Second East Asian winter Seasonal Outlook Forum
29-31 October 2014
Tokyo, Japan

Statistical relationship between ENSO and East Asian climate

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Outline

1. Introduction
2. analysis method
3. Result (characteristics for winter and summer)
4. Summary

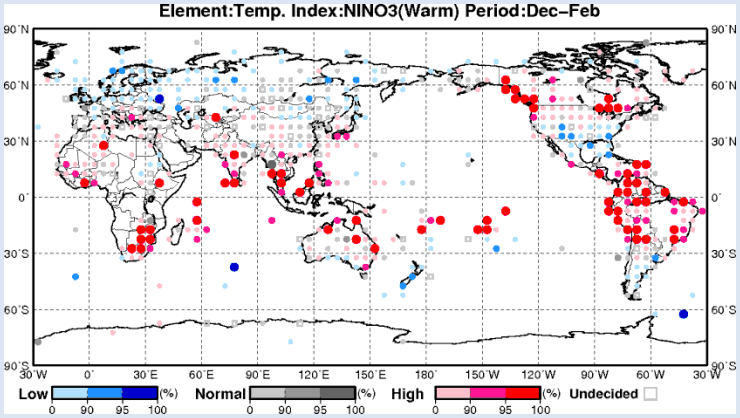
Introduction

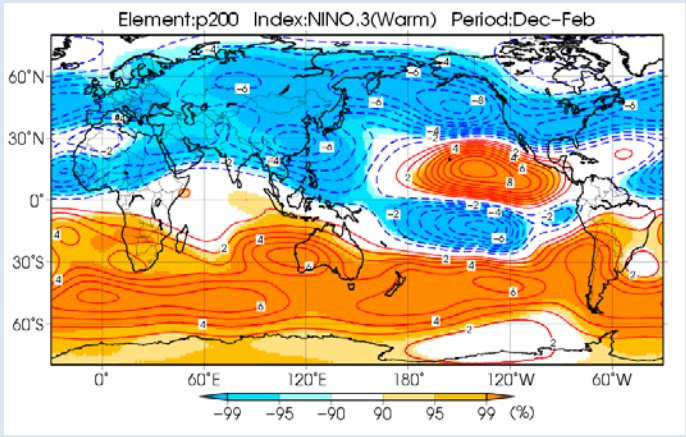
- ENSO is the most dominant mode of the climate system and the most reliable signal for seasonal prediction.
- JMA produced the products on statistical relationship between ENSO and the climate system using JRA-25 between 1979 and 2008 as atmospheric circulation data and provides the products in TCC website.
- JMA is currently producing new statistical products using JRA-55 between 1958 and 2012.

Analysis method

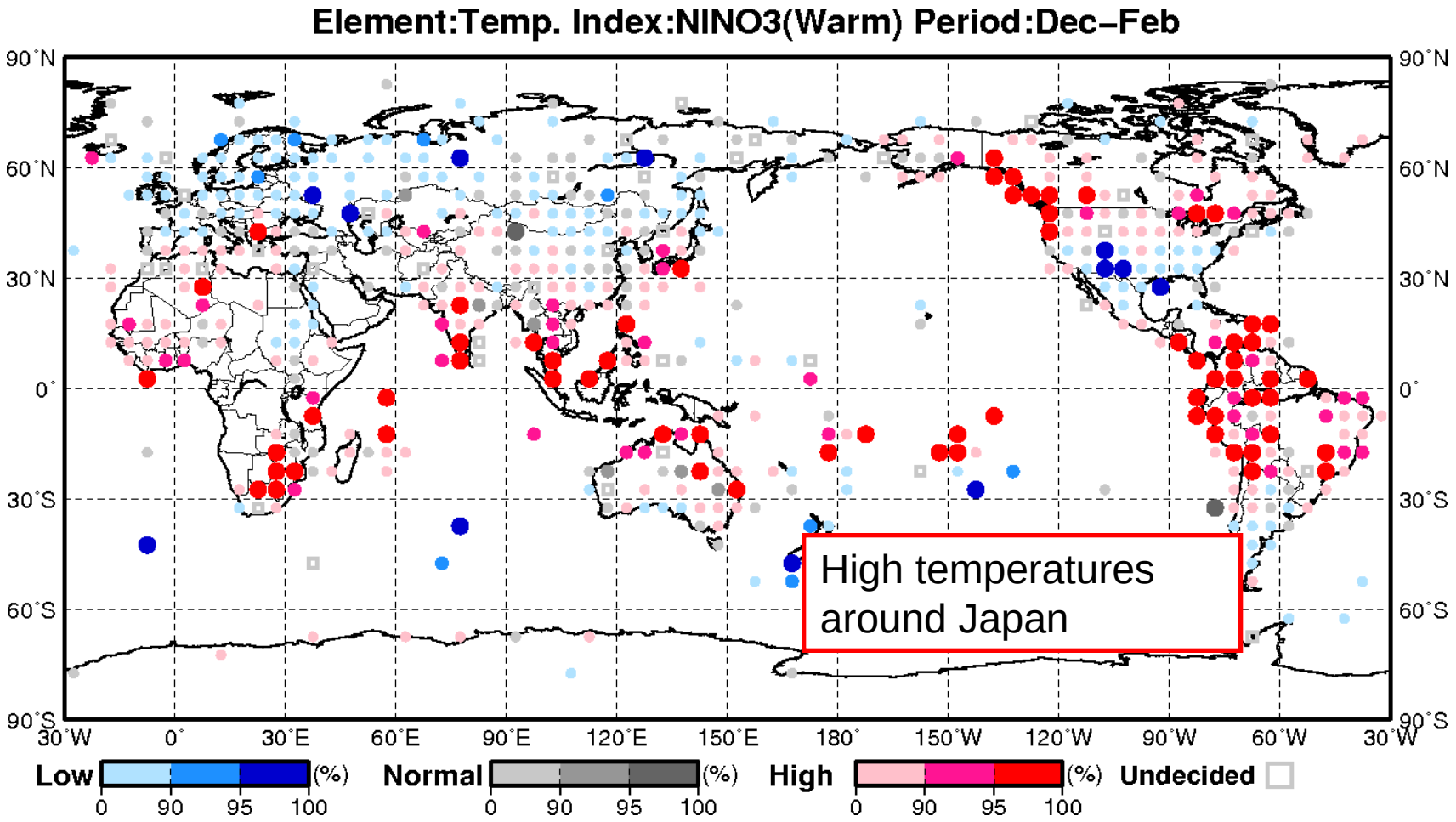
- We produced composite maps of climate and atmospheric circulations in El Nino and La Nina events from1958 to 2012.

- Please see the details of data and method in TCC website.





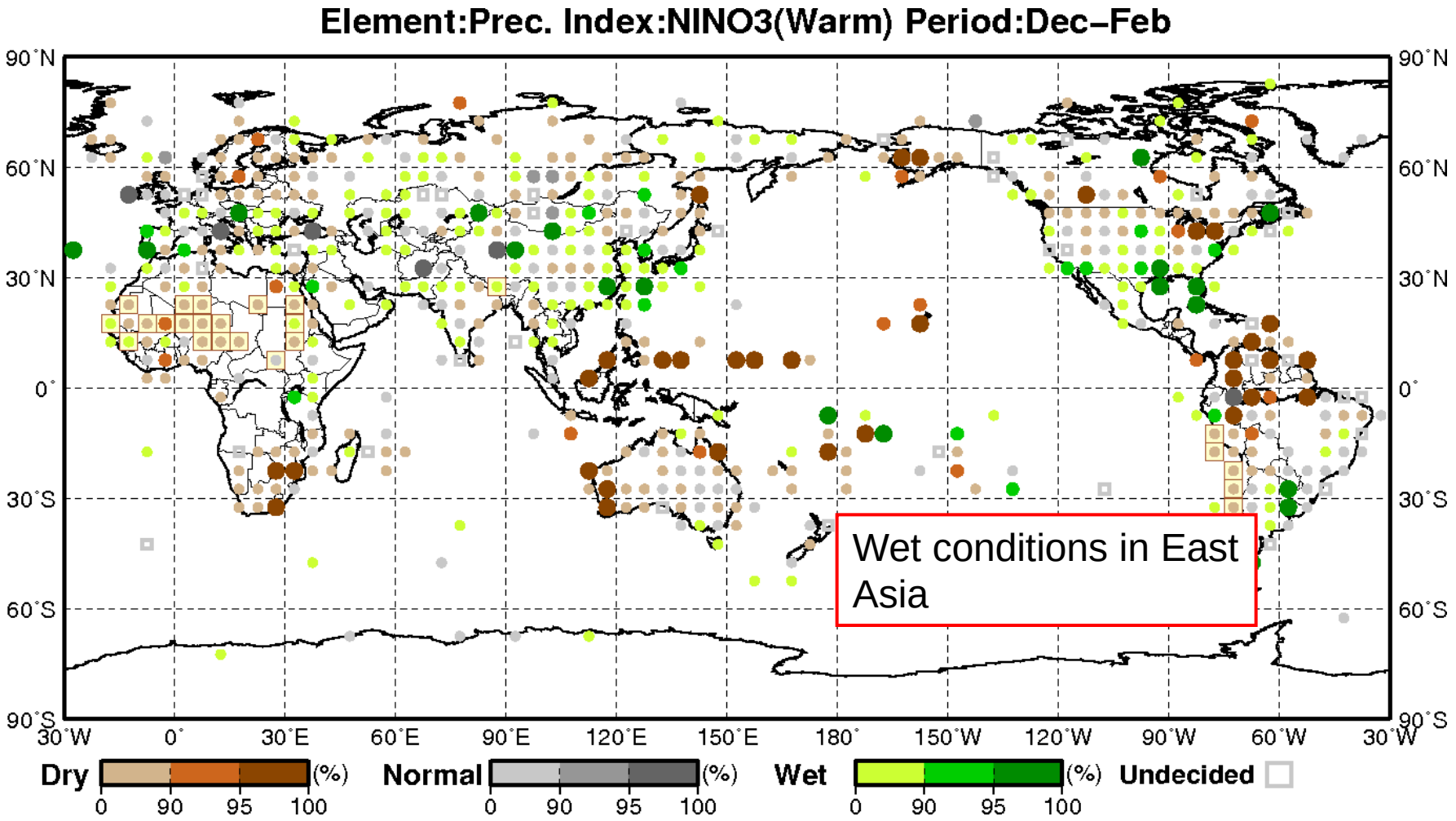
Winter(DJF) in El Nino events



Red: above normal Blue: below normal Grey: near normal

Color density: statistical confidence level as color bar.

Winter(DJF) in El Nino events

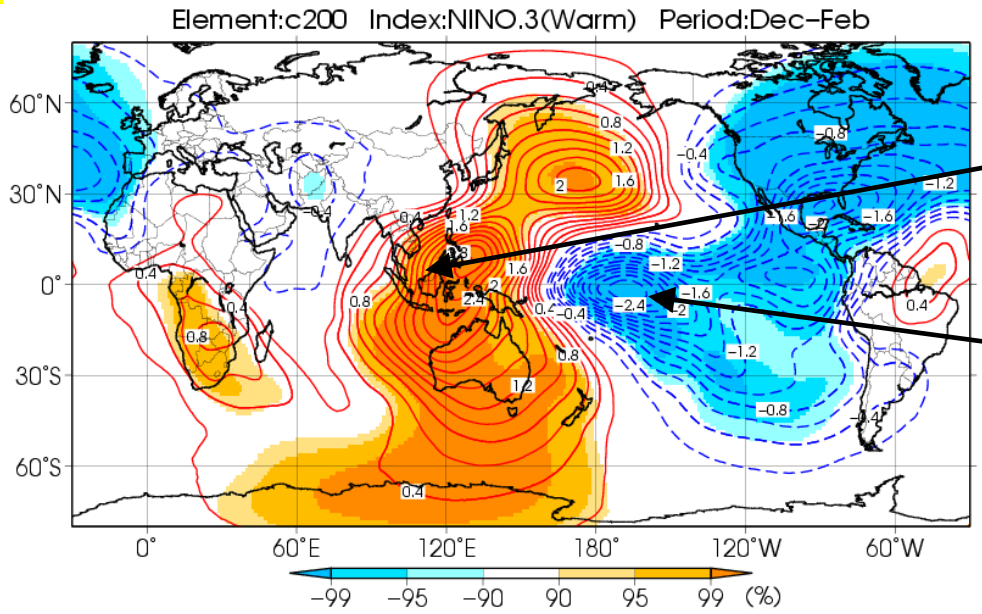


Green: above normal Brown: below normal Grey: near normal

Color density: statistical confidence level as color bar.

Winter(DJF) in El Nino events

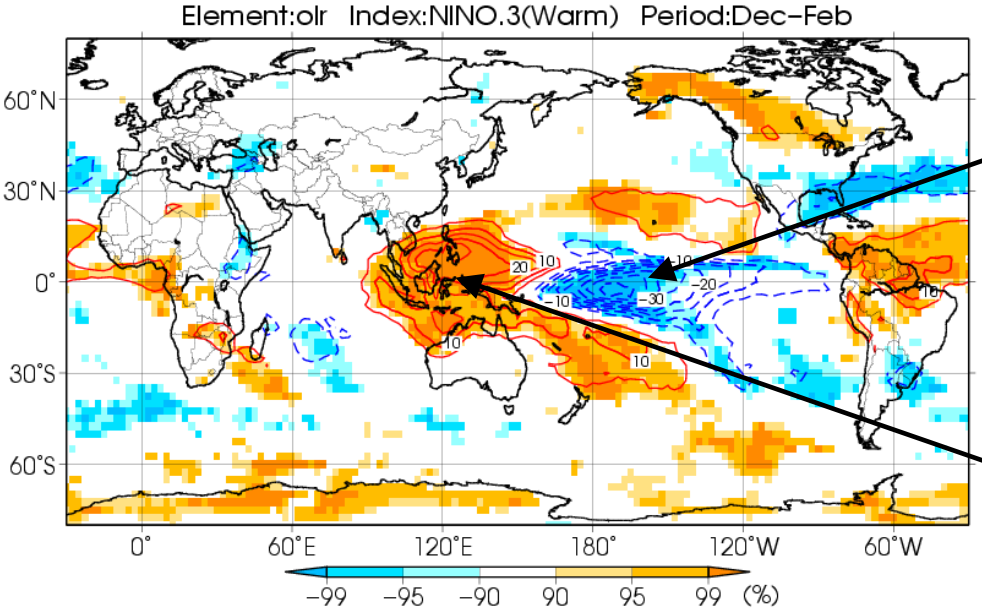
200hPa Velocity Potential anomalies



Large scale convergence anomalies

Large scale divergence anomalies

OLR anomalies

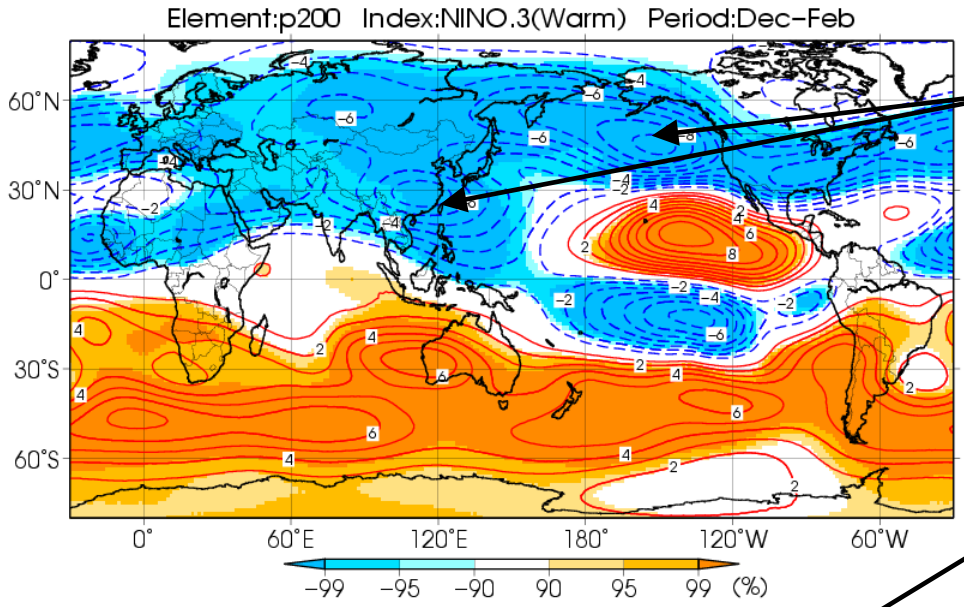


Active convection anomalies

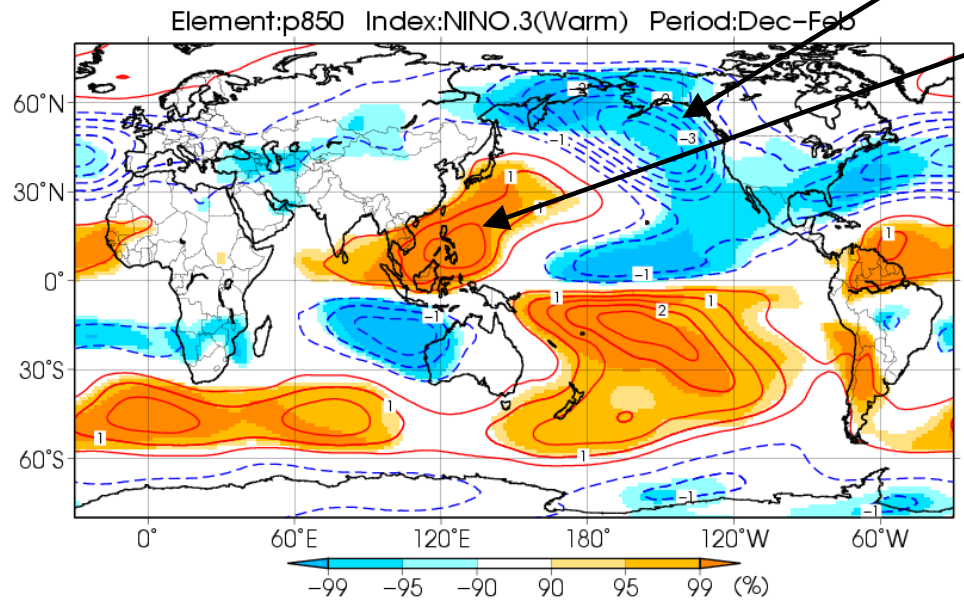
Suppressed convection anomalies

Winter(DJF) in El Nino events

200hPa stream function anomalies



850hPa stream function anomalies



Cyclonic circulation anomalies

Heat source response

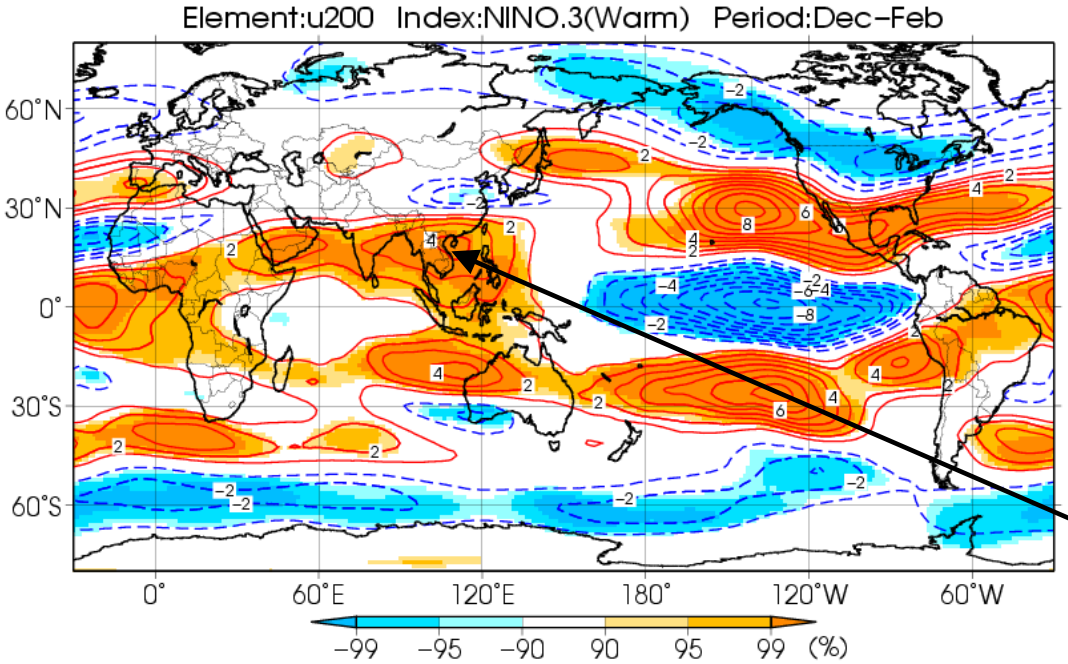
Cyclonic circulation anomalies

Anti-cyclonic circulation anomalies

The Aleutian low shift eastward.
Southerly wind anomalies are seen around south of Japan, meaning winter monsoon is weaker than normal.

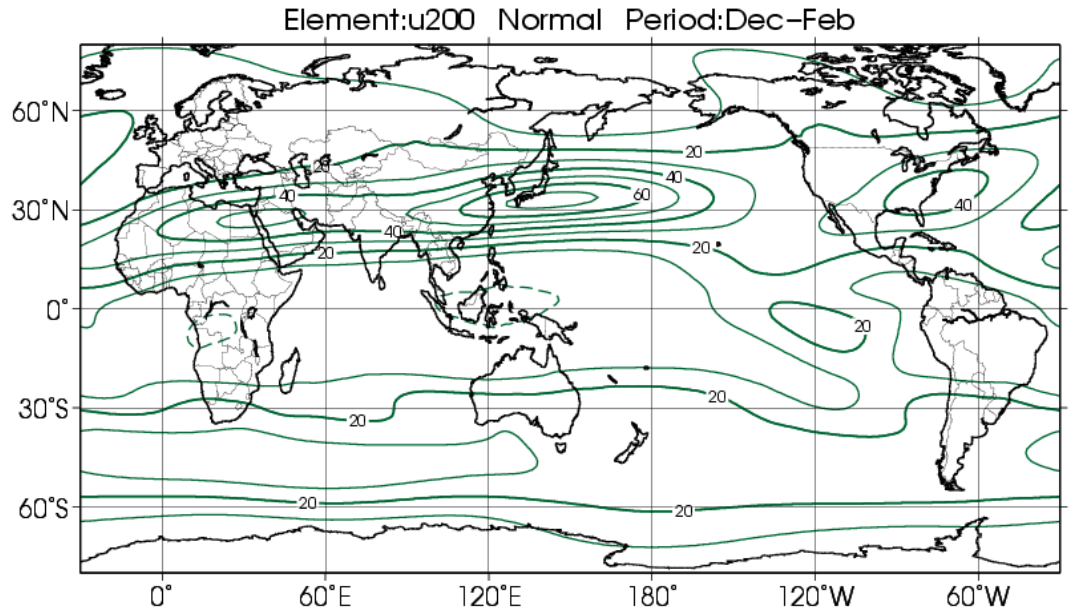
Winter(DJF) in El Nino events

200-hPa zonal wind anomalies



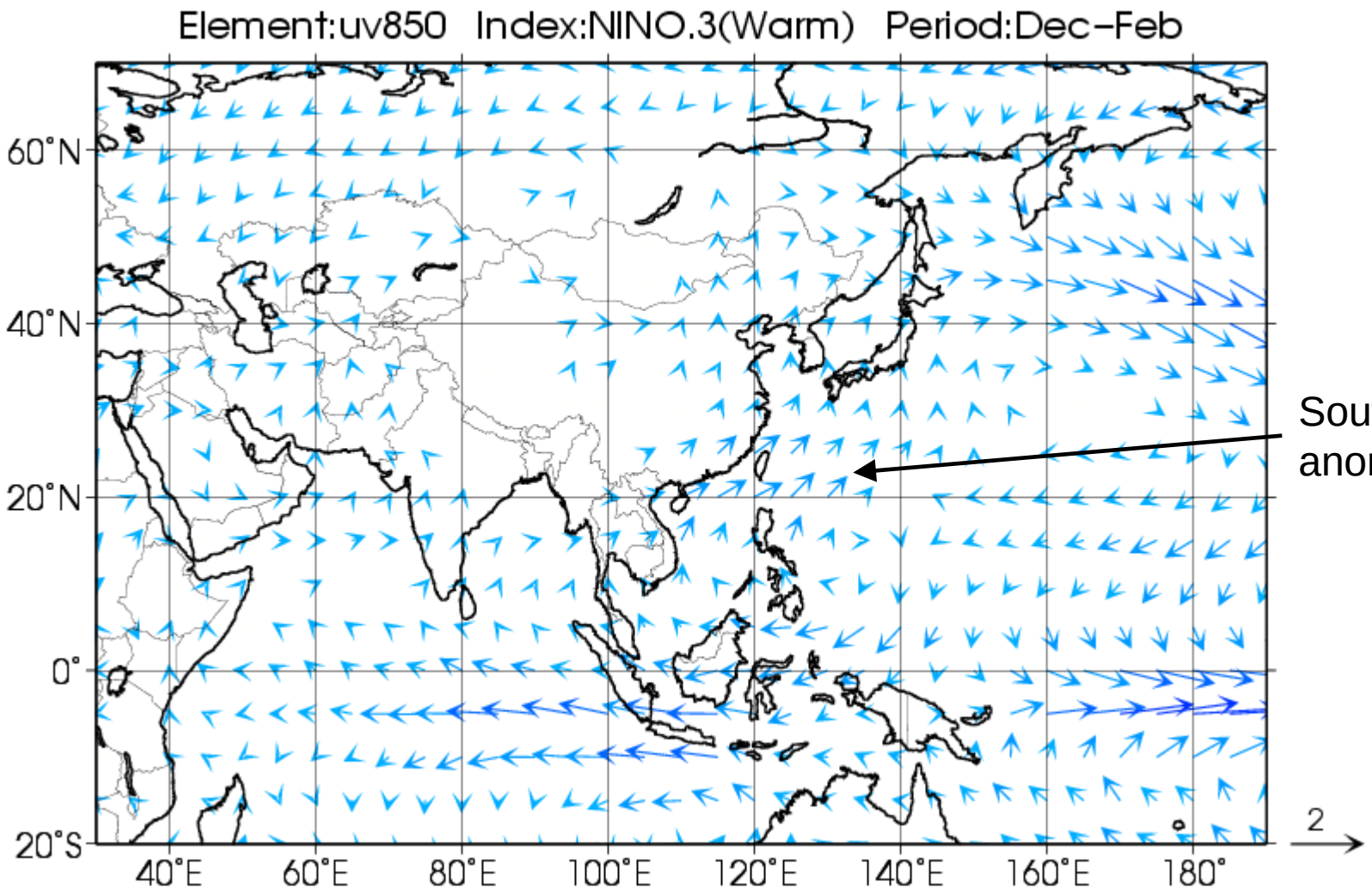
Shift southward

200-hPa zonal wind normal



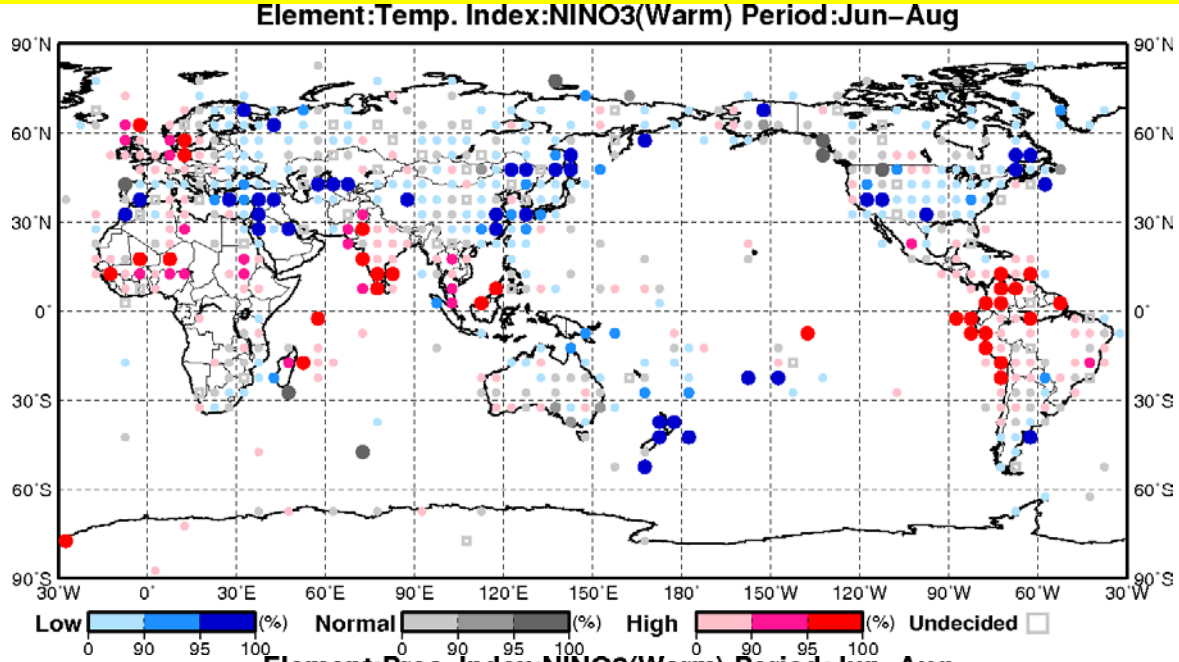
Winter(DJF) in El Nino events

850-hPa wind vector anomalies

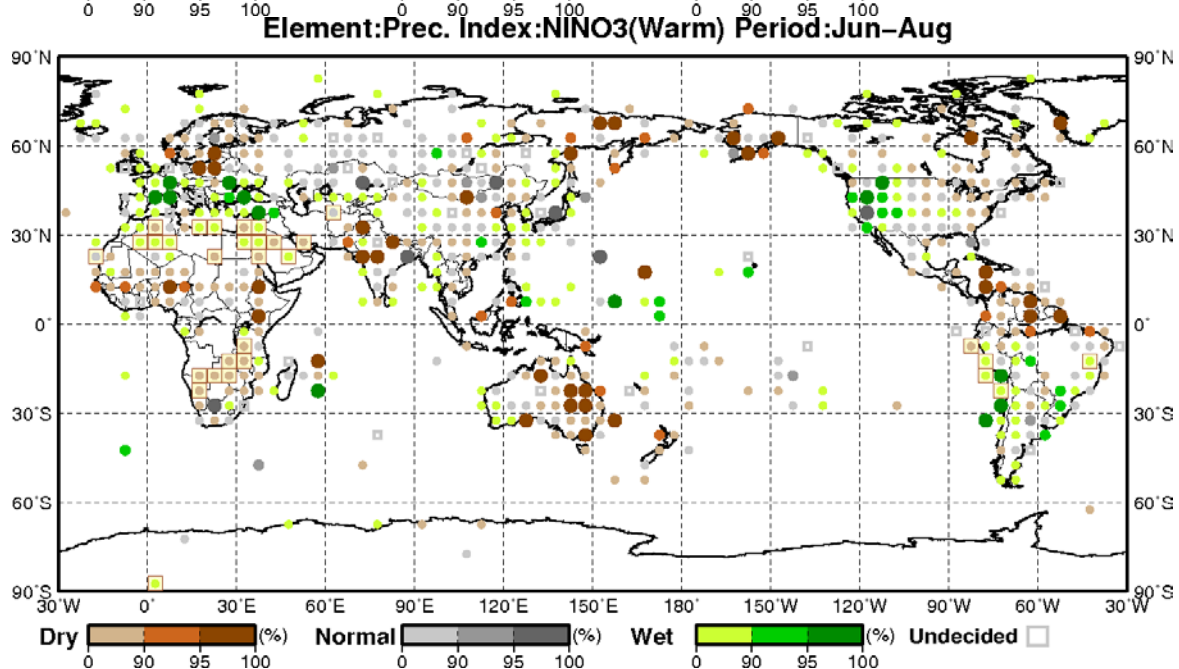


Southerly wind anomalies

Summer(JJA) in El Nino events



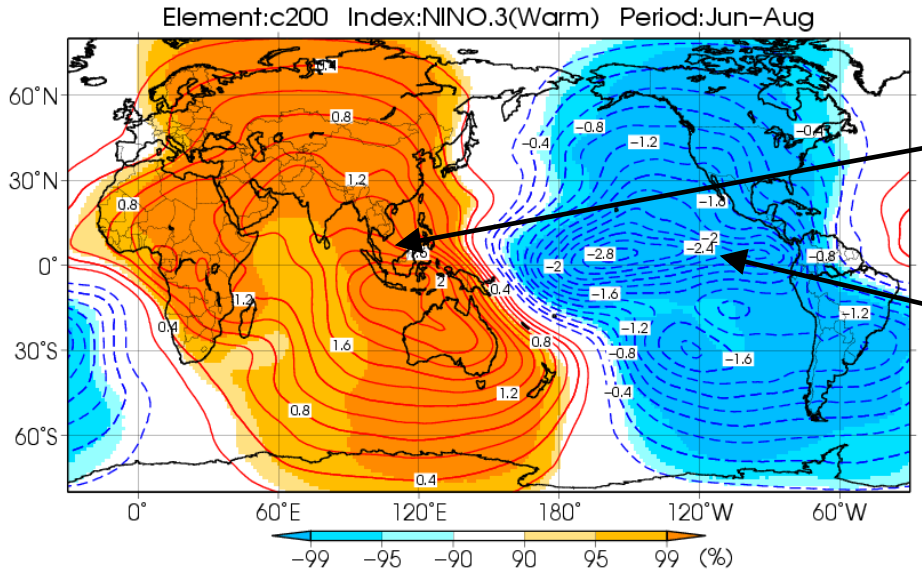
Low temperatures in eastern East Asia



Dry conditions in northern China and southern Mongolia.

Summer(JJA) in El Nino events

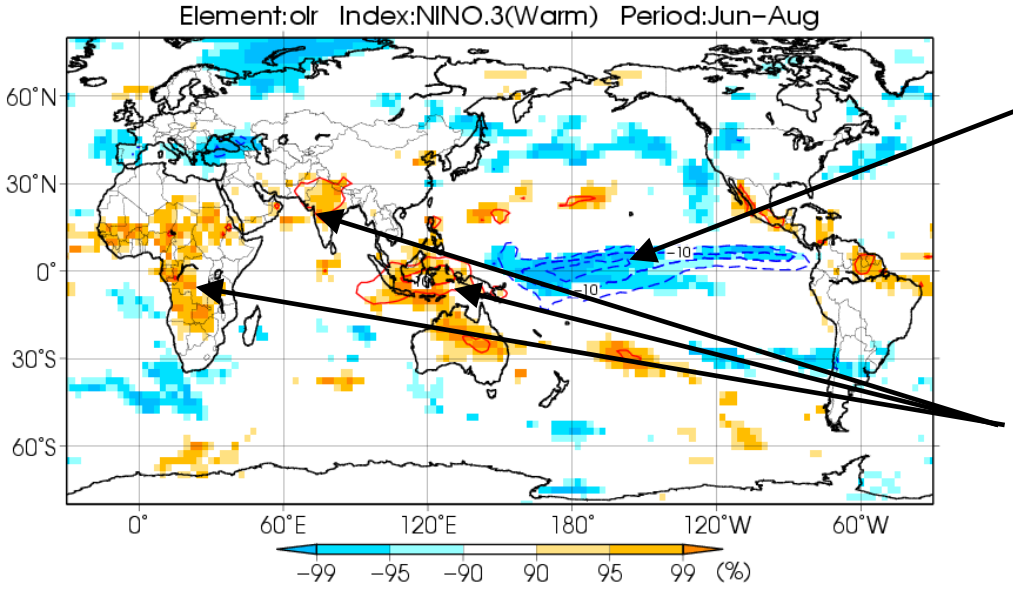
200hPa Velocity Potential anomalies



Large scale convergence anomalies

Large scale divergence anomalies

OLR anomalies

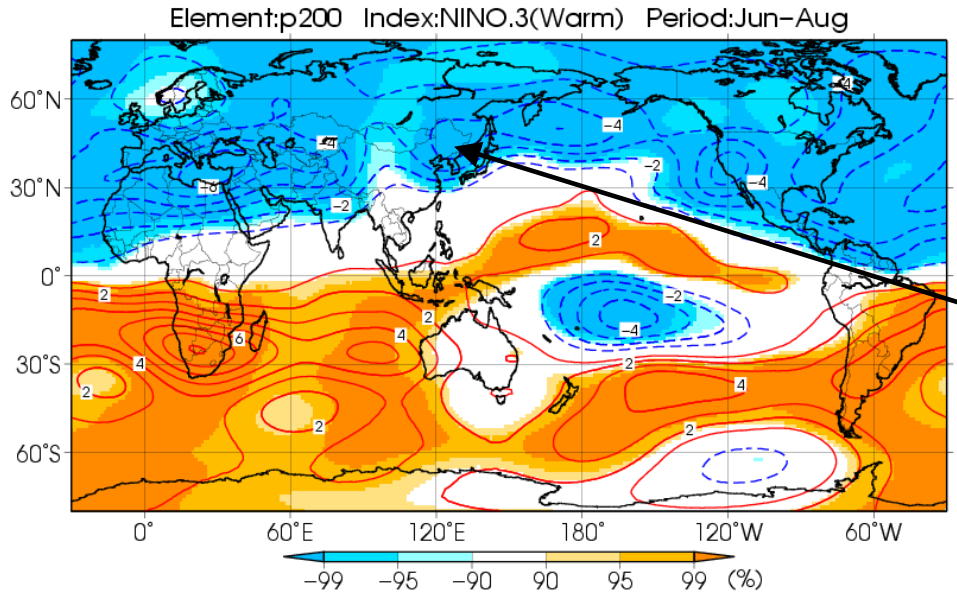


Active convection anomalies

Suppressed convection anomalies

Summer(JJA) in El Nino events

200hPa stream function anomalies

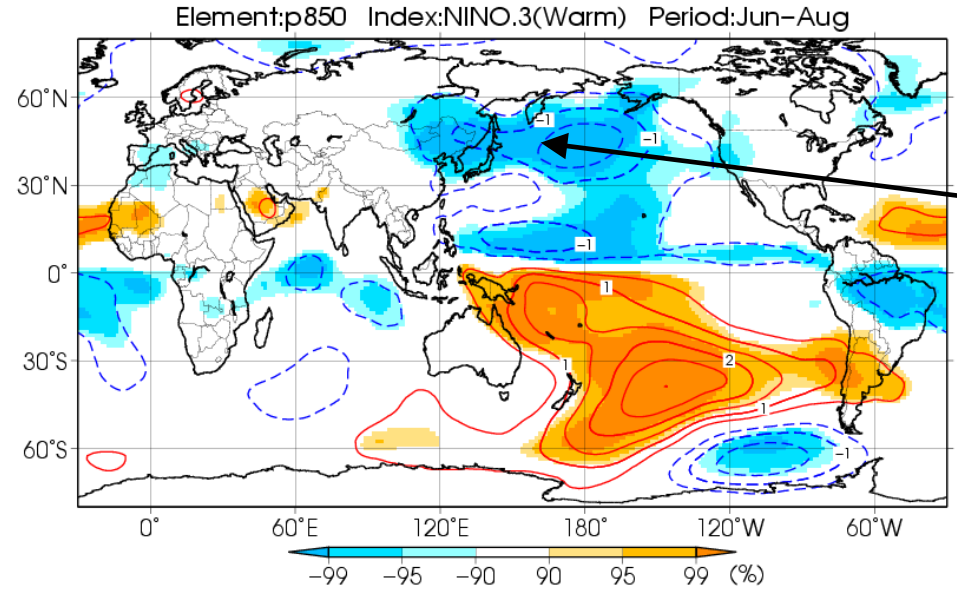


Cyclonic circulation anomalies

Cyclonic circulation anomalies

The Tibetan High is weaker than normal over its northeastern part.

850hP stream function anomalies

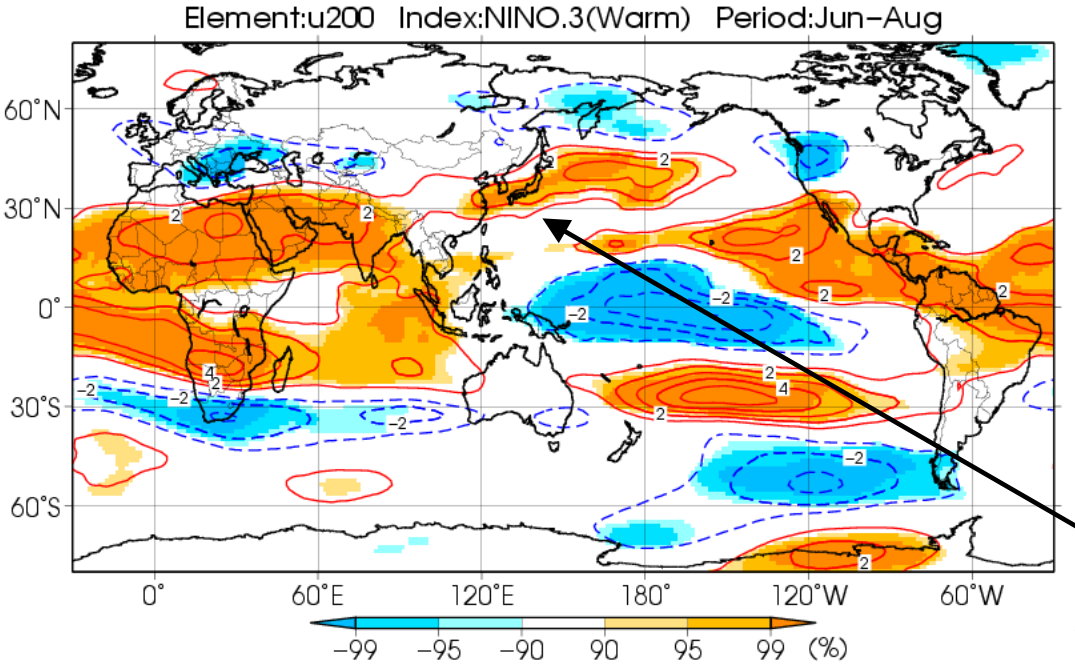


Cyclonic circulation anomalies

The Northwestern Pacific High is weaker than normal.

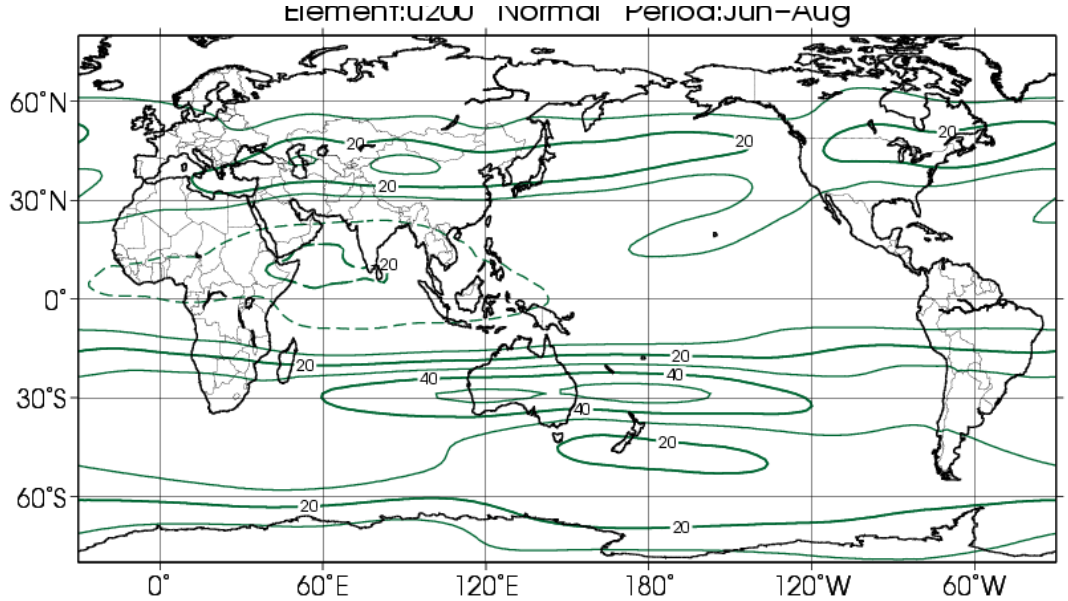
Summer(JJA) in El Nino events

200-hPa zonal wind anomalies

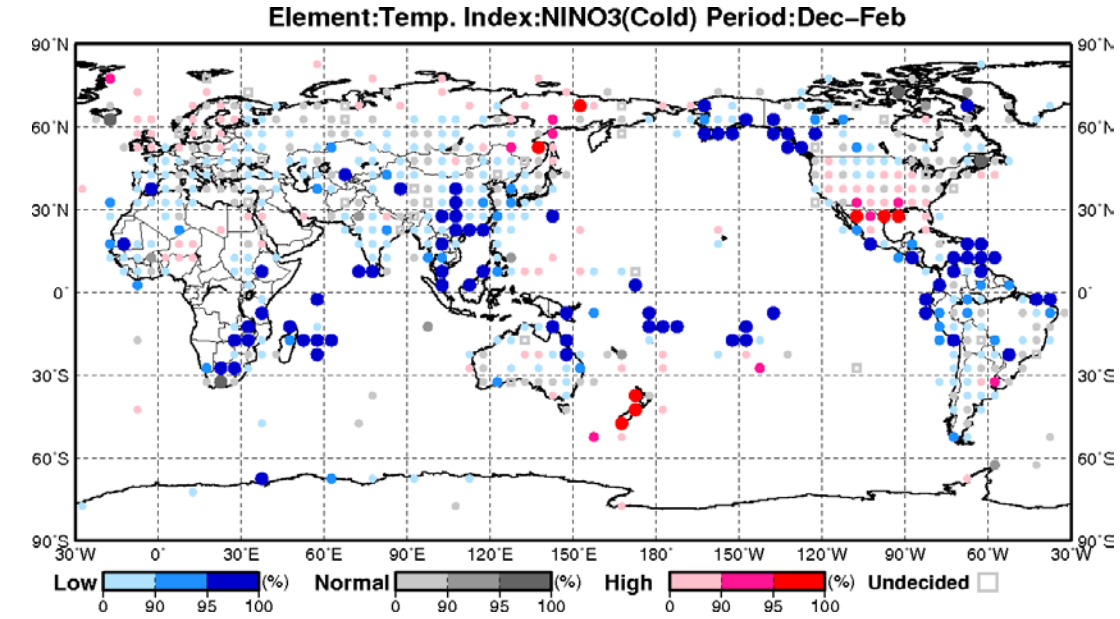


Shift southward

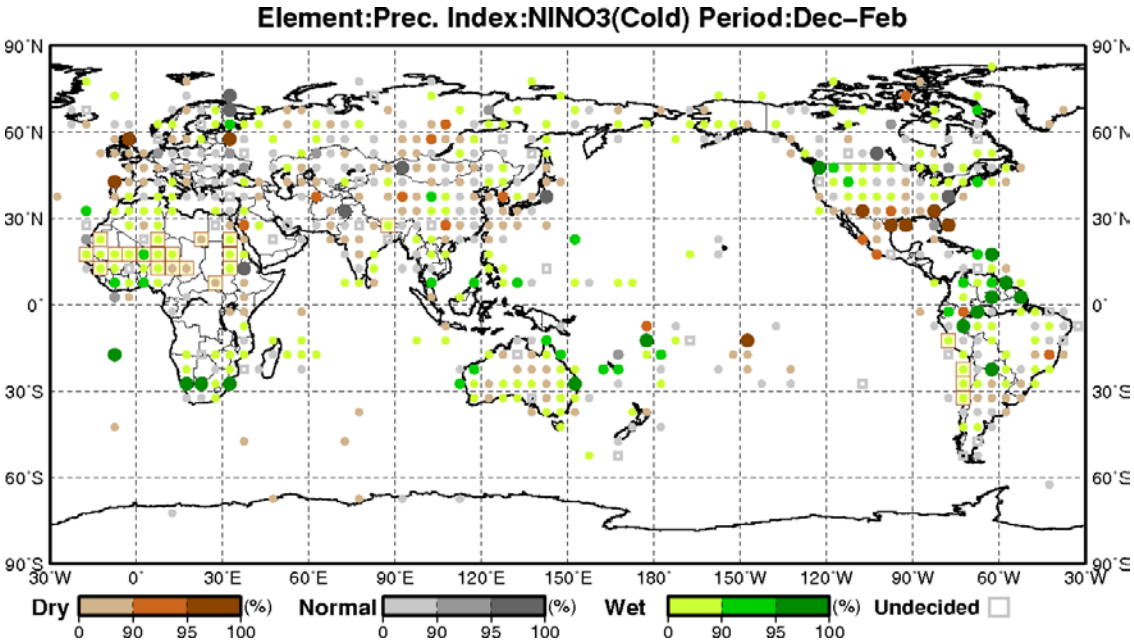
200-hPa zonal wind normal



Winter(DJF) in La Nina events



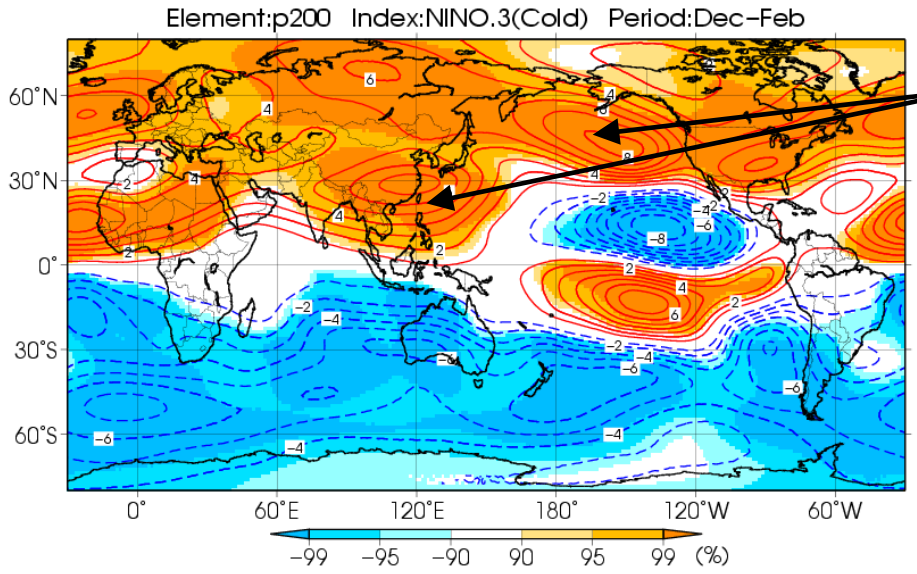
Low temperatures in southern East Asia



Dry conditions in the Korean Peninsula and a part of China

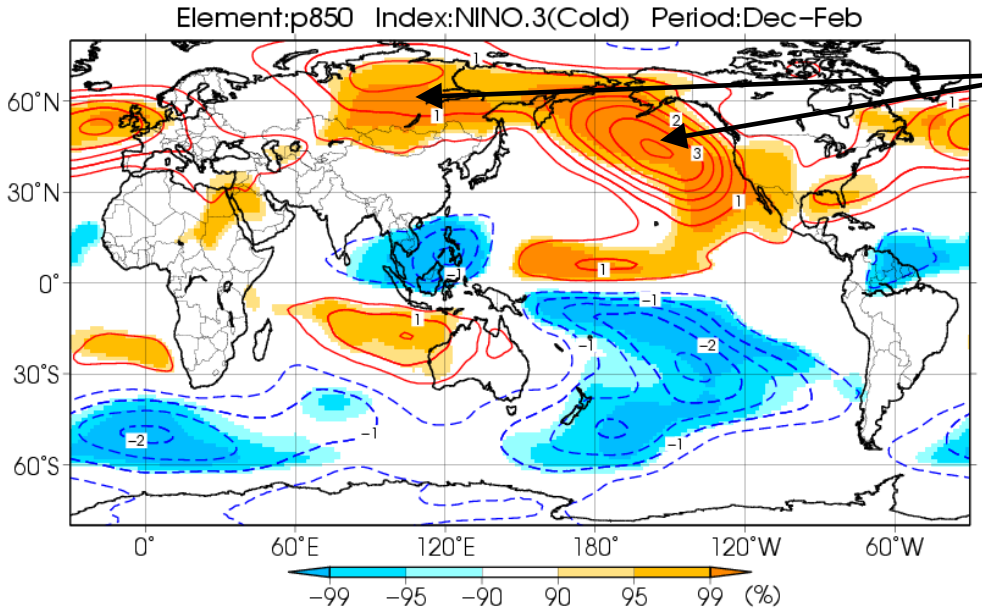
Winter(DJF) in La Nina events

200hPa stream function anomalies



Anti-cyclonic circulation anomalies

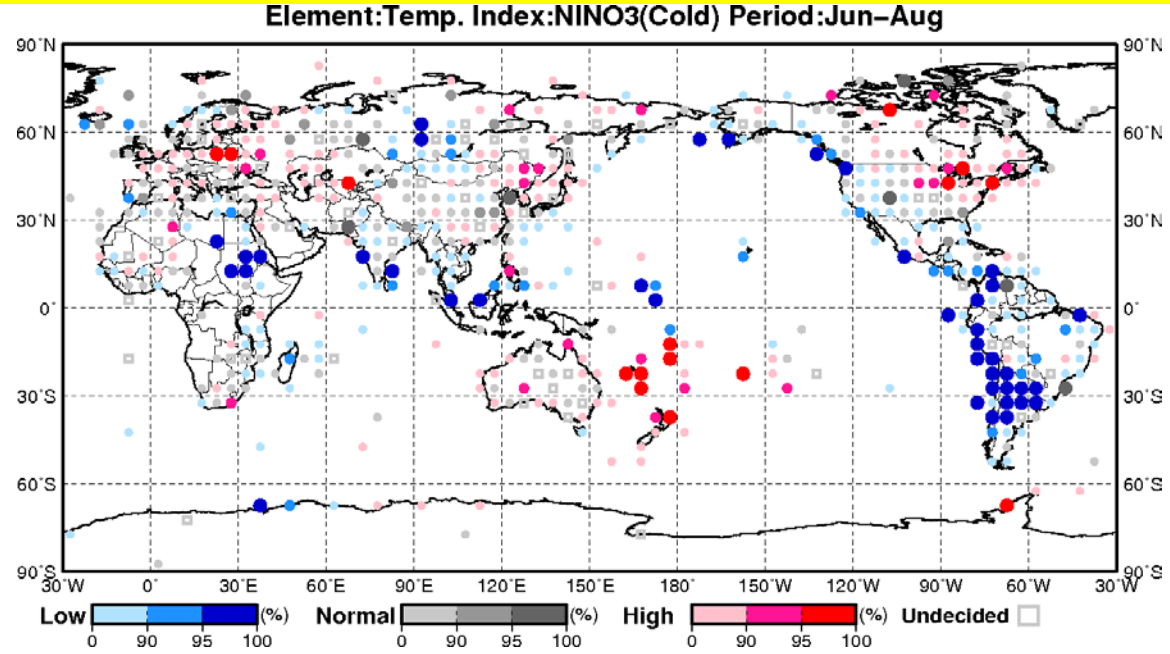
850hPa stream function anomalies



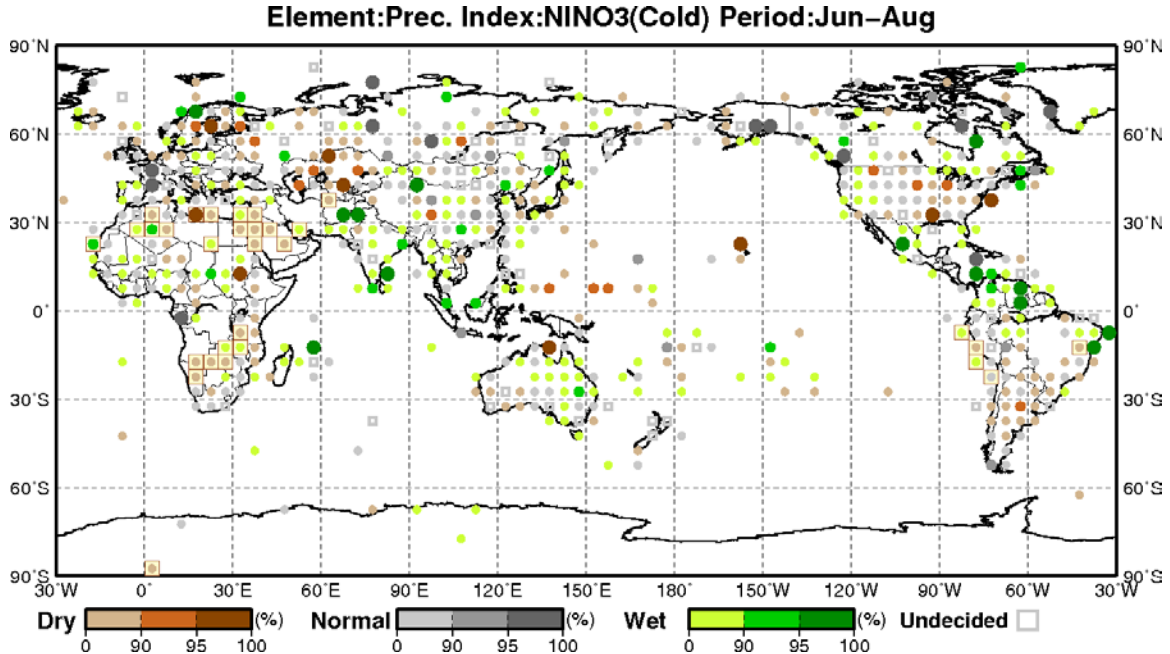
Anti-cyclonic circulation anomalies

The Aleutian low is weaker than normal.
The Siberian high is stronger than normal.

Summer(JJA) in La Nina events



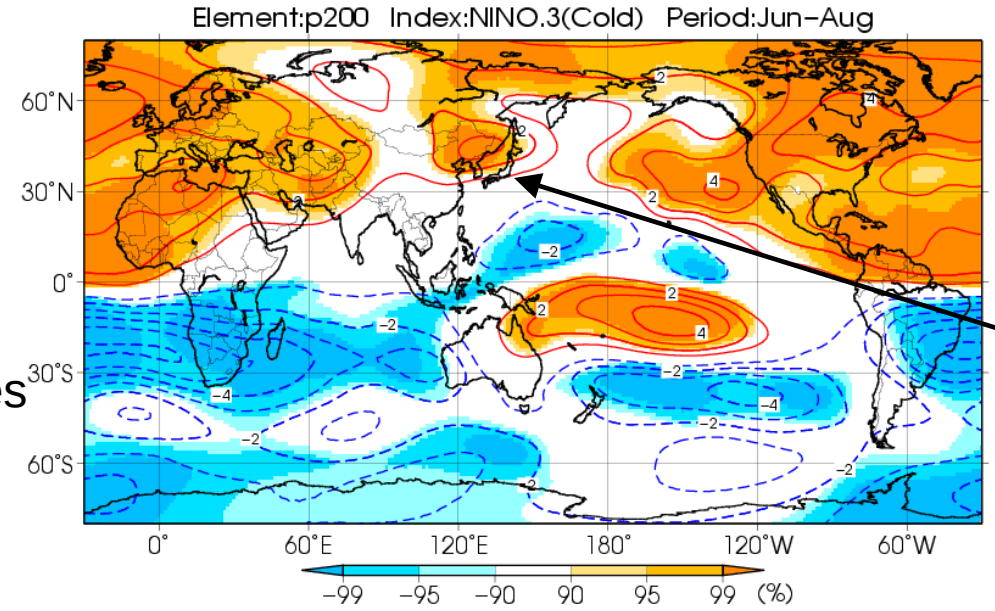
High temperatures in north east China.
Low temperature in central Siberia.



Wet conditions in some area of East Asia

Summer(JJA) in La Nina events

200hpa stream function anomalies

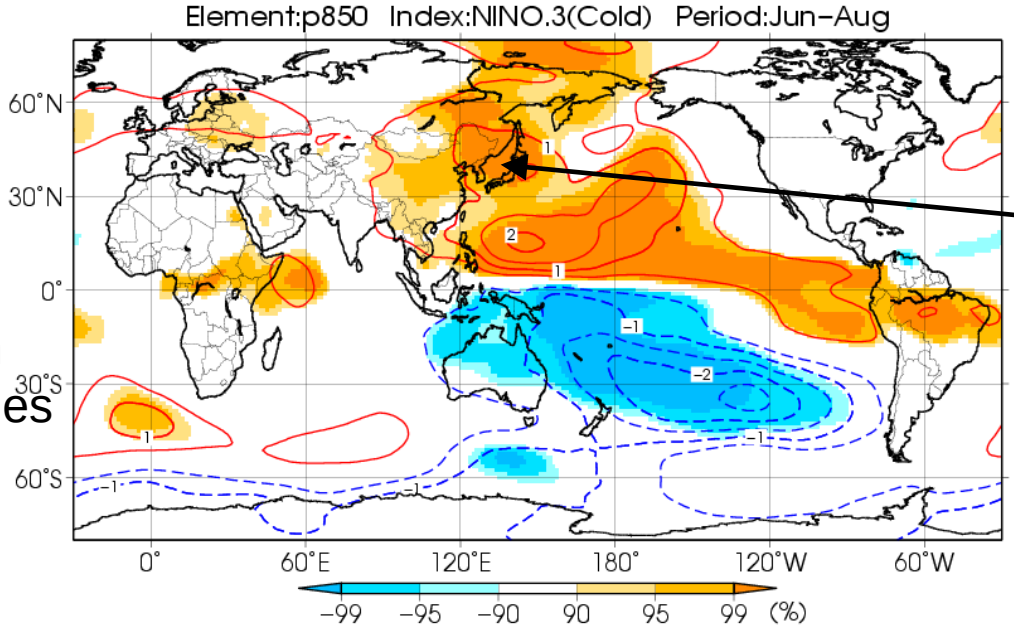


Anti-cyclonic circulation anomalies

Anti-cyclonic circulation anomalies

The Tibetan high is stronger than normal over its northeast side.

850hpa stream function anomalies



Anti-cyclonic circulation anomalies

The Northwestern Pacific High is stronger than normal.

Summary

- We produced the statistical relationship between ENSO and Climate by the period 1958-2012.
- Characteristics of East Asian winter monsoon seen in El Nino events are as follows.

  - Weaker-than-normal monsoon in southern and eastern parts of East Asia.

  - Wet conditions in a southeastern part of East Asia.

  - Warm conditions around Japan.

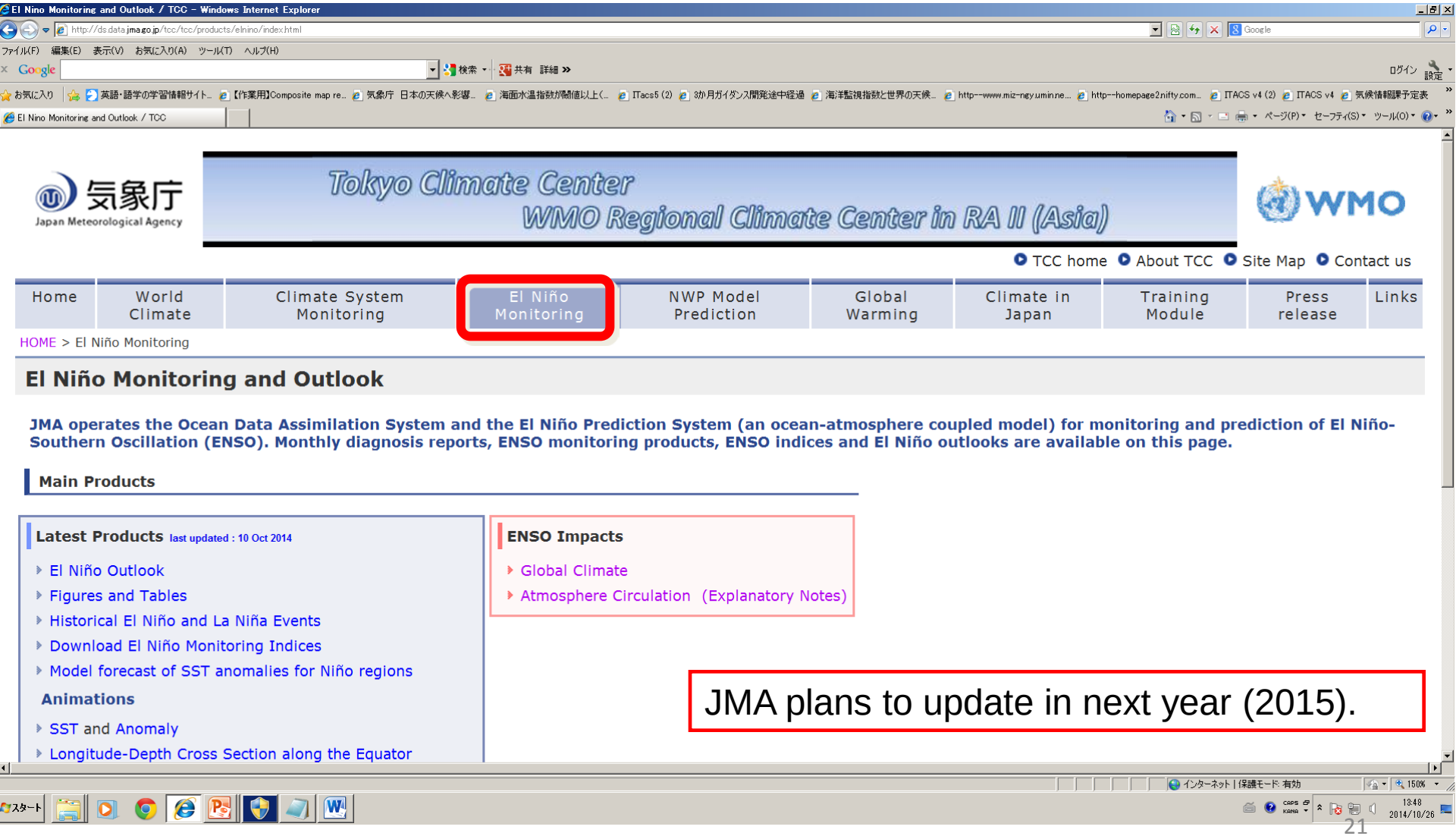
Summary

We expect that it will be used

- in understanding of the mechanism how ENSO affect atmospheric circulations.
- in interpretation of the product of seasonal predicted model and in estimating reliability of one.
- in explanation of seasonal forecast and extreme climate.

El Niño Monitoring

- ENSO Impacts are available on the TCC website.
  http://ds.data.jma.go.jp/tcc/tcc/products/elnino/index.html



Thank you