

## **Tropospheric moisture and monsoonal rainfall over the southwestern United States**

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This study investigates the role of increased atmospheric humidity in occurrences of wet days in the southwestern United States during the monsoon seasons of 1996–2002, using spatiotemporal analyses of ground-measured precipitation, spatial analyses of surface and 700-hPa humidity, and air-parcel trajectory analyses. A precipitation regionalization indicates that the Gila River basin in southern Arizona/southwest New Mexico should be divided into a western region and an eastern region. A rainfall peak occurred in late August/early September for the western region; however, similar to that of the core monsoon zone in northwestern Mexico, the eastern region of the basin had a rainfall peak in late July/early August. Wet days in the western (eastern) region were associated with a large (moderate) peak in dew point temperature in the southwestern (south central) portion of the basin. The middle troposphere was more humid than normal on both sets of days, with the anomalies for western region wet days being larger and located more over the Gila River basin than anomalies for the eastern region wet days. The Sierra Madre Occidental was the most likely source of middle troposphere moisture for both regions; however, the Gulf of Mexico may have been a significant contributor to rainfall in parts of the eastern region. The Gulf of California probably was the dominant source of low-level moisture for western region wet days, with gulf surges likely causing the late August/early September peak.

***FORECASTING AND QUANTITATIVE PRECIPITATION ESTIMATION***