Monthly Highlights on the Climate System (April 2015)

Highlights in April 2015

- El Niño conditions are present in the equatorial Pacific (see *El Niño Outlook* updated on 12 May 2015).
- Monthly mean temperatures were above normal all over Japan and significantly above normal in western Japan.
- Monthly mean temperatures were extremely high from the Florida Peninsula to the Yucatan Peninsula succeeding to the previous month.
- The sub-tropical jet stream shifted southward of its normal position over southern China and northward over Middle East.
- Convective activity was enhanced over the latitude band of 10°N in the western and central North Pacific, India and the eastern part of the South Indian Ocean.
- Remarkably positive SST anomalies were observed over most of the equatorial Pacific.

Climate in Japan:

Mean temperatures and precipitation amounts were above normal all over Japan due to warm and wet southerly wind in early and mid- April. Besides, sunny days were dominant and mean temperatures were significantly above normal in the north and east Japan since high pressure systems often covered over Japan late in the month.

World Climate:

The monthly anomaly of the global average surface temperature in April 2015 (i.e., the combined average of the near-surface air temperature over land and the SST) was +0.30°C (3rd warmest since 1891) (preliminary value) (Fig. 2). On a longer time scale, global average surface temperatures have risen at a rate of about 0.74°C per century in April (preliminary value).

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

- Monthly precipitation amounts were extremely heavy in southern India.
- Monthly mean temperatures were extremely high and monthly precipitation amounts were extremely light from southwestern Europe to the western part of Northern Africa.
- Monthly mean temperatures were extremely high from the Florida Peninsula to the Yucatan Peninsula succeeding to the previous month.

Extratropics:

In the 500-hPa height field (Fig.4), negative anomalies were observed over eastern Canada and western Russia, and positive anomalies were observed over western Europe, the northern part of Central Siberia and over Japan. The sub-tropical jet stream shifted southward of its normal position over southern China and northward over Middle East, and was weaker than normal over Japan. The two branches of the jet stream over the central to eastern Pacific were both intensified (Fig. 5).

Tropics:

Convective activity was enhanced over the latitude band of 10°N in the western and central North Pacific, India and the eastern part of the South Indian Ocean, and it was suppressed over the central part of the tropical South Pacific and the South China Sea (Fig. 6). The active phase of the Madden-Julian Oscillation (MJO) was seen over the Indian Ocean in the first half of early April and became obscure afterward (Fig. 7). In the lower troposphere, cyclonic circulation anomalies straddling the equator were seen over the area from the Indian Ocean to the Pacific in the tropics and westerly wind anomalies were dominant over the equatorial Pacific (Fig. 7). In the upper troposphere, wave trains were seen along the subtropical jet stream over Eurasia (Fig. 8). The Southern Oscillation Index value was +0.1 (Fig. 10).

Oceanographic Conditions:

Remarkably positive SST anomalies were observed over most of the equatorial Pacific. The monthly mean SST anomaly in the NINO.3 region was +0.7˚C and the SST deviation from the latest sliding 30-year mean was +0.8˚C. In the North Pacific, remarkably positive SST anomalies were observed from the coast of North America to central and eastern part of the equatorial region, and from south of Japan to the east of the Kuril Islands, and remarkably negative SST anomalies were observed from east of the Philippines to near 30˚N, 160˚W. In the South Pacific, remarkably positive SST anomalies were observed near the eastern coast of Australia, and from near the coast of Chile to near 25˚S, 115˚W. In the Indian Ocean, remarkably positive SST anomalies were observed from the western coast of Australia to eastern part of the tropical region and near Madagascar. In the North Atlantic, remarkably positive SST anomalies were observed from near the eastern coast of North America and the Gulf of Mexico to near 40˚N, 30˚W, and remarkably negative SST anomalies were observed near the western coast of North Africa and south of Greenland. These SST anomalies constituted a tripole pattern.

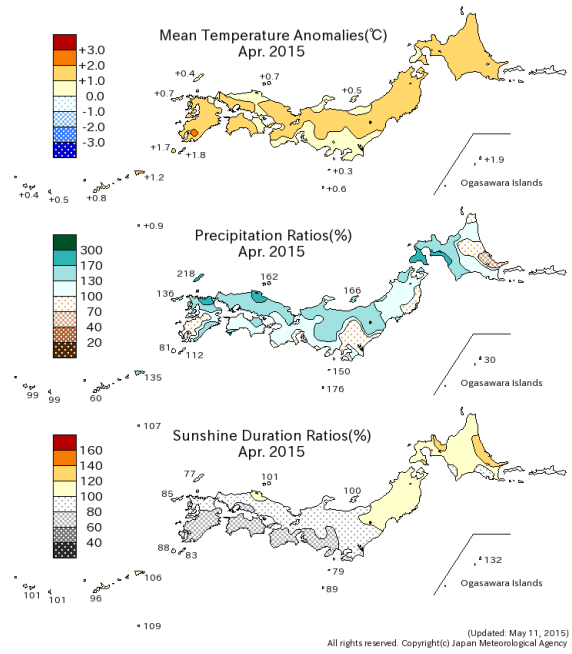

Fig. 1 Monthly climate anomaly / ratio over Japan (April 2015)
Top: temperature anomalies (°C)
Middle: precipitation ratio (%)
Bottom: sunshine duration ratio (%)
Anomalies are defined as the deviations from the normal (1981-2010 average).

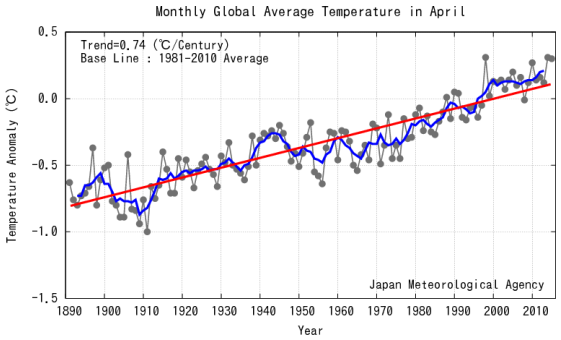

Fig. 2 Long-term change in monthly anomalies of global average surface temperature in April
The thin black line indicates anomalies of the surface temperature in each year. The blue line indicates five-year running mean, and the red line indicates a long-term linear trend. Anomalies are deviations from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

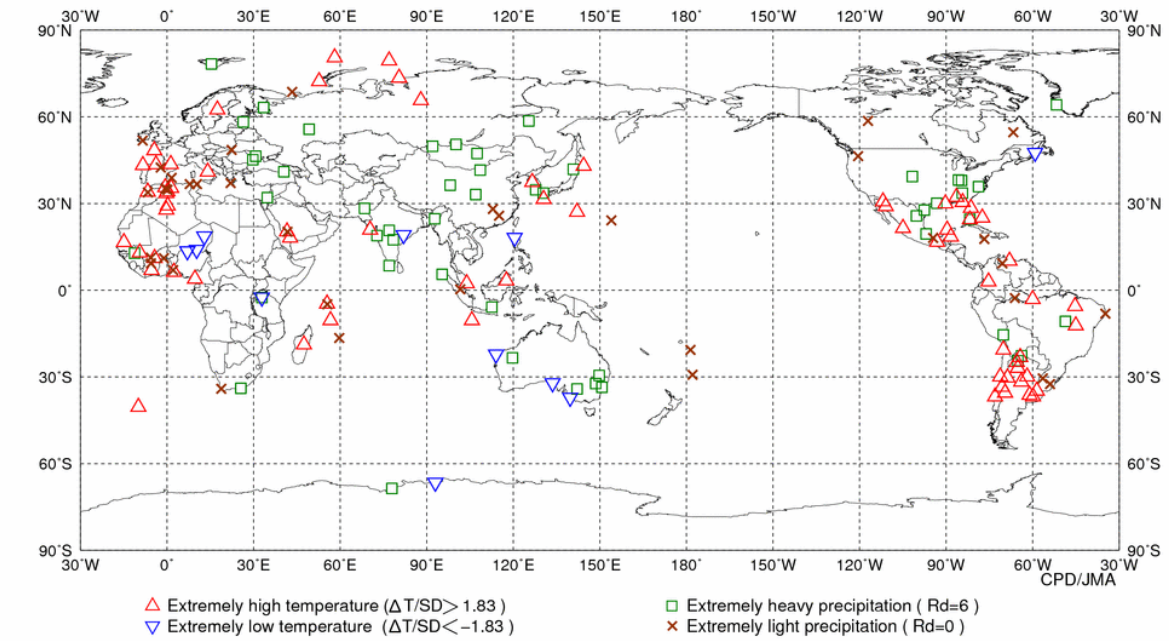

Fig. 3 Distribution of extreme climate events (April 2015)

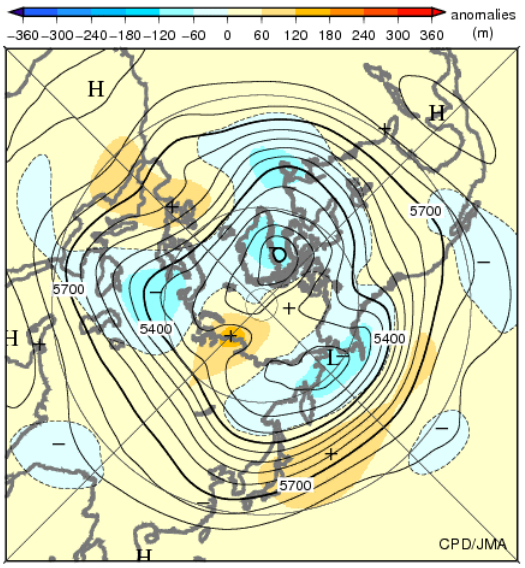

Fig. 4 Monthly mean 500-hPa height and anomaly in the Northern Hemisphere (April 2015)
The contours show heights at intervals of 60 m. The shading indicates height anomalies. The base period for the normal is 1981-2010.

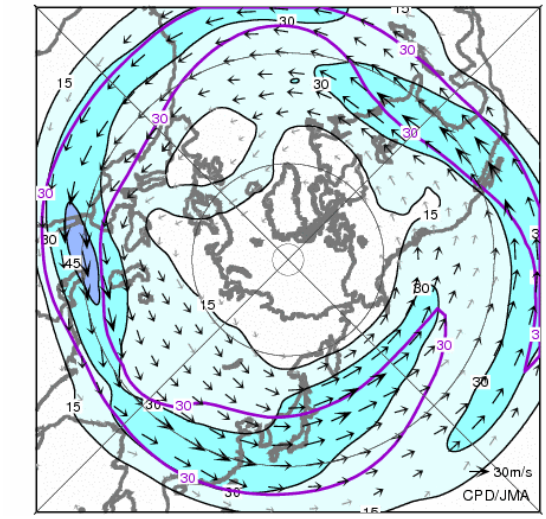

Fig. 5 Monthly mean 200-hPa wind speed and vectors in the Northern Hemisphere (April 2015)
The black lines show wind speeds at intervals of 15 m/s. The darkest blue shading shows values greater than 45 m/s. The purple lines show normal wind speeds at intervals of 30 m/s. The base period for the normal is 1981-2010.

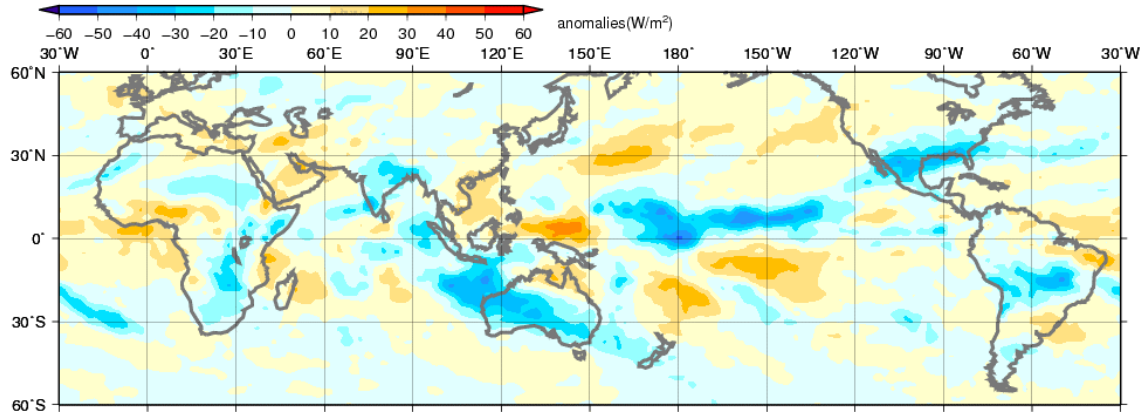

Fig. 6 Monthly mean Outgoing Longwave Radiation (OLR) anomaly (April 2015)
The contour interval is 10 W/m^2. The base period for the normal is 1981-2010. Original data provided by NOAA.

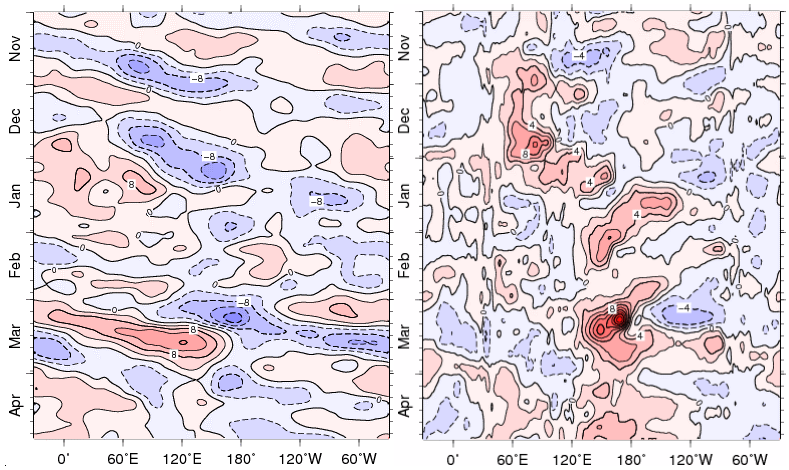

Fig. 7 Time-Longitude cross section (5°N-5°S) of five-day running mean 200-hPa velocity potential anomaly (left) and 850-hPa zonal wind anomaly (right) (November 2014 - April 2015)
The contour intervals are 4x10^6 m^2/s (left) and 2 m/s (right). The base period for the normal is 1981-2010.

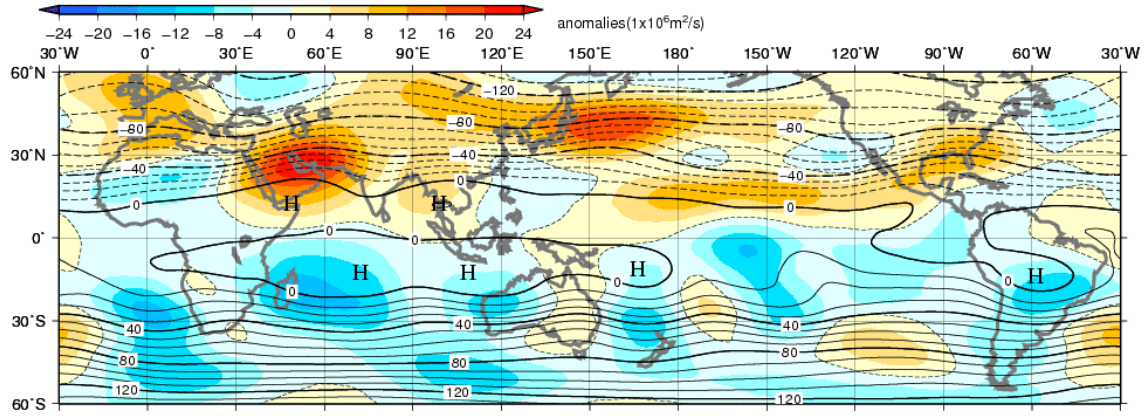

Fig. 8 Monthly mean 200-hPa stream function and anomaly (April 2015)

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

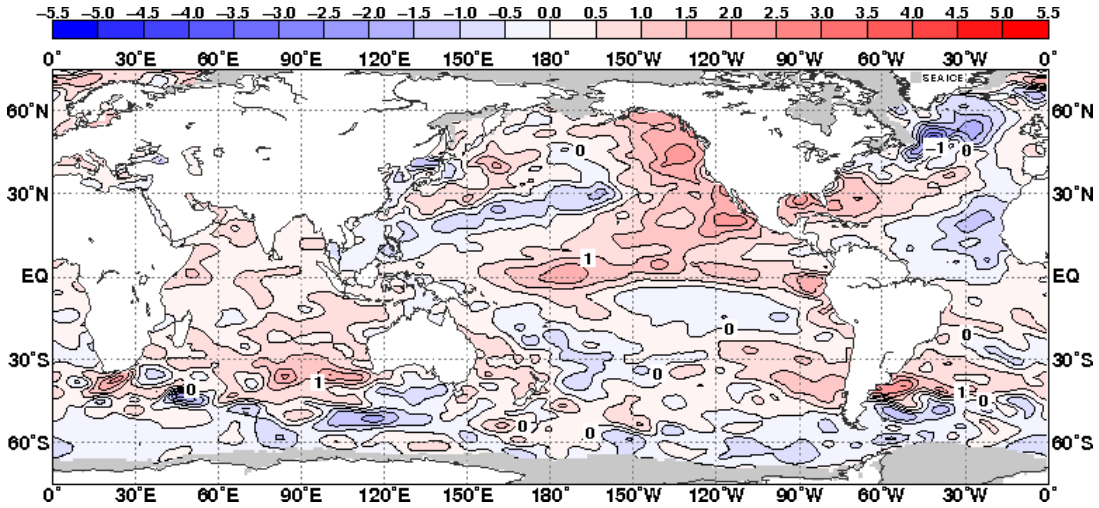

Fig. 9 Monthly mean sea surface temperature anomaly (April 2015)

The contour interval is 0.5 ºC. The base period for the normal is 1981-2010. Maximum coverage with sea ice is shaded in gray.

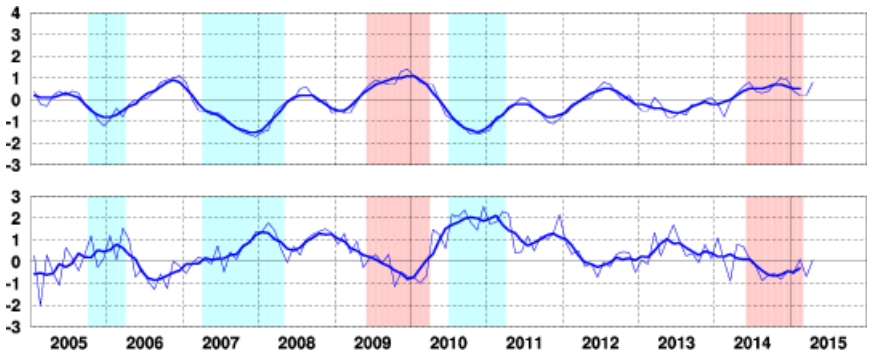

Fig. 10 Time series of monthly mean SST departure (°C) from the reference value defined as the immediate past 30-year mean SST averaged over the NINO.3 region (upper). Time series of the Southern Oscillation Index with respect to the 1981-2010 base period (lower).

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.