

Seismicity in view of science of complexity

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Firstly, it is discussed that the statistical properties of both spatial distance and time interval between two successive earthquakes are well described by the q -exponential distributions which maximize the Tsallis entropy under appropriate constraints. It is shown that the exponents of these distributions approximately satisfy the duality symmetry. This discovery naturally leads to examining a possible underlying complex-network structure. Accordingly, earthquake networks are constructed from the seismic data taken in Japan and California. It is found that the networks are of the small-world type and are scale free. Finally, the natures of event-event correlation is studied. The seismic data is classified into two types, stationary and nonstationary regimes. The latter is the regime relevant to aftershocks. Then, it is shown that event-event correlation exhibits an interesting aging phenomenon and obeys a definite scaling law. These results imply that the mechanism governing aftershocks is governed by glassy dynamics.