ANALYSIS OF TWNETY-FIVE YEARS OF HEAVY RAINFALL IN THE TEXAS HILL COUNTRY

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ABSTRACT

Forecasting heavy rain events and the area of greatest threat has been a long standing challenge in operational meteorology. This is especially true in certain regions where the physical geography lends itself to the creation of such events. With its thin soil layers, low latitude, and proximity to the Gulf of Mexico, the Texas Hill County is one such region.

Twenty-five years of daily (24-hour) rainfall data were examined for the Texas Hill Country using observations from 86 cooperative climate stations in the region; the period examined for this study was 1982-2006. Days with measurable precipitation were treated as a gamma distribution in order to determine the top 2%, 1%, and 0.5% to define events as unusual, rare, and extreme, respectively. Quantifying rainfall as a distribution provides forecasters with supplementary information on precipitation thresholds that can lead to significant flash flooding or major flooding. This approach was applied to each station as well as to the aggregate data for all 86 stations, resulting in an analysis of 130,986 observations of 24-hour precipitation.

Soundings were then constructed for each using the 3-hourly North American Regional Reanalysis (NARR) gridded datasets. From these individual soundings mean values were created, and composite soundings were then made for each rainfall threshold for the Mesohigh, Frontal and Synoptic classifications. Convective stability parameters were also tested for each of the classes of heavy rain events. From these exercises, it was learned that high values of precipitable water and wind shear are key ingredients for heavy rainfall to occur.