

Monthly Highlights on the Climate System (October 2014)

Highlights in October 2014

- Nearly all over the country, monthly precipitation amounts were above normal, since two typhoons hit Japan.
- Monthly mean temperatures were extremely high around the western USA.
- In the 500-hPa height field, positive anomalies were seen over the Arctic region, northeastern Canada and Europe, and negative anomalies were seen to the west of Europe and over western Siberia.
- Convective activity was enhanced over the Inter-tropical Convergence Zone of the Pacific, Central America and the Arabian Sea, and was suppressed from the South China Sea to the Maritime Continent.
- Positive SST anomalies were observed in almost the entire region of the equatorial Pacific.

Climate in Japan:

Monthly precipitation amounts were above normal in most of Japan, especially in eastern Japan, since two typhoons hit Japan. Monthly sunshine durations were above normal in northern Japan and the Sea of Japan side of eastern Japan due to frequent pass of migratory high pressure systems. Monthly precipitation amounts were below normal in Hokkaido and the western part of Okinawa due to less frequent pass of cyclones. In northern Japan, monthly temperatures were below normal for the month for the first time in 11 years since 2003.

World Climate:

The monthly anomaly of the global average surface temperature in October 2014 (i.e., the combined average of the near-surface air temperature over land and the SST) was +0.34°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 0.63°C per century in October (preliminary value).

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

- Monthly mean temperatures were extremely high around the western USA.
- Monthly mean temperatures were extremely high around northern Argentina.
- Monthly mean temperatures were extremely high in southern Australia.

Extratropics:

In the 500-hPa height field (Fig. 4), positive anomalies were seen over the Arctic region. In the mid- to high-latitudes, positive anomalies were seen over northeastern Canada and Europe, and negative anomalies were seen to the west of Europe and over western Siberia. The subtropical jet stream was weaker than normal over Eurasia and flowed southward of its normal position over the Pacific (Fig. 5). Zonal mean temperatures in the troposphere were generally above normal.

Tropics:

Convective activity was enhanced over the Inter-tropical

Convergence Zone of the Pacific, Central America and the Arabian Sea, and was suppressed from the South China Sea to the Maritime Continent (Fig. 6). The active phase of the Madden-Julian Oscillation propagated eastward over the Pacific in the first half of October and from the Atlantic to the Indian Ocean in the second half of the month (Fig. 7). In the lower troposphere, easterly wind anomalies were seen over the central and eastern equatorial Pacific in early October, and westerly wind anomalies were seen over the entire equatorial Pacific in late October (Fig. 7). In the upper troposphere, anti-cyclonic circulation anomalies were observed over the Arabian Peninsula, and cyclonic circulation anomalies were observed over the area from South Asia to southern China (Fig. 8). The Southern Oscillation Index value was -0.6 (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 +0.6 °C and the SST deviation from the latest sliding 30-year mean was +0.7 °C.

In the North Pacific, remarkably positive SST anomalies were observed in large area from the northern part of Sea of Okhotsk to near the Aleutian Islands and from the coast of North America to near 15°N, 155°E, and in the eastern part of tropical region, and negative SST anomalies were observed from near Japan to far east of Japan. In the South Pacific, remarkably negative SST anomalies were observed from near 15°S, 130°W to near 40°S, 90°W and remarkably positive SST anomalies were observed to the west of the negative anomalies.

In the Indian Ocean, remarkably positive SST anomalies were observed in the western and eastern part of equatorial area and from near Madagascar to the western coast of Australia, and remarkably negative SST anomalies were observed from near the southeastern coast of Africa to near 35°S, 75°E.

In the Atlantic, remarkably positive SST anomalies were observed from near the eastern coast of North America to near the Iberian Peninsula and remarkably negative SST anomalies were observed from near 40°N, 40°W to near 55°N, 25°W.

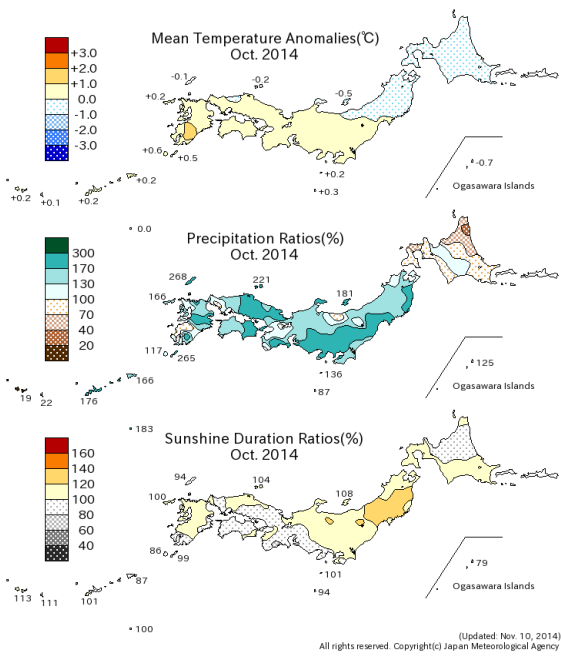


Fig. 1 Monthly climate anomaly / ratio over Japan (October 2014)
Top: temperature anomalies (degree C)
Middle: precipitation ratio (%)
Bottom: sunshine duration ratio (%)
Anomalies are defined as the deviations from the normal (1981-2010 average).

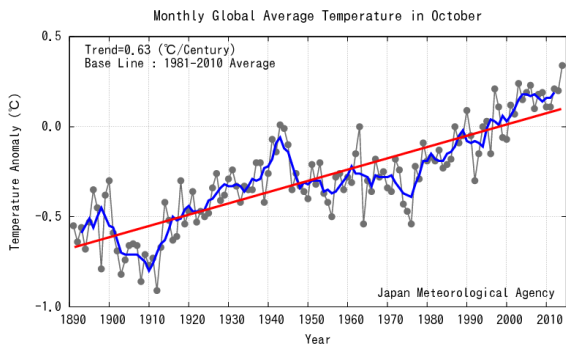


Fig. 2 Long-term change in monthly anomalies of global average surface temperature in October
The thin black line indicates anomalies of the surface temperature in each year. The blue line indicates five-year running mean, and the red line indicates a long-term linear trend. Anomalies are deviations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

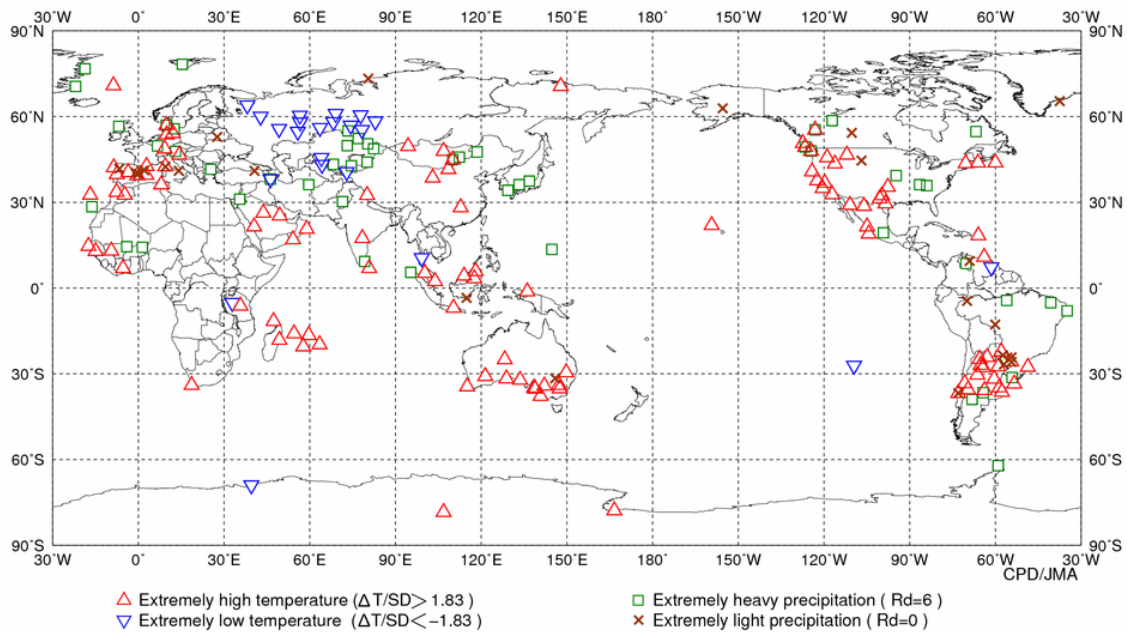


Fig. 3 Distribution of extreme climate events (October 2014)

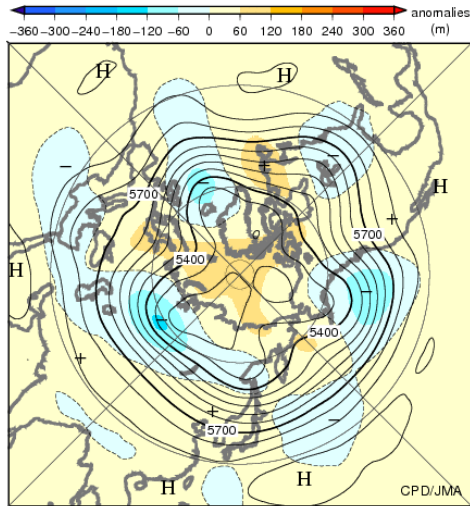


Fig. 4 Monthly mean 500-hPa height and anomaly in the Northern Hemisphere (October 2014)
The contours show heights at intervals of 60 m. The shading indicates height anomalies. The base period for the normal is 1981-2010.

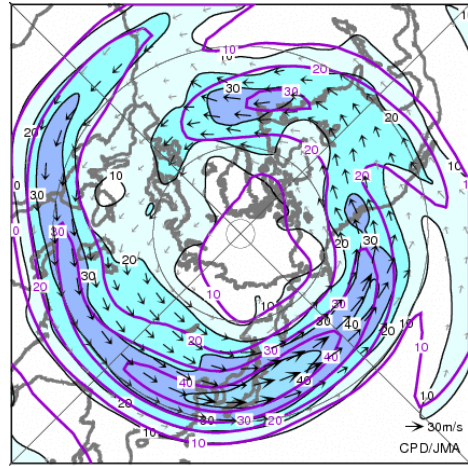


Fig. 5 Monthly mean 200-hPa wind speed and vectors in the Northern Hemisphere (October 2014)
The black lines show wind speeds at intervals of 10 m/s. The dark blue shading shows values greater than 20 m/s. The purple lines show normal wind speeds at intervals of 20 m/s. The base period for the normal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

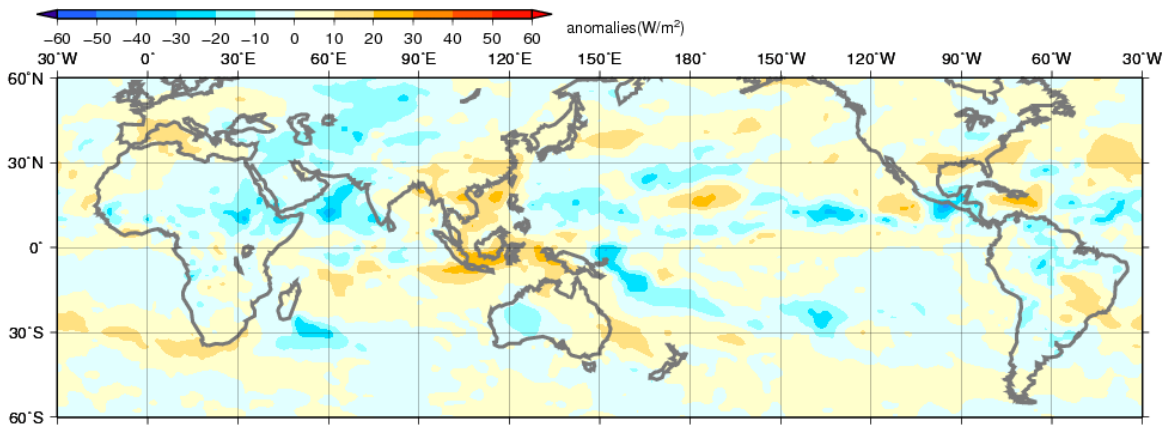


Fig. 6 Monthly mean Outgoing Longwave Radiation (OLR) anomaly (October 2014)
The contour interval is 10 W/m². The base period for the normal is 1981-2010. Original data provided by NOAA.

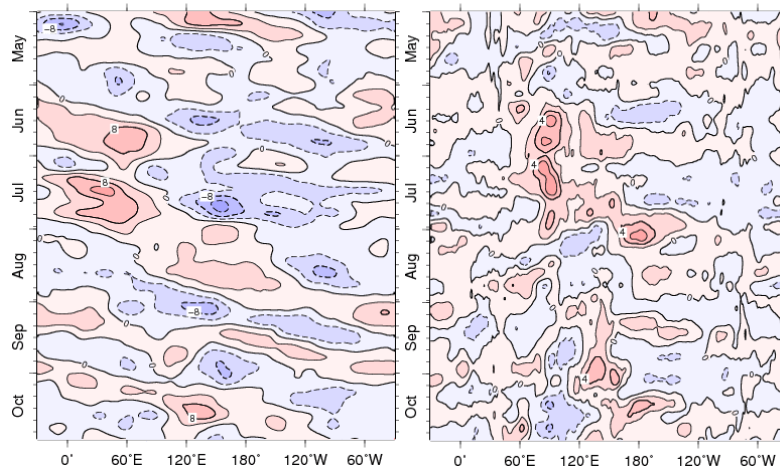


Fig. 7 Time-Longitude cross section (5°N-5°S) of five-day running mean 200-hPa velocity potential anomaly (left) and 850-hPa zonal wind anomaly (right) (May 2014- October 2014)
The contour intervals are 4×10^6 m²/s (left) and 2 m/s (right). The base period for the normal is 1981-2010.

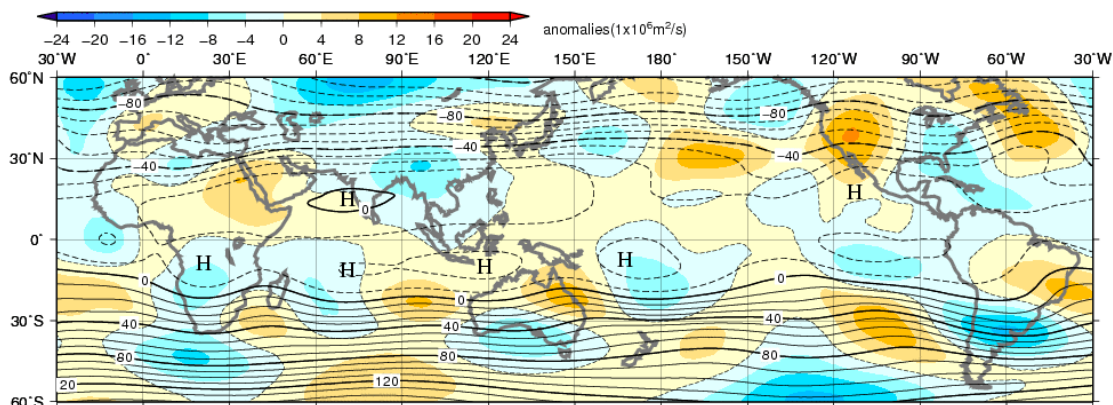


Fig. 8 Monthly mean 200-hPa stream function and anomaly (October 2014)
 The contour interval is $10 \times 10^6 \text{ m}^2/\text{s}$. The base period for the normal is 1981-2010.

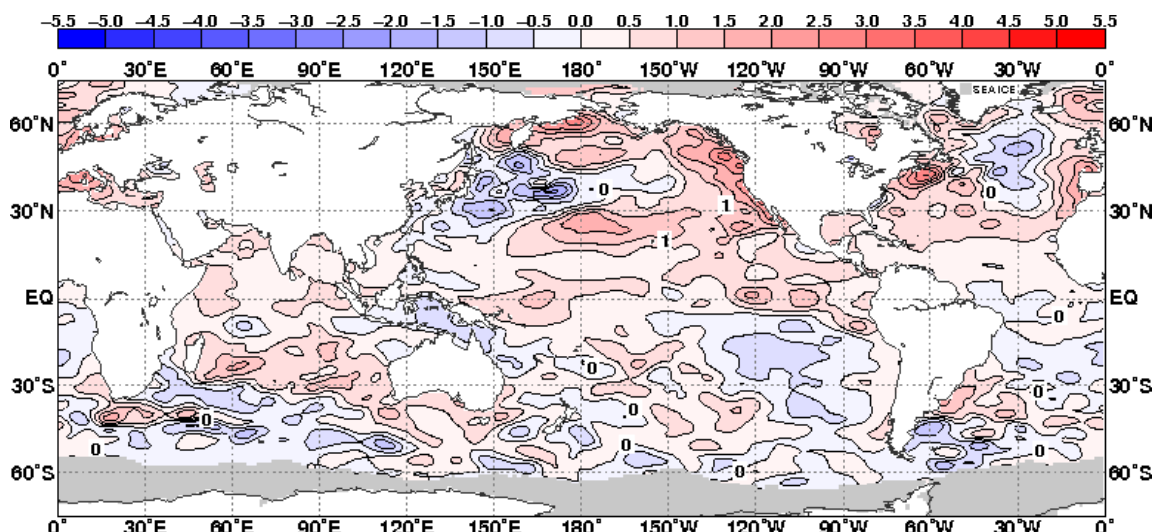


Fig. 9 Monthly mean sea surface temperature anomaly (October 2014)
 The contour interval is 0.5 degree C. The base period for the normal is 1981-2010. Maximum coverage with sea ice is shaded in gray.

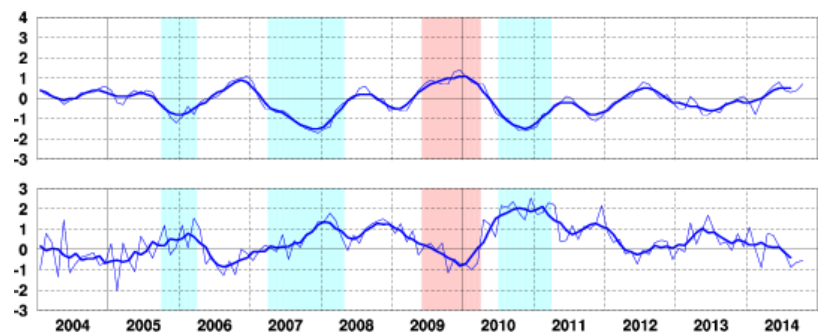


Fig. 10 Time series of monthly mean SST departure (degree C) from the reference value defined as the immediate past 30-year mean SST averaged over the NINO.3 region (upper). Time series of the Southern Oscillation Index with respect to the 1981-2010 base period (lower).
 Thin blue lines represent monthly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