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Title: A Modeling Study on Effects of Taiwan Topography on A Line Convection along the Meiyu Front

Abstract: (Resubmit for 57-OOA-A1468, session OA8) During overnight hours of 22-23 May 2002, a Meiyu front approached northern Taiwan and a line convection along the front brought heavy rainfall (reaching 100 mm) over coastal regions of central Taiwan. Favorable conditions at synoptic scale included prefrontal warm air advection and large CAPE (3000 m2 s-2). Doppler radar observations revealed that the northwest-southwest-oriented line formed over northern Taiwan Strait at 0000 LST 23 May, and moved southeastward toward Taiwan at a slow speed of about 4 m s-1. As the line moved closer its southern section intensified and extended farther to the south. Shortly after this enhancement, the line made landfall near 0530 LST and heavy rainfall was resulted. Since terrain blocking can often lead to strong low-level convergence offshore from central Taiwan under prefrontal southwesterly flow [1], a numerical study using the Cloud-Resolving Storm Simulator (CReSS) developed by the Hydrosphere-Atmosphere Research Center of Nagoya University, Japan [2] was conducted to investigate the role played by Taiwan topography in the intensification of the current line convection. Three experiments with different terrain height of Taiwan were conducted and the results were compared. In full terrain run, low-level prevailing prefrontal southwesterly flow was blocked and deflected northward to formed an elongated zone of confluence with unaffected flow over the strait. As the line moved over this region of convergence, new cells were triggered and subsequent enhancement was resulted near its southern end. In the second run with the terrain reduced by half, the simulated convergence zone was weaker and closer to the shoreline of Taiwan, and the line enhanced only as it moved over the new convergence zone. In the third run with Taiwan terrain completely removed, no line convection formed over the strait at all. Thus, through sensitivity tests, the offshore convergence induced by Taiwan topography was shown to play a vital role in the intensification of line convection offshore, and in the subsequent heavy rainfall along the coast of central Taiwan. References [1] J. Li and Y.-L. Chen. Mon. Wea. Rev., 126, 959 (1998). [2] K. Tsuboki and A. Sakakibara, High Performance Computing, Springer, 243 (2002).

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