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The Inland Maintenance and Re-intensification of Tropical Storm Bill (2015) Part 2: Precipitation Microphysics

Noah S. Brauer¹, Jeffrey B. Basara², Pierre E. Kirstetter³, Ryann A. Wakefield⁴, Cameron R. Homeyer⁵, Jinwoong Yoo⁶, Marshall Shepherd⁷, and Joseph. A. Santanello Jr.⁸

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Abstract

Tropical Storm Bill produced over 400 mm of rainfall to portions of southern Oklahoma from 16-20 June 2015, adding to the catastrophic urban and river flooding that occurred throughout the region in the month prior to landfall. The unprecedented excessive precipitation event that occurred across Oklahoma and Texas during May

and June 2015 resulted in anomalously high soil moisture and latent heat fluxes over the region, acting to increase the available boundary layer moisture. Tropical Storm Bill progressed inland over the region of anomalous soil moisture and latent heat fluxes which helped maintain polarimetric radar signatures associated with tropical, warm rain events. Vertical profiles of polarimetric radar variables such as Z_H , Z_{DR} , K_{DP} , and ρ_{hv} were analyzed in time and space over Texas and Oklahoma. The profiles suggest that Tropical Storm Bill maintained warm rain signatures and collision-coalescence processes as it tracked hundreds of kilometers inland away from the landfall point consistent with tropical cyclone precipitation characteristics. Dual-frequency precipitation radar observations from the NASA GPM DPR were also analyzed post-landfall and showed similar signatures of collision-coalescence while Bill moved over north Texas, southern Oklahoma, eastern Missouri, and western Kentucky.

**Corresponding author address:* Noah S. Brauer, National Weather Center, 120 David L. Boren Blvd, Norman, OK 73072. E-mail: nbrauer@ou.edu

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Headquarters:

45 Beacon Street
Boston, MA 02108-3693

DC Office:

1200 New York Ave NW
Suite 500
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