



Multifractality of the spatial distribution of seismicity in Landers (1992, Mw 7.3) and Hector Mine (1999, Mw 7.1) aftershock area (Southern California) and possible predictive signs of mainshocks

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The spatial clustering of the epicentres corresponding to the seismic activity in the aftershock area of 1992 Landers earthquake (Mw 7.3, Southern California) is analysed from the viewpoint of the multifractal theory. The recording period considered (1981–2007) includes low magnitude seismicity previous to Landers earthquake, the mainshock and its aftershock activity, and the subsequent period of low magnitude activity. This recording period also includes the 1999 Hector Mine earthquake (Mw 7.1), close to Landers epicentre, and its aftershock activity. In a first step, several multifractal parameters (critical Hölder exponent α_0 , multifractal width $\Delta\alpha$, spectral asymmetry B , and capacity dimension D_0) are computed for threshold magnitudes from 2.0 to 4.5. In a second step, generalised multifractal dimensions, $D(q)$, mass exponents, $\tau(q)$, and the non-uniformity factor Δ are computed for several values of the parameter q within the interval $(-2, 2)$. Landers aftershock series and the whole seismic activity of Landers area depict a different evolution of α_0 , $\Delta\alpha$, B and D_0 with threshold magnitudes. This fact suggests that epicentre clustering processes are different before, along and after an aftershock period. Additionally, time changes on $D(q)$, $\tau(q)$ and Δ could be interpreted as predictive signs of Landers and Hector Mine mainshocks.