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Modeling river runoff with correctly reproduced scaling laws

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We report on fluctuation scaling (Taylor's law) and the scaling of higher moments in various time series of river runoff, both w.r.t. to the time scale and the catchment scale. Deviations from mono-fractal scaling are found and associated with spatio-temporal intermittency.
Conventional catchment models are based on conservation laws (water, momentum and energy) but do not attempt to reproduce these scaling laws. We propose to use non-linear non-Markovian Langevin equations as catchment models that incorporate both conservation and scaling laws. Ultimately, such models should lead to more reliable predictions, in particular of the extreme runoff events.