



Investigating space-time patterns of rainfall in I-Lan (Taiwan) by hierarchical clustering and correlation dimension methods

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Adequate understanding of rainfall patterns in a region is crucial for undertaking short-term water emergency measures (floods) as well as devising long-term water planning and management strategies. Rainfall patterns can vary both in space and time depending upon the underlying generating mechanisms and forces, including local topographical changes and macroscopic atmospheric circulation. To identify the dominant driving forces of space-time rainfalls, it is worthwhile to perform and compare the results from different classification methods. In this study, we apply the hierarchical ascending clustering (HAC) and correlation dimension (CD) methods to determine the most significant spatio-temporal features of rainfalls in I-Lan, Taiwan. Daily rainfall data observed during 1996–2008 at 19 rainfall stations are studied. The HAC distinguishes the classes of space-time rainfall patterns by analyzing the consistency of temporal variations in the rainfall events at each station. The CD method employs phase space reconstruction and neighbor searching procedures to identify patterns and dynamic nature (stochastic or deterministic) of space-time rainfalls. Results from these two methods are also interpreted and discussed in terms of the dominant governing mechanisms.