

A Maximum Likelihood estimator for Long-range Persistence

A Guerrero and LA Smith

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Abstract

A wide variety of processes are thought to show “long-range persistence”, specifically an autocorrelation function with power-law decay. A variety of methods have been proposed to quantify this power-law decay, and weather and climate systems, among others, have been claimed to show long-range persistence. In this paper we present a new approach, defining and illustrating a new maximum likelihood estimator of the persistence exponent H . This method provides estimates of H at each time scale considered, as well as meaningful uncertainty estimates. Several independent realisations of processes with a known degree of long-range persistence are used to test the accuracy of the new estimator in terms of spread and bias. The persistence exponent of temperature data is estimated and the problems of using observational data are addressed.

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