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The Statistics of Heavy Rainfall Occurrences in Taiwan

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The seasonal variations of heavy rainfall days over Taiwan are analyzed using 6-yr (1997-2002) hourly rainfall data from about 360 rainfall stations, including high-spatial-resolution Automatic Rainfall and Meteorological Telemetry System (ARMTS) stations and 25 conventional stations. The seasonal variations and spatial variations of non-typhoon and typhoon heavy rainfall occurrences are also analyzed. From mid-May to early October, with abundant moisture, potential instability and the presence of mountainous terrain, non-typhoon heavy rainfall days are frequent ($>$ 60%) but only a few stations would possibly record extremely heavy rainfall ($>$ 130 mm day-1) for each heavy rainfall day except during the passage of synoptic disturbances or drifting of mesoscale convective systems inland. During the Mei-yu season, especially in early June, these events are more widespread than in other seasons. The orographic effects are important in determining the spatial distribution of heavy rainfall occurrences with a pronounced afternoon maximum, especially during the summer months under the southwesterly monsoon flow. After summer-autumn transition, heavy rainfall days are most frequent over northeastern Taiwan under the northeasterly monsoon flow. Extremely heavy rainfall events ($>$ 130 mm day-1) are infrequent during the winter months because of stable atmospheric stratification with a low moisture content. Typhoon heavy rainfall events start in early May and become more frequent in late summer and early fall. During the analysis period, heavy rainfall occurrences are widespread and dominated by extremely heavy rainfall events ($>$ 130 mm day-1) on the windward slopes of the storm circulations. The spatial distribution of typhoon heavy rainfall occurrences depends on the typhoon track with very little diurnal variations.