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Changes in orographic extreme rain events over Meghalaya Hills in Northeast India in the 20th century

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The interaction between large-scale circulation and the local topography plays a crucial role in determining the spatial distribution of rainfall over the Meghalaya Hills. The Meghalaya plateau forms the first orographic barrier for the humid southwest monsoon winds, on their way from the Bay of Bengal to the Himalayas. The annual rainfall distribution varies from 12,000 mm in Cherrapunji (1300 m a.s.l.) located at the southern edge of the plateau to 2200 mm in Shillong (1598 m a.s.l.) and only 1600 mm in Gauhati (54 m a.s.l.), located to the north in the Brahmaputra valley. The daily rainfall data for the 20th century, from these three stations across the region, constitute the basis for statistical analysis. However, the low signal-to-noise ratio makes it difficult to find any significant departure from the simplest null hypothesis of stability of rain record at individual stations. Comparing the two halves of the century, provided strongly significant results in the numbers of days with extreme rain. The number of Fourier Transform extreme amplitudes also differed significantly. Increasingly heavy events during the summer monsoon season, and partly in the pre- and post-monsoon seasons, are offset by a weakening in the winter monsoon season, so that the annual mean rainfall does not show a significant trend over the Meghalaya Hills. Apart from a greater number of years with noticeable extreme rainfall events in the second half of the 20th century, we can also observe a more pronounced quasi-periodicity of the 10-20 and 30-60 days during the same period.