

Characteristics of 2017/2018 winter monsoon in Japan

Mizuki Hanafusa

Assistant Forecaster, Tokyo Climate Center, Japan Meteorological Agency

hanafusa_mizuki@met.kishou.go.jp

In winter 2017/2018, strong cold surges often flowed over Japan, so the seasonal mean temperatures were lower than normal in most areas of the country. In particular, the seasonal mean temperature in western Japan was 1.2 °C below normal and it was the coldest in the last 32 winters. Furthermore, when cold surges were at their peaks, there were heavy snow events mainly on the Sea of Japan side. In Fukui Prefecture, the snow depth exceeded 140 cm for the first time since 1981, causing a serious traffic hazard.

The cause of the low temperature and heavy snow in Japan is that the subtropical and the polar front jet stream tended to meander southward around Japan.

The factor of the southward meandering of the subtropical jet stream is that convection was more active than normal over the Maritime Continent in association with the ongoing La Niña phenomenon. As the response to this enhanced convection, anticyclonic circulation anomalies became clear in the upper troposphere on southeastern Eurasia. Moreover, this meandering was also probably attributable to Rossby wave packet propagation that can be traced back to a persistent upper-level ridge over the North Atlantic.

On the other hand, the factor of the southward meandering of the polar front jet stream is as follows. First, because of a blocking high over western Siberia and other influences, the meandering of the polar front jet stream grew over northern Eurasia. Associated with this, the polar vortex in the upper troposphere split, and one of the polar vortex pieces shifted southward over eastern Siberia. As a result, the polar front jet stream meandered southward around Japan. In addition, the meandering over northern Eurasia was possibly attributable to lower-than-normal sea ice extents in the Barents Sea and Kara Sea, but further investigation is necessary about this.