Monthly Highlights on the Climate System (July 2014)

Highlights in July 2014

- Monthly mean temperatures were significantly above normal and monthly sunshine durations were above normal in northern Japan.
- Monthly mean temperatures were extremely high in northern Europe and extremely low around Western Siberia.
- The subtropical jet stream was stronger than normal over Eurasia to the central Pacific.
- Convective activity was enhanced in the northern part of the equatorial Pacific, and was suppressed over Indian Ocean.
- Positive SST anomalies were observed in the eastern and western parts of the equatorial Pacific.

Climate in Japan:

Monthly mean temperatures were significantly above normal and monthly sunshine durations were above normal in northern Japan due to warm southerly winds and a lot of sunny days brought by low-pressure systems around the Maritime Territory and dominant high-pressure systems on the sea east of Kamchatka.

Monthly precipitation amounts were above normal in Okinawa/Amami, since Typhoon Neoguri brought a record breaking rainfall in Okinawa. Meanwhile, they were below normal on the Pacific side of eastern Japan since the Baiu-front was not active around Japan after the middle of the month.

World Climate:

The monthly anomaly of the global average surface temperature in July 2014 (i.e., the combined average of the near-surface air temperature over land and the SST) was +0.28 °C (the 2nd warmest since 1891) (preliminary value) (Fig. 2). On a longer time scale, global average surface temperatures have risen at a rate of about 0.66°C per century in July (preliminary value).

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

- Monthly mean temperatures were extremely high in northern Europe and extremely low around Western Siberia.
- Monthly mean temperatures were extremely high in various places in the low latitudes succeeding to the previous month.
- Monthly precipitation amounts were extremely light from Mexico to northern South America.

Extratropics:

In the 500-hPa height field (Fig. 4), positive anomalies were seen around the northern Europe, over the Bearing Sea, western North America, and the sea northeast of North America, while negative anomalies were observed over the western part of the Mediterranean Sea, Western Siberia and eastern North America. The subtropical jet stream was stronger than normal from Eurasia to the central Pacific, and flowed southward of its normal position around the area from the eastern coast of Japan to the central Pacific (Fig. 5). Tropospheric air temperatures were higher than normal globally except around the polar regions of both hemispheres. The North Pacific High was stronger than normal over the sea south of Japan.

Tropics:

Convective activity was enhanced in the northern part of the equatorial Pacific, and was suppressed over Indian Ocean (Fig. 6). The active phase of the Madden-Julian Oscillation was seen from Africa to the Indian Ocean in early July, from the Pacific to South America in middle and late July (Fig. 7). In the lower troposphere of the equatorial central Pacific, easterly wind anomalies were seen from early to mid-July, and westerly wind anomalies were seen in late July (Fig. 7). 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 the eastern and western parts of the equatorial Pacific. The monthly mean SST anomaly in the NINO.3 region and the SST deviation from the latest sliding 30-year mean were both +0.4℃. In the North Pacific, remarkably positive SST anomalies were observed from near northern Japan to the coast of North America, from the coast of Mexico to the eastern part of tropical area and from near 20˚N, 140˚E to near 20˚N, 170˚W, and remarkably negative SST anomalies were observed from the East China Sea to near 35˚N, 175˚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 the coast of Chile to near 15˚S, 135˚W. In the Indian Ocean, remarkably positive SST anomalies were observed from near Madagascar to near 30˚S, 100˚E. In the Atlantic, remarkably positive SST anomalies were observed from the Gulf of Mexico to near the eastern coast of the USA and near 35˚N, 40˚W, and remarkably negative SST anomalies were observed near 20˚W of equatorial part.

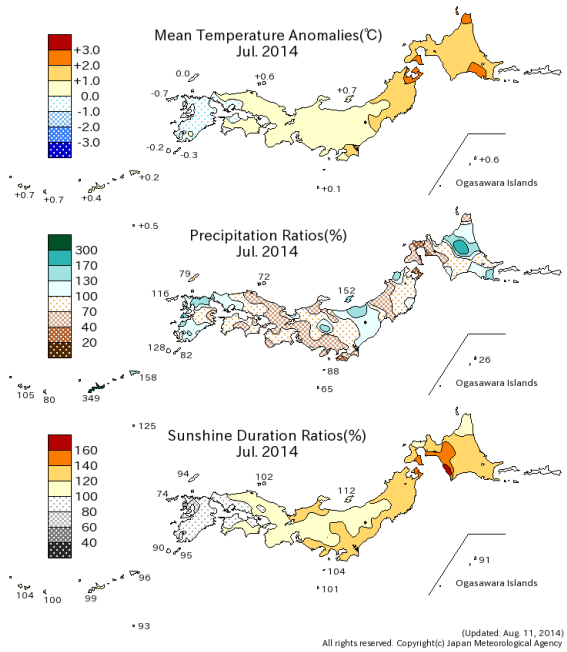

Fig. 1 Monthly climate anomaly / ratio over Japan (July 2014)
Top: temperature anomalies (degree C)
Middle: precipitation ratio (%)
Bottom: sunshine duration ratio (%)
Anomalies are defined as the deviations from the normal (1981-2010 average).

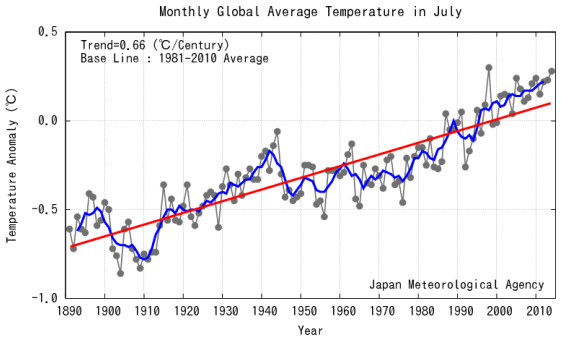

Fig. 2 Long-term change in monthly anomalies of global average surface temperature in July
The thin black line indicates anomalies of the surface temperature in each year. The blue line indicates five-year running mean, and the red line indicates a long-term linear trend. Anomalies are deviations from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

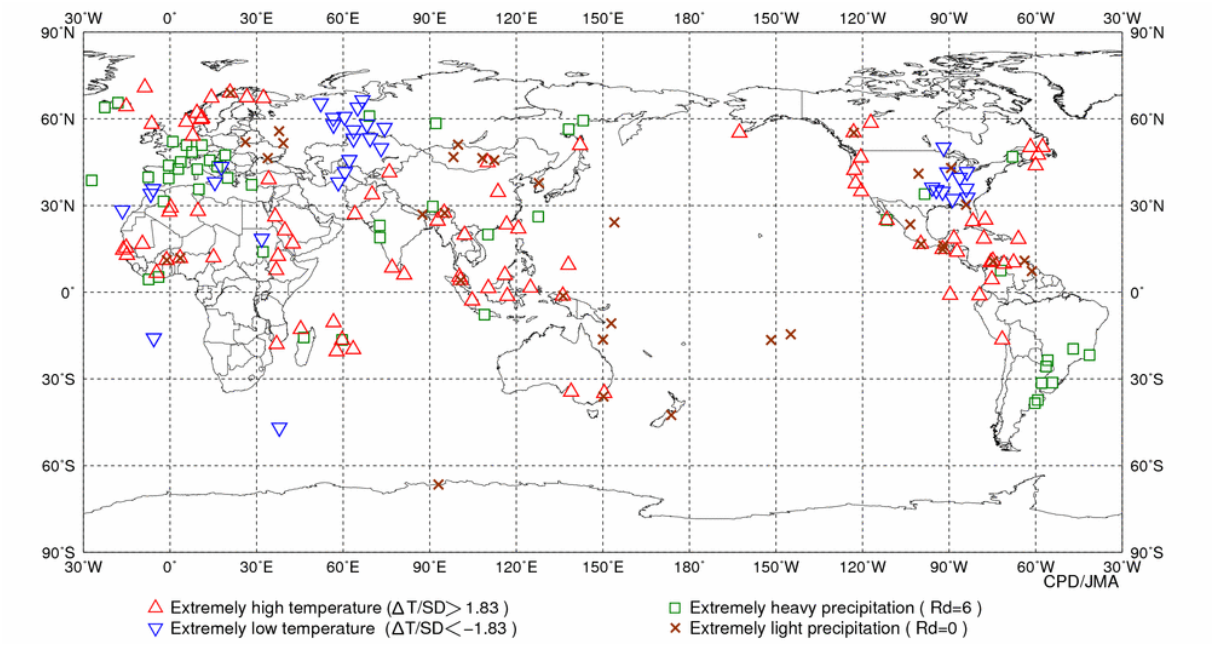

Fig. 3 Distribution of extreme climate events (July 2014)

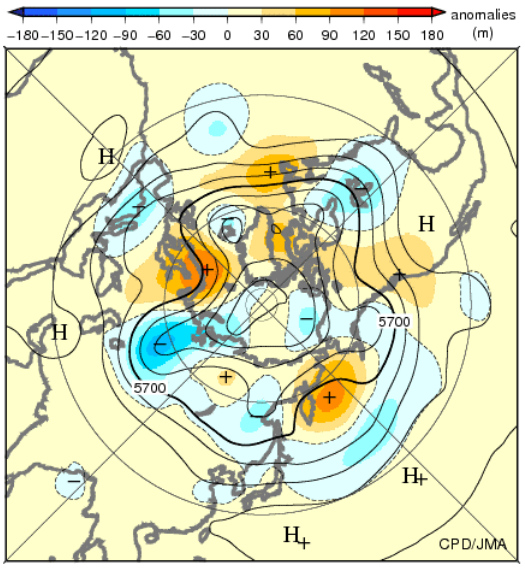

Fig. 4 Monthly mean 500-hPa height and anomaly in the Northern Hemisphere (July 2014)
The contours show heights at intervals of 60 m. The shading indicates height anomalies. The base period for the normal is 1981-2010.

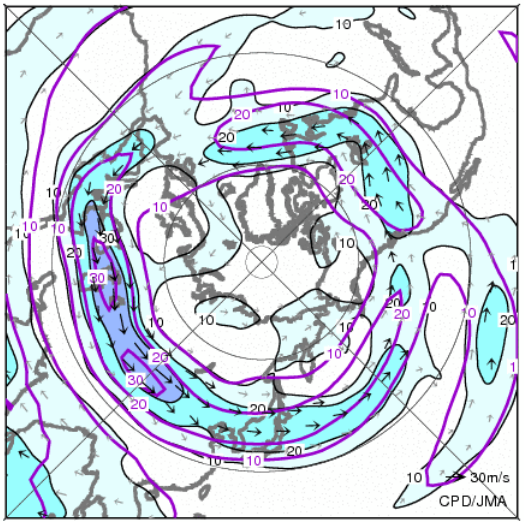

Fig. 5 Monthly mean 200-hPa wind speed and vectors in the Northern Hemisphere (July 2014)
The black lines show wind speeds at intervals of 10 m/s. The dark blue shading shows values greater than 20 m/s. The purple lines show normal wind speeds at intervals of 20 m/s. The base period for the normal is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

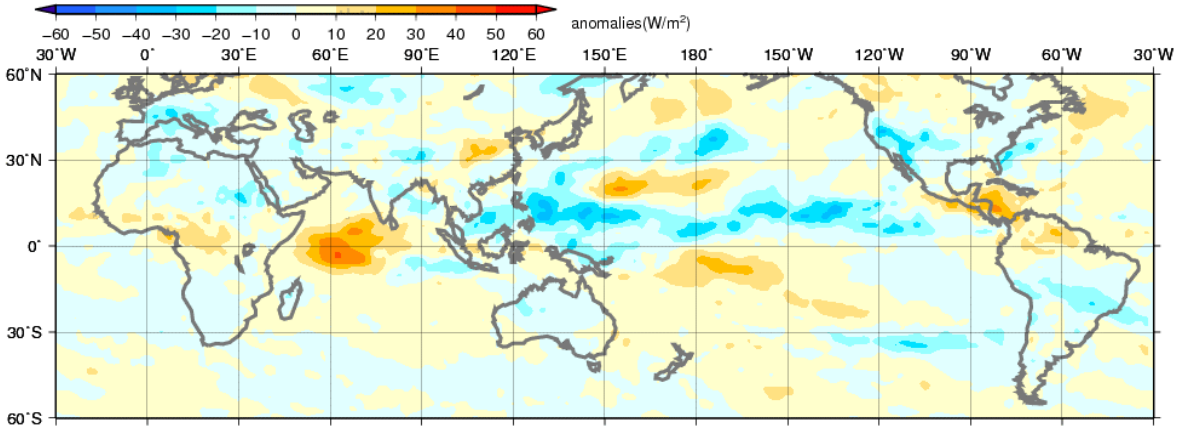

Fig. 6 Monthly mean Outgoing Longwave Radiation (OLR) anomaly (July 2014)
The contour interval is 10 W/m^2. The base period for the normal is 1981-2010. Original data provided by NOAA.

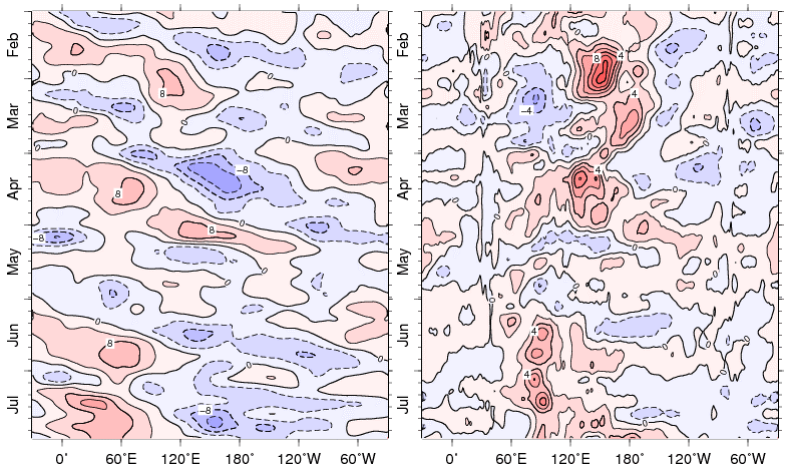

Fig. 7 Time-Longitude cross section (5°N-5°S) of five-day running mean 200-hPa velocity potential anomaly (left) and 850-hPa zonal wind anomaly (right) (February 2014- July 2014)
The contour intervals are 4x10^6 m^2/s (left) and 2 m/s (right). The base period for the normal is 1981-2010.

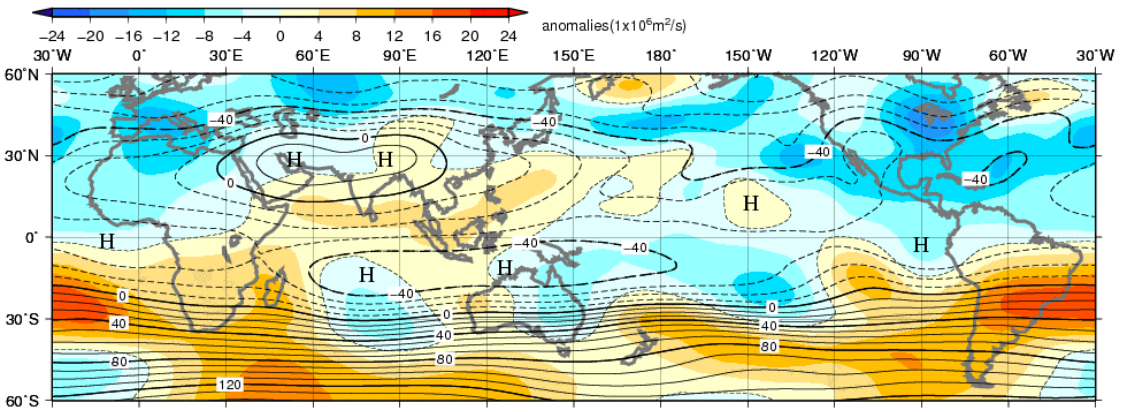

Fig. 8 Monthly mean 200-hPa stream function and anomaly (July 2014)

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

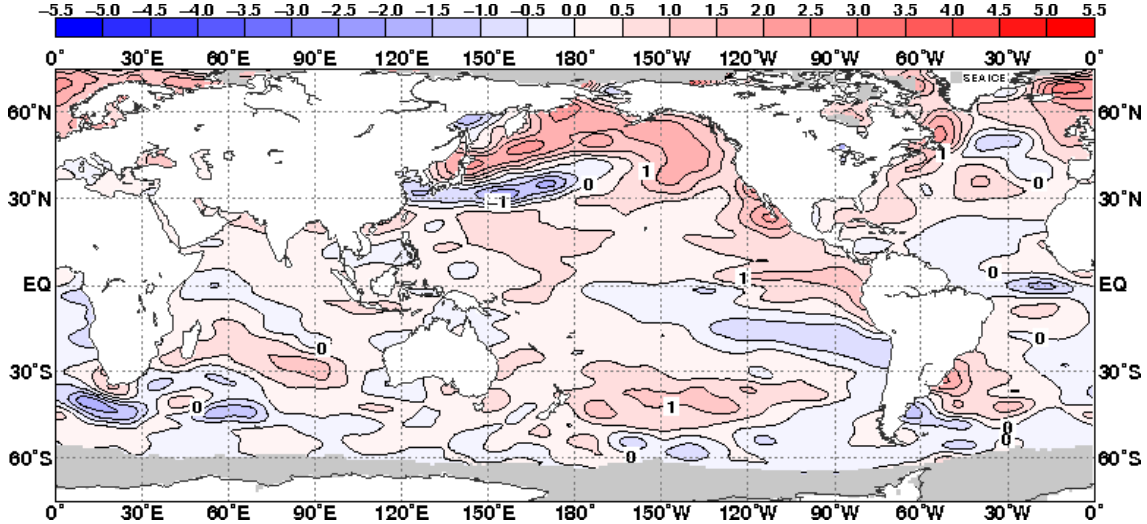

Fig. 9 Monthly mean sea surface temperature anomaly (July 2014)

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.

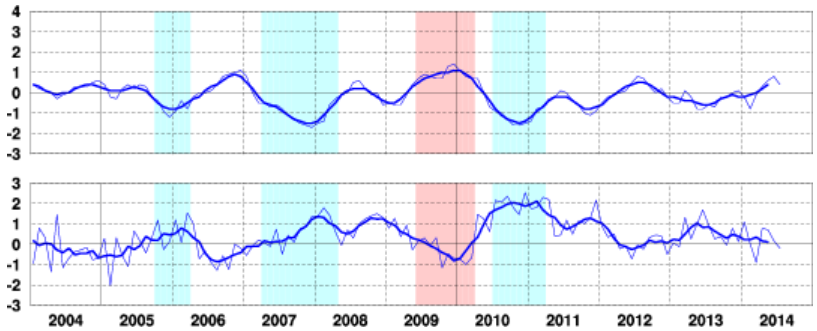

Fig. 10 Time series of monthly mean SST departure (degree C) from the reference value defined as the immediate past 30-year mean SST averaged over the NINO.3 region (upper). Time series of the Southern Oscillation Index with respect to the 1981-2010 base period (lower).

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.