

## **Observed relationship of fall drought events in Southern China with different anomalous sea surface temperature patterns in Indo-Pacific Ocean**

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The characteristics of regional droughts in fall in the southern China and related general circulation anomalous patterns are statistically analyzed with observed precipitation data and NCEP/NCAR reanalysis data from 1968 to 2009. The seasonal droughts in fall in the southern China occurred mainly in region-wide event. There exist two dominant patterns of sea surface temperature anomalies (SSTA) related the fall droughts in the southern China. The first SSTA pattern shows positive anomalies in the tropical western Pacific and the Marine Continent in a horseshoe-shape and negative anomalies in the western tropical Indian Ocean, the area from South China Sea northeastward to the subtropical northwestern Pacific and the central and eastern tropical Pacific with a cooling center in the east. The second SSTA pattern exhibits a feature of negative anomalies in tropical and subtropical western Pacific, the South China Sea and the tropical Indian Ocean, and positive anomalies in the tropical central and eastern Pacific and the subtropical northeastern and southeastern Pacific. Corresponding to the first SSTA pattern, the fall droughts in the southern China result from the enhanced ascending motion over Marine Continent and surrounding area, which is forced by the warmer sea surface temperature. However, corresponding to the second SSTA pattern, the droughts in the southern China mainly result from the prominent anomalous ascending motion over the northeast Asia which might be forced by the adjustment of the large-scale synoptic activities in the mid-latitudes and the warmer underlying sea surface temperature. The anomalous ascending motion over the subtropical northwestern Pacific east to Taiwan and Philippines has also influence in the fall drought events in the southern China. Furthermore, the two categories of droughts in the southern China are related to the decrease of tropical cyclones in fall over the central and northern South China Sea and the increase of tropical cyclones over the subtropical northwestern Pacific east to Taiwan and Philippines, which reduces the frequency of tropical cyclone landfall on the southern China and thus results in the fall drought events.