

Seasonal Highlights on the Climate System (December 2018 – February 2019)

Highlights (December 2018 – February 2019)

- El Niño conditions are considered to have persisted in the equatorial Pacific (see [El Niño Outlook](#) updated on 11 March 2019).
- Seasonal mean temperatures were significantly above normal in eastern and western Japan, and Okinawa/Amami.
- Seasonal mean temperatures were extremely high from Okinawa/Amami region of Japan to southern China and in Australia, and were extremely low from western Mongolia to northwestern China. Seasonal precipitation amounts were extremely low in eastern Australia.
- Convective activity was enhanced over the west of the date line, and was suppressed from the eastern South Indian Ocean to the Maritime Continent and around the Philippines.
- In the 500-hPa height field, a wave train was seen over mid-latitudes with positive anomalies to the seas south of Alaska, over western Europe, and from eastern China to the seas east of Japan, and negative anomalies over the western USA.
- The westerly jet stream shifted northward from its normal position from eastern China to Japan.

[Climate in Japan](#) (Fig. S1):

- Seasonal mean temperatures were significantly above normal in eastern and western Japan, and Okinawa/Amami, with the highest for winter since winter 1946/47 recorded in Okinawa/Amami.

[World Climate](#) (Fig. S2):

- Seasonal mean temperatures were extremely high from Okinawa/Amami region of Japan to southern China, from the central part of Southeast Asia to the southern part of South Asia, from the southeastern USA to southern Mexico, and in Australia.
- Seasonal mean temperatures were extremely low from western Mongolia to northwestern China.
- Seasonal precipitation amounts were extremely high in and around the northwestern USA, and in and around the Midwest of the USA.
- Seasonal precipitation amounts were extremely low from northern Spain to northern Algeria and in eastern Australia.

[Oceanographic Conditions](#) (Fig. S3):

- In the equatorial Pacific, positive SST anomalies were observed in almost the entire region.
- In the North Pacific, remarkably positive SST anomalies were observed from the South China Sea to the central part and from the western coast of North America to the Gulf of Alaska.
- In the South Pacific, remarkably positive SST anomalies were observed from the area near the date line of the tropics to the area near 40°S, 90°W and from the area near the southeastern coast of Australia to the area near 50°S, 150°W.
- In the Indian Ocean, remarkably positive SST anomalies were observed off the eastern coast of Madagascar, and remarkably negative SST anomalies were observed in the western coast of Australia.
- In the North Atlantic, remarkably positive SST anomalies were observed in the equatorial area and off the eastern coast of the Florida Peninsula, and remarkably negative SST anomalies were observed south of Greenland.

Tropics:

- Convective activity was enhanced over the west of the date line, and was suppressed from the eastern part of the South Indian Ocean to the Maritime Continent and around the Philippines (Fig. S4).
- In the upper troposphere, cyclonic circulation anomalies straddling the equator were seen over the Maritime Continent. A wave train was seen along the subtropical jet stream, with cyclonic circulation anomalies over North Africa and northern India, and anticyclonic circulation anomalies over the Middle East and the East China Sea (Fig. S5).
- In the lower troposphere, cyclonic circulation anomalies straddling the equator were seen from the west of the date line to the central Pacific, and anticyclonic circulation anomalies were seen around the Philippines and over the South Indian Ocean.
- In the sea level pressure field, positive anomalies were seen from the Atlantic to the Indian Ocean in the equatorial area, and negative anomalies were seen around the date line.

Extratropics:

- In the 500-hPa height field (Fig. S6), the polar vortex were centered near the North Pole and over the Kamchatka Peninsula. A wave train was seen over mid-latitudes with positive anomalies to the seas south of Alaska, over western Europe, and from eastern China to the seas east of Japan, and negative anomalies over the western USA.
- The subtropical jet stream from North Africa to Eurasia meandered. The westerly jet stream shifted northward from its normal position from eastern China to Japan (Fig. S7).
- In the sea level pressure field (Fig. S8), negative anomalies were seen over the Kamchatka Peninsula, indicating a northwestward shift of the Aleutian Low activity. The Siberian High was stronger than normal over its normal position, and its eastward extension was weaker than normal. Positive anomalies were seen from Japan to its east.
- Temperatures at 850-hPa were above normal over Alaska, the southeastern USA, and from southern China to the seas south of Japan, and were below normal over the western USA (Fig. S9).

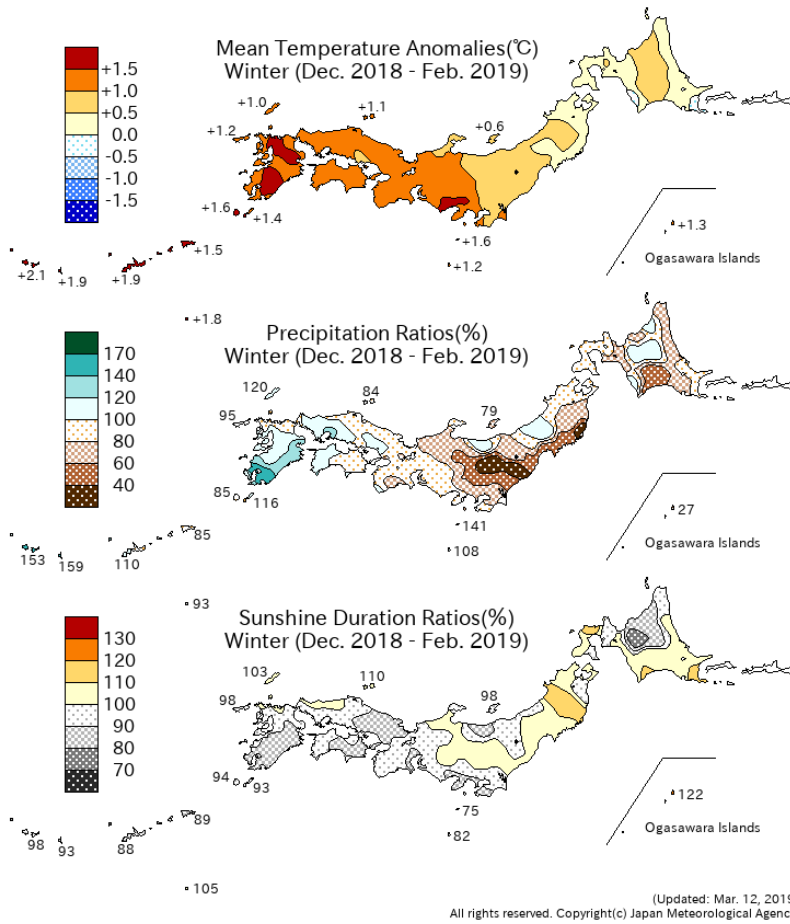


Fig. S1 Seasonal climate anomaly/ratio over Japan (December 2018 – February 2019)
Top: temperature anomalies (degree C)
Middle: precipitation ratio (%)
Bottom: sunshine duration ratio (%)
The base period for the normal is 1981-2010.

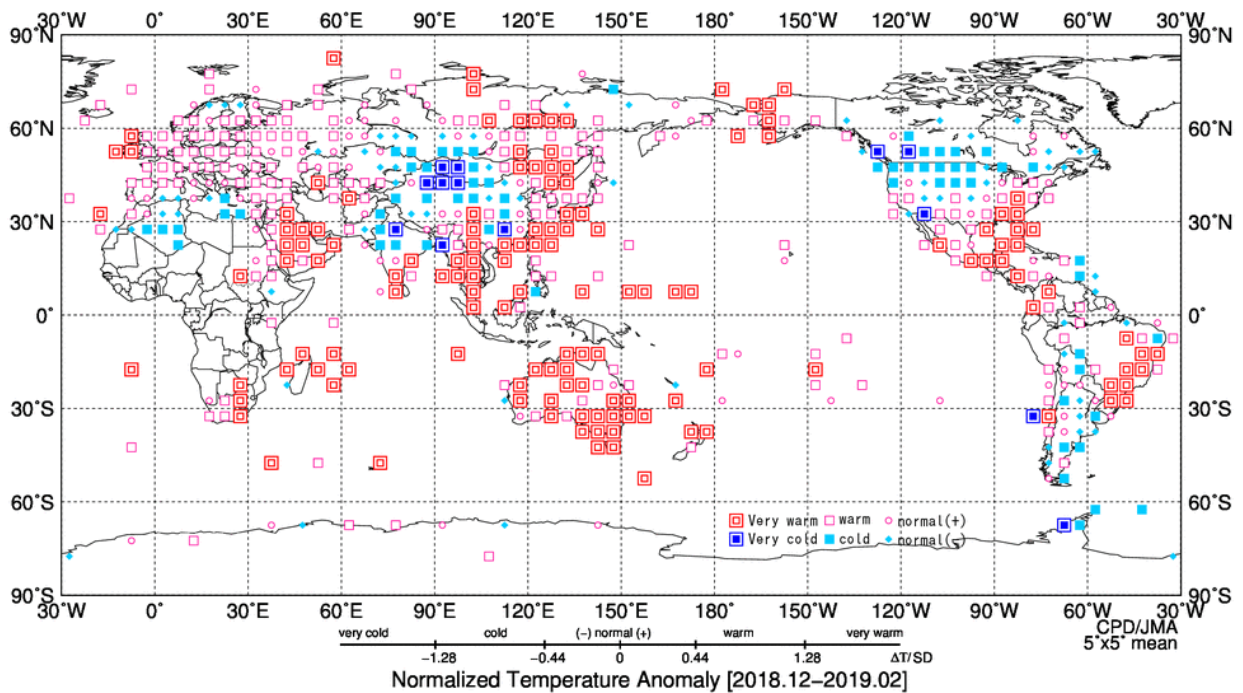


Fig. S2 Three-month mean temperature anomaly (normalized) category (December 2018 – February 2019)

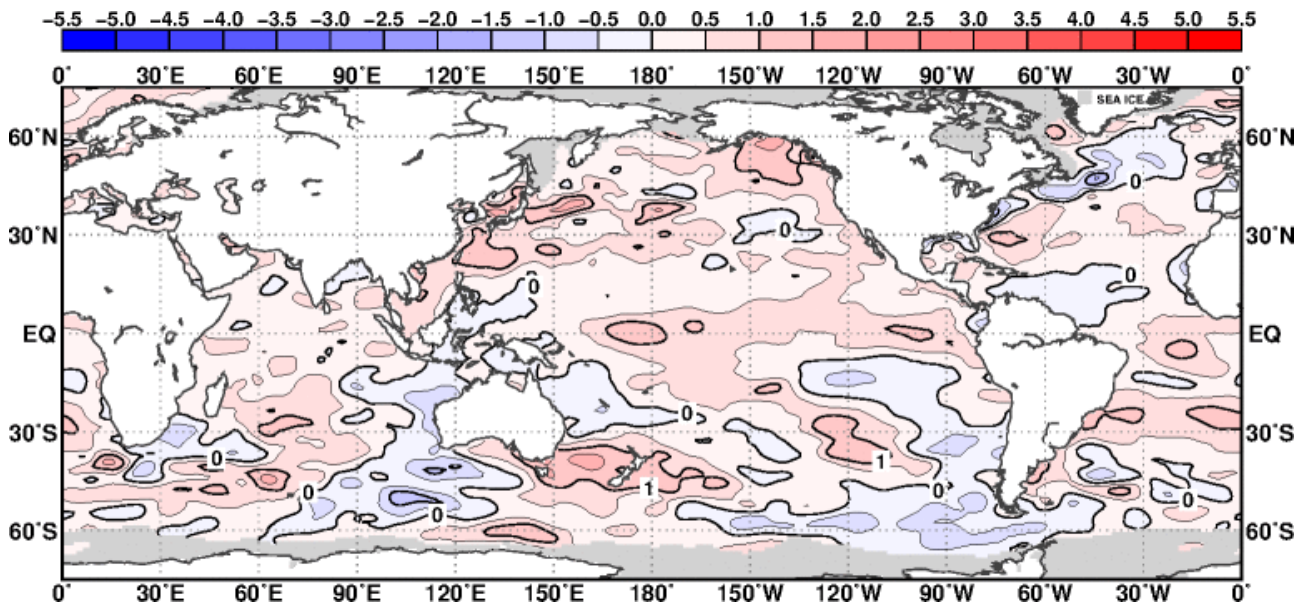


Fig. S3 Three-month mean sea surface temperature anomaly (December 2018 – February 2019)
 The contour interval is 0.5 degree C. The base period for the normal is 1981-2010. Maximum coverage with sea ice is shaded in gray.

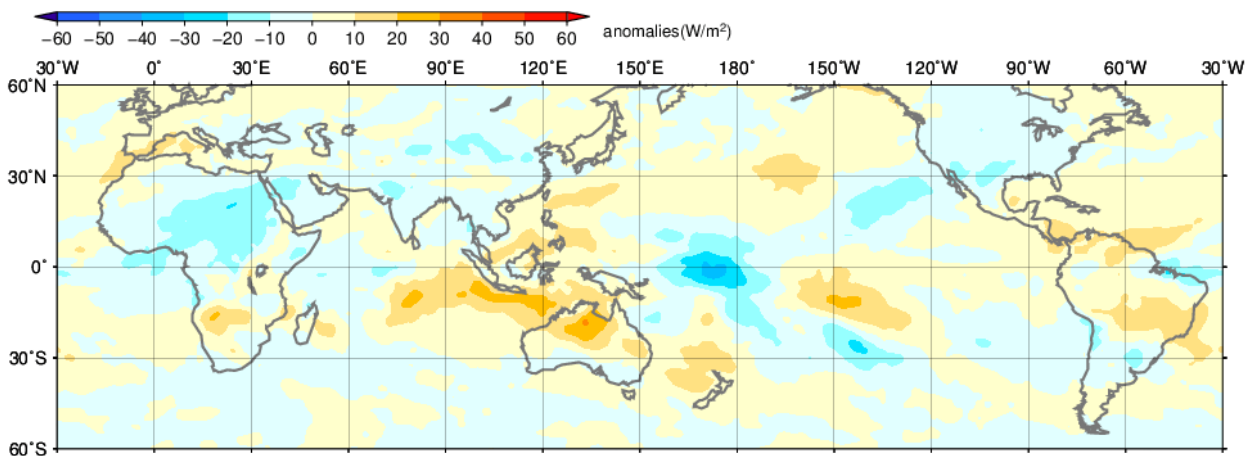


Fig. S4 Three-month mean Outgoing Longwave Radiation (OLR) anomaly (December 2018 – February 2019)
 The contour interval is 10 W/m². The base period for the normal is 1981-2010. Original data provided by NOAA.

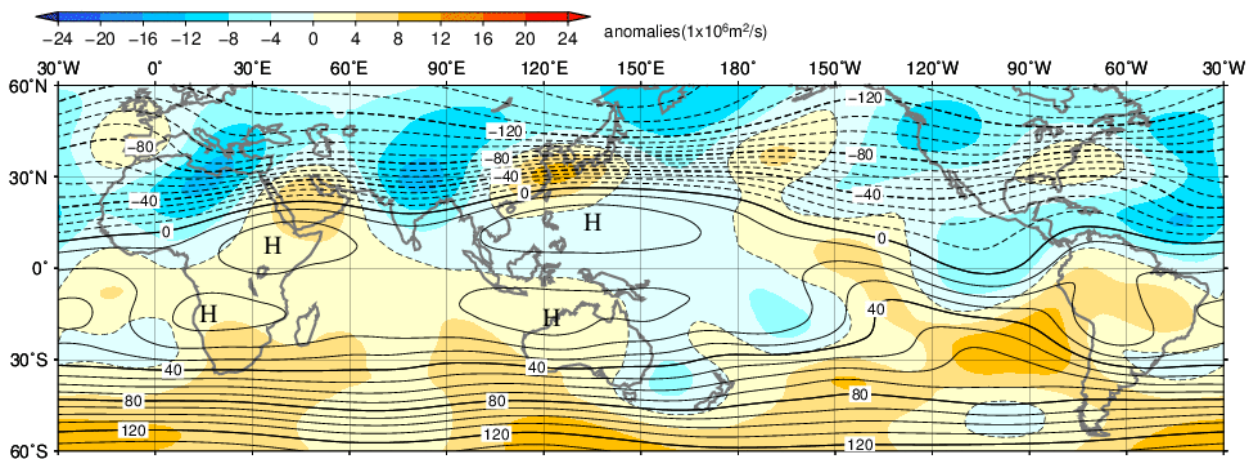


Fig. S5 Three-month mean 200-hPa stream function and anomaly (December 2018 – February 2019)
 The contour interval is 10x10⁶ m²/s. The base period for the normal is 1981-2010.

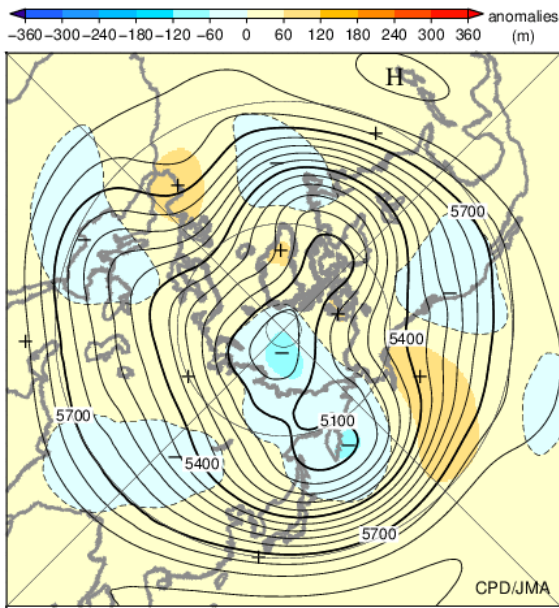


Fig. S6 Three-month mean 500-hPa height and anomaly in the Northern Hemisphere (December 2018 – February 2019)

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.

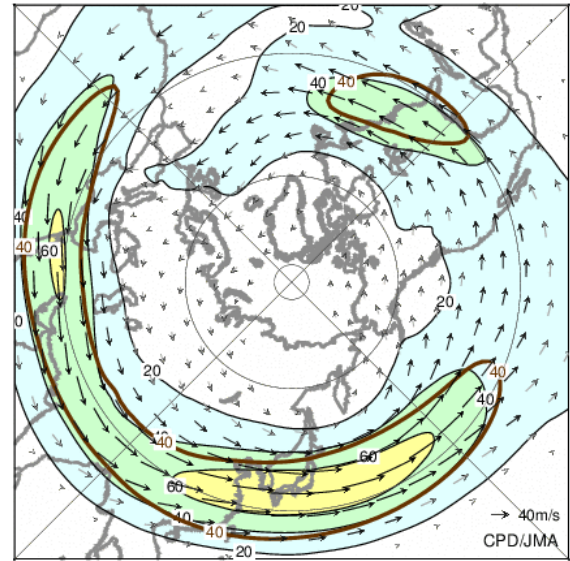


Fig. S7 Three-month mean 200-hPa wind speed and vectors in the Northern Hemisphere (December 2018 – February 2019)

The black lines show wind speed at intervals of 20 m/s. The brown lines show its normal at intervals of 40 m/s. The base period for the normal is 1981-2010.

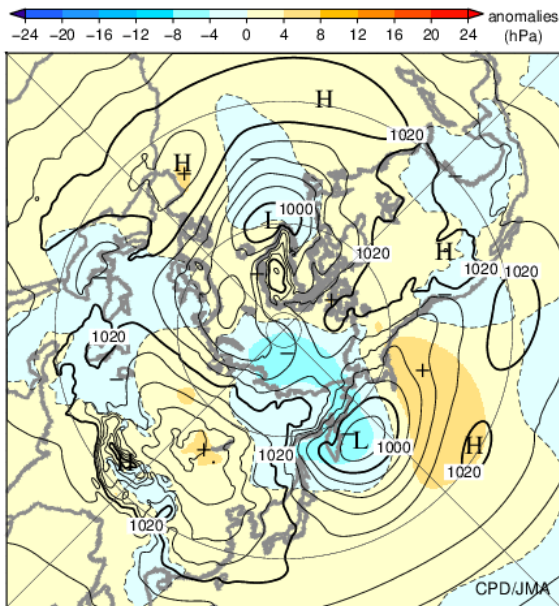


Fig. S8 Three-month mean sea level pressure and anomaly in the Northern Hemisphere (December 2018 – February 2019)

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.

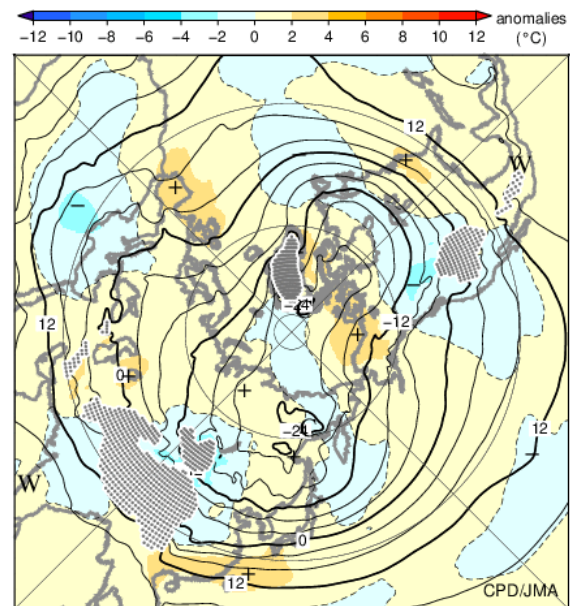


Fig. S9 Three-month mean 850-hPa temperature and anomaly in the Northern Hemisphere (December 2018 – February 2019)

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.