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中国春季降水异常及其与热带太平洋海面温度和欧亚大陆积雪的联系

The Anomalies of Spring Rainfall in China and its Relation with Tropical Pacific SST and Eurasian Snow

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中文摘要:

利用降水观测资料,研究了1979~2004年中国春季(3~5月)标准化累积降水异常的时空特征及其与前冬、春热带太平洋海面温度和春季欧亚大陆积雪的关系。中国春季标准化累积降水量EOF第一模态最大变率位于中国东部中纬度地区,主要反映了中国东部中纬度地区春季降水的变化特征。同时,中国东部春季降水异常具有南、北反相变化的特征。当长江以南大部分地区的降水偏少时,长江以北地区的降水偏多。春季降水异常具有显著的年际变化,但在1980年代末出现年代际转型,即年际变化的振幅明显增大变强、周期变长。从华北到长江流域中纬度地区的春季降水异常特征与前冬热带太平洋海面温度有密切的关系。当前冬、春热带太平洋海面变暖,西太平洋海面偏冷时,中国东部从华北到长江流域中纬度地区的春季降水偏多,反之亦然。虽然当春季欧亚大陆楚科奇半岛和青藏高原积雪偏多,贝加尔湖到中国东北地区的积雪偏少时,对应着中国东部从华北到长江流域中纬度地区的降水偏多,但当去掉ENSO信号后,这种关系并不显著。说明EOF第一模态所反映的中国东部从华北到长江流域中纬度地区春季降水与欧亚大陆积雪的相关关系可能是前冬热带太平洋海面温度异常的一个体现。

Abstract:

The spatial and temporal characteristics of spring (March–May) rainfall in China and its relations with the previous winter (December–January) and spring sea surface temperature (SST) over the tropical Pacific Ocean and spring snow over Eurasia are investigated using the observed rainfall dataset for the period 1979–2004. The leading EOF mode of normalized spring rainfall shows the most robust variability in the vast regions from the Yangtze River valley to North China (YRNC), representing the variation of spring rainfall in the middle-latitude eastern China. The anomalies of spring rainfall in eastern China show a meridional dipole mode across the Yangtze River valley. The interannual variability of springtime rainfall is notable and becomes more robust after the late 1980s. The anomalies of springtime rainfall over YRNC are significantly correlated with the SST in the tropical Pacific Ocean during the previous winter and spring. Positive spring rainfall anomalies in YRNC correspond to warmer tropical East Pacific Ocean and colder tropical West Pacific Ocean, and vice versa. Although more rainfall over YRNC is associated with increased snow water equivalent (SWE) in the Chukchi Peninsula and the Tibetan Plateau and reduced SWE in the area from south of Lake Baikal to Northeast China, and this correlation becomes insignificant after subtracting El Niño–South Oscillation (ENSO) effect. Thus, the link between Eurasian snow and springtime rainfall over YRNC is probably a component of the relationship between ENSO and rainfall.

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