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Causes of extreme rainfall in May 2013 over Henan Province: The role of the southwest vortex and low-level jet

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Abstract: The present work investigated the large-scale background and possible causes of the rainstorm in Henan Province on 25-26 May 2013 using observational and numerical studies. The results indicated that this rainstorm was accompanied by widespread rainfall in China, especially central China. The storm was caused by the eastward movement of the southwest vortex (SWV) and a strong low-level southwesterly jet, which brought adequate moisture from the Bay of Bengal and triggered a strong ascending motion. The main features of the daily rain belt and large-scale atmospheric circulation were well captured by the numerical simulation. Both observational and numerical results confirmed the essential role of the low-level southwesterly jet and its warm advection in the development and propagation of the SWV. Low-level warm advection guiding SWV propagation may provide a reference for forecasting rainfall induced by the SWV.
Keywords: extreme rainfall, southwest vortex, low-level jet, warm advection, WRF, causes