

River scaling analysis and the BHP universality hypothesis

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The XY-model shows in two dimensions in the strong coupling regime a universal distribution, named BHP after [5], which in turn also describes other models of criticality and self-organized criticality and even describes natural data as river level and flow. We start by analysing the two dimensional XY-model and calculate the BHP probability density function. The results obtained for several dissimilar phenomena which includes the deseasonalised Danube height data raised the universality hypothesis for rivers. This hypothesis is tested for the Iberian river Douro. Deviations from the BHP are found especially for medium and small runoffs. For regimes closer to the natural flow the fluctuations tend to follow the universal curve again.

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