

Seasonal Outlook for winter 2010/2011 over Japan

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ABSTRACT

1. Oceanic conditions

In August 2010, the SST deviation from a sliding 30-year mean SST averaged over the NINO.3 region was -1.0°C . The five-month running-mean value of the NINO.3 SST deviations was -0.4°C for June. The Southern Oscillation Index for August was +1.9. In August, remarkably positive SST anomalies were found in the western equatorial Pacific, and remarkably negative anomalies were found from west of the date line to the eastern parts. Subsurface temperature anomalies were positive in the western equatorial Pacific, and were remarkably negative in the central and the eastern parts. In the equatorial Pacific, convective activities near the date line were below normal. Easterly wind anomalies in the lower troposphere prevailed in the western and the central equatorial Pacific. The oceanic and atmospheric features mentioned above reflect La Nina conditions. In the equatorial Pacific, persistent easterly anomalies in the lower troposphere maintained the negative subsurface temperature anomalies in the central and the eastern parts. The negative subsurface temperature anomalies will, in turn, keep SSTs below normal. The JMA couple-model predicts that the NINO.3 SST deviations will continue to be below normal into boreal winter (December-January-February).

Considering all the above, La Nina conditions are present in the equatorial Pacific, and are likely to persist into boreal winter. It is likely that the SST in the NINO.WEST will continue to be near or above normal from boreal autumn to winter.

2. Numerical Prediction

The SST anomaly pattern predicted by the JMA couple-model is very similar to that of La Nina events (i.e. above normal in the western Pacific and below normal in the central and eastern Pacific).

In association with the SST anomaly pattern, the predicted ensemble averaged atmospheric circulation anomaly pattern by the model is also very similar to that of La Nina events in the tropics and the sub-tropics as stated below.

In the lower tropospheric (850-hPa) stream function field, cyclonic circulation anomaly is clearly predicted from South India to South China Sea. In the upper tropospheric (200-hPa) stream function field, anti-cyclonic circulation anomaly is clearly predicted from North India to South China and cyclonic circulation anomaly is predicted around Japan. Corresponding to the circulation anomalies over East Asia, the subtropical jet streams shift northward over China and southward over Japan, suggesting strong winter monsoon around Japan. It is speculated that such meandering

of the subtropical jet streams is forced by the predicted La Nina type SST anomalies.

In the mid- and high-latitudes, a slightly positive phase of the Arctic Oscillation (AO) is predicted by the JMA couple-model. The positive (negative) phase of AO tends to cause weak (strong) winter monsoon, and above-normal (below-normal) temperature in Northern Japan. However, the spread among each ensemble member is large and the hindcast (30 years from 1979 to 2008) suggests that the model does not have enough skill to predict the AO.

3. Long-term trend and decadal variation

Long-term upward trends are clearly seen in the winter mean temperatures over Japan except for the northern part. In Northern Japan, the winter mean temperature has large year-to-year fluctuations and the recent ten-winters-mean temperature is near normal (slightly warmer than normal). The winter precipitation tends to be above normal in the Pacific side of Northern, Eastern, and Western Japan since the end of 1990s.

The tropospheric thickness temperature averaged over the mid-latitudes of the Northern Hemisphere (30 N - 50 N), which is positively correlated with temperature in Japan, tends to be above normal since 2006. It is predicted to be above normal into boreal winter (December-January-February) by the JMA couple-model.

4. Conclusion

From the numerical prediction, in response to the La Nina condition, below-normal temperature is expected in winter in Japan except for the northern part. However, considering the long-term trend, it is likely that temperature will be warmer than the result of the numerical prediction. In Northern Japan, from both the numerical prediction and the long-term trend, it is likely that temperature will be slightly warmer than normal in winter.

5. Summary of the Outlook

The cold season mean temperatures and the total precipitation amounts have no significant features for all regions. The cold season snowfall amounts on the Sea of Japan side of Japan outlook call for both near normal and below normal with 40% probabilities in Northern Japan.