

Monthly Highlights on the Climate System (June 2014)

Highlights in June 2014

- Monthly mean temperatures were significantly above normal in northern Japan.
- Monthly mean temperatures were extremely high in various places in the low latitudes.
- The subtropical jet stream flowed southward of its normal position around Japan.
- Convective activity was enhanced over Maritime Continent, around the date line region and eastern Pacific, and was suppressed over Indian Ocean, sea east of the Philippines and northeastern coast of South America.
- Positive SST anomalies were observed in almost the entire region of the equatorial Pacific.

Climate in Japan:

Monthly mean temperatures were significantly above normal in northern Japan due to predominant ridge around the Kamchatka Peninsula.

Monthly precipitation amounts were above normal in northern Japan and the Pacific side of eastern Japan. Meanwhile, those were below normal in the Sea of Japan side of eastern Japan and most parts of western Japan, since the Baiu-front was away from the regions and sustained in south of Japan. In particular, Monthly precipitation amounts in Kinki subdivision were smallest in June since records began in 1946.

World Climate:

The monthly anomaly of the global average surface temperature in June 2014 (i.e., the combined average of the near-surface air temperature over land and the SST) was $+0.32^{\circ}\text{C}$ (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 in various places in the low latitudes.
- Monthly precipitation amounts were extremely heavy from northwestern Russia to western Turkey.
- Monthly precipitation amounts were extremely heavy in central South America.

Extratropics:

In the 500-hPa height field (Fig. 4), positive anomalies were seen to the north of Europe, over eastern Canada and the northern Pacific, while negative anomalies were observed over the Mediterranean Sea. The subtropical jet stream flowed southward of its normal position around Japan (Fig. 5). The polar-front jet stream was clearly seen around Siberia. Tropospheric temperatures were higher than normal globally except around the North Pole and in the high latitudes of the Southern Hemisphere.

Tropics:

Convective activity was enhanced over Maritime Continent, around the date line region and eastern Pacific, and was suppressed over Indian Ocean, sea east of the Philippines and northeastern coast of South America (Fig. 6). The active phase of the Madden-Julian Oscillation propagated eastward from the Indian Ocean to Maritime Continent from early to mid-June and across the Pacific in late June (Fig. 7). In the lower troposphere of the equatorial Pacific, westerly wind anomalies were seen from early to mid-June, and easterly wind anomalies were seen in late June (Fig. 8). In the upper troposphere, Tibetan High was weaker than normal over its western part (Fig. 8). The Southern Oscillation Index value was $+0.2$ (Fig. 10).

Oceanographic Conditions:

Positive SST anomalies were observed in almost the entire region of the equatorial Pacific. The monthly mean SST anomaly in the NINO.3 region was $+0.7^{\circ}\text{C}$ and the SST deviation from the latest sliding 30-year mean was $+0.8^{\circ}\text{C}$. In the North Pacific, remarkably positive SST anomalies were observed from near Japan to the coast of North America, from the coast of Mexico to the eastern part of tropical area and from near Philippines to 20°N , 155°W , and remarkably negative SST anomalies were observed from south of Japan to near 30°N , 165°E . In the South Pacific, remarkably positive SST anomalies were observed in zonal area around 40°S and remarkably negative SST anomalies were observed from off the coast of Chile to near 15°S , 135°W . In the Indian Ocean, remarkably positive SST anomalies were observed from near 10°S , 115°E to near 5°S , 90°E and from near Madagascar to southwest of Australia. In the North Atlantic, remarkably positive SST anomalies were observed from near the eastern coast of the USA to the eastward offshore of Florida and remarkably negative SST anomalies were observed from near 35°N , 60°W to near 50°N , 25°W .

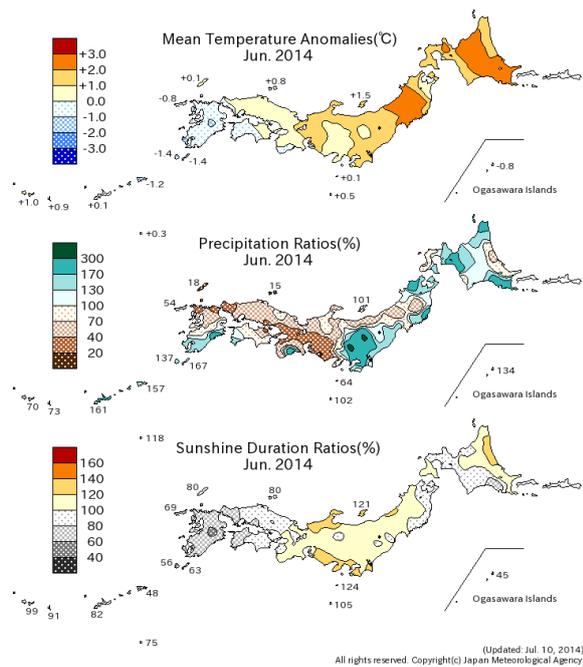


Fig. 1 Monthly climate anomaly / ratio over Japan (June 2014)
 Top: temperature anomalies (degree C)
 Middle: precipitation ratio (%)
 Bottom: sunshine duration ratio (%)
 Anomalies are defined as the deviations from the normal (1981-2010 average).

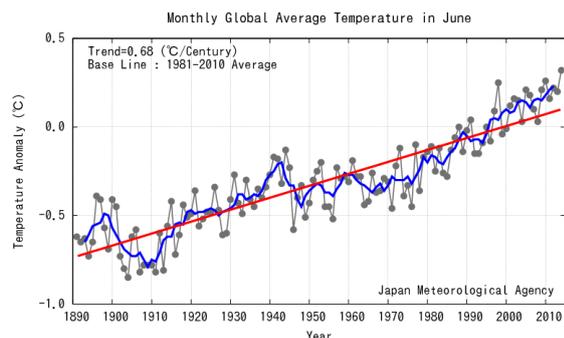


Fig. 2 Long-term change in monthly anomalies of global average surface temperature in June
 The thin black line indicates anomalies of the surface temperature in each year. The blue line indicates five-year running mean, and the red line indicates a long-term linear trend. Anomalies are deviations from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

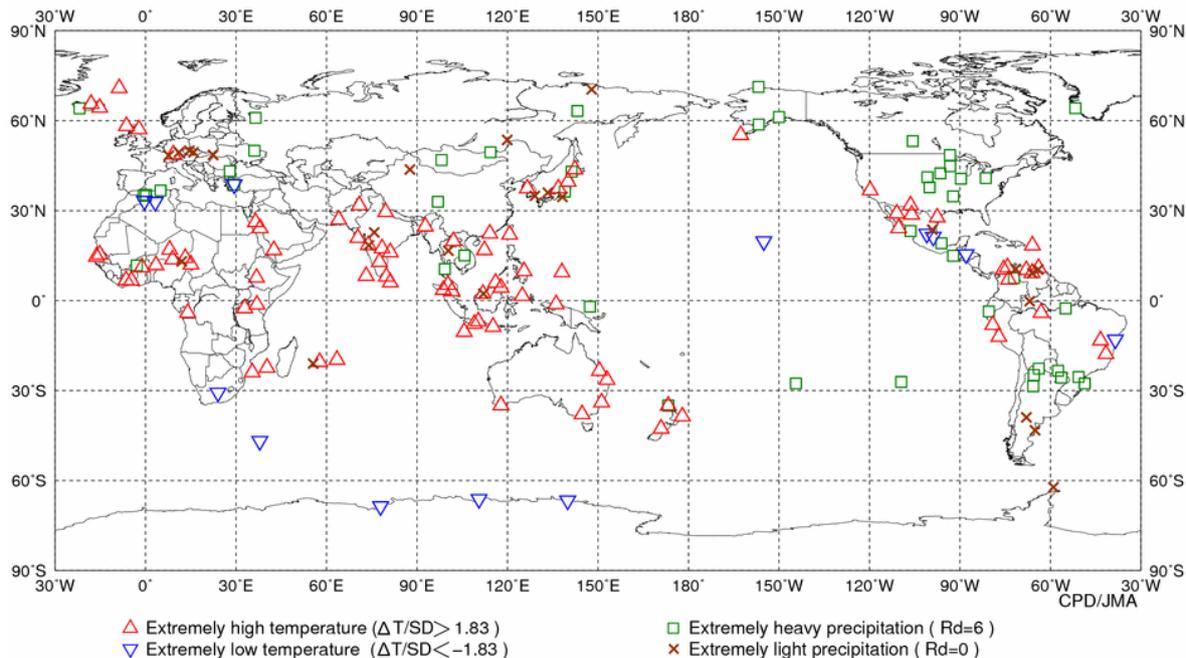


Fig. 3 Distribution of extreme climate events (June 2014)

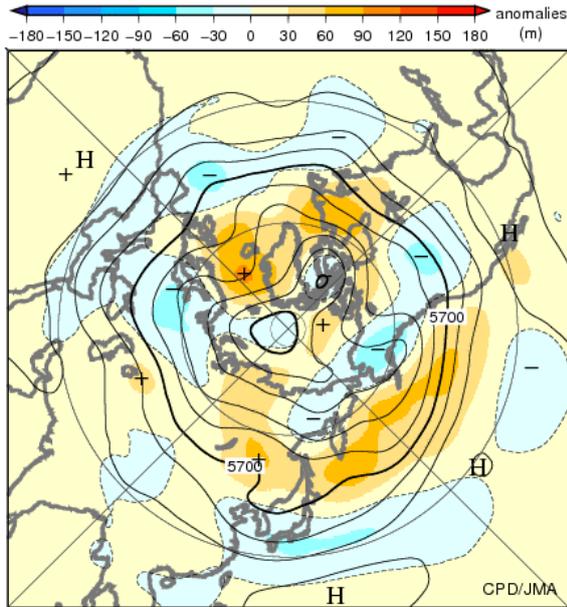


Fig. 4 Monthly mean 500-hPa height and anomaly in the Northern Hemisphere (June 2014)
The contours show heights at intervals of 60 m. The shading indicates height anomalies. The base period for the normal is 1981-2010.

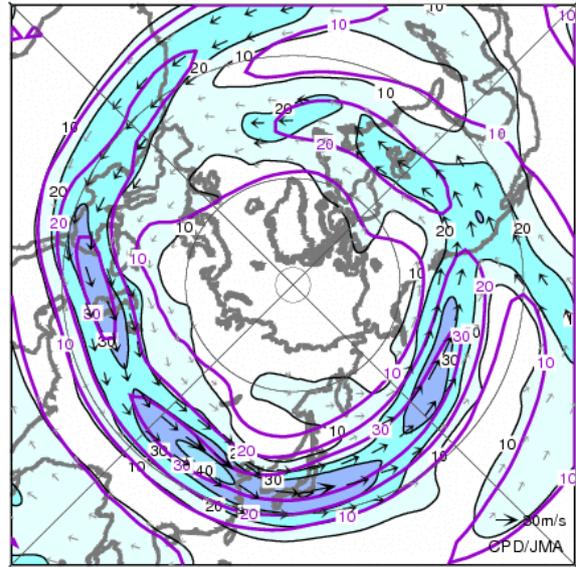


Fig. 5 Monthly mean 200-hPa wind speed and vectors in the Northern Hemisphere (June 2014)
The black lines show wind speeds at intervals of 10 m/s. The dark blue shading shows values greater than 20 m/s. The purple lines show normal wind speeds at intervals of 20 m/s. The base period for the normal is 1981-2010.

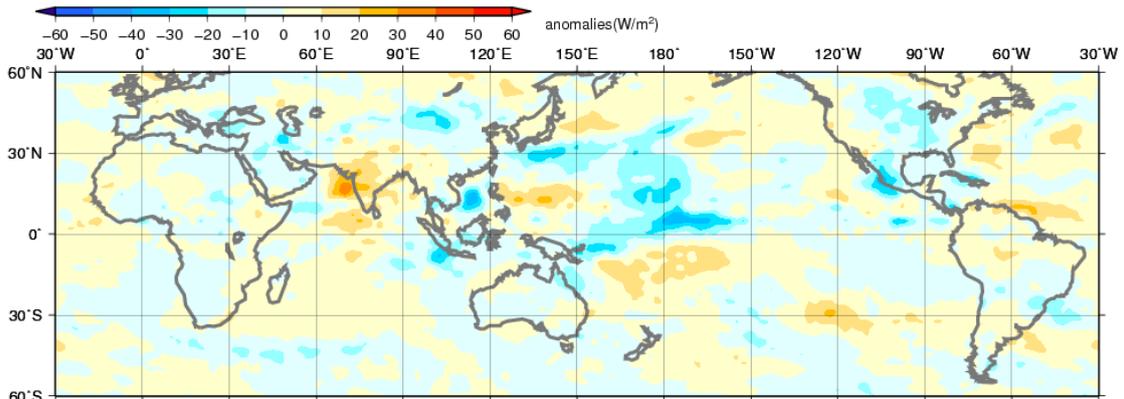


Fig. 6 Monthly mean Outgoing Longwave Radiation (OLR) anomaly (June 2014)
The contour interval is 10 W/m². The base period for the normal is 1981-2010. Original data provided by NOAA.

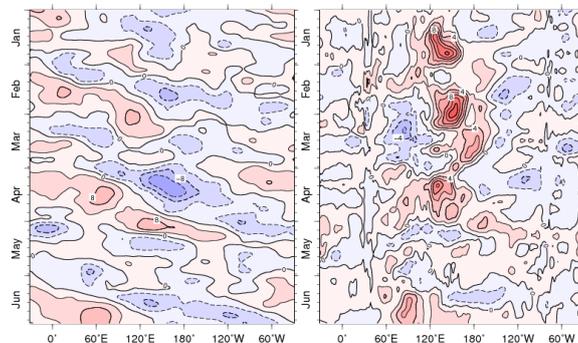


Fig. 7 Time-Longitude cross section (5°N-5°S) of five-day running mean 200-hPa velocity potential anomaly (left) and 850-hPa zonal wind anomaly (right) (January 2014 - June 2014)
The contour intervals are 4x10⁶ m²/s (left) and 2 m/s (right). The base period for the normal is 1981-2010.

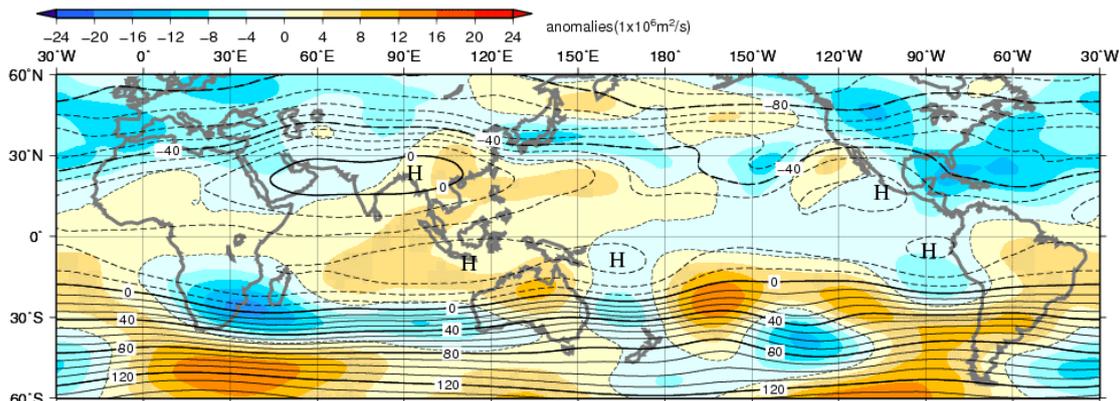


Fig. 8 Monthly mean 200-hPa stream function and anomaly (June 2014)
 The contour interval is $10 \times 10^6 \text{ m}^2/\text{s}$. The base period for the normal is 1981-2010.

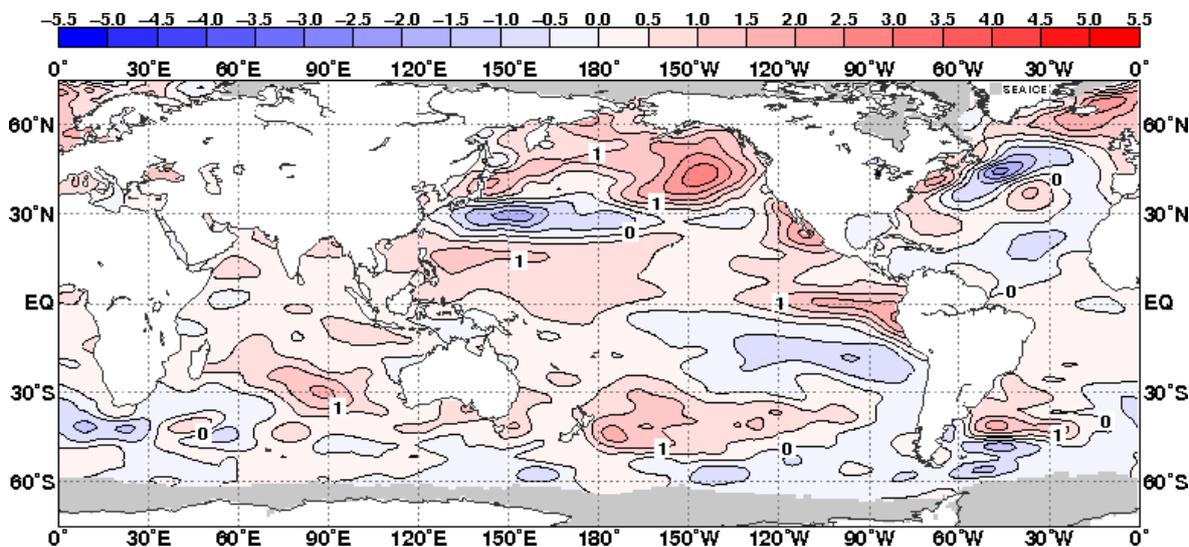


Fig. 9 Monthly mean sea surface temperature anomaly (June 2014)
 The contour interval is 0.5 degree C. The base period for the normal is 1981-2010. Maximum coverage with sea ice is shaded in gray.

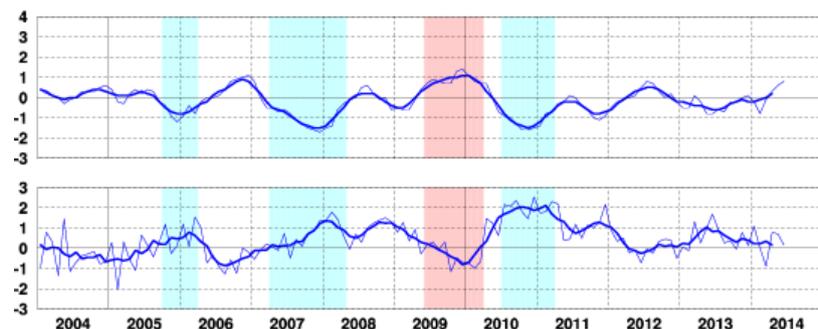


Fig. 10 Time series of monthly mean SST departure (degree C) from the reference value defined as the immediate past 30-year mean SST averaged over the NINO.3 region (upper). Time series of the Southern Oscillation Index with respect to the 1981-2010 base period (lower).
 Thin blue lines represent monthly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