



Autocorrelation of river flows as a tool for classifying the river flow regime and optimising hydrological models

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Recent research in hydrology highlighted that the temporal variability and autocorrelation properties of the river discharge contain important information about the catchment dynamics. Such information can be useful for the calibration of hydrological models in ungauged basins. Within this respect, the main challenge is to infer the autocorrelation properties of river flows on the basis of readily available catchment behaviours. This study aims to provide a contribution to this end, by analysing the correlation structure of 52 extended series of river discharges observed in central Italy. The first goal of the study is to find an efficient analytical formulation for the autocorrelation function of the river discharge. Two different two-parameter formulations have been considered, namely an exponential law and a power law. Although very similar in practice, the two formulations are well distinguished from a conceptual point of view. In fact, a power-law autocorrelation function implies the presence of long-memory, and therefore the presence of the well-known Hurst Effect in the river flows. After the identification of the best performing formulation, an extended analysis has been carried out to relate its parameters to the geomorphological and climatic characteristics of the contributing catchment. The results show interesting perspectives and confirm the relevant effects that the catchment structure can induce on the river flow regime.