Monthly Highlights on the Climate System (April 2019)

Highlights in April 2019

- El Niño conditions continue in the equatorial Pacific (see El Niño Outlook updated on 10 May 2019).
- Monthly sunshine durations were significantly above normal in northern Japan.
- Monthly mean temperatures were extremely high over the northern part of Eastern Siberia, from central to northwestern China, and in and around the northwestern part of Southeast Asia.
- Convective activity was enhanced over the central tropical Indian Ocean and the west of the date line.
- In the 500-hPa height field, a wave train was clearly seen from North America to northern Eurasia with positive anomalies over the Norwegian Sea and Eastern Siberia. Negative anomalies extended zonally over the mid-latitudes of the western and central North Pacific.
- Temperatures at 850-hPa were above normal from northern Europe to Greenland, over Eastern Siberia and near China, and below normal over the seas east of Japan.

Climate in Japan (Fig. 1):

- In northern Japan, monthly sunshine durations were significantly above normal and monthly precipitation amounts were below normal because high pressure systems tended to cover the region.
- In eastern Japan, monthly mean temperatures were below normal as cold air often affected the region.
- In Okinawa/Amami, monthly mean temperatures and monthly precipitation amounts were above normal due to warm and moist southerly airflow.

World Climate:

- The monthly anomaly of the global average surface temperature (i.e., the combined average of the near-surface air temperature over land and the SST) was +0.43°C (2nd warmest since 1891) (preliminary value) (Fig. 2). On a longer time scale, global average surface temperatures have risen at a rate of about 0.78°C per century in April (preliminary value).
- Extreme climate events were as follows (Fig. 3).
    - Monthly mean temperatures were extremely high over the northern part of Eastern Siberia, from central to northwestern China, in and around the northwestern part of Southeast Asia, from southern Norway to the northern UK, in and around Iceland, in and around northern Madagascar, and from central Argentina to southern Chile.
    - Monthly precipitation amounts were extremely high from northwestern Spain to northwestern Algeria, and from southeastern Canada to the northeastern USA. Monthly precipitation amounts were extremely low in and around the northeastern part of East Asia, and from Western Russia to Poland.

Oceanographic Conditions (Fig. 4):

- In the equatorial Pacific, positive SST anomalies were observed in almost the entire region except the area near Indonesia. In the NINO.3 region, the monthly mean SST anomaly and the SST deviation from the latest sliding 30-year mean were both +0.7°C (Fig.5).
- In the North Pacific, remarkably positive SST anomalies were observed from the South China Sea to the central part, from the area around Aleutian Islands to the Gulf of Alaska and in the eastern tropical region.
- In the South Pacific, remarkably positive SST anomalies were observed from east of New Guinea Island to the area near 20°S, 120°W, from the area near the southeastern coast of Australia to the area near 50°S, 140°W and off the western coast of Chile, and remarkably negative SST anomalies were observed in the area near 30°S, 135°W and near the western coast of Chile.
- In the Indian Ocean, remarkably positive SST anomalies were observed in almost the entire region, and remarkably negative SST anomalies were observed in the southwestern coast of Australia.

- In the North Atlantic, remarkably positive SST anomalies were observed from the Gulf of Mexico to the area near 30°N, 30°W, and remarkably negative SST anomalies were observed south of Greenland.

Tropics:

- Convective activity was enhanced over the central tropical Indian Ocean and the west of the date line, and was suppressed over the western North Indian Ocean, from the South China Sea to the Philippines, the seas south of the Maritime Continent, the central and eastern North Pacific, and around the latitude band of 10°S in the western and central South Pacific (Fig. 6).
- The active phase of equatorial intraseasonal oscillation propagated eastward from the Indian Ocean to the Maritime Continent in late April (Fig. 7).
- In the upper troposphere, cyclonic circulation anomalies were observed over the eastern North Indian Ocean, and anti-cyclonic circulation anomalies were seen over the western tropical North Pacific and around the date line in the South Pacific (Fig. 8).
- In the lower troposphere, cyclonic circulation anomalies were observed over the North Indian Ocean, and anti-cyclonic anomalies were seen over a wide area from the South China Sea to the eastern North Pacific.
- In the sea level pressure field, positive anomalies were seen over a wide area of the tropics. The Southern Oscillation Index value was +0.1 (Fig. 5).

Extratropics:

- In the 500-hPa height field (Fig. 9), the polar vortex in the Northern Hemisphere split into the Siberian part and the North American part. A wave train was clearly seen from North America to northern Eurasia with positive anomalies over the Norwegian Sea and Eastern Siberia. Negative anomalies extended zonally over the mid-latitudes of the western and central North Pacific.
- The westerly jet stream split into two branches over Eurasia, and shifted southward from its normal position over the western North Pacific (Fig. 10).
- In the sea level pressure field (Fig. 11), positive anomalies were seen near the Scandinavian Peninsula, and negative anomalies were seen over the seas south of Greenland, Central Siberia and to the south of the Aleutian Islands.
- Temperatures at 850-hPa were above normal from northern Europe to Greenland, over Eastern Siberia and near China, and below normal over the seas east of Japan (Fig. 12).
- Zonal mean temperatures in the troposphere were above normal except over the latitude bands from 50°N to 60°N. In the stratosphere, below-normal temperatures were widely seen except over the latitude bands from 40°N to 60°N.

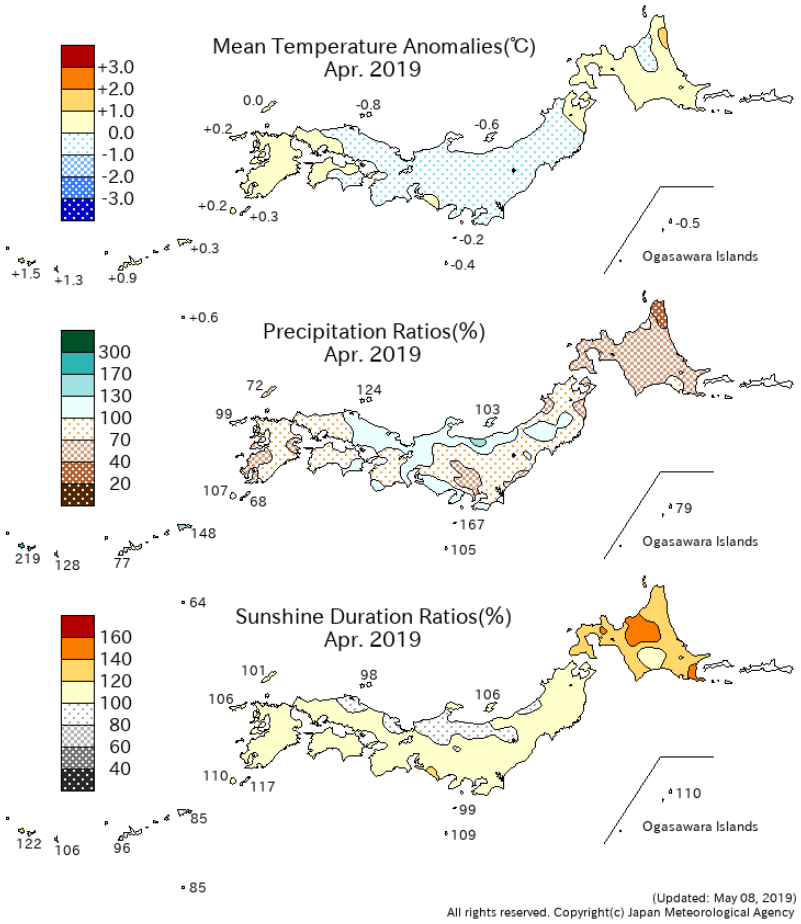

Fig. 1 Monthly climate anomaly/ratio over Japan (April 2019)
Top: temperature anomalies (degree C)
Middle: precipitation ratio (%)
Bottom: sunshine duration ratio (%)
The base period for the normal is 1981-2010.

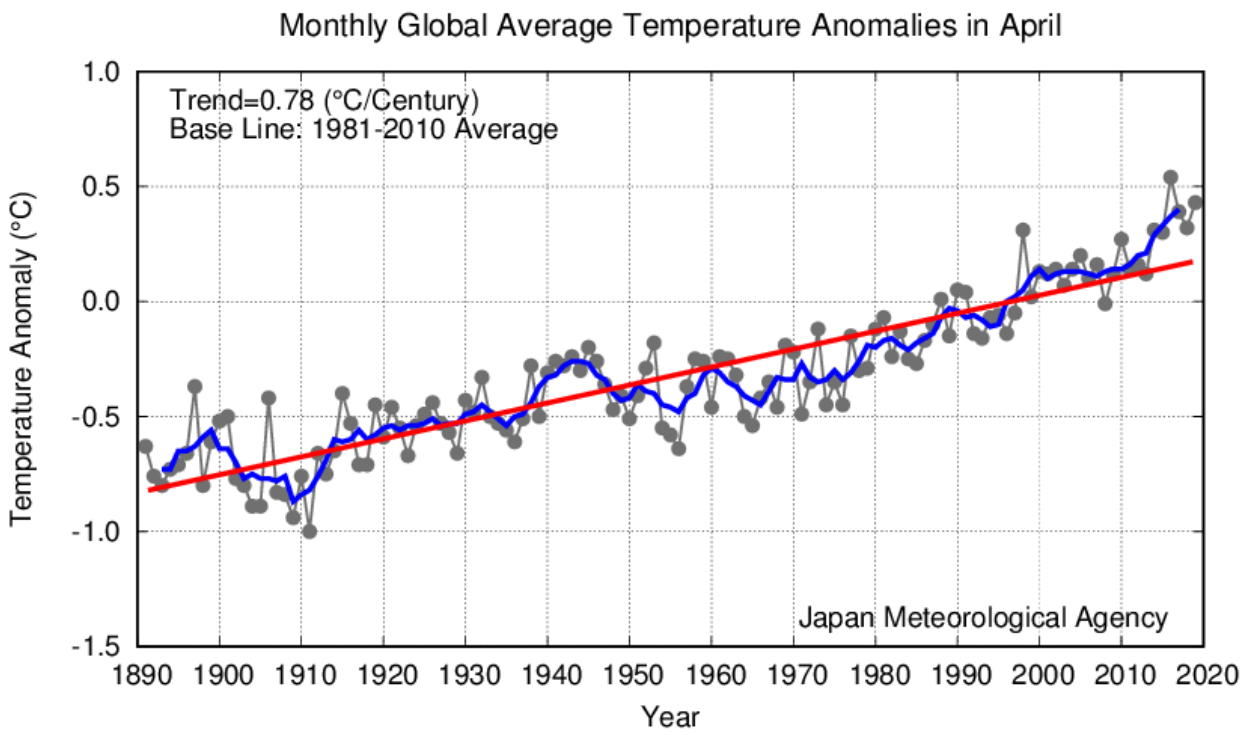

Fig. 2 Long-term change in monthly anomalies of global average surface temperature in April
The thin black line indicates anomalies of the surface temperature in each year. The blue line indicates five-year running mean, and the red line indicates a long-term linear trend. Anomalies are deviations from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

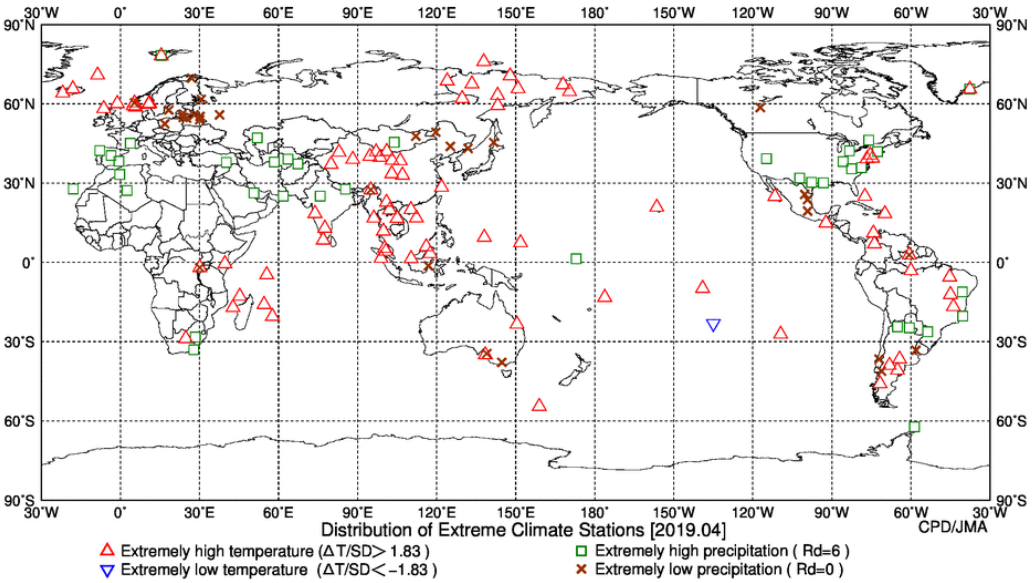

Fig. 3 Distribution of extreme climate stations (April 2019)

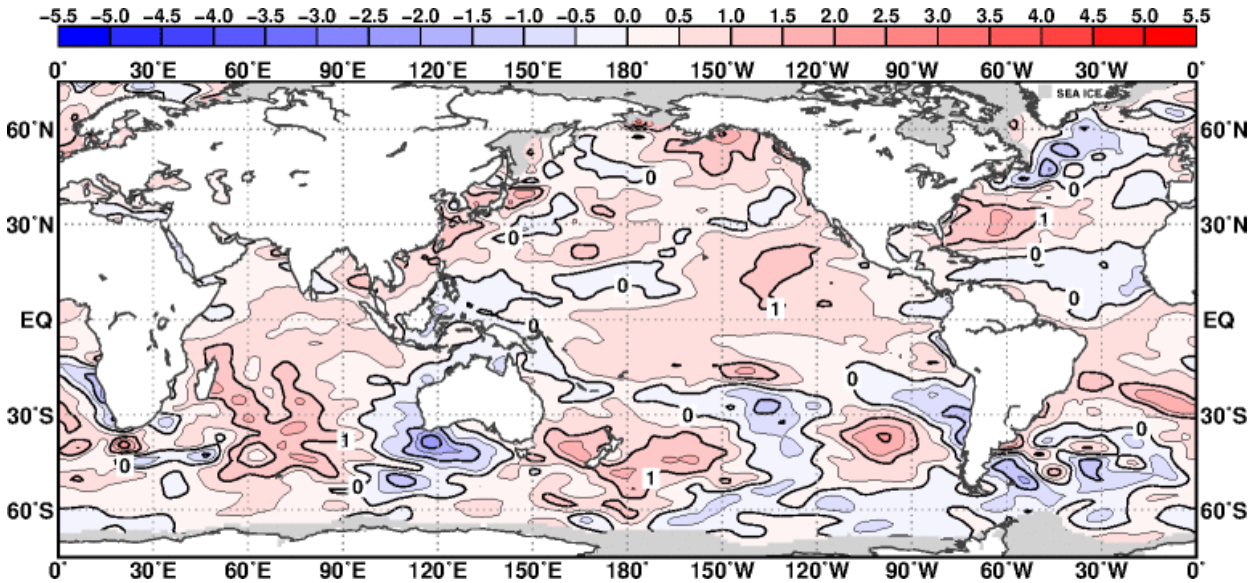

Fig. 4 Monthly mean sea surface temperature anomaly (April 2019)

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.

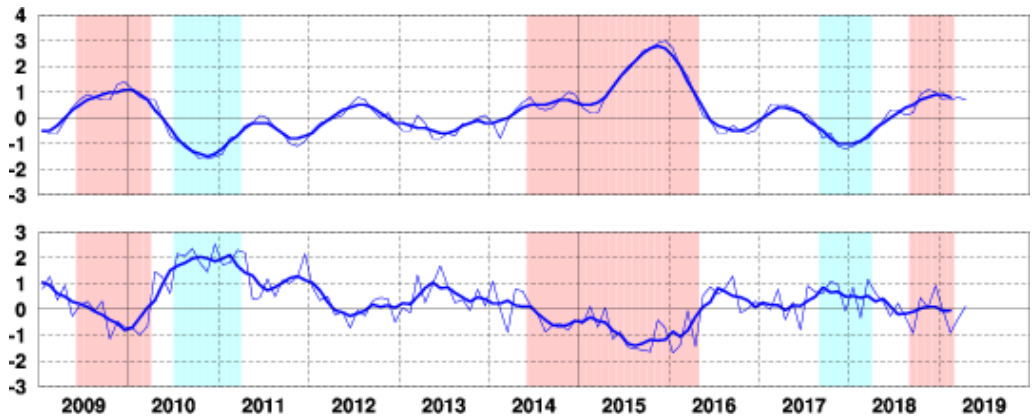

Fig. 5 Time series of monthly mean SST departure (degree C) from the reference value defined as the immediate past 30-year mean SST averaged over the NINO.3 region (upper). Time series of the Southern Oscillation Index with respect to the 1981-2010 base period (lower).

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.

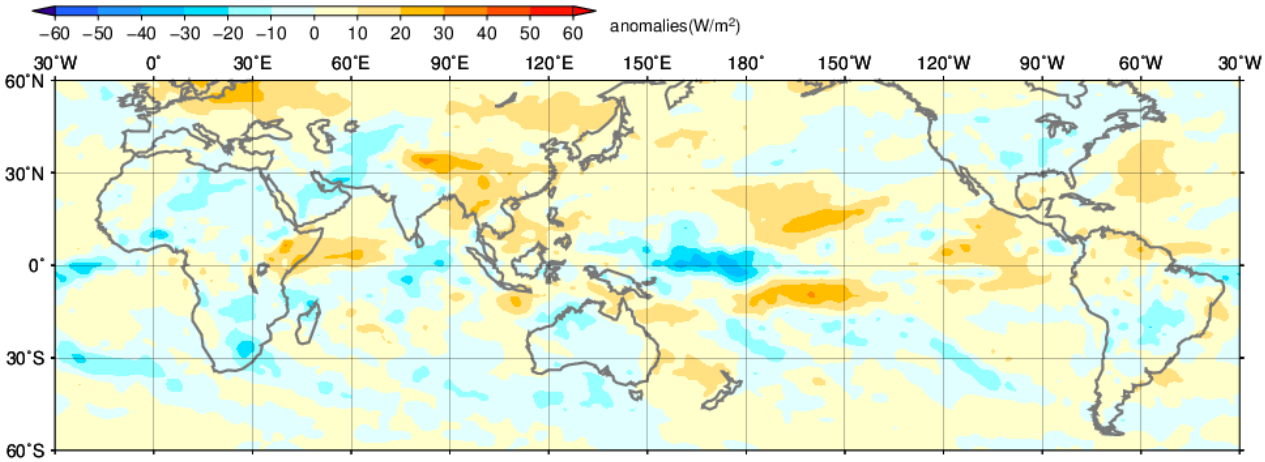

Fig. 6 Monthly mean Outgoing Longwave Radiation (OLR) anomaly (April 2019)
The contour interval is 10 W/m^2. The base period for the normal is 1981-2010. Original data provided by NOAA.

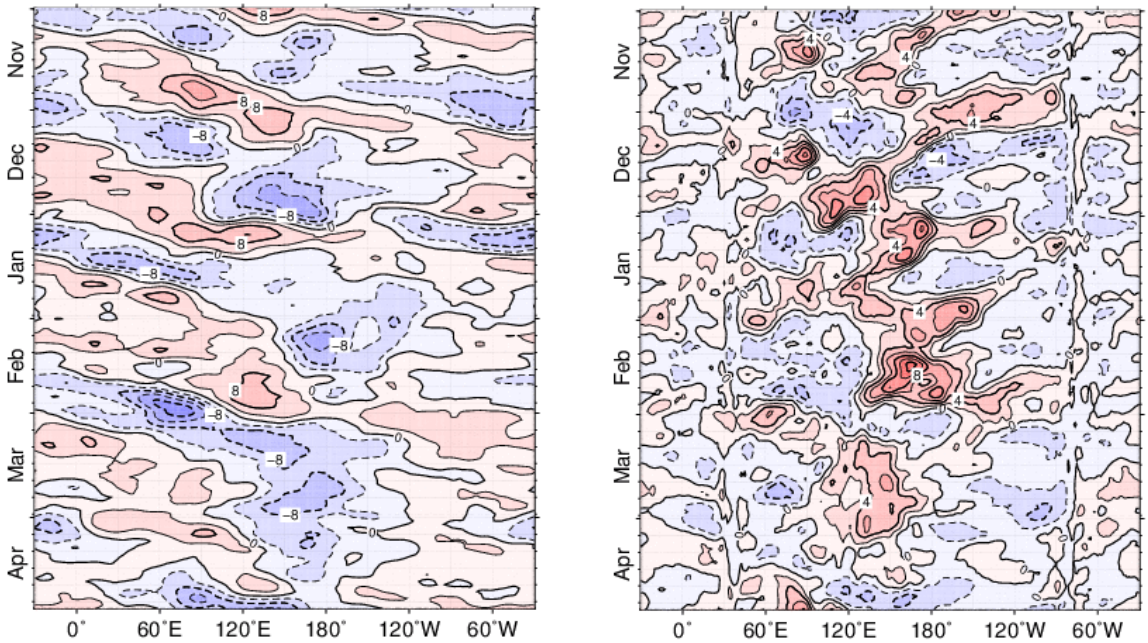

Fig. 7 Time-Longitude cross section (5°N-5°S) of five-day running mean 200-hPa velocity potential anomaly (left) and 850-hPa zonal wind anomaly (right) (November 2018 – April 2019)
The contour intervals are 4x10^6 m^2/s (left) and 2 m/s (right). The base period for the normal is 1981-2010.

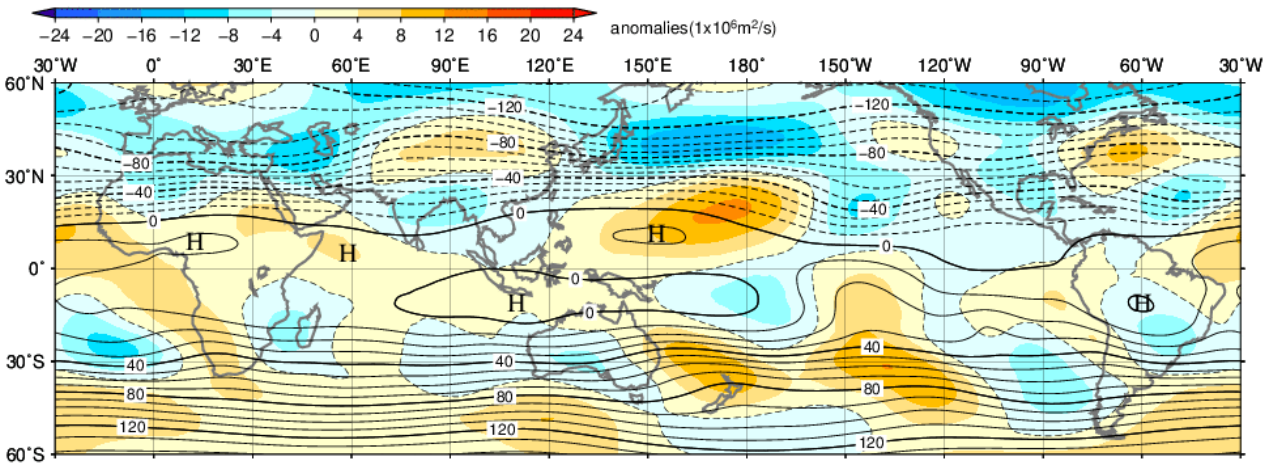

Fig. 8 Monthly mean 200-hPa stream function and anomaly (April 2019)
The contour interval is 10x10^6 m^2/s. The base period for the normal is 1981-2010.

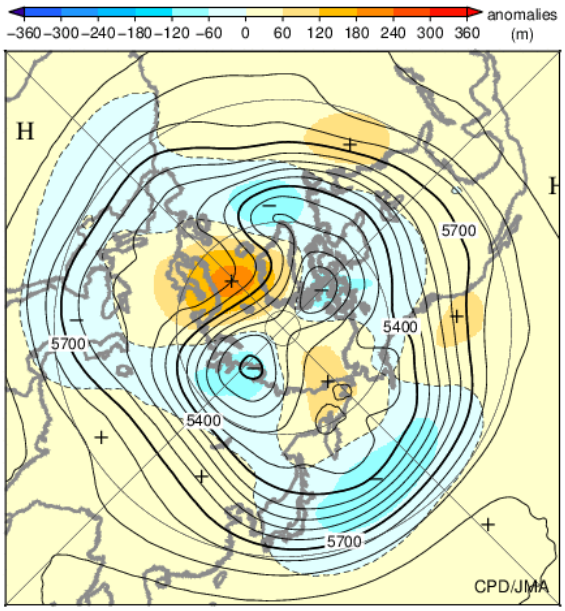

Fig. 9 Monthly mean 500-hPa height and anomaly in the Northern Hemisphere (April 2019)

The contours show 500-hPa height at intervals of 60 m. The shading indicates its anomalies. The base period for the normal is 1981-2010.

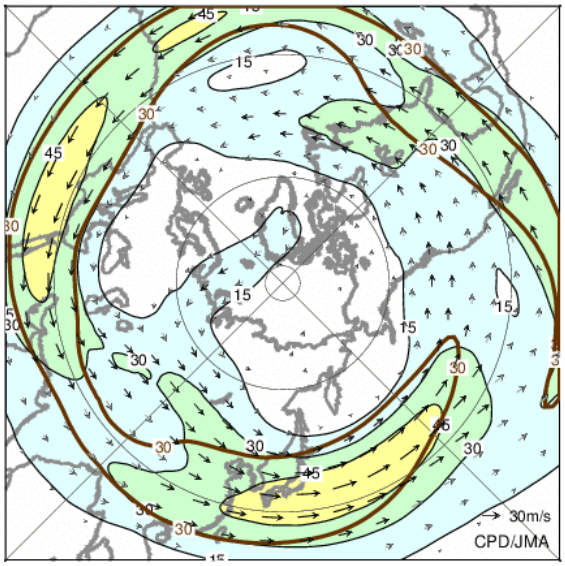

Fig. 10 Monthly mean 200-hPa wind speed and vectors in the Northern Hemisphere (April 2019)

The black lines show wind speed at intervals of 15 m/s. The brown lines show its normal at intervals of 30 m/s. The base period for the normal is 1981-2010.

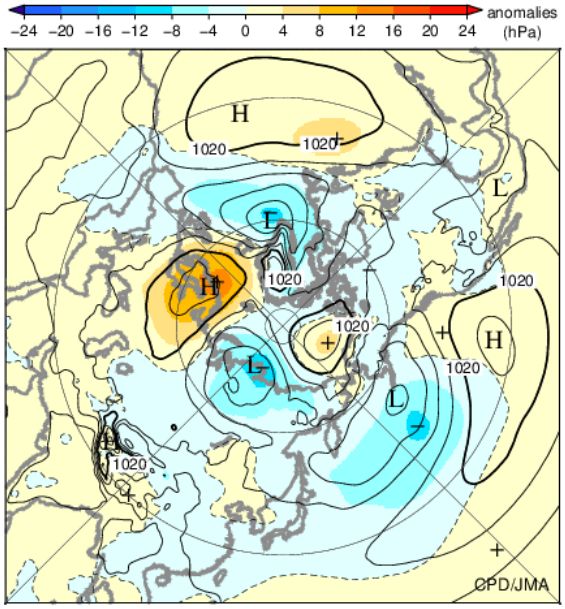

Fig. 11 Monthly mean sea level pressure and anomaly in the Northern Hemisphere (April 2019)

The contours show sea level pressure at intervals of 4 hPa. The shading indicates its anomalies. The base period for the normal is 1981-2010.

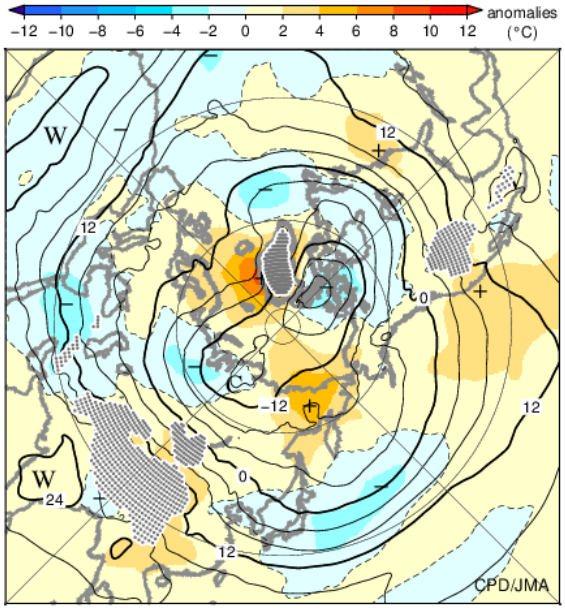

Fig. 12 Monthly mean 850-hPa temperature and anomaly in the Northern Hemisphere (April 2019)

The contours show 850-hPa temperature at intervals of 4 degree C. The shading indicates its anomalies. The base period for the normal is 1981-2010.

Detailed information on the climate system is available on the Tokyo Climate Center's website.
https://ds.data.jma.go.jp/tcc/tcc/index.html
This report is prepared by the Tokyo Climate Center, Climate Prediction Division, Global Environment and Marine Department, Japan Meteorological Agency.