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Predictability of the monthly NAO index: fractal analyses and comparisons with daily rainfall regimes and seismic activity

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The predictability of the monthly North Atlantic Oscillation, NAO, index is analysed from the point of view of different fractal concepts such as lacunarity, rescaled analysis (Hurst exponent) and reconstruction theorem (embedding and correlation dimensions, Kolmogorov entropy and Lyapunov exponents). Monthly NAO values for the period 1825-2007 are considered. The complexity of the physical processes governing the NAO fluctuations is quantified by the mentioned fractal concepts and the results are compared with other fractal analyses applied to physical phenomena concerning daily pluviometric regimes and seismic activity of the Earth. The main results can be summarised as follows: evident signs of randomness, necessity of stochastic models to represent time evolution of monthly NAO index and notable predictive instability. The results obtained are in agreement with those derived by several authors, who proposed some stochastic models for the prediction of the NAO index.