Cause of the Severe Drought in Yunnan province During winter of 2009 to 2010

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In the winter of 2009 to 2010, a severe drought struck Yunan province, China. This severe drought is due to the lack of rainfall for a long period. Using the National Center for Environmental Prediction/National center for Atmospheric Research (NCEP/NCAR) reanalysis data, NOAA Extended Reconstructed Sea Surface Temperature V3b, and the China rainfall and surface temperature data of the China Meteorological Administration, the statistical features of the atmospheric circulation and the sea surface temperature for anomalous precipitation in winter over Yunan province are studied. Furthermore, the severe drought in the winter of 2009 to 2010 is analyzed. Study shows that when the precipitation over Yunan province decreases, the North Atlantic Oscillation (NAO) index is negative. The occurrence of the severe drought in the winter of 2009 to 2010 is related to the anomalies of the atmospheric circulation systems in the westerly belt. Negative height anomalies control Lake Baikal and positive height anomalies are sustained over the coastal areas of East Asia, which weaken the northwesterly and force of cold air from the north. Thus cold air can not southward extend into Yunan province. Especially the Middle East jet stream is weakened. Consequently, it results in a weak pressure trough around the Tibetan Plateau/Bay of Bengal, which reduces the warm and wet air into Yunan province. Because a high pressure ridge develops from East Europe to the Caspian Sea, the perturbations of the westerly belt could hardly reach East Asia. Over the Tibetan Plateau there is a high pressure ridge, which leads to the dry northwesterly prevails over Yunan province. Although the sea surface temperature anomalies in the Pacific can influence the winter precipitation over Yunan province, it does not give cause for the drought in winter of 2009 to 2010.