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## 华南前汛期降水异常与太平洋海表温度异常的关系

强学民<sup>1,2</sup>, 杨修群<sup>1\*</sup>

1. 南京大学大气科学学院, 南京 210093;
2. 解放军理工大学气象海洋学院, 南京 211101

Relationship between the first rainy season precipitation anomaly in South China and the sea surface temperature anomaly in the Pacific

QIANG Xue-Min<sup>1,2</sup>, YANG Xiu-Qun<sup>1\*</sup>

1. School of Atmospheric Sciences, Nanjing University, Nanjing 210093, China;
2. Institute of Meteorology, PLA University of Science and Technology, Nanjing 211101, China

摘要

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### 摘要

利用近50年华南地区站点逐日降水观测资料和全球大气、海洋分析资料,分析了华南前汛期降水异常的变化特征及其与太平洋海温异常的联系.结果表明,近50年来华南前汛期降水总体呈现减少趋势.影响华南前汛期降水异常的太平洋海温异常型是一个类似于ENSO的西太平洋暖池模态,即显著海温异常区域位于西太平洋暖池.西太平洋暖池区域(120° E—180° E, 20° S—20° N)前期冬季海温异常同华南前汛期降水存在显著的负相关关系,是具有预报意义的海温关键区.该关键区海温异常影响华南前汛期降水的可能物理过程是:当前期冬季暖池异常偏暖时,菲律宾周围地区对流活动加强,导致Walker环流及东亚太平洋中低纬局地Hadley环流增强;该异常通过影响东亚—太平洋遥相关波列,使前汛期期间西太平洋副高加强西伸,脊线位置偏北,同时副热带西风急流减弱北退.随着Hadley环流上升支的增强,东亚副热带地区下沉运动也增强了,华南地区对流活动受到抑制.而且由于副高的增强,经过其北侧向华南地区的西南水汽输送辐合也减弱了,因此前汛期降水偏少.冷海温年的情形则相反,华南前汛期降水偏多.近50年来华南前汛期降水总体呈现趋势性减少正是由于前冬西太平洋暖池趋势性增暖所致.

关键词 华南前汛期, 降水异常, 西太平洋暖池, 海表温度异常

### Abstract:

This study investigates the variability of precipitation during the First Rainy Season (FRS) in South China and its relationship with the Sea Surface Temperature Anomaly (SSTA) in the Pacific, by using daily records of precipitation in South China and global analysis data of ocean and atmosphere for 1957—2004. The variability of the FRS precipitation over the past 50 years is characterized by a descending trend. There is a significant correlation between the SSTA in the Pacific and the FRS precipitation anomaly in South China. The dominant mode of the Pacific SSTA that can affect the FRS precipitation is characterized by an ENSO-like pattern with a significant SSTA center in the western Pacific warm pool region during the preceding winter. The preceding winter SSTA in such a key region bounded by 120° E—180° E and 20° S—20° N is identified as a precursor of the FRS precipitation anomaly. A possible mechanism by which the SSTA in the key region affects the FRS precipitation in South China is proposed. A positive SSTA in the key region of western Pacific warm pool but negative SSTA in the central and eastern equatorial Pacific in the preceding winter can cause anomalous convective activities around the Philippines and its surrounding areas which strengthen the equatorial Walker cell and the regional Hadley cell in mid and lower latitudes along the East Asia-Pacific sector and induce an East Asia-Pacific teleconnection wavetrain. Thus, the Western Pacific Subtropical High (WPSH) is strengthened and extends westward with its ridge line shifting northward during FRS, and the subtropical westerly jet stream is weakened and withdraws northward. As the ascending branch of the Hadley cell is reinforced, the descending movement in the subtropical East Asia is also intensified. Moreover, the water vapor transport to South China around the northern edge of WPSH is weakened. As a result, the convective activities over South China are suppressed and accordingly the precipitation during FRS is decreased. A negative SSTA in the key region of western Pacific warm pool can cause

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an opposite situation. The decreasing trend of the FRS precipitation in South China is associated with the warming trend of the preceding winter SSTA in the western Pacific warm pool.

Keywords [First rainy season in South China](#), [Precipitation anomaly](#), [Western Pacific warm pool](#), [Sea surface temperature anomaly](#)

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Corresponding Authors: 杨修群,男,1963年生,教授,主要从事海气相互作用和气候动力学研究.E-mail: xqyang@nju.edu.cn Email: xqyang@nju.edu.cn

About author: 强学民,男,1973年生,讲师,主要从事海气相互作用和气候动力学研究.E-mail: qiangxm@sina.com

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