



Hurst-Kolmogorov dynamics in long climatic proxy records

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Orbital climate theory states that the variations in insolation caused by changes in the shape of the earth's orbit (eccentricity of ellipse), tilt of the earth's axis (obliquity) and precession of the equinoxes are linked with large-scale climate variations. However, there is an on-going debate about the qualitative characteristics that describe the driving force of large scale climate dynamics (linear vs. nonlinear, insolation vs. obliquity forcing), that extends to a greater disagreement about the overall appropriateness of deterministic or stochastic descriptions of glacial cycles. Through this scientific discussion some concepts are widely used by all sides, including threshold mechanisms, state transition and multi-scale fluctuations, which are characteristics that can be associated with a power-law stochastic dependence. Hurst-Kolmogorov (HK) dynamics is a characteristic model that results in power-law dependence. Here we show that HK dynamics combined with components of orbital forcing is consistent with several proxy climatic time series spanning periods up to 500 million years before present.