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Topographic impacts on the extreme precipitation event over North China during July 18-21, 2016

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From July 18 to 21, 2016, extreme precipitation occurred over North China, which characterized by long-lasting duration, far-reaching influence, and high rainfall intensity. This process was divided into two different stages in accordance with the upper synoptic system, namely the westerly trough and the low vortex. The topographical features were distinctive especially on the first phase of precipitation. According to the ground rainfall observation and radar reflectivity, firstly,the regions above sea level 200 to 800 meters received more and stronger echoes and had rainfall one to two times larger than the foot of the Taihang Mountain. Furthermore, based on FNL data, diagnostic analysis of water vapor and stability revealed that the water vapor from two oceans with the strengthening East Jet accumulated in the front of mountain and formed potential unstable stratification. In addition, the wind product retrieved from radar proved that the easterly airflow formed a vertical circulation flow between the mountain and the plain, leading to the occurrence of extreme precipitation in the mountains. Precipitation rate in the mountain area was found to be more than 100mm/h by calculating the condensation function and the vertical velocity.At last, it was indicated that the vertical distribution of environmental wind directly affected the spatial distribution of precipitation in mountain areas. In conclusion, both the observation and the diagnosis show that the topography expanding from north to south and the strong easterly jet stream made joint efforts to this extreme precipitation. However, its effects on precipitation should be further studied due to the complex terrain of Taihang Mountain.