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On the Distribution of Earthquake Interevent Times and the Impact of Spatial Scale

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Abstract

The distribution of earthquake interevent times is a subject that has attracted much attention in the statistical physics literature [1-3]. A recent paper proposes that the distribution of earthquake interevent times follows from the the interplay of the crustal strength distribution and the loading function (stress versus time) of the Earth's crust locally [4]. It was also shown that the Weibull distribution describes earthquake interevent times provided that the crustal strength also follows the Weibull distribution and that the loading function follows a power-law during the loading cycle.

I will discuss the implications of this work and will present supporting evidence based on the analysis of data from seismic catalogs. I will also discuss the theoretical evidence in support of the Weibull distribution based on models of statistical physics [5]. Since other-than-Weibull interevent times distributions are not excluded in [4], I will illustrate the use of the Kolmogorov-Smirnov test in order to determine which probability distributions are not rejected by the data. Finally, we propose a modification of the Weibull distribution if the size of the system under investigation (i.e., the area over which the earthquake activity occurs) is finite with respect to a critical link size.

keywords: hypothesis testing, modified Weibull, hazard rate, finite size

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