

Mechanisms of the 2010 summer heat wave in Japan

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Japan experienced an extraordinary heat wave in the summer of 2010 with highest average temperature ever since 1898. This may be linked with the strong positive sea level pressure (SLP) anomaly just to the south of Japan. To identify its cause, a series of atmospheric general circulation model simulations are conducted. Although the tropical Pacific is known as one of the major sources of abnormal weather in Japan, it did not play a significant role during this summer. Rather, the sea surface temperature (SST) anomaly in the tropical Indian and Atlantic Oceans played an important role in forming the positive SLP anomaly. It is suggested that anomalously high SST in the tropical Indian Ocean after the 2009/10 El Nino played a role in inducing an anomalous anticyclone over the northwestern Pacific. On the other hand, the positive SST anomaly in the tropical Atlantic induces more convection and diabatic heating, which in turn, becomes a source of Rossby wave-train along the Asian jet in the upper troposphere that generate positive SLP anomalies around Japan.

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