

Monthly Highlights on the Climate System (November 2024)

Highlights in November 2024

- Convective activity was enhanced from the central tropical South Indian Ocean to Australia, to the north of the Philippines and in and around the Caribbean Sea, and suppressed from the western to central equatorial Pacific.
- In the upper troposphere, anti-cyclonic circulation anomalies straddling the equator were seen from the eastern Pacific to the western Indian Ocean through Africa. A wavy anomaly pattern was seen over southern Eurasia, with anti-cyclonic circulation anomalies in East Asia.
- In the 500-hPa height field, a wavy anomaly pattern was dominant in the Northern Hemisphere, with positive anomalies to the southwest of Alaska, from eastern Canada to Europe and over East Asia.
- The westerly jet streams shifted northward near Japan, and southward to the east of Japan from its normal position.
- The zonal mean temperatures in the troposphere were above normal from the tropics to the mid-latitudes in both hemispheres.
- Monthly mean temperatures were significantly above normal in western Japan and Okinawa/Amami, and above normal in northern/eastern Japan.
- Monthly precipitation amounts were significantly above normal on the Sea of Japan side of eastern/western Japan and Okinawa/Amami. On the Sea of Japan side of western Japan, they were the highest on record for November since 1946.

Climate in Japan (Fig. 1):

- Monthly mean temperatures were significantly above normal in western Japan and Okinawa/Amami, and above normal in northern/eastern Japan, because Japan was less affected by cold air.
- Monthly precipitation amounts were significantly above normal on the Sea of Japan side of eastern/western Japan, and above normal on the Pacific side of eastern/western Japan due to the low-pressure systems and fronts. Monthly precipitation amounts were the highest on the Sea of Japan side of western Japan on record for November since 1946. In Okinawa/Amami, monthly precipitation amounts were significantly above normal and monthly sunshine durations were below normal, because the regions were well affected by typhoons and moist air inflow.
- On the other hand, monthly sunshine durations were above normal on the Sea of Japan side of northern/eastern Japan and on the Pacific side of northern Japan, because the regions were well covered by high-pressure systems.

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 $+0.67^{\circ}\text{C}$ (2nd warmest for November 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 November (preliminary value).
- Extreme climate events were as follows (Fig. 3).
 - Monthly mean temperatures were extremely high from the Korean Peninsula to central Mongolia, from the Philippines to northwestern Australia, from northern India to the Arabian Peninsula, around the western Mediterranean Sea, from northern to eastern Canada and from northern New Zealand to eastern Australia.
 - Monthly precipitation amounts were extremely low around the western Mediterranean Sea.

Oceanographic Conditions (Fig. 4):

- In the equatorial Pacific, remarkably positive SST anomalies were observed in the western part and negative anomalies were observed from the central to eastern parts. Both the monthly mean SST anomaly averaged over the NINO.3 region and the SST deviation from the latest sliding 30-year mean over the region were -0.2°C (Fig. 5).

- In the North Pacific, remarkably positive SST anomalies were observed from the western part of the tropics to a wide area of the mid-latitudes.
- In the South Pacific, remarkably positive SST anomalies were observed in the western part, and negative SST anomalies were observed in the central part of the subtropics and off the west coast of South America.
- In the Indian Ocean, remarkably positive SST anomalies were observed in a wide area except off Somalia and a few other areas.
- In the North Atlantic, remarkably positive SST anomalies were observed in a wide area except off the east coast of the USA.
- In the South Atlantic, remarkably positive SST anomalies were observed from the western part of the subtropics to the mid-latitudes, and negative SST anomalies were observed from the central part of the tropics to the eastern part of the subtropics.

Tropics:

- Convective activity was enhanced from the central tropical South Indian Ocean to Australia, to the north of the Philippines and in and around the Caribbean Sea, and suppressed from the western to central equatorial Pacific, from the central tropical North Atlantic to Western Africa (Fig. 6).
- The active phase of equatorial intraseasonal oscillation propagated eastward from South America to Indonesia through the Indian Ocean (Fig. 7).
- In the upper troposphere, anti-cyclonic circulation anomalies straddling the equator were seen from the eastern Pacific to the western Indian Ocean through Africa, and cyclonic circulation anomalies straddling the equator were seen in the western Pacific (Fig. 8). A wavy anomaly pattern was seen over southern Eurasia, with anti-cyclonic circulation anomalies in East Asia.
- In the lower troposphere, cyclonic circulation anomalies straddling the equator were seen in the eastern Pacific and the Indian Ocean, and anti-cyclonic circulation anomalies straddling the equator were seen from the western to central Pacific.
- In the sea level pressure field, negative anomalies were seen from the tropical Indian Ocean to Indonesia, and positive anomalies were seen over a wide area of the tropical Pacific. The Southern Oscillation Index value was +0.6 (Fig. 5).

Extratropics:

- In the 500-hPa height field (Fig. 9), a wavy anomaly pattern was dominant in the Northern Hemisphere, with positive anomalies to the southwest of Alaska, from eastern Canada to Europe and over East Asia, and negative anomalies over western North America, over the mid-latitude North Atlantic, over Western Russia and to the east of Japan.
- The westerly jet streams shifted northward near Japan, and southward to the east of Japan and over the North Atlantic from its normal position. The polar-front jet stream was clearly seen over northern Eurasia (Fig. 10).
- In the sea level pressure field (Fig. 11), positive anomalies were seen from Greenland to Europe and from Eastern Siberia to Alaska, and negative anomalies from the USA to the mid-latitude North Atlantic, from Western Russia to Western Siberia and from East Asia to the east of Japan.
- Temperatures at 850-hPa were above normal from eastern North America to western Europe and from Siberia to northern East Asia, and below normal over the northwestern Middle East (Fig. 12).
- In the zonal mean zonal wind in the troposphere, westerly wind anomalies were seen in the Southern Hemisphere extratropics and in the latitude bands of 30°N and 70°N. The polar-night jet streams in both hemispheres were stronger than normal. The zonal mean temperatures in the troposphere were above normal from the tropics to the mid-latitudes in both hemispheres, and below-normal in the Southern Hemisphere high-latitudes.

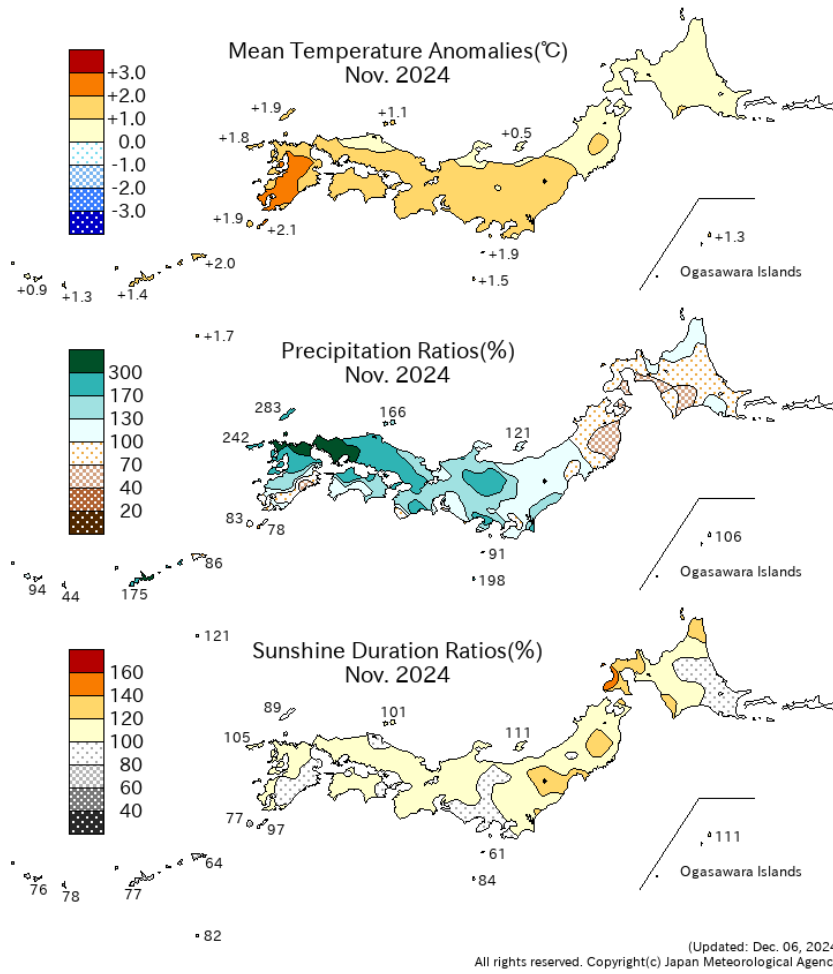


Fig. 1 Monthly climate anomaly/ratio over Japan (November 2024)
 Top: temperature anomalies (degree C)
 Middle: precipitation ratio (%)
 Bottom: sunshine duration ratio (%)
 The base period for the normal is 1991-2020.

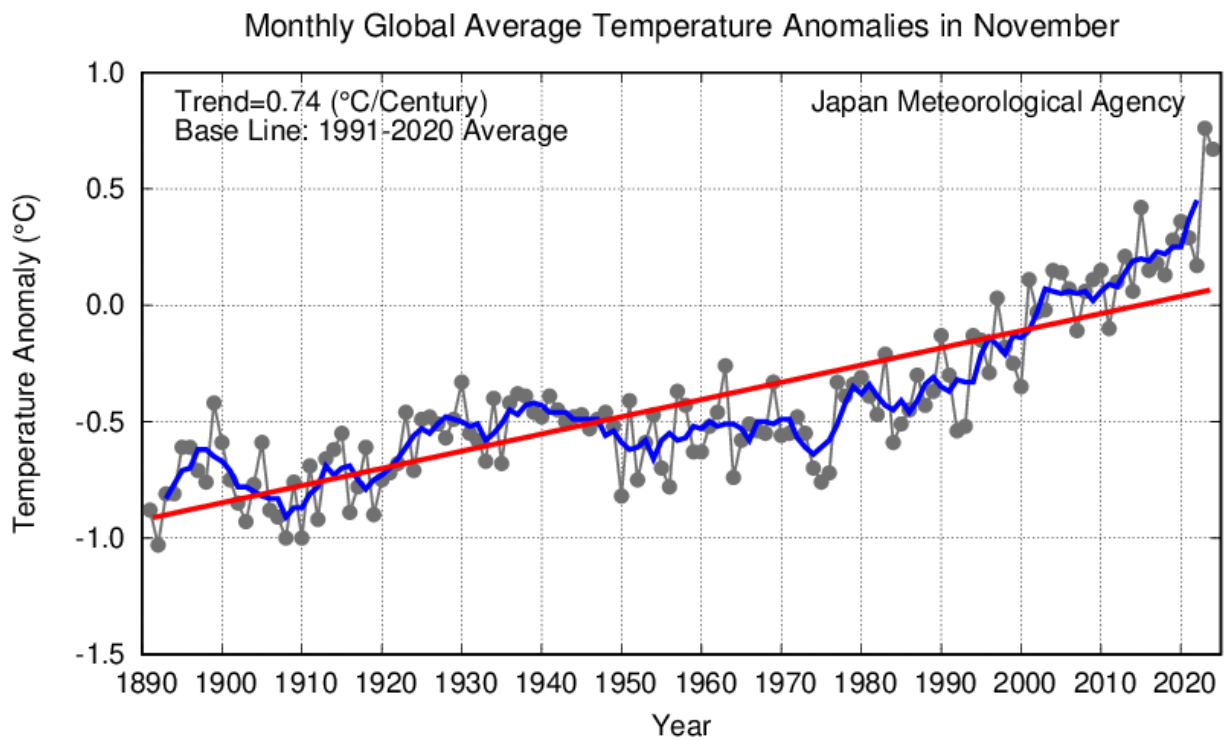


Fig. 2 Long-term change in monthly anomalies of global average surface temperature in November
 The thin black line indicates anomalies of the surface temperature in each year. The blue line indicates five-year running mean, and the red line indicates a long-term linear trend. Anomalies are deviations from the 1991-2020 average.

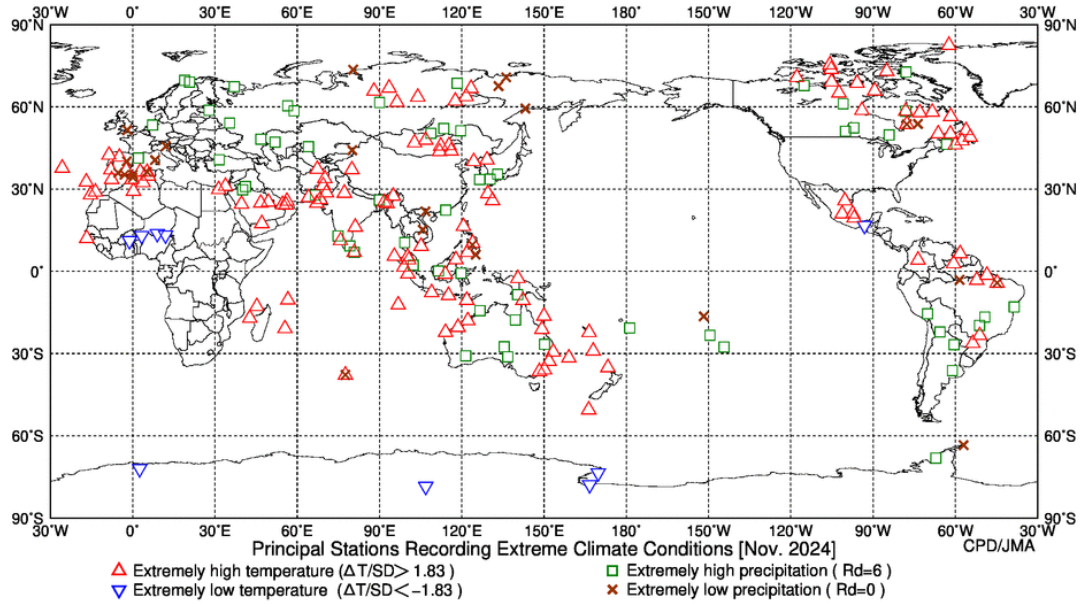


Fig. 3 Distribution of extreme climate stations (November 2024)

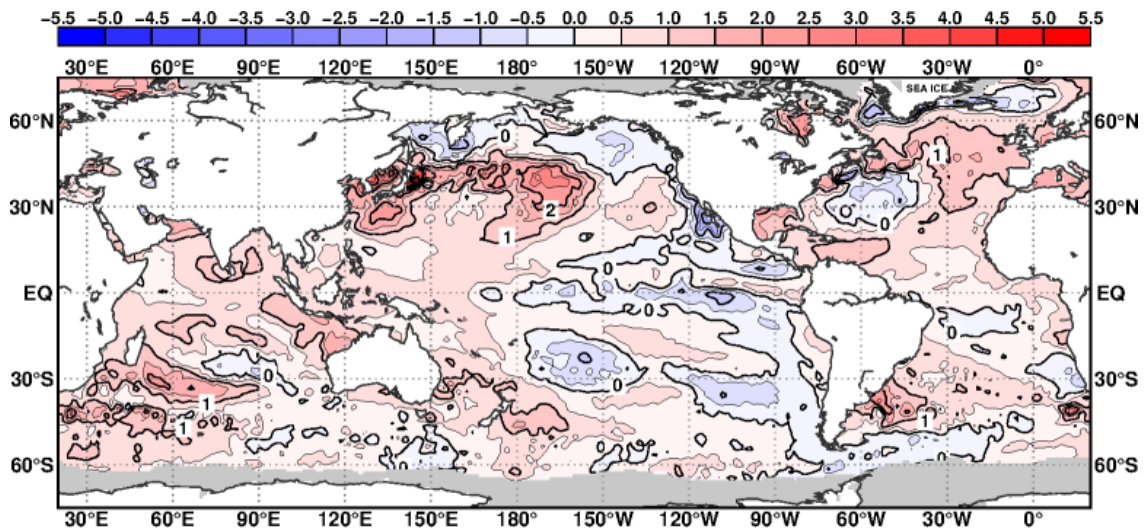


Fig. 4 Monthly mean sea surface temperature anomaly (November 2024)
 The contour interval is 0.5 degree C. The base period for the normal is 1991-2020. Maximum coverage with sea ice is shaded in gray.

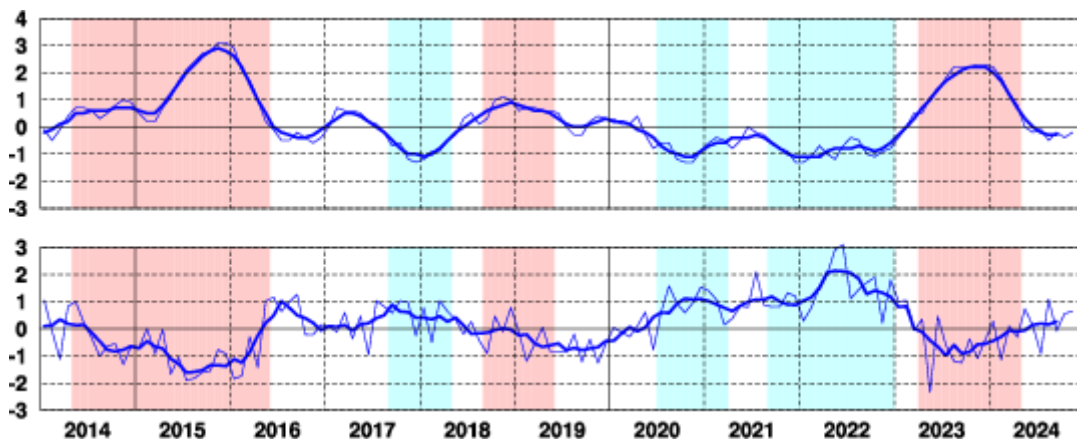


Fig. 5 Time series of monthly mean SST departure (degree C) from the reference value defined as the immediate past 30-year mean SST averaged over the NINO.3 region (upper). Time series of the Southern Oscillation Index with respect to the 1991-2020 base period (lower). Thin blue lines represent monthly 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.

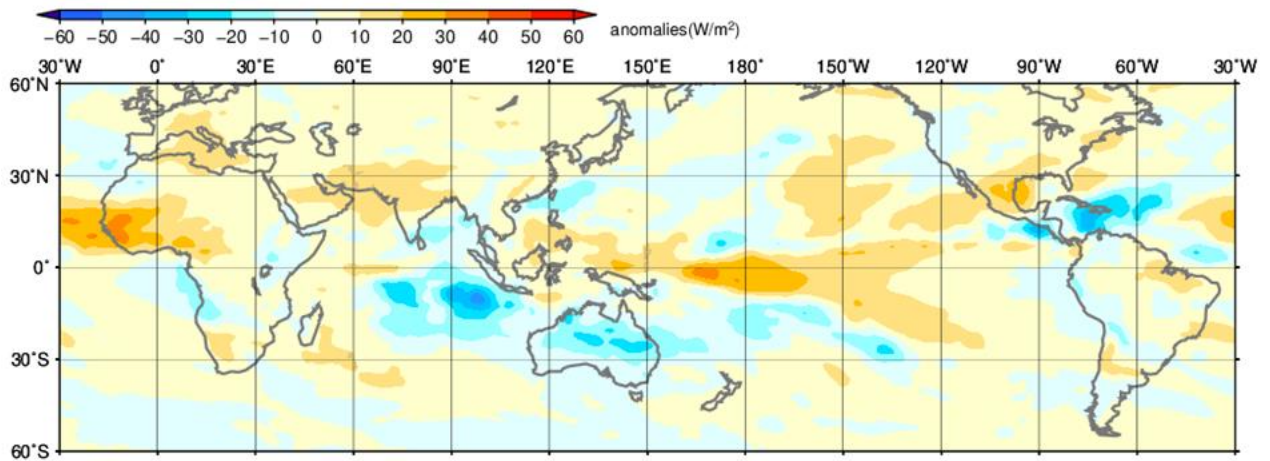


Fig. 6 Monthly mean Outgoing Longwave Radiation (OLR) anomaly (November 2024)
 The shading interval is 10 W/m². The base period for the normal is 1991-2020. Original data (CPC Blended OLR) are provided by NOAA.

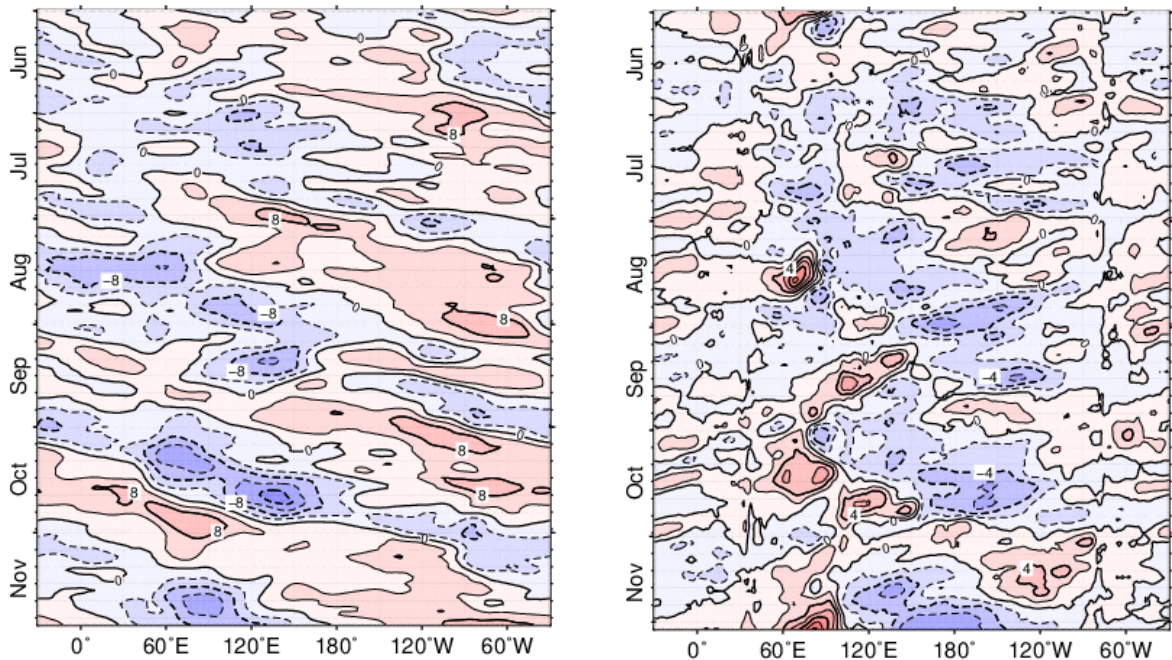


Fig. 7 Time-Longitude cross section (5°N-5°S) of five-day running mean 200-hPa velocity potential anomaly (left) and 850-hPa zonal wind anomaly (right) (June – November 2024)
 The contour intervals are 4x10⁶ m²/s (left) and 2 m/s (right). The base period for the normal is 1991-2020.

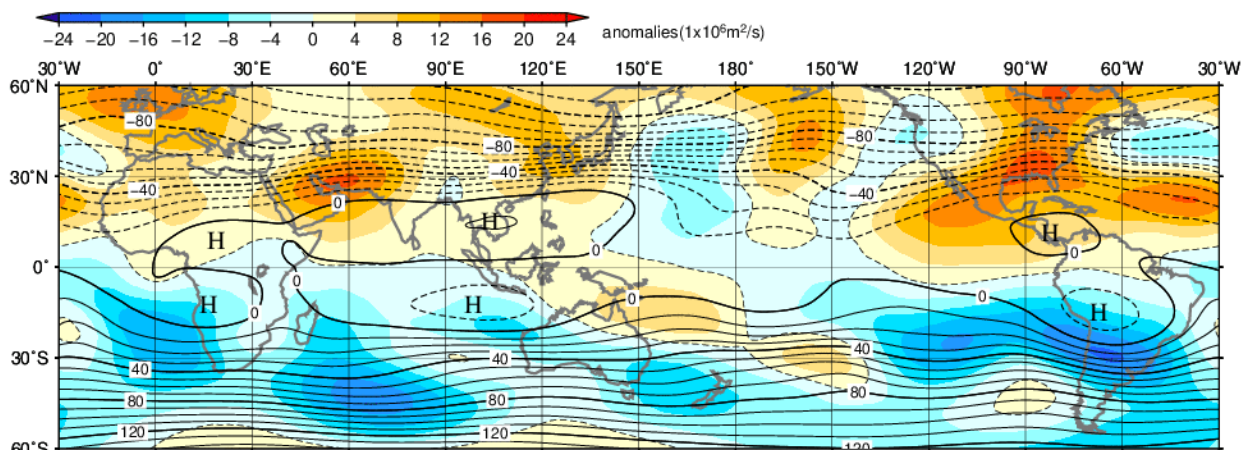


Fig. 8 Monthly mean 200-hPa stream function and anomaly (November 2024)
 The contour interval is 10x10⁶ m²/s. The base period for the normal is 1991-2020.

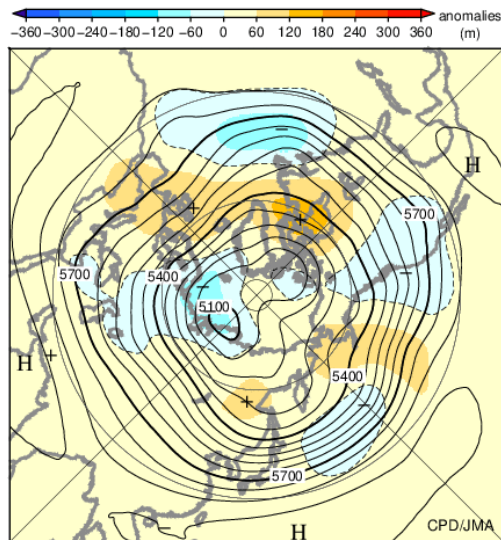


Fig. 9 Monthly mean 500-hPa height and anomaly in the Northern Hemisphere (November 2024)

The contours show 500-hPa height at intervals of 60 m. The shading indicates its anomalies. The base period for the normal is 1991-2020.

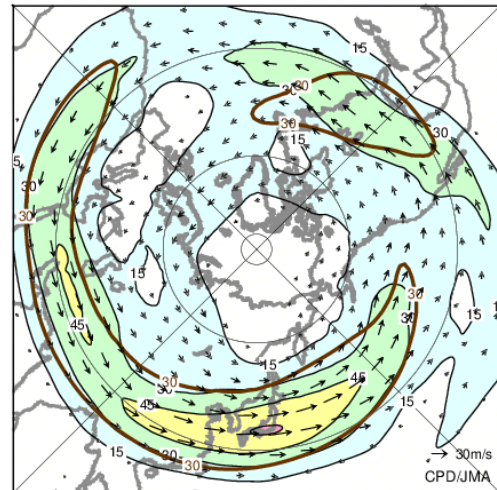


Fig. 10 Monthly mean 200-hPa wind speed and vectors in the Northern Hemisphere (November 2024)

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 1991-2020.

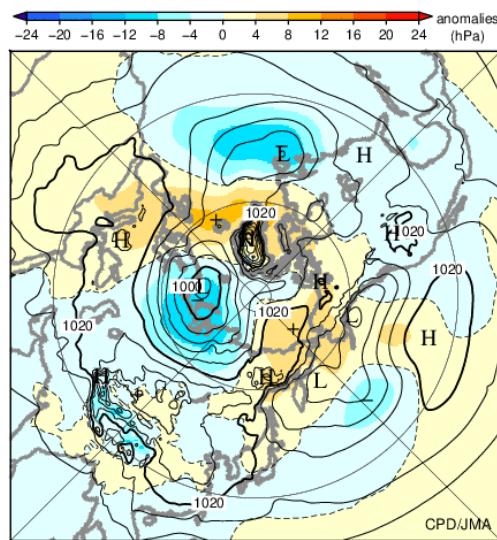


Fig. 11 Monthly mean sea level pressure and anomaly in the Northern Hemisphere (November 2024)

The contours show sea level pressure at intervals of 4 hPa. The shading indicates its anomalies. The base period for the normal is 1991-2020.

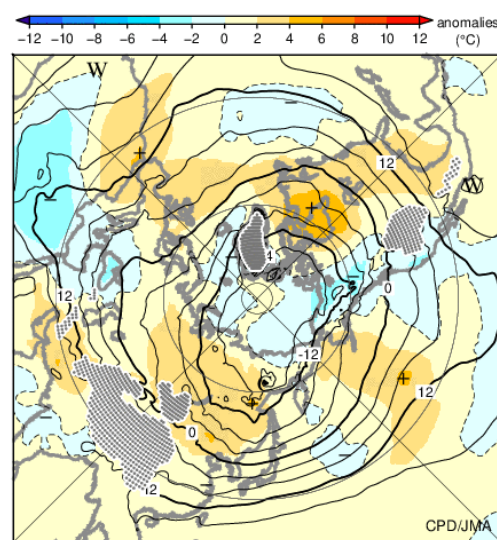


Fig. 12 Monthly mean 850-hPa temperature and anomaly in the Northern Hemisphere (November 2024)

The contours show 850-hPa temperature at intervals of 4 degree C. The shading indicates its anomalies. The base period for the normal is 1991-2020.

Detailed information on the climate system is available on the Tokyo Climate Center's website.

<https://www.data.jma.go.jp/tcc/tcc/index.html>

This report is prepared by the Tokyo Climate Center, Climate Prediction Division, Atmosphere and Ocean Department, Japan Meteorological Agency.