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Fractal structure and predictability of distances between consecutive events: an analysis of three seismic aftershock sequences in Southern California

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Three series of distances between consecutive seismic events are analysed by means of mono- and multifractal techniques with the aim of quantifying the complexity of their physical mechanism and their predictability and predictive instability. These series are also simulated by means of fractional noise by taking into account their self-affine character, the dependence of their power spectra on frequency and the values of Hurst and Hausdorff exponents. The prediction of these series is also attempted by means of an autoregressive AR(p) process to estimate the p+1 distance depending on the previous p distances. The interevent distance series are derived from the aftershock sequences associated with Landers (Mw 7.3 June 28, 1992), Northridge (Mw 6.7 January 17, 1994) and Hector Mine (Mw 7.1 October 16, 1999) mainshocks. The seismic records are obtained from the Southern California Seismic Network (SCSN) catalogue. Aftershocks with Mw equalling to or exceeding 2.0 are considered in order to assure catalogue completeness.