# Monthly Highlights on the Climate System (February 2015)

Highlights in February 2015

- El Niño event, which had emerged since Northern Hemisphere summer 2014, is likely to have ended (see *El Niño Outlook* updated on 10 March 2015).
- Monthly total snowfall depths were the least on record for February on the Sea of Japan side of northern Japan.
- Monthly mean temperatures were extremely low from southeastern Canada to the eastern USA, and were extremely high around the western USA.
- In the 500-hPa height field, the polar vortex was stronger than normal over the Atlantic, and a pronounced ridge and trough were observed over western and eastern North America, respectively.
- Convective activity was enhanced over the western Pacific and the eastern North Pacific, and was suppressed around Indonesia.
- Remarkably positive SST anomalies were observed in the western equatorial Pacific.

## Climate in Japan:

Since the winter monsoon was weaker than normal, monthly mean temperatures were above normal in northern Japan, and total snowfall depths were the least on record for February since 1961 on the Sea of Japan side of northern Japan. Meanwhile, some rapidly developing low pressure systems brought blizzards to northern Japan. In other regions, temperatures were below and above normal in the first and second half of the month, respectively

## World Climate:

The monthly anomaly of the global average surface temperature in February 2015 (i.e., the combined average of the near-surface air temperature over land and the SST) was +0.25°C (3rd warmest since 1891) (preliminary value) (Fig. 2). On a longer time scale, global average surface temperatures have risen at a rate of about 0.76°C per century in February (preliminary value).

Extreme climate events were as follows (Fig. 3).

- Monthly mean temperatures were extremely high around the southern part of Eastern Siberia.
- Monthly precipitation amounts were extremely heavy around the southern part of Central Asia.
- Monthly mean temperatures were extremely low from southeastern Canada to the eastern USA, and were extremely high around the western USA.

## Extratropics:

In the 500-hPa height field (Fig. 4), the polar vortex was stronger than normal over the Atlantic, and positive anomalies were observed over the area from Eastern Siberia to Alaska. A pronounced ridge and trough were observed over western and eastern North America, respectively. The jet stream over the area from South Asia to the central Pacific shifted southward of its normal position (Fig. 5). The Siberian High was weaker than normal. The Aleutian Low was stronger than normal over the southeastern part of its normal extent.

## Tropics:

Convective activity was enhanced over the western Pacific and the eastern North Pacific, and was suppressed around Indonesia (Fig. 6). The active phase of the Madden-Julian Oscillation (MJO) propagated eastward from the eastern Pacific through South America to the Indian Ocean from early to mid-February. The amplitude of the MJO weakened in late February (Fig. 7). In the equatorial lower troposphere, westerly wind anomalies were dominant over the western Pacific in early and mid-February and over the central Pacific in late February (Fig. 7). In the upper troposphere, equatorial symmetric anticyclonic circulation anomalies were seen over the central Pacific (Fig. 8). The Southern Oscillation Index value was +0.1 (Fig. 10).

## Oceanographic Conditions:

Remarkably positive SST anomalies were observed in the western equatorial Pacific. The monthly mean SST anomaly in the NINO.3 region was +0.1˚C and the SST deviation from the latest sliding 30-year mean was +0.2 ˚C.

In the North Pacific, remarkably positive SST anomalies were observed from the Bering Sea through south of Alaska and the coast of North America to near 15˚N, 170˚W, and remarkably negative SST anomalies were observed from south of Japan to near 30˚N, 155˚W. In the South Pacific, remarkably positive SST anomalies were observed around 15˚S, 180˚, and from near 50˚S, 160˚W to near 40˚S, 80˚W, and remarkably negative SST anomalies were observed from the coast of Chile to near 15˚S, 115˚W, and around 35˚S, 175˚W.

In the Indian Ocean, remarkably positive SST anomalies were observed in the west of Australia.

In the North Atlantic, remarkably positive SST anomalies were observed from near the eastern coast of North America to near 35˚N, 30˚W, and remarkably negative SST anomalies were observed from near 55˚N, 50˚W to near 55˚N, 15˚W.

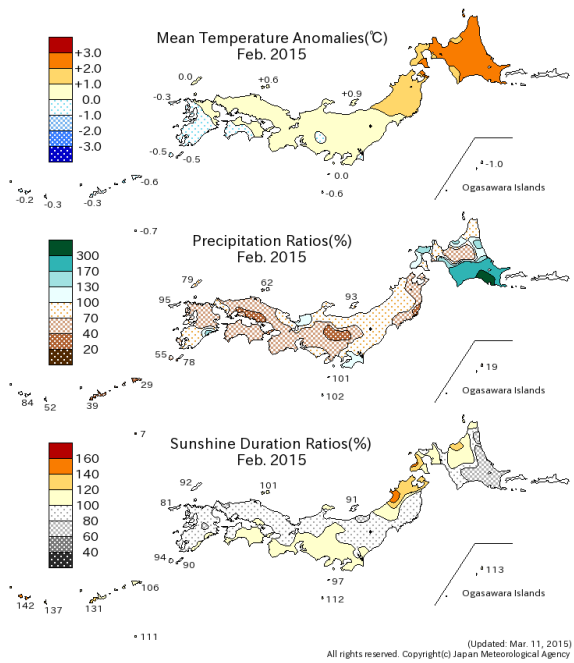


Fig. 1 Monthly climate anomaly / ratio over Japan (February 2015)
Top: temperature anomalies (degree C)
Middle: precipitation ratio (%)
Bottom: sunshine duration ratio (%)
Anomalies are defined as the deviations from the normal (1981-2010 average).

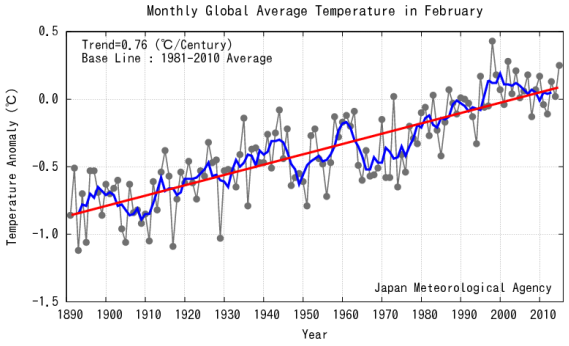


Fig. 2 Long-term change in monthly anomalies of global average surface temperature in February
The thin black line indicates anomalies of the surface temperature in each year. The blue line indicates five-year running mean, and the red line indicates a long-term linear trend. Anomalies are deviations from the 1981-2010 average.

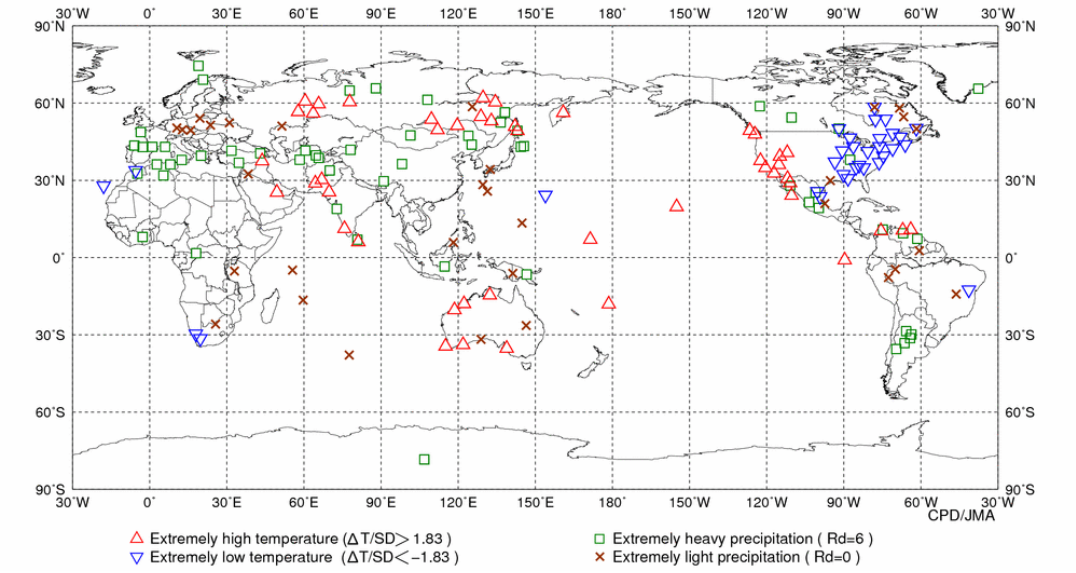


Fig. 3 Distribution of extreme climate events (February 2015)

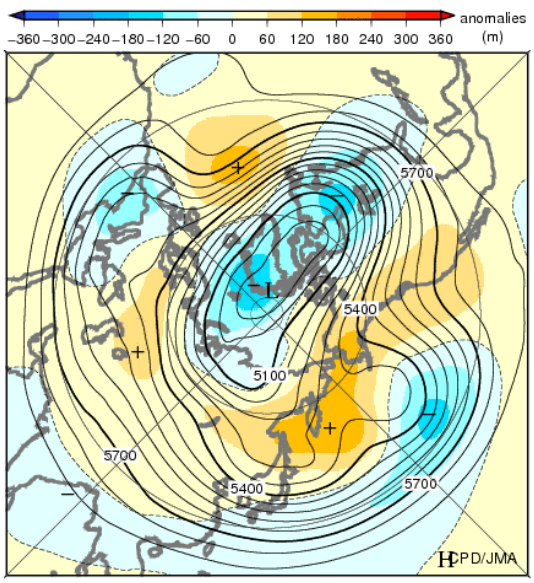


Fig. 4 Monthly mean 500-hPa height and anomaly in the Northern Hemisphere (February 2015)
The contours show heights at intervals of 60 m. The shading indicates height anomalies. The base period for the normal is 1981-2010.

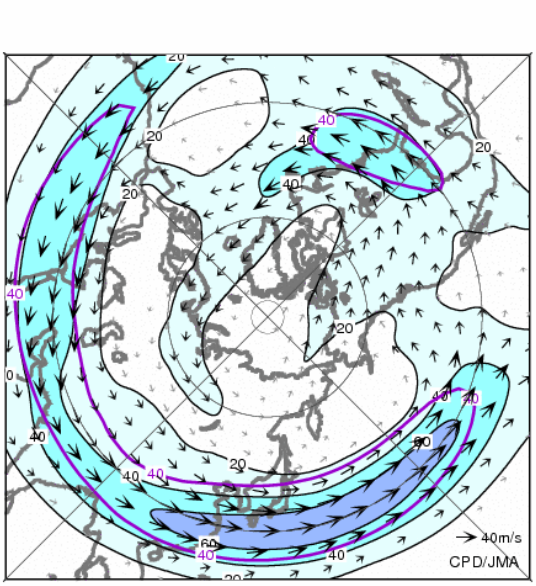


Fig. 5 Monthly mean 200-hPa wind speed and vectors in the Northern Hemisphere (February 2015)
The black lines show wind speeds at intervals of 20 m/s. The darkest blue shading shows values greater than 60 m/s. The purple lines show normal wind speeds at intervals of 40 m/s. The base period for the normal is 1981-2010.

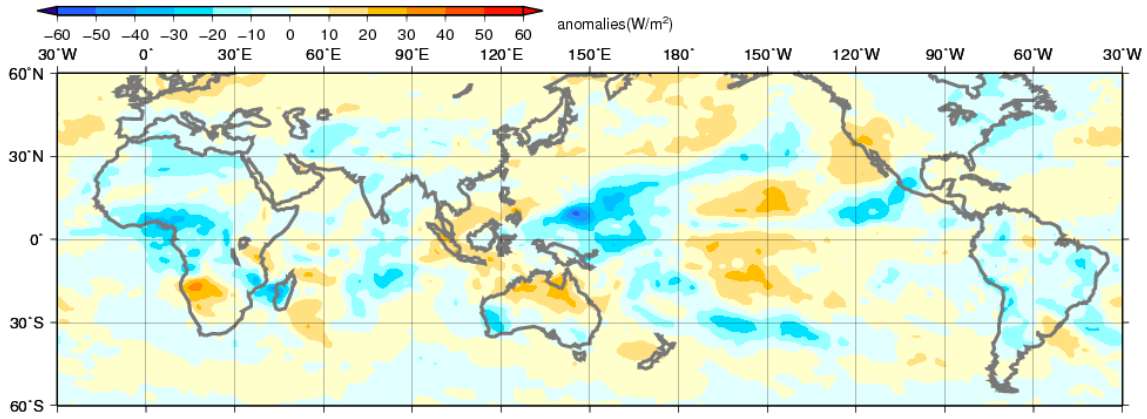


Fig. 6 Monthly mean Outgoing Longwave Radiation (OLR) anomaly (February 2015)
The contour interval is 10 W/m$^2$. The base period for the normal is 1981-2010. Original data provided by NOAA.

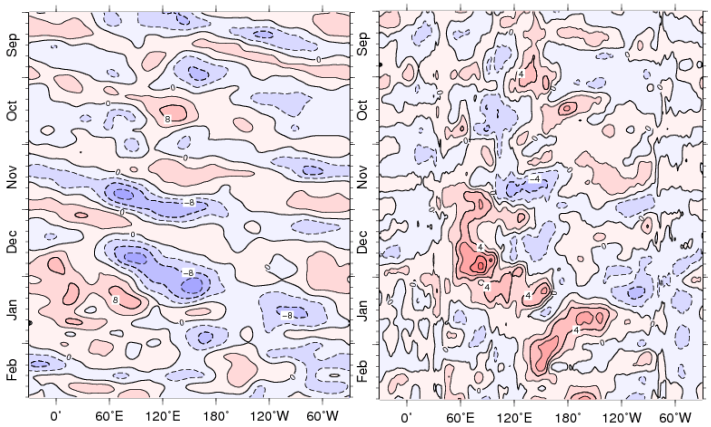


Fig. 7 Time-Longitude cross section (5°N-5°S) of five-day running mean 200-hPa velocity potential anomaly (left) and 850-hPa zonal wind anomaly (right) (September 2014 - February 2015)
The contour intervals are 4x10$^6$ m$^2$/s (left) and 2 m/s (right). The base period for the normal is 1981-2010.

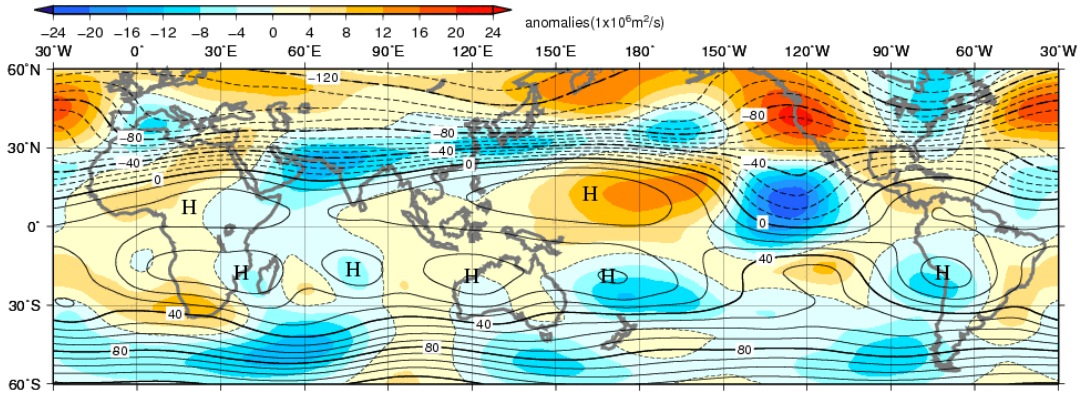


Fig. 8 Monthly mean 200-hPa stream function and anomaly (February 2015)

The contour interval is $10x10^6$ $m^2/s$. The base period for the normal is 1981-2010.

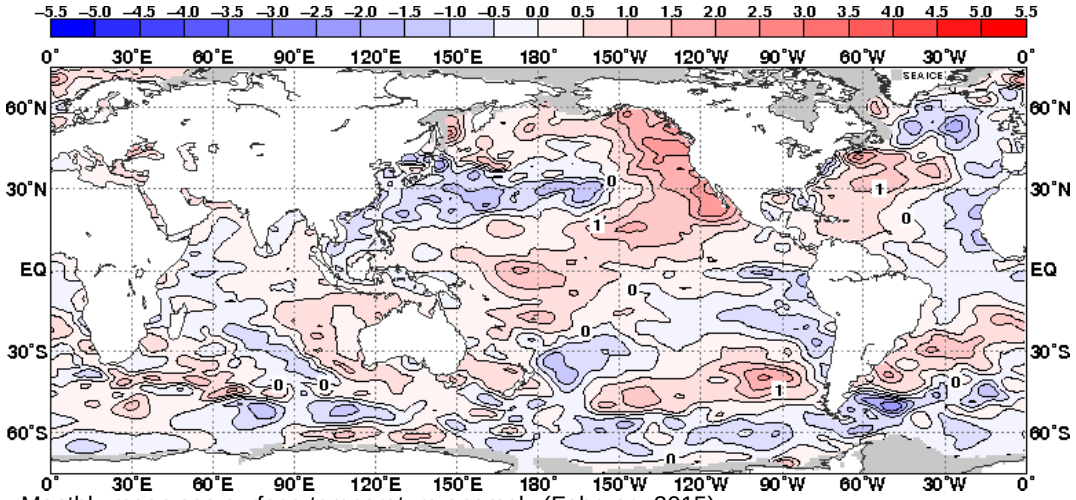


Fig. 9 Monthly mean sea surface temperature anomaly (February 2015)

The contour interval is 0.5 degree C. The base period for the normal is 1981-2010. Maximum coverage with sea ice is shaded in gray.

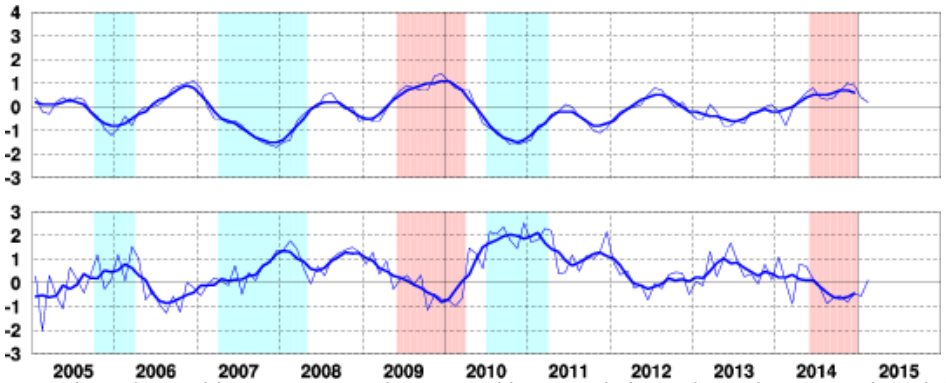


Fig. 10 Time series of monthly mean SST departure (degree C) from the reference value defined as the immediate past 30-year mean SST averaged over the NINO.3 region (upper). Time series of the Southern Oscillation Index with respect to the 1981-2010 base period (lower).

Thin blue lines represent monthly means and thick blue lines five-month running means. Periods of El Niño and La Niña events are shown as red-colored and blue-colored boxes, respectively.

Detailed information on the climate system is available on the Tokyo Climate Center's website.

http://ds.data.jma.go.jp/tcc/tcc/index.html

This report is prepared by the Climate Prediction Division, Global Environment and Marine Department, Japan Meteorological Agency.

Seasonal Highlights (December 2014 – February 2015)

- Seasonal mean temperatures were above normal in northern Japan, and were below normal in other regions. Seasonal snowfall depths were below normal on the Sea of Japan side of the country.
- Seasonal mean temperatures were extremely low in the northeastern USA, and were extremely high around the western USA.
- In the 500-hPa height field, positive anomalies were observed over the area from Eastern Siberia to Alaska, and the stronger-than-normal polar vortex shifted toward the Atlantic.
- Convective activity was enhanced over the western Pacific and the eastern North Pacific, and was suppressed over the equatorial Indian Ocean and the central Pacific.
- Remarkably positive SST anomalies were observed in the western equatorial Pacific.

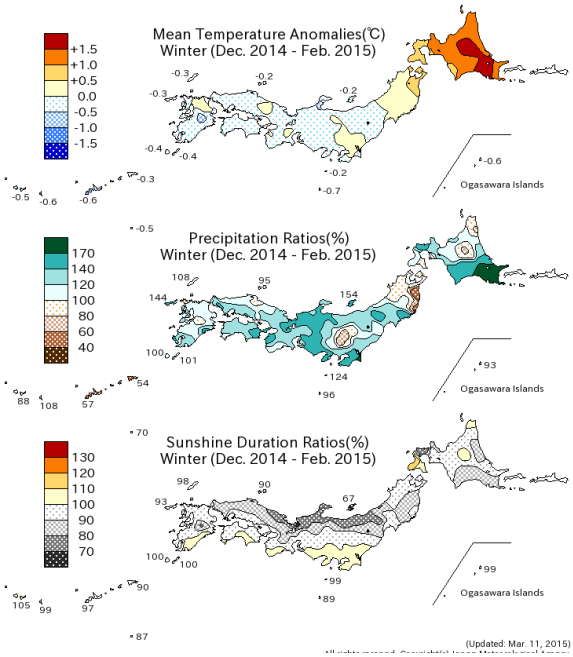


Fig. S1 Seasonal climate anomaly / ratio over Japan (December 2014 - February 2015)
Top: Temperature anomalies (degree C)
Middle: Precipitation ratio (%)
Bottom: Sunshine duration ratio (%)
Anomalies are defined as the deviations from the normal (1981-2010 average).

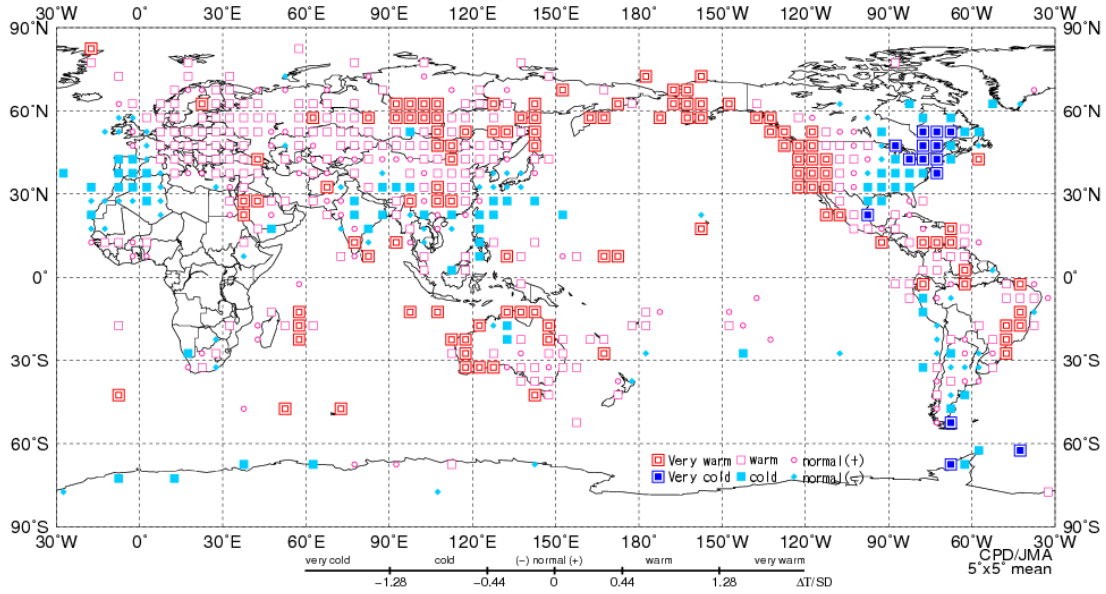


Fig. S2 Three-month mean temperature anomaly (normalized) category (December 2014 - February 2015)

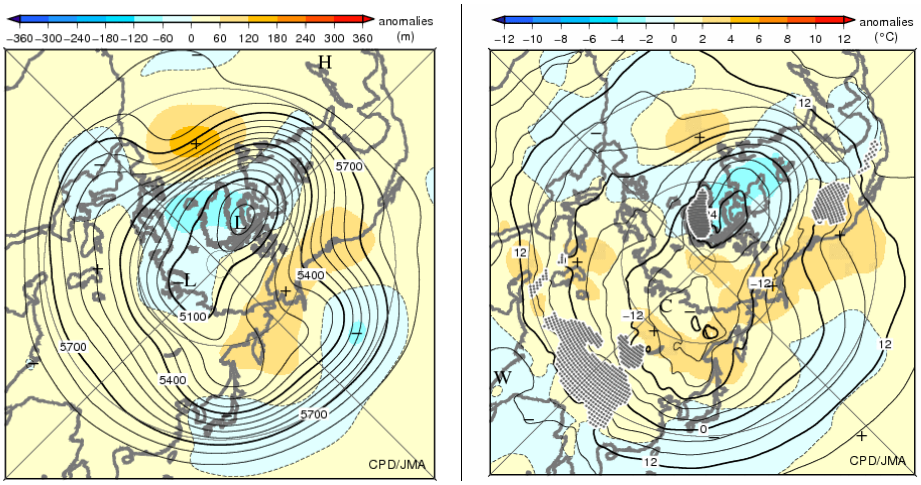


Fig. S3 Three-month mean 500-hPa height and anomaly (left) and 850-hPa temperature and anomaly (right) in the Northern Hemisphere (December 2014 - February 2015)

The contour intervals are 60 m (left) and 4 degree C (right). The shading shows anomalies. The base period for the normal is 1981-2010.

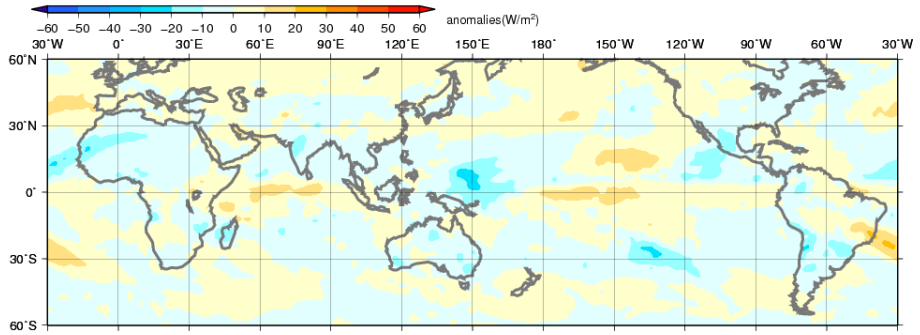


Fig. S4 Three-month mean Outgoing Longwave Radiation (OLR) anomaly (December 2014 - February 2015)

The contour interval is 10 W/m$^2$. The base period for the normal is 1981-2010. Original data provided by NOAA.

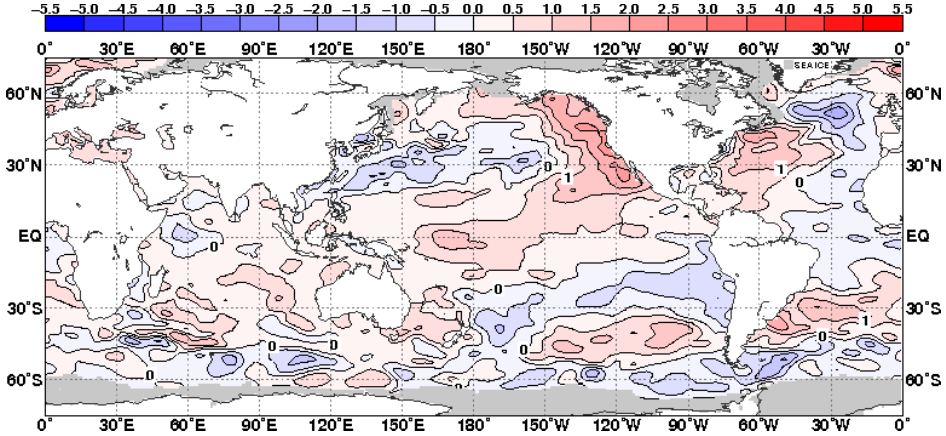


Fig. S5 Three-month mean sea surface temperature anomaly (December 2014 - February 2015)

The contour interval is 0.5 degree C. The base period for the normal is 1981-2010.

Detailed seasonal information on the climate system is available on the Tokyo Climate Center's website.
http://ds.data.jma.go.jp/tcc/tcc/index.html
This report is prepared by the Climate Prediction Division, Global Environment and Marine Department, Japan Meteorological Agency.