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Supplement of

Use of streamflow indices to identify the catchment drivers of hydrographs

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Figure S1. Maps of topographic characteristics of CAMELS catchments over the CONUS (Addor et al., 2017). (a) Mean elevation [m above sea level] (b) Mean slope [m km\(^{-1}\)] (c) Area [km\(^2\)].
| Sl.no | Attribute           | Description                                                                                                                                                                                                 | Unit     |
|-------|---------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------|
|       | **Climatic indices**                                                                                                                                  |                                                    |          |
| 1     | aridity             | aridity (ratio of mean PET to mean precipitation)                                                                                                                                                           | -        |
| 2     | p_seasonality       | seasonality and timing of precipitation (positive (negative) values indicate that precipitation peaks in summer (winter); values close to 0 indicate uniform precipitation throughout the year)                                  | -        |
| 3     | frac_snow           | fraction of precipitation falling as snow                                                                                                                                                                   | -        |
| 4     | high_prec_freq      | frequency of high precipitation days (≥ 5 times mean daily precipitation). High precipitation days are defined as days that are ≥ five times the mean daily precipitation (Addor et al., 2017).                               | days yr⁻¹ |
| 5     | high_prec_dur       | average duration of high precipitation events                                                                                                                                                                | days     |
| 6     | low_prec_freq       | frequency of dry days                                                                                                                                                                                        | days yr⁻¹ |
| 7     | low_prec_dur        | average duration of dry periods                                                                                                                                                                             | days     |
|       | **Land cover characteristics**                                                                                                                         |                                                    |          |
| 8     | Forest_frac         | forest fraction                                                                                                                                                                                             | -        |
| 9     | Lai_max             | maximum monthly mean of the leaf area index                                                                                                                                                                 | -        |
| 10    | Gvf_max             | maximum monthly mean of the green vegetation fraction                                                                                                                                                         | -        |
|       | **Soil characteristics**                                                                                                                               |                                                    |          |
| 11    | soil_depth_pelletier | depth to bedrock                                                                                                                                                                                           | m        |
| 12    | sand_frac           | sand fraction                                                                                                                                                                                             | %        |
| 13    | clay_frac           | clay fraction                                                                                                                                                                                              | %        |
|       | **Geological characteristics**                                                                                                                          |                                                    |          |
| 14    | geol_porosity       | subsurface porosity                                                                                                                                                                                         | -        |
| 15    | geol_permeability   | subsurface permeability (log10)                                                                                                                                                                             | m²       |
Figure S2. Location of clustered CAMELS catchments and level I ecoregions in the continental United States (Omernik and Griffith, 2014). Source: https://zutn.github.io/Catchment-Classification/map.html. The clusters derived from the hydrological signatures by Jehn et al. (2020) largely follow to ecoregions in the United States. The 100th meridian is typically considered as the dividing climatic line in the United States, splitting the country into a semiarid west and a humid east. Clusters 3, 4, 5, 6, and 7 are mainly in the west, and Clusters 1 and 10 are primarily in the east. However, Clusters 2, 8, and 9 show approximately similar catchment numbers in both regions. Furthermore, catchments in the eastern half of the US form large spatial patterns of similar behavior; in contrast, catchments in the west are patchier.
Table S2. Properties of catchment clusters (Jehn et al., 2020)

| Cluster | Number of catchments | Region                                      | Dominating attribute                          |
|---------|----------------------|---------------------------------------------|-----------------------------------------------|
| 1       | 230                  | Southeastern and Central Plains             | Aridity                                       |
| 2       | 101                  | Central Plains (with scattered catchments all over western US) | Green vegetation fraction maximum            |
| 3       | 7                    | Northwestern Forested Mountains            | Fraction of precipitation falling as snow     |
| 4       | 52                   | Northwestern Forested Mountains and Florida | Precipitation seasonality                      |
| 5       | 9                    | Northern Marine West Coast Forests         | Forest fraction                               |
| 6       | 18                   | Marine West Coast Forests                  | Aridity                                       |
| 7       | 23                   | Western Cordillera                         | Fraction of precipitation falling as snow     |
| 8       | 90                   | Great Plains and North American deserts    | Precipitation seasonality                      |
| 9       | 61                   | All southernmost states of the US          | Aridity                                       |
| 10      | 52                   | Appalachian Mountains                      | Mean elevation                                |
Figure S3. Boxplots of the catchment attributes of the clusters (Jehn et al., 2020).