

Monthly Highlights on the Climate System (September 2014)

Highlights in September 2014

- Sunny days with below normal temperature were dominant over the main islands of Japan.
- Monthly precipitation amounts were extremely light around western Europe.
- The subtropical jet stream flowed southward of its normal position over the area from the western to central Pacific.
- Convective activity was enhanced over the western Indian Ocean and the Inter-tropical Convergence Zone (ITCZ) of the Pacific, and was suppressed from the Bay of Bengal to Maritime Continent.
- Remarkably positive SST anomalies were observed in the western part of the equatorial Pacific.

Climate in Japan:

High pressure systems accompanied with cold air frequently passed over the main islands and brought sunny and cool days there. The autumn rain front was seen south of western Japan and its activity was weak over the Honshu. The Pacific High was dominant over Okinawa/Amami throughout the month and brought dry and remarkably hot days there. The monthly mean temperature averaged over Okinawa/Amami was the highest on record since 1946.

World Climate:

The monthly anomaly of the global average surface temperature in September 2014 (i.e., the combined average of the near-surface air temperature over land and the SST) was $+0.34^{\circ}\text{C}$ (the warmest since 1891) (preliminary value) (Fig. 2). On a longer time scale, global average surface temperatures have risen at a rate of about 0.61°C per century in September (preliminary value).

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

- Monthly mean temperatures were extremely high from Okinawa region of Japan to southeastern China.
- Monthly precipitation amounts were extremely light around western Europe.
- Monthly mean temperatures were extremely high from southeastern to western Australia.

Extratropics:

In the 500-hPa height field (Fig. 4), positive anomalies were observed in Europe and the area from eastern Siberia to North America, and negative anomalies were seen around the Greenland and western to central Siberia. The subtropical jet stream flowed southward of its normal position over the area from the western to central Pacific (Fig. 5). Zonal mean temperatures were above normal in the troposphere except the high latitudes of the Northern Hemisphere.

Tropics:

Convective activity was enhanced over the western

Indian Ocean and the Inter-tropical Convergence Zone (ITCZ) of the Pacific, and was suppressed from the Bay of Bengal to Maritime Continent (Fig. 6). The active phase of the Madden-Julian Oscillation propagated eastward from the Pacific to the Atlantic from early to mid-September and was seen over Indian Ocean and the western Pacific in late September (Fig. 7). In the lower troposphere of the equatorial central Pacific, westerly wind anomalies were seen in mid-September, and easterly wind anomalies were seen in late September (Fig. 7). In the upper troposphere, the Tibetan High was stronger than normal (Fig. 8). The Southern Oscillation Index value was -0.6 (Fig. 10).

Oceanographic Conditions:

Remarkably positive SST anomalies were observed in the western part 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 $+0.4^{\circ}\text{C}$.

In the North Pacific, remarkably negative SST anomalies were observed from east of Japan to near 40°N , 170°W , and as surrounding them, remarkably positive SST anomalies were observed in large area north of 20°N . In the South Pacific, remarkably positive SST anomalies were observed from near 40°S , 165°W to near 35°S , 115°W and remarkably negative SST anomalies were observed from near 15°S , 130°W to near 20°S , 90°W .

In the Indian Ocean, remarkably positive SST anomalies were observed in the eastern part of equatorial area and from near Madagascar to the western coast of Australia, and remarkably negative SST anomalies were observed from near 30°S , 45°E to near 40°S , 80°E .

In the Atlantic, remarkably negative SST anomalies were observed from near 45°N , 50°W to near 40°N , 30°W , and as surrounding them, remarkably positive SST anomalies were observed in large area north of 20°N .

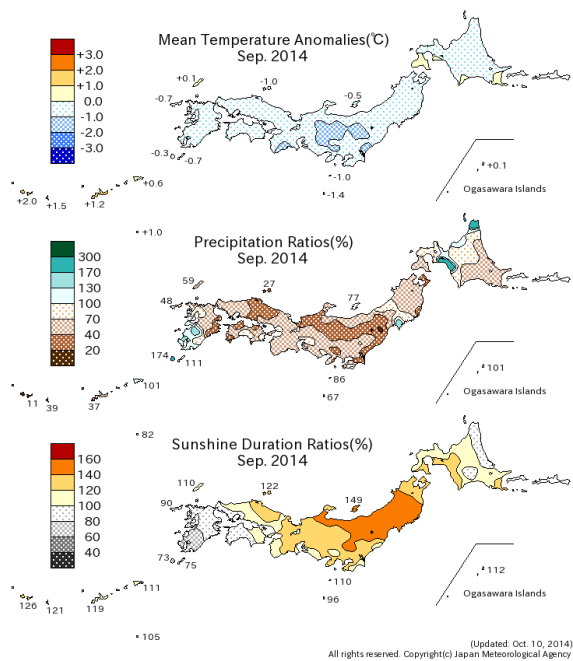


Fig. 1 Monthly climate anomaly / ratio over Japan (September 2014)
 Top: temperature anomalies (degree C)
 Middle: precipitation ratio (%)
 Bottom: sunshine duration ratio (%)
 Anomalies are defined as the deviations from the normal (1981-2010 average).

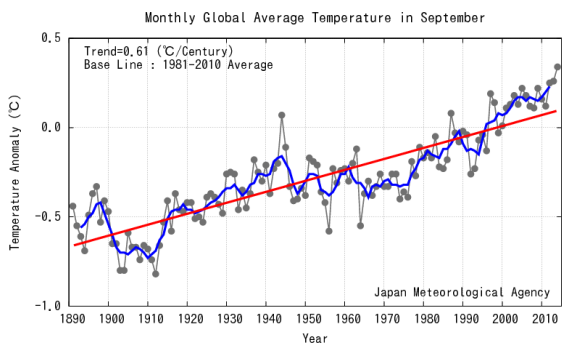


Fig. 2 Long-term change in monthly anomalies of global average surface temperature in September
 The thin black line indicates anomalies of the surface temperature in each year. The blue line indicates five-year running mean, and the red line indicates a long-term linear trend. Anomalies are deviations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

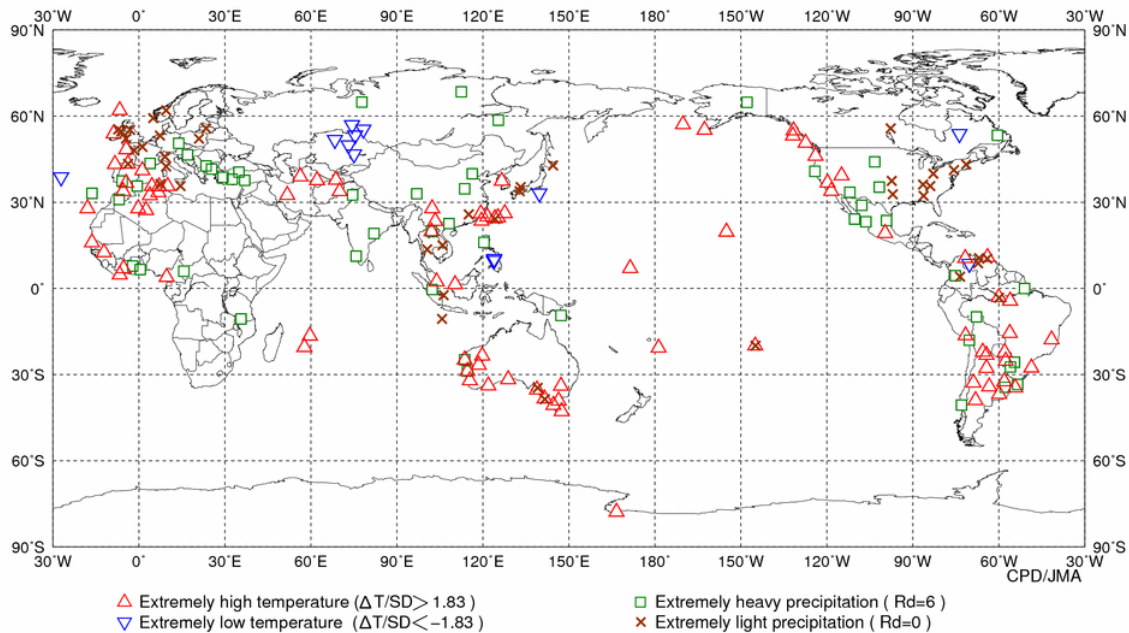


Fig. 3 Distribution of extreme climate events (September 2014)

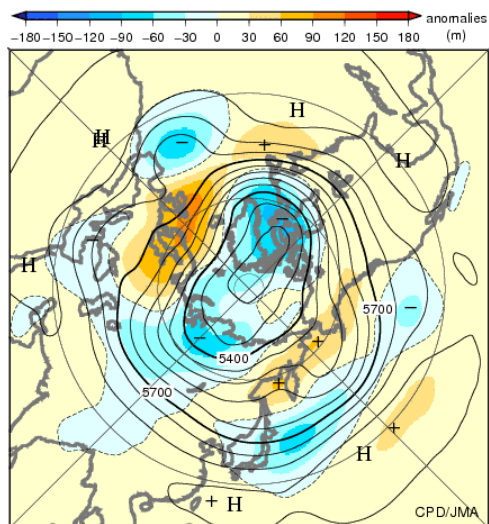


Fig. 4 Monthly mean 500-hPa height and anomaly in the Northern Hemisphere (September 2014)
The contours show heights at intervals of 60 m. The shading indicates height anomalies. The base period for the normal is 1981-2010.

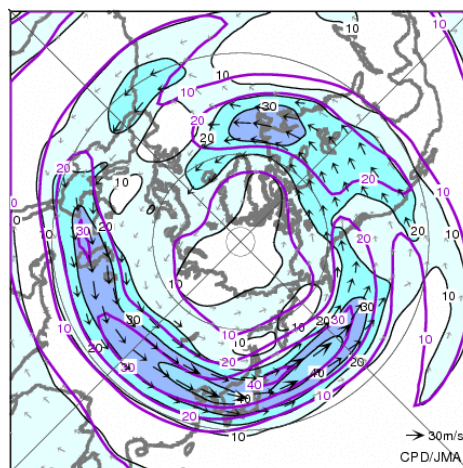


Fig. 5 Monthly mean 200-hPa wind speed and vectors in the Northern Hemisphere (September 2014)
The black lines show wind speeds at intervals of 10 m/s. The dark blue shading shows values greater than 20 m/s. The purple lines show normal wind speeds at intervals of 10 m/s. The base period for the normal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

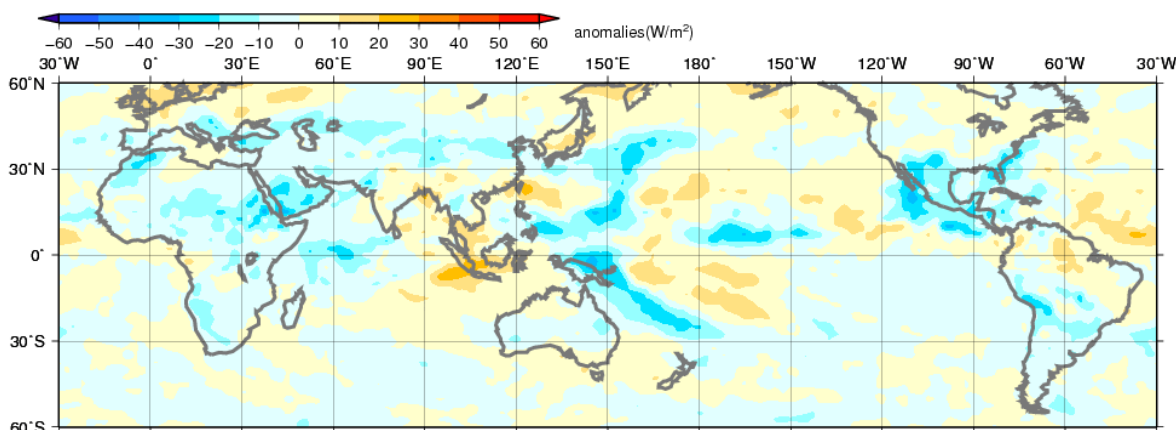


Fig. 6 Monthly mean Outgoing Longwave Radiation (OLR) anomaly (September 2014)
The contour interval is 10 W/m². The base period for the normal is 1981-2010. Original data provided by NOAA.

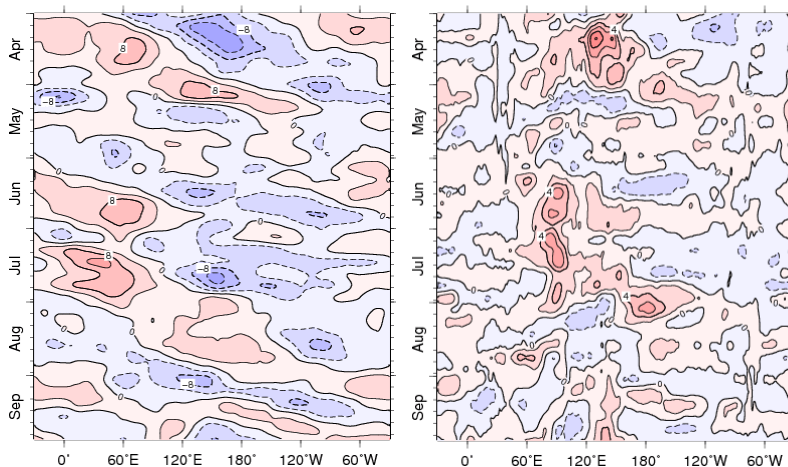


Fig. 7 Time-Longitude cross section (5°N-5°S) of five-day running mean 200-hPa velocity potential anomaly (left) and 850-hPa zonal wind anomaly (right) (April 2014- September 2014)
The contour intervals are 4×10^6 m²/s (left) and 2 m/s (right). The base period for the normal is 1981-2010.

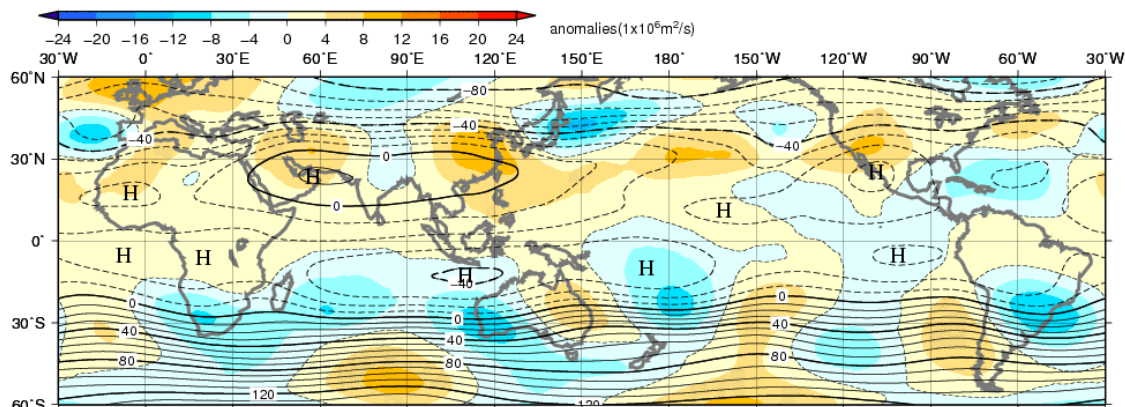


Fig. 8 Monthly mean 200-hPa stream function and anomaly (September 2014)
 The contour interval is $10 \times 10^6 \text{ m}^2/\text{s}$. The base period for the normal is 1981-2010.

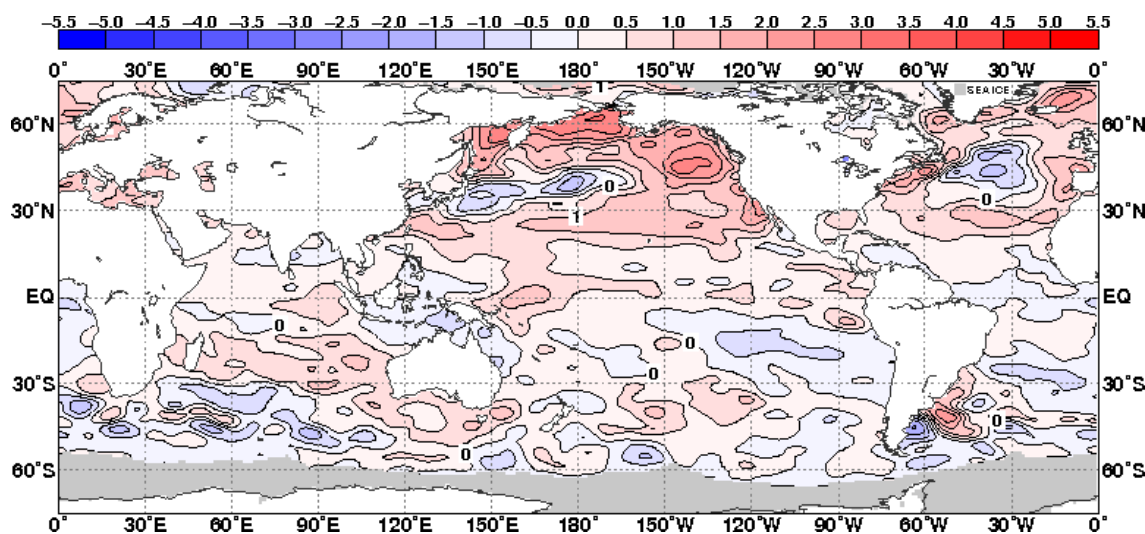


Fig. 9 Monthly mean sea surface temperature anomaly (September 2014)
 The contour interval is 0.5 degree C. The base period for the normal is 1981-2010. Maximum coverage with sea ice is shaded in gray.

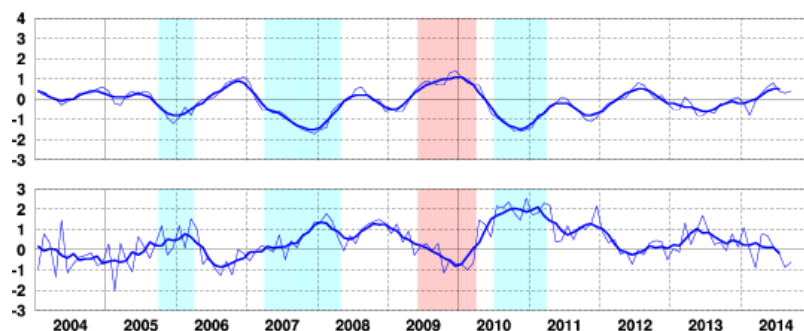


Fig. 10 Time series of monthly mean SST departure (degree C) from the reference value defined as the immediate past 30-year mean SST averaged over the NINO.3 region (upper). Time series of the Southern Oscillation Index with respect to the 1981-2010 base period (lower). Thin blue lines represent monthly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