



Long-term persistence in precipitation: are mega-droughts really a riddle?

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During the last years there is increasing paleoclimatic evidence on the emergence of extensive meteorological droughts during the Holocene. These findings have puzzled both the hydrological and climatological community, since instrumental records and model results suggest a less persistent behaviour of rainfall. On the other hand paleoclimatic reconstructions depict that droughts occur more often than one should expect based on observations and models. Here, we show that the long-term persistence or Hurst-Kolmogorov (HK) behaviour of rainfall could describe stochastically this phenomenon if a scale-dependent scaling law is assumed. We also provide some evidence of this varying behaviour between sub-decadal timescales, where HK behaviour is weak or absent, and larger ones, where it becomes strong enough to be linked to multi-decadal drought. Finally, it is compared to the standard statistical approach, in terms of the estimation of the return period, and the implications in water resource management are discussed.