

Characteristics of 2018/19 winter monsoon in Japan

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In winter 2018/19, most areas of Japan experienced very warm climate condition. Especially, the seasonal mean temperature anomaly in Okinawa/Amami was +1.8 °C and it was the warmest winter since 1946/47. Because the influence of cold air was weak, seasonal total snowfall was extremely below normal all over Japan. However, northern Japan was sometimes affected by cold spells. On 8th February, observed 850hPa temperature at Sapporo was -24.4 °C and was the lowest since 1957.

There were two primary factors contributing the warm climate condition around Japan detailed above. One is that subtropical jet stream tended to meander northward around Japan. Wave trains were observed from blocking high over the North Atlantic Ocean to Eurasian continent along the subtropical jet stream. Associated with the wave trains, the subtropical jet stream meandered northward and anticyclonic circulation anomaly formed at the upper level over the East China Sea. As a result, Japan was often covered with warm air.

The other is that anticyclonic circulation anomaly formed at the lower level around the Philippines. The anticyclone was partly attributed to suppressed convective activity over the Maritime Continent in association with El Niño event observed from boreal autumn 2018. Warm and moist air often flowed into Okinawa/Amami along the edge of the anticyclone.

Meanwhile, northern Japan was sometimes affected by cold spells. A part of the polar vortex was stronger than normal over Kamchatka Peninsula, and the Aleutian Low located in the northwest of its normal position. The condition seemed to be associated with Stratospheric Sudden Warming (SSW) which occurred from December 2018 to January 2019. Once SSW occurs, polar front jet stream tends to meander southward for several weeks. The conditions partly brought by the SSW sometimes caused cold spells into northern Japan.