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The Impacts of the MPS on the Diurnal Cycle of convections in Meiyu Front

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Cloud-resolving numerical experiments using the Weather Research and Forecast model are performed to examine the impact of a thermally-driven mountain-plain solenoid on the diurnal variation of precipitation along the Meiyu front over the Yangtze-Huang River Valleys of East China during 1-10 July 2007. The focus of analyses is on a 10-d simulation that used simplified flat terrains in the Valleys and initialized with the 10-d mean 0000-UTC global analysis with 10-d mean diurnal-varying-only lateral boundary conditions. Despite difference in the rainfall intensity and location, this experiment successfully simulated the observed diurnal variation and eastward propagation of rainfall evolution along the Meiyu front. It is found that the mountain-plains solenoid, along with the attendant nocturnal low-level jet, is primarily responsible for the midnight-to-earlier-morning rainfall enhancement along the Meiyu front. Diabatic heating from the enhanced nocturnal rainfall maximum subsequently leads to the formation of a mesoscale convective vortex that further organizes and amplifies moist convection while propagating eastward along the Meiyu front.