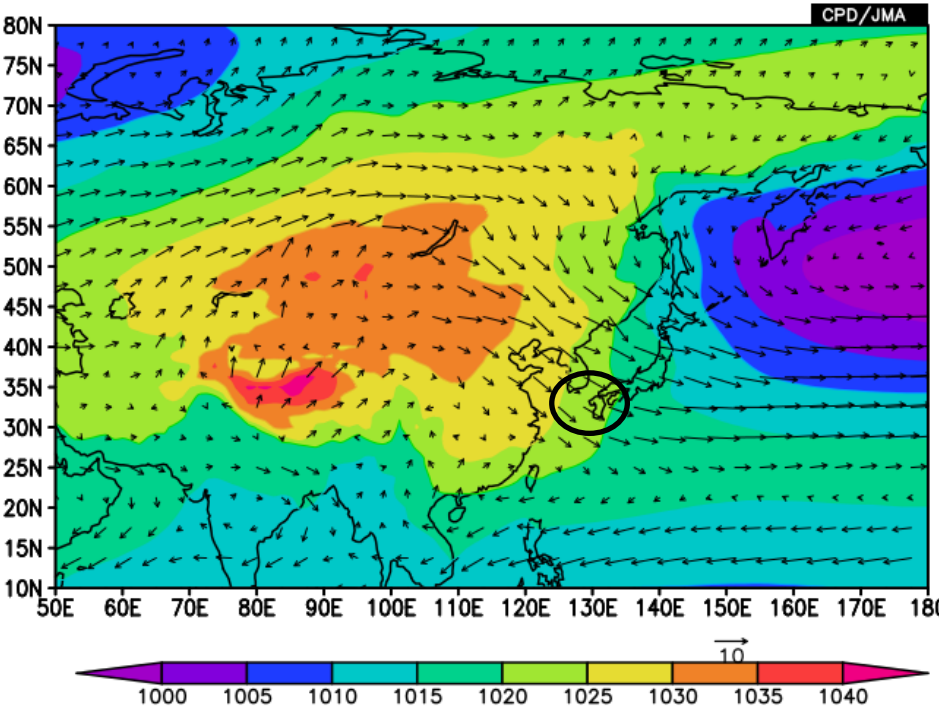
The base period for the analysis is 1958 – 2012. This is drawn by the ITACS.

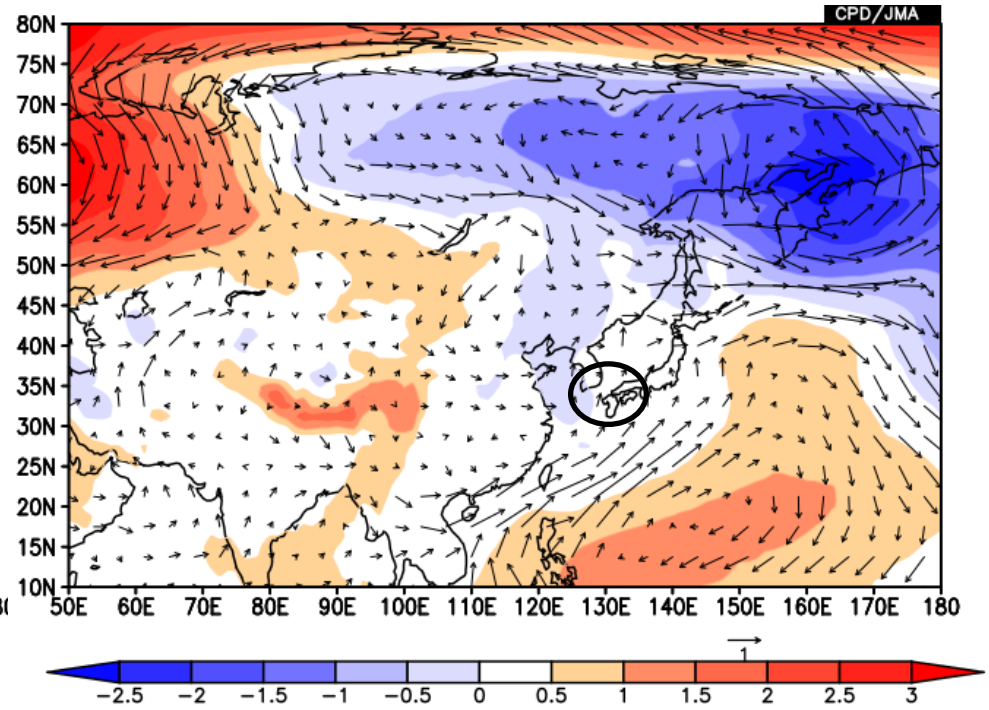
Contour: regression coefficients

Gray shade: the area where regression coefficient is significant at 95% confidence level by t-testing

# Winter monsoon around Japan

- In the El Nino phase, the winter monsoon (northwesterly winds) is tend to be weaker than normal.




Sea Level Pressure (shade) and wind vector at 850-hPa (vector) in January.

Left: normal (1981-2010 average), Right: composite map in the El Nino phase in 1958-2012.

This is drawn by the ITACS.

# Conclusion

- Fukuoka station (Japan) has statistical tendency of “Warm” temperature associated with El Nino condition in January.
- The mechanism of the tendency of Fukuoka station in El Nino phase in January is considered as following.
  a. In El Nino phase, convective activity is suppressed over and around t[illegible]es in El Nino p[illegible]
  b. I[illegible]over southeastern China and anticyclonic anomalies to the east of Japan as a result of the suppressed convective activity.
  c. Winter monsoon (northwesterly wind) tend to be week around Japan and warm and wet air advections affect climate in Japan.

Please conclude your findings from your exercise.