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Selection of donor catchments for hydrological model parameter transfer

A possibility to model ungauged catchments is the transfer of parameters from appropriate gauged donor catchments. The selection of possible donors is mainly based on catchment properties quantified using different similarity measures. We suggest an approach where the possible donor catchments are first filtered to find out which of them are appropriate candidates. Catchments with very specific hydrological response are unlikely to be good donors. The criteria applied include:

- The uncertainty of the parameters is calculated as the volume of the good parameter sets. Ill defined model parameters are often caused by infrequent occurrences of certain processes and thus indicate that the catchment is not representative. Thus catchments with high parameter uncertainty are unlikely to be good donors.
- If the discharge of the selected catchment is of low complexity, then this indicates that the corresponding model parameterization might not capture higher dynamics in other catchments. The complexity of the observed discharge sequences is measured using the boundary of the multidimensional set of subsequent discharges.
- If the bivariate copulas between antecedent precipitation and discharge of a catchment indicate unusual catchment behaviour than a parameter transfer might be ineffective.

After the reduction of the set of possible donors the most appropriate among them is selected using similarity measures. These measures are defined using a distance metric, where the appropriate distance is not selected as a universal measure, but instead as an indicator which of the donors should be taken. The methodology is tested using a parsimonious lumped hydrological model.