

Strong East Asian Monsoon in January 2011

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During late December 2010 and January 2011, East Asian winter monsoon remained significantly enhanced, leading to extremely low temperature broadly over East Asia. Japan experienced nationwide below-normal temperature, which is the first time since 1986, and heavy snowfall on the Sea of Japan side of the country. In February, however, the winter monsoon turned to weak condition, resulting in above-normal temperature broadly over East Asia. Below are summarized the characteristics of atmospheric circulation associated with the strong winter monsoon in January.

In the extratropics, ridges were seen over the western part of Siberia in the upper troposphere, and blocking highs were developed over the eastern part in January. These were suitable for the enhancement of the Siberian High. The Aleutian Low was enhanced to the east of Japan, although it was obscure in December and February. The pronounced Siberian High and Aleutian Low lead to strong winter monsoon over East Asia. In addition, the Arctic Oscillation remained in the significantly negative phase from the middle of November to the middle of January, indicating that cold air mass over the arctic region tended to be brought to the mid-latitudes.

In the tropics, convective activity was significantly enhanced from the eastern Indian Ocean to the Philippines, which was associated with the ongoing La Niña event that started in summer 2010. At 200-hPa, anticyclonic circulation anomaly over southern Asia from India to the southern China was developed as a response to the active convection. Rossby wave packets propagated from the southern Asia to Japan, leading to the development of cyclonic circulation anomaly to the east of Japan. A response experiment to heating anomaly in the tropics was implemented using a linear baroclinic model. The experiment reproduced such anomalous circulation in the upper troposphere from the southern Asia to Japan and below-normal temperature in the lower troposphere around Japan. Therefore, it can be presumed that the La Niña event partly contributed to the enhancement of winter monsoon in the vicinity of Japan.

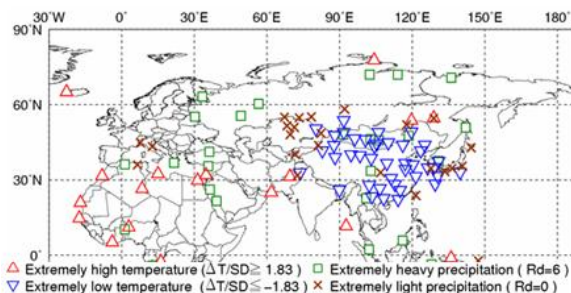


Fig. 1 Extreme Climate Events (Jan. 2011)

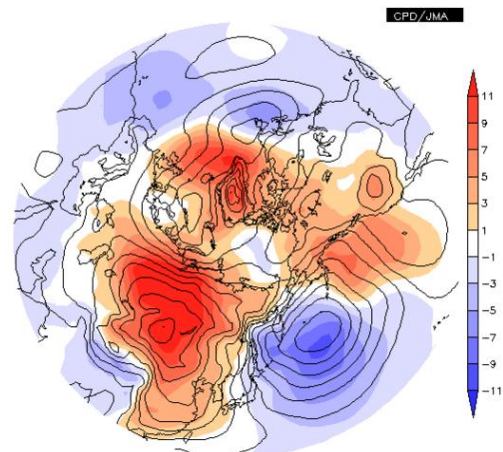


Fig. 2 Sea level pressure and anomaly (Jan. 2011)