



Changes of Moisture Budget over Southeast Tibetan Plateau and its Impacts on Precipitation of China in Summer

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Using ERA-Interim's reanalysis data and the monthly precipitation data from China National Meteorological Information Center (CNMIC) from 1979 to 2014, the characteristics of moisture budget variation over southeastern Tibetan Plateau and the anomalous moisture flux transport in Asian Monsoon system have been analyzed. And their influences on the precipitation of China in summer (June to August) has also been studied. The results shows that the southeast area of Tibetan Plateau is not only the region which has the highest moisture content in the middle and upper troposphere, but also a region whose net moisture budget is rich in surplus. A significant trend of sudden increase of regional net moisture budget is shown in 1994/1995 years, due to the opposite characteristics of two branches of abnormal moisture flux wave-trains over Asian monsoon area before and after the turning point. One anomalous moisture flux wave-train is generated from the central of Equatorial Indian Ocean which locates in South Asian monsoon region, through the southeast of Tibetan Plateau, propagated to the northwest of Pacific Ocean along SW-ENE direction. The anomalous moisture flux circulation systems consists the weak abnormal anti-cyclone in equatorial Indian Ocean, the abnormal cyclone in the Bay of Bengal, the abnormal anti-cyclone in Southern China, and the abnormal cyclone in the Ocean of Southern Japan. The other anomalous moisture flux wave-train is generated from near the equatorial New Guinea locates in Asian-Australian monsoon area, through South China Sea, propagated to the east of Mongolia along SSE-NNW direction. The anomalous moisture flux circulations consists the weak abnormal anti-cyclone in New Guinea, the abnormal cyclone in South China Sea and Philippines, the abnormal anti-cyclone in Southern China, and the abnormal cyclone in Eastern Mongolia. This two abnormal water vapor flux wave-trains converge and interact with each other over southern China and Yangtze-Huaihe river basin, which causes to abnormal changes of water vapor transport and anomaly precipitation of China in summer.

Before the year of 1994, (comparing to the mean annual precipitation during 1979 to 2014), the pattern of precipitation in eastern China in summer is Southern China less, Yangtze River more, Huang-Huai river less, Northern China more. After the year of 1995, the path of two branches of anomalous moisture transport wave-train propagation is the same, while the circulation systems are the opposite to which of before. As a result, the precipitation pattern is more-less-more-less from south to north. It is also a possible explanation to the abnormal weather event of "Southern flood and Northern drought" in China from 1990s.