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Evidence of the non-extensive character of Earth's ambient noise.

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Investigation of dynamical features of ambient seismic noise is one of the important scientific and practical research challenges. In the same time there isgrowing interest concerning an approach to study Earth Physics based on thescience of complex systems and non extensive statistical mechanics which is a generalization of Boltzmann-Gibbs statistical physics (Vallianatos et al., 2016).This seems to be a promising framework for studying complex systems exhibitingphenomena such as, long-range interactions, and memory effects. Inthis work we use non-extensive statistical mechanics and signal analysis methodsto explore the nature of ambient noise as measured in the stations of the HSNC in South Aegean (Chatzopoulos et al., 2016). In the present work we analyzed the de-trended increments time series of ambient seismic noise X(t), in time windows of 20 minutes to 10 seconds within "calm time zones" where the human-induced noise presents a minimum. Following the non extensive statistical physics approach, the probability distribution function of the increments of ambient noise is investigated. Analyzing the probability density function (PDF)p(X), normalized to zero mean and unit varianceresults that the fluctuations of Earth's ambient noise follows a q-Gaussian distribution asdefined in the frame of non-extensive statisticalmechanics indicated the possible existence of memory effects in Earth's ambient noise.

References:
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