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Study on Precipitation Anomalies of North of China in April and Its relationship to Sea Surface Temperature Evolvement

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Using monthly precipitation data in North of China for 1960-2007, American NCEP/NCAR monthly reanalysis data and NOAA SST (sea surface temperature) data, and SST indices data in Climate System Monitoring Bulletin collected by National Climate Center, this paper studied the general circulation, large-scale weather system anomalous characteristics and SSTA evolvement with more rainfall of North of China in April. The results showed that precipitation differences between months in spring in North of China were quite obvious, and the correlation coefficients between precipitation of North of China in April and that in March and in May were not significant respectively. The linear trend of precipitation in April was out of phase with that in spring. It was meaningful to study precipitation in April solely. The space pattern of first leading mode of EOF analysis for precipitation of North of China in April indicated that rainfall changed synchronously. In years of more rainfall in April showed negative phase of EU pattern in 500hPa geopotential height field of high latitude in the Northern Hemisphere, and North of China located at where cold and warm air masses met, which availed reinforcement of south wind and ascending motion. In middle and high latitudes was latitudinal circulation, and North of China was controlled by warm ridge and latitudinal large-scale front zone; In years of less rainfall, meridional circulation prevailed and large-scale front zone located northward and presented meridional pattern, and North of China was affected by cold air mass. At the same time, water vapor was transported strongly from Pacific, South China Sea and southwest of China, and reached Northeast of China. In years of less rainfall, the water vapor transportation was quite weak. The rainfall was related closely to sea surface temperature anomalies, especially to the Indian Ocean, the middle and east of Pacific, middle and south of Pacific and northwest of Pacific where there were remarkable correlation areas more than 0.05 confidence level. Generally, the precipitation in April was significantly positive correlation to SSTA in Indian Ocean and middle and east of Pacific Ocean in February, and negative correlation to middle and north of Pacific Ocean in March, and positive correlation to northwest of Pacific Ocean in April. When warm SST in equatorial middle and east of Pacific Ocean and Indian Ocean reduced gradually from winter to spring, there was less rainfall in North of China in April; in less rainfall years, the rainfall was independent of sea surface temperature anomalies. Therefore, the relationship of precipitation of North of China in April and sea surface temperature anomalies in key areas was not symmetrical. Rainfall of North of China in April was closely connected to the Indian Ocean SSTA in February, the warmer the sea surface temperature was, the more the rainfall increased.
Key words: precipitation of North of China, the general circulation, sea surface temperature anomaly