

JMA's seasonal forecast for 2008/2009 winter

Shuhei Maeda

Climate Prediction Division/JMA

The JMA's seasonal forecast for 2008/2009 winter calls for above-normal temperature with a 50% probability in Okinawa/Amami, and both near-normal and above-normal temperatures with 40% probabilities in Western and Eastern Japan. Grounds for the forecast are as follows.

1. Long-term trend and decadal variation

Long-term upward trends are clear in the winter (December-January-February) mean temperatures over Japan except for Northern Japan. In Northern Japan, the winter mean temperature has large year-to-year fluctuations, while the recent ten winters mean temperature is near normal. The winter precipitation tends to be above normal in the Pacific side of Northern, Eastern, and Western Japan since the end of 1990s. Consistent with the global warming trend, the winter mean 500hPa height anomalies in the decade are positive almost in the Northern Hemisphere. But, it is negative in the northern part of the North Pacific including Northern Japan. It implies that this large-scale anomaly affects the recent climate in Northern Japan in which the recent ten winters mean temperature is near normal inconsistent with the global warming trend. The tropospheric thickness temperature averaged over the mid-latitudes of the Northern Hemisphere (30-50 N), which is positively correlated with temperature in Japan, tends to be above normal since 2006.

2. Oceanic conditions

Although the SST averaged over the NINO.3 region was above normal in August 2008, conditions of subsurface temperatures and atmospheric circulations in the equatorial Pacific showed no signs of increasing SST anomalies further in the central and eastern equatorial Pacific. The JMA's El Niño forecast model predicts that the NINO.3 SST will be near normal during the prediction period. Considering all the above, the NINO.3 SST is likely to be near normal in the months ahead. It is unlikely that an El Niño or a La Niña event will develop during autumn and winter. Since the El Niño and La Niña are the most important climate events as grounds for the seasonal

prediction and these events are unlikely to develop during the winter, high predictability of the coming winter season prediction is not expected.

In recent years, above normal SST anomalies have persisted in the equatorial western Pacific. Besides, an El Niño, which tends to lower SST anomalies in the equatorial western Pacific, is unlikely to develop as mentioned above. Considering these, it is likely that positive SST anomalies in the region will persist during the winter. SST anomalies in the region are negatively correlated with strength of the winter monsoon, and temperature anomalies in Japan.

Due to the La Niña which had faded out last spring, the global mean SST anomaly was near normal during the last winter and spring. But, it is rapidly rising in these months. It is likely that the global mean SST will be above normal during the winter.

3. Numerical prediction

The SST anomaly pattern fed to the atmospheric global model is similar to that of the recent ten winters mean SST anomaly pattern (i.e. above normal in the western Pacific, the sub-tropical central North Pacific, the Indian Ocean, and the Atlantic Ocean, and below normal in the equatorial central Pacific and the northern part of the North Pacific).

In association with the SST anomaly pattern, the predicted ensemble averaged atmospheric circulation anomaly pattern by the model is also similar to that of the recent ten winters mean circulation anomaly pattern in the tropics and the sub-tropics (i.e. anti-cyclonic circulation anomalies in the upper troposphere along the southern part of the Eurasia continent, and in the central and eastern North Pacific). The former anomaly extends to Eastern Japan. Among the two anti-cyclonic circulation anomalies, a cyclonic circulation anomaly is predicted in the east of Japan. This result clearly indicates that the greatest signal for the winter prediction comes from the long-term trend including decadal variation.

In the mid- and high-latitudes, the positive phase of the Arctic Oscillation (AO) is predicted. The positive phase of AO tends to cause moderate winter monsoon, and above-normal temperature in northern Japan. However, the spread

among each ensemble member is large and the hindcast (22 years from 1984 to 2005) shows low prediction skill in the AO.

4. Conclusion

From the numerical prediction, above-normal temperature is expected in the winter in whole Japan. However, considering the prediction skill of the AO and long-term trend, it is likely that temperature in Northern Japan will be lower than the result of the numerical prediction. The positive SST anomaly in the equatorial western Pacific supports this modification.

5. Summary of the Outlook

The JMA's cold season outlook calls for above-normal temperature with a 50% probability in Okinawa/Amami, and both near-normal and above-normal temperatures with 40% probabilities in Western and Eastern Japan. The cold season snowfall amount in the Sea of Japan side of Japan outlook calls for both near-normal and below-normal with 40% probabilities.