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Classification of Rainfall-Runoff Events for Flood Analysis and Forecasting in Lower Saxony, Germany

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Local rainfall events, especially those with high precipitation levels in a short period of time, can cause extreme runoff in their associated catchment areas. The high variability of rainfall and runoff events makes it difficult to accurately calculate the risk of flooding. To improve the assessment of individual rainfall-runoff events, it is essential to analyze their frequency, intensity and the complex relationship between rainfall and runoff. This analysis leads to a better understanding of the involved processes, enabling more precise modeling and earlier recognition and prediction of runoff events.

This study focuses on the Hannover radar range, which is primarily located in Lower Saxony, Germany. The rainfall events resulting from the radar data from the German Weather Service are classified into convective, stratiform and mixed rainfall based on their intensity, areal extent and duration. The associated rainfall-runoff events of various catchments in Lower Saxony will be further classified into three categories: long-rain floods, short-rain floods and flash floods.

The results of this study are expected to demonstrate the relationship between rainfall and runoff events including the frequency of different types of rainfall-runoff events. Additionally, the study aims to identify the type of rainfall responsible for extreme rainfall-runoff events. The analysis will also consider the influence of catchment characteristics and initial conditions on the runoff.