



Multiyear behaviour and monthly simulation and forecasting of the Nile River flow

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Multiyear persistence of droughts is a typical natural behaviour that cannot be modelled by typical stochastic or deterministic approaches. As this persistence is closely related to the Hurst (or scaling) behaviour, a stochastic approach to represent multiyear persistence of droughts should also reproduce the Hurst phenomenon. An advanced, yet simple, stochastic methodology, is proposed based on the concept of maximum entropy that is able to represent multiyear persistence. The approach can be used to generate long-term simulations or shorter-term forecasts, and is demonstrated for the Nile River, the persistence behaviour of which motivated the discovery of the Hurst phenomenon. The analysis and demonstrations use the Nile flow record, the longest available flow record worldwide. The stochastic methodology is also compared with a chaotic model and an artificial neural network model developed using the same flow record.