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华南秋旱的大气环流异常特征

Characteristics of General Circulation Anomalies Related to the Drought Events in Fall in South China

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中文摘要:

利用实测降水量资料及NCEP再分析资料,通过统计方法分析了华南秋旱及其相关的环流异常特征。结果发现,华南秋旱以全区性的干旱出现居多。华南秋旱事件对应的同期海温异常分布型大致可分两类。一类是热带中东太平洋的负海表温度距平(SSTA)区的极值中心位于赤道东太平洋,在海洋性大陆和热带西太平洋有马蹄形的正SSTA,而在热带西印度洋,南海至日本东、南部西北太平洋是负SSTA;另一类是热带中东太平洋正SSTA极值中心位于赤道中太平洋,热带一副热带西太平洋、南海和热带印度洋为负SSTA区,副热带北太平洋东部和南太平洋东部为显著的正SSTA。与第一类SSTA相关的华南秋旱与海洋性大陆区域上空的上升运动异常增强(与其下垫面海温异常偏暖有关)。而与第二类SSTA相关的华南秋旱则与中纬度环流的长波调整造成的东北亚上空的异常上升运动距平有关。而两类华南秋旱都是通过大气环流对华南地区的异常下沉运动产生强迫作用而产生的。另外,华南秋旱还与菲律宾和台湾东侧洋面上空出现上升运动距平有关。两类华南秋旱都与南海中北部热带气旋频数偏少,菲律宾和台湾东侧热带气旋频数偏多有关,因此,使得登陆华南的热带气旋偏少,导致华南秋季干旱。

Abstract:

The Characteristics of regional droughts in fall in South China and related general circulation anomalous patterns are statistically analyzed with the observed precipitation data and the NCEP/NCAR reanalysis data from 1968 to 2009. The seasonal droughts in fall in South China occurred mainly in the region-wide event. There exist two dominant patterns of sea surface temperature anomalies (SSTA) related to the fall droughts in South China. The first SSTA pattern shows positive anomalies in the tropical western Pacific and the Maritime Continent in a horseshoe-shape and negative anomalies in the western tropical Indian Ocean, the area from the 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 the 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 South China result from the enhanced ascending motion over the Maritime Continent and its surrounding area, which is forced by the warmer underlying sea surface temperature. However, corresponding to the second SSTA pattern, the droughts in South China mainly result from the prominent anomalous ascending motion over Northeast Asia which might be forced by the adjustment of the large-scale synoptic activities in the mid-latitudes. The anomalous ascending motion over the subtropical northwestern Pacific to the east of Taiwan and the Philippines exerts also influence on the fall drought events in South China. Two categories of fall droughts in South China are induced by the anomalous descending motions over South China, which are forced by the anomalous general circulation. Furthermore, the two categories of droughts in South 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 of Taiwan and the Philippines, which reduces the frequency of tropical cyclone landfall on South China and thus results in the fall drought events.

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