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Flood Seasonality in the Congo River Basin

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Information on flood seasonality is required in many practical applications of hydrology and water resources management. However, an understanding of flood seasonality and how flood frequencies may have changed over time has not been established for the Congo Basin. The main objective of this study is therefore to identify flood seasonality and change in frequency the Congo Basin (CB). The analysis based on six major drainage areas of the CB, where we used a Peaks Over Threshold (POT) flood time-series with three peaks per year. The relative frequency method is applied to identify flood seasons, and then a cluster analysis is performed to classify flood into type based on monthly frequency. The directional statistics method is used to determine the mean day of flood and the flood variability measure. To identify flood frequency changes, the analysis of variance was applied to test the difference between two flood frequency time series blocks before and after the change point year. Results show that four gauging stations exhibit a unimodal flood seasonality distribution while two gauging stations have bimodal flood seasonality distribution, and two significant flood rich months are observed in all studied gauging stations. The cluster analysis results in four spatially flood types with distinct seasonality characteristics. Mean flood dates show that the time interval between adjacent flood events in the south and south-east is shorter compared to time interval between flood events in the north and north-west. It is observed that, in almost all gauging stations, there is strong flood seasonality, and the geographical location of a watershed is indicative of its flood pattern. Most of significant decreasing frequencies are found in the southern part of the Congo Basin. There are no significant changes in flood frequency identified in the northern and eastern part of the Basin. However, flood frequencies have been increasing in the centre and western part of the Basin. This study suggest that, exploring flood generating factors and the drivers of change can provide insights for understanding the influence of these factors on floods as climate models projected changes in extreme precipitation and aridity in the future.