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Recent advances in identifying the occurrence time of an impending earthquake using natural time

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Novel dynamical features hidden behind time series in complex systems can emerge upon analyzing them in a new time domain, termed natural time [1-6]. In a time series comprising N events, the natural time $\chi_k = k/N$ serves as an index for the occurrence of the k-th event[1, 2], and is smaller than, or equal to, unity (cf. the symbol χ originates from the ancient Greek word $\chi\rho\nu o\varsigma$ (chronos) which means "time"). In natural time analysis, the evolution of the pair of two quantities (χ_k, E_k) is considered, where E_k denotes in general a quantity proportional to the energy of the individual event. The natural time analysis has been shown[7] to be optimal (since it extracts the maximum information) for the study of the dynamical *evolution* of a complex system and identifies when a system enters a critical stage. Hence, natural time plays a key role in predicting impending catastrophic events in general. Such an example is the case of earthquakes: Here, we review the recent results for earthquakes that occurred in Greece[8,9] including the case of the January 18, 2010, Ms(ATH)=5.7 earthquake with an epicenter at 38.4^{o}N 22.0^{o}E.

REFERENCES

[1] P. A. Varotsos, N. V. Sarlis, and E. S. Skordas, Practica of Athens Academy 76, 294 (2001).
[2] P. A. Varotsos, N. V. Sarlis, and E. S. Skordas, Phys. Rev. E 66, 011902 (2002).
[3] P. A. Varotsos, N. V. Sarlis, and E. S. Skordas, Phys. Rev. E 67, 021109 (2003).
[4] P. A. Varotsos, N. V. Sarlis, and E. S. Skordas, Phys. Rev. E 68, 031106 (2003).
[5] P. A. Varotsos, N. V. Sarlis, H. K. Tanaka, and E. S. Skordas, Phys. Rev. E 72, 041103 (2005).
[6] P. A. Varotsos, N. V. Sarlis, E. S. Skordas, H. K. Tanaka, and M. S. Lazaridou, Phys. Rev. E 73, 031114 (2006).
[7[S. Abe, N.V. Sarlis, E.S. Skordas, H.K. Tanaka and P.A. Varotsos, Phys. Rev. Lett. 94, 170601 (2005).
[8] N.V. Sarlis, E.S. Skordas, M.S. Lazaridou, and P.A. Varotsos, Proceedings of the Japan Academy, Ser. 84, 331-343 (2008).
[9] S Uyeda, and M. Kamogawa, Eos Trans. AGU 89, 363 (2008).