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Functional streamflow disaggregation - modern variations on a classical theme

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Conceptual foundation, algorithmic solution, and independent evaluation of exemplary applications are given of the recently introduced "functional streamflow disaggregation" (FSD) technique (WRR, 2008). This is an algorithmic construct of blind, largely non-probabilistic, uncalibrated, 'minimalistic' runoff analysis. It starts with a first guess using a variant of singular-system analysis (SSA) and runs through a hierarchy of lower streamflow envelopes as obtained by means of iterative cubic spline interpolation (CSI). A lower bound is preset by a sort of minimal convolution. In doing so, empirical streamflow components are separated, also suggesting comparison with structured runoff as obtained from hydrologic modelling. Assignment to classical overland, vadose zone, and base flows, i.e., to conceptual entities of the parallel-flow framework, is discussed for daily runoff from three headwater catchments of German and Austrian highlands environments. The method has recourse to the regular time series contents, leaving multifractal analyses as proper means of further independent evaluation.