Website describing some watershed attributes in more detail. (“WP&M: Lesson 5 Watershed Characteristics: Classification and Measurement,” n.d., 5).

## Small headwater catchments – spatial delimitation and their classification in terms of runoff risks :

Abstract: This article presents an aerial delineation of  small headwater catchments up to 5 km2 in the Czech Republic. The aim was not only to present the delineation of these catchments, but also their categorization in terms of the characteristics affecting the  formation of  direct runoff. Direct runoff caused by torrential rainfall is  a  very dynamic process of  episodic nature and has a  major impact specifically in  small catchments. The  delineation of  small headwater catchments, where the aforementioned processes take place, can complement the standard hierarchical classification of basins in the Czech Republic. These basins make up 80 % of the Czech Republic. The  delimited catchments were further classified according to  a number of  characteristics related to  the  risk of  direct runoff. A  cluster analysis was performed in  order to  classify these catchments. The  catchment characteristics that influence the  hydrological response were included in  the  analysis. These are mainly rainfall data, hydro-morphological characteristics of  the  relevant basin, land use, and soil hydrological characteristics. One negative impact of direct runoff is erosion. Erosion monitoring can be indirectly used as an indicator of  the  state of  a  specific area in  terms of  the  occurrence of  direct runoff (https://me.vumop.cz). As part of this initiative, which completed ten years of operation in 2022, erosion events are recorded. The database contains more than two thousand records. However, the records within the Czech Republic are inconsistent, which is due to the involvement of branches of the State Land Office (Státní pozemkový úřad, SPÚ). However, it is a relatively extensive evidence of erosion. (Kavka et al. 2023)

## Identification of flood seasonality and drivers across Canada

Abstract Floods are the most frequently occurring natural hazard in Canada. An in-depth understanding of flood seasonality and its drivers at a national scale is essential. Here, a circular, statistics-based approach is implemented to understand the seasonality of annual-maximum floods (streamflow) and to identify their responsible drivers across Canada. Nearly 80% and 70% of flood events were found to occur during spring and summer in eastern and western watersheds across Canada, respectively. Flooding in the eastern and western watersheds was primarily driven by snowmelt and extreme precipitation, respectively. This observation suggests that increases in temperature have led to early spring snowmelt-induced floods throughout eastern Canada. Our results indicate that precipitation (snowmelt) variability can exert large controls on the magnitude of flood peaks in western (eastern) watersheds in Canada. Further, the nonstationarity of flood peaks is modelled to account for impact of the dynamic behaviour of the identified flood drivers on extreme-flood magnitude by using a cluster of 74 generalized additive models for location scale and shape models, which can capture both the linear and nonlinear characteristics of flood-peak changes and can model its dependence on external covariates. Using nonstationary frequency analysis, we find that increasing precipitation and snowmelt magnitudes directly resulted in a significant increase in 50-year streamflow. Our results highlight an east–west asymmetry in flood seasonality, indicating the existence of a climate signal in flood observations. The understating of flood seasonality and flood responses under the dynamic characteristics of precipitation and snowmelt extremes may facilitate the predictability of such events, which can aid in predicting and managing their impacts.

[Hydrological Processes | Hydrology Journal | Wiley Online Library](https://onlinelibrary.wiley.com/doi/10.1002/hyp.14398)

(Singh et al. 2021)

## How Do Climate and Catchment Attributes Influence Flood Generating Processes? A Large-Sample Study for 671 Catchments Across the Contiguous USA

Abstract Hydrometeorological flood generating processes (excess rain, short rain, long rain, snowmelt, and rain-on-snow) underpin our understanding of flood behavior. Knowledge about flood generating processes improves hydrological models, flood frequency analysis, estimation of climate change impact on floods, etc. Yet, not much is known about how climate and catchment attributes influence the spatial distribution of flood generating processes. This study aims to offer a comprehensive and structured approach to close this knowledge gap. We employ a large sample approach (671 catchments across the contiguous United States) and evaluate how catchment attributes and climate attributes influence the distribution of flood processes. We use two complementary approaches: A statistics-based approach which compares attribute frequency distributions of different flood processes; and a random forest model in combination with an interpretable machine learning approach (accumulated local effects [ALE]). The ALE method has not been used often in hydrology, and it overcomes a significant obstacle in many statistical methods, the confounding effect of correlated catchment attributes. As expected, we find climate attributes (fraction of snow, aridity, precipitation seasonality, and mean precipitation) to be most influential on flood process distribution. However, the influence of catchment attributes varies both with flood generating process and climate type. We also find flood processes can be predicted for ungauged catchments with relatively high accuracy (*R*2 between 0.45 and 0.9). The implication of these findings is flood processes should be considered for future climate change impact studies, as the effect of changes in climate on flood characteristics varies between flood processes.

[How Do Climate and Catchment Attributes Influence Flood Generating Processes? A Large‐Sample Study for 671 Catchments Across the Contiguous USA - Stein - 2021 - Water Resources Research - Wiley Online Library](https://agupubs.onlinelibrary.wiley.com/doi/10.1029/2020WR028300)

## Performance Comparison of New Adjusted Min-Max with Decimal Scaling and Statistical Column Normalization Methods for Artificial Neural Network Classification

Abstract In this research, the normalization performance of the proposed adjusted min-max methods was compared to the normalization performance of statistical column, decimal scaling, adjusted decimal scaling, and min-max methods, in terms of accuracy and mean square error of the final classification outcomes. The evaluation process employed an artificial neural network classification on a large variety of widely used datasets. The best method was min-max normalization, providing 84.0187% average ranking of accuracy and 0.1097 average ranking of mean square error across all six datasets. However, the proposed adjusted-2 min-max normalization achieved a higher accuracy and a lower mean square error than min-max normalization on each of the following datasets: white wine quality, Pima Indians diabetes, vertical column, and Indian liver disease datasets. For example, the proposed adjusted-2 min-max normalization on white wine quality dataset achieved 100% accuracy and 0.00000282 mean square error. To conclude, for some classification applications on one of these specific datasets, the proposed adjusted-2 min-max normalization should be used over the other tested normalization methods because it performed better.

Link: [Performance Comparison of New Adjusted Min‐Max with Decimal Scaling and Statistical Column Normalization Methods for Artificial Neural Network Classification - Sinsomboonthong - 2022 - International Journal of Mathematics and Mathematical Sciences - Wiley Online Library](https://onlinelibrary.wiley.com/doi/10.1155/2022/3584406)

(Sinsomboonthong 2022)