



Classification and Water Vapor Source Analysis of Persistent Heavy Rainfall Events over South China

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Persistent heavy rainfall events (PHREs) over South China during 1981–2014 were selected and classified by an objective method, based on the daily precipitation data at 752 stations in China. The circulation characteristics, as well as the dry-cold air and water vapor sources of each type of PHRE were studied, and the main results were as follows. There were a total of 32 non-typhoon PHREs in South China during the study period, most of which occurred in June and July. Correlation methods were used to divide the selected PHREs into three types: SC-A type, whose main rain belt was located in the coastal areas and the northeast of Guangdong Province in China; SC-B type, whose main rain belt was between Guangdong and Guangxi provinces in China; and SC-C type, whose main rain belt was located in the north of Guangxi Province in China. This study mainly focused on the SC-A type and SC-C type, which had higher frequency than the SC-B type events. Dry-cold air was delivered to South China under the steering effect of troughs in the middle troposphere for the SC-A events, which originated from the Ural Mountains and West Siberia Plain; whereas, the SC-C events were not influenced by the cold air from high latitudes. There were three water vapor pathways from low-latitude areas for both the SC-A and SC-C PHREs. The tropical Indian Ocean was the main water vapor source for these two PHRE types, while the South China Sea also contributed to the SC-C PHREs. In addition, the SC-A events were also influenced by moist and cold air originating from the Yellow Sea. Generally, the SC-C PHREs belonged to a warm-sector rainfall type, whose precipitation areas were dominated by southwesterly wind, and the convergence in wind speed was the main reason for precipitation.