Monthly Highlights on the Climate System (June 2015)

Highlights in June 2015

- El Niño conditions continue in the equatorial Pacific (see *El Niño Outlook* updated on 10 July 2015).
- In the southern part of Kyushu, monthly precipitation amounts were the highest on record for June since 1946 and monthly sunshine durations were significantly below normal.
- Monthly mean temperatures were extremely high and monthly precipitation amounts were extremely light in the southern part of Western Africa.
- Zonal mean temperatures in the troposphere were generally above normal except over the Antarctic region.
- In the lower troposphere, cyclonic circulation anomalies straddling the equator were seen and westerly wind anomalies were dominant from the western to central equatorial Pacific.
- Remarkably positive SST anomalies were observed from near the date line to the eastern part of the equatorial Pacific.

Climate in Japan:

Baiu-front was active and frequently located along the south coast of the main island of Japan. Therefore, sunshine durations were significantly below normal and monthly precipitation amounts were above normal in the Pacific side of western Japan. In particular, monthly precipitation amounts were the highest on record for June since 1946 in the southern part of Kyushu. Meanwhile, in Okinawa/Amami, monthly mean temperatures were the highest on record for June, monthly sunshine durations were significantly above normal and monthly precipitation amounts were below normal, since the north Pacific High strongly extended from south of Japan to the vicinity of Okinawa.

World Climate:

The monthly anomaly of the global average surface temperature in June 2015 (i.e., the combined average of the near-surface air temperature over land and the SST) was +0.41°C (the warmest since 1891) (preliminary value) (Fig. 2). On a longer time scale, global average surface temperatures have risen at a rate of about 0.68°C per century in June (preliminary value).

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

- Monthly mean temperatures were extremely high from the south area of Japan to the northern Indochina Peninsula.
- Monthly mean temperatures were extremely high and monthly precipitation amounts were extremely light in the southern part of Western Africa.
- Monthly mean temperatures were extremely high and monthly precipitation amounts were extremely light from southwestern Canada to the northwestern USA.

Extratropics:

In the 500-hPa height field (Fig.4), positive anomalies were observed over Western Siberia, the Bering Sea, and the western USA, and negative anomalies were observed over the northern part of Europe. The jet stream was stronger than normal over Japan and the area from North America to the western part of the Atlantic Ocean (Fig. 5). Zonal mean temperatures in the troposphere were generally above normal except over the Antarctic region.

Tropics:

Convective activity was enhanced over the equatorial Pacific and to the east of New Guinea, and it was suppressed from the South China Sea to east of the Philippines (Fig. 6). The active phase of the Madden-Julian Oscillation (MJO) propagated from Africa to the Indian Ocean in the first half of the month, from the Maritime Continent to the Pacific in the second half of the month (Fig. 7). In the lower troposphere, cyclonic circulation anomalies straddling the equator were seen and westerly wind anomalies were dominant from the western to central equatorial Pacific (Fig. 7). In the upper troposphere, wave trains were seen along the subtropical jet stream (Fig. 8). The Southern Oscillation Index value was -0.9 (Fig. 10).

Oceanographic Conditions:

Remarkably positive SST anomalies were observed from near the date line to the eastern part of the equatorial Pacific. The monthly mean SST anomaly and the SST deviation from the latest sliding 30-year mean in the NINO.3 region were both +1.6℃.

In the North Pacific, remarkably positive SST anomalies were observed near the coast of North America and from the central to the eastern part of the tropical region, and from the South China Sea to near 35˚N, 180˚. In the South Pacific, remarkably negative SST anomalies were observed from near 15˚S, 140˚W to near 15˚S, 110˚W.

In the Indian Ocean, positive SST anomalies were observed in almost the entire region north of 30˚S.

In the North Atlantic, remarkably positive SST anomalies were observed from the Gulf of Mexico to near 40˚N, 20˚W, and remarkably negative SST anomalies were observed from near 10˚N, 55˚W to near 20˚N, 25˚W and south of Greenland.

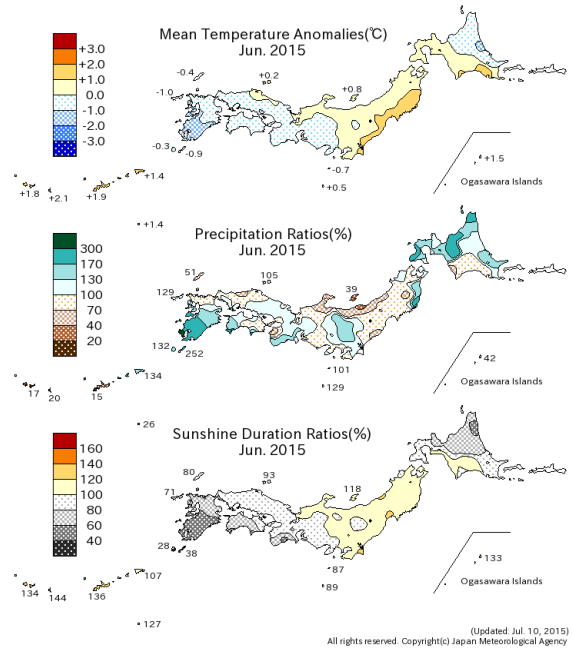

Fig. 1 Monthly climate anomaly / ratio over Japan (June 2015)
Top: temperature anomalies (degree C)
Middle: precipitation ratio (%)
Bottom: sunshine duration ratio (%)
Anomalies are defined as the deviations from the normal (1981-2010 average).

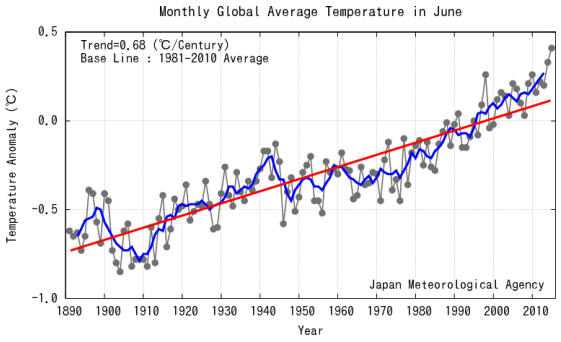

Fig. 2 Long-term change in monthly anomalies of global average surface temperature in June
The thin black line indicates anomalies of the surface temperature in each year. The blue line indicates five-year running mean, and the red line indicates a long-term linear trend. Anomalies are deviations from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

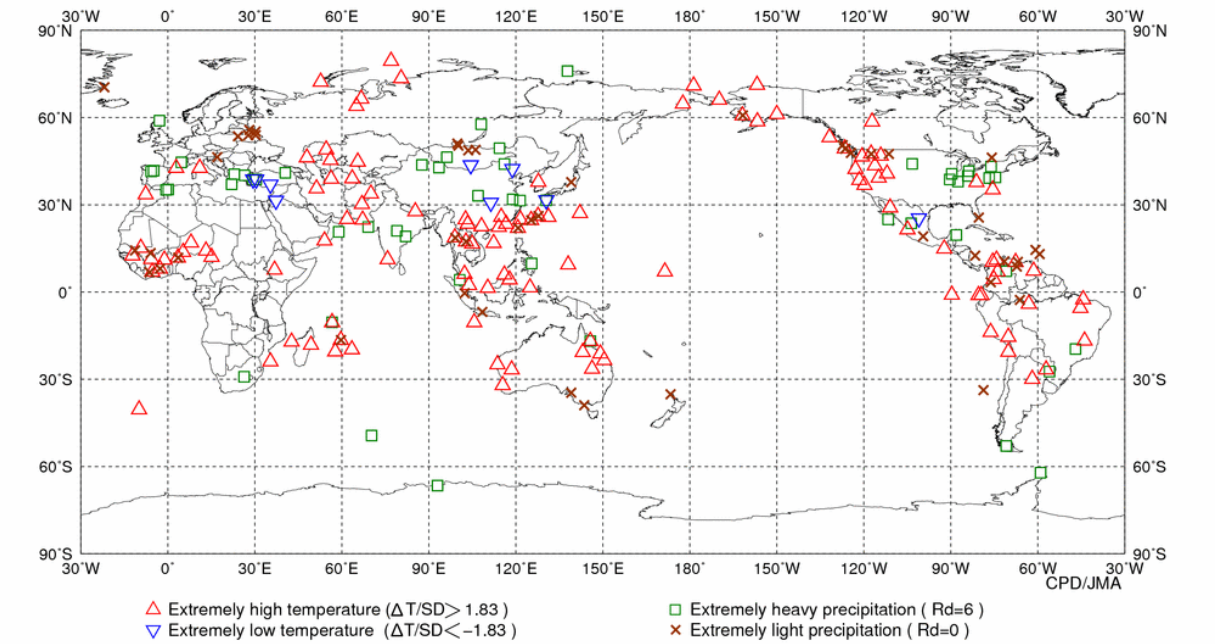

Fig. 3 Distribution of extreme climate events (June 2015)

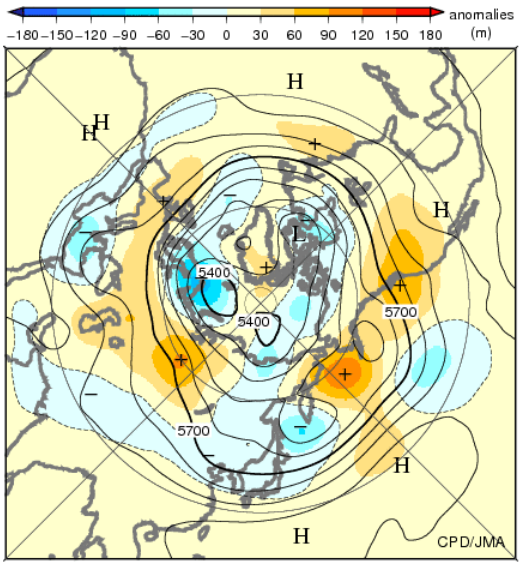

Fig. 4 Monthly mean 500-hPa height and anomaly in the Northern Hemisphere (June 2015)
The contours show heights at intervals of 60 m. The shading indicates height anomalies. The base period for the normal is 1981-2010.

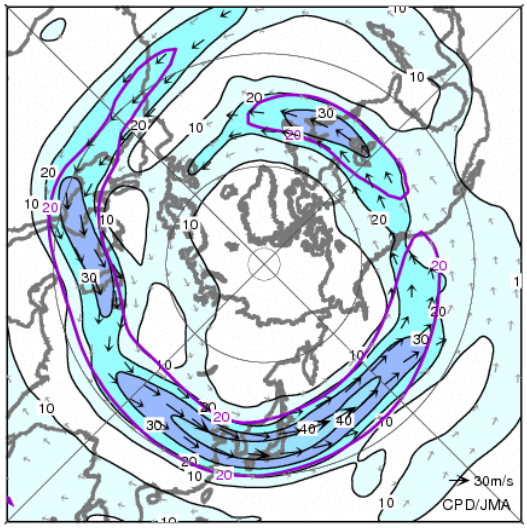

Fig. 5 Monthly mean 200-hPa wind speed and vectors in the Northern Hemisphere (June 2015)
The black lines show wind speeds at intervals of 10 m/s. The darkest blue shading shows values greater than 40 m/s. The purple lines show normal wind speeds at intervals of 20 m/s. The base period for the normal is 1981-2010.

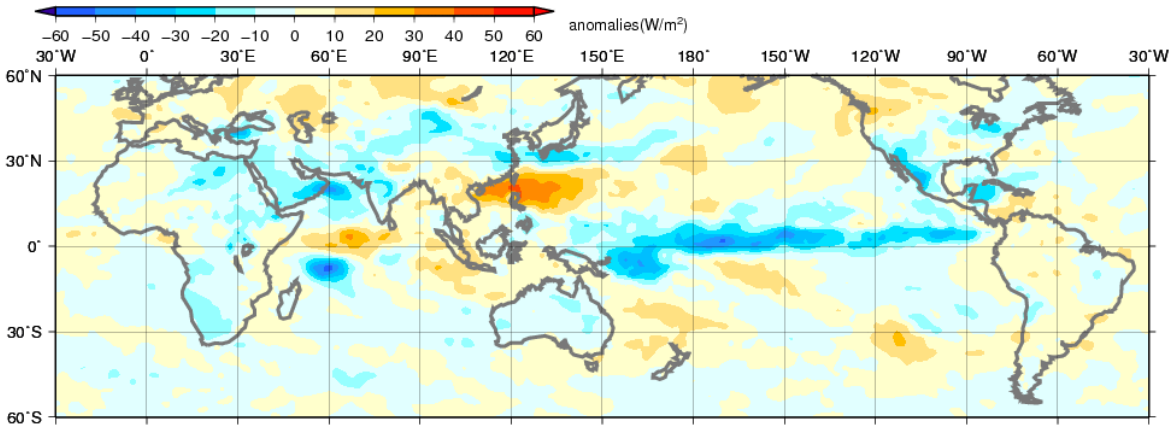

Fig. 6 Monthly mean Outgoing Longwave Radiation (OLR) anomaly (June 2015)
The contour interval is 10 W/m^2. The base period for the normal is 1981-2010. Original data provided by NOAA.

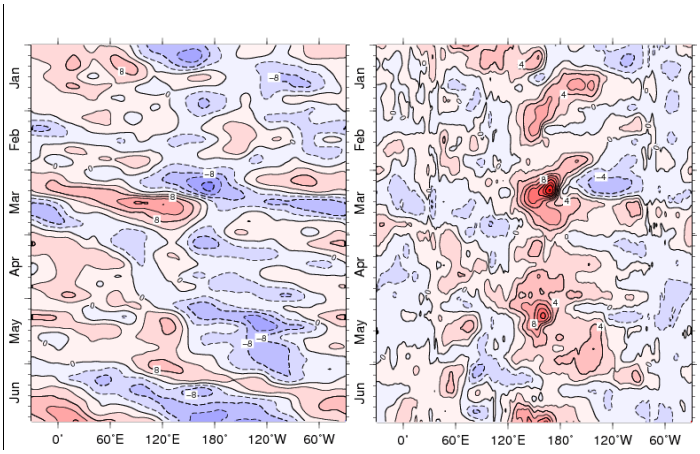

Fig. 7 Time-Longitude cross section (5°N-5°S) of five-day running mean 200-hPa velocity potential anomaly (left) and 850-hPa zonal wind anomaly (right) (January 2015 - June 2015)
The contour intervals are 4x10^6 m^2/s (left) and 2 m/s (right). The base period for the normal is 1981-2010.

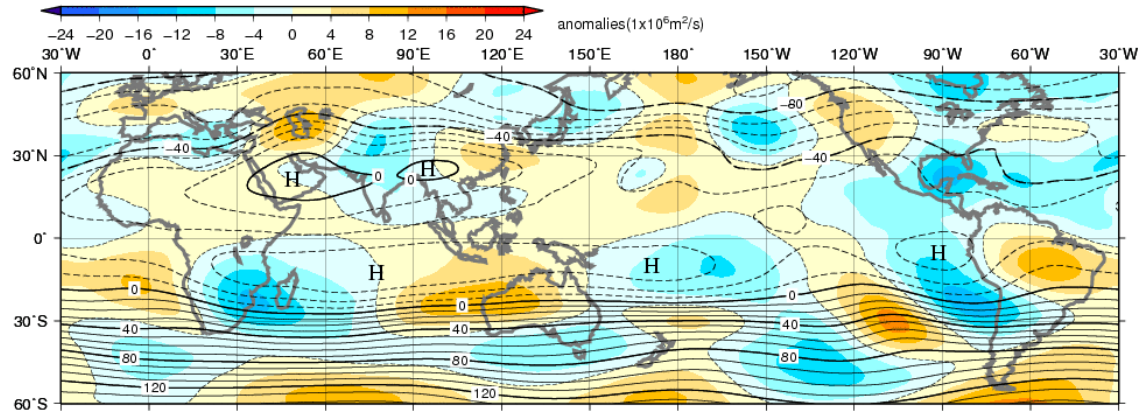

Fig. 8 Monthly mean 200-hPa stream function and anomaly (June 2015)

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

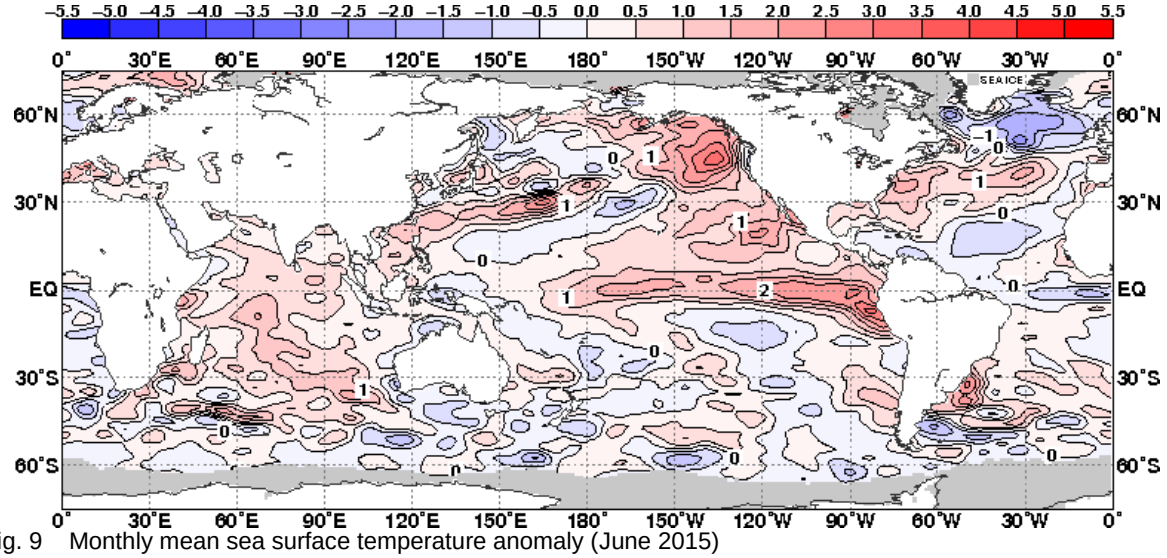

Fig. 9 Monthly mean sea surface temperature anomaly (June 2015)

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.

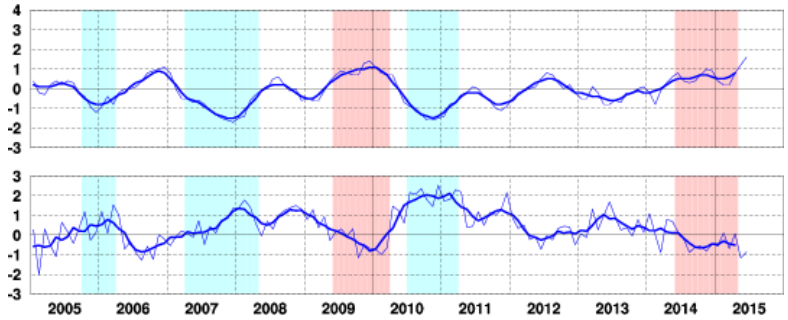

Fig. 10 Time series of monthly mean SST departure (degree C) from the reference value defined as the immediate past 30-year mean SST averaged over the NINO.3 region (upper). Time series of the Southern Oscillation Index with respect to the 1981-2010 base period (lower).

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.