EMS Annual Meeting Abstracts
Vol. 16, EMS2019-234, 2019

Classification of Persistent Summer Extreme Heavy Rainfall Events in North China During Recent 40 Years

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Classification of Persistent Summer Extreme Heavy Rainfall Events in North China During Recent 40 Years will be presented by Dr. Jie Cao

The persistent heavy rainfall events are responsible for most catastrophic floods in North China. They account for heavy loss in economy and society, and thus have received much attention both academically and financially. However many previous studies focus on particular cases in some specific periods, instead of systematic studies. Since the topographic influence plays an important role in the persistent heavy rainfall events in North China, two balanced thermodynamic models under the approximations of quasi-geostrophic and semi-balance relationships, respectively, are adopted in the calculations for the topographic influence on mesoscale and large-scale circulations. Theoretically without consideration of terrain effects, the semi-balance approximation is of higher-order accuracy compared to the widely used quasi-geostrophic relation. In this study, the balanced equation for primary flow with the consideration of topographic influences is derived first. Then the spatially and temporally distributions of the balanced flow and secondary circulations in both quasi-geostrophic and semi-balance models in the persistent heavy rainfall events in North China during 1978-2017 are calculated by utilizing the daily precipitation data at 752 stations. Comparisons and classifications of these orographically induced flows are performed. The results will be helpful to the future study of revealing and understanding the processes that govern the occurrence of the PHREs and to the improvement of the forecasts of the persistent heavy rainfall events in North China.