Geophysical Research Abstracts
Vol. 21, EGU2019-10656, 2019
EGU General Assembly 2019

Fractal analysis of microseismic noise in order to detect earthquake indicators and search for connection with their focal mechanisms

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The global impacts of atmospheric and oceanic processes, tidal deformations of the earth's crust, the global seismic process, as well as the less well-studied processes in the Earth's crust are associated with accumulation and slow dissipation of tectonic energy in the lithosphere. These processes are the "participants" in the formation of the random process, at the study of which the traditional apparatus of spectral analysis proves to be less effective.

The transition from the analysis of baseline low- frequency microseismic data to study the variations of the parameter $\Delta\alpha$ (singular spectrum width F(α)); α* (general exponent Hurst- the singularity spectrum argument F(α) realizing its maximum); and their singularity spectra evaluated in consecutive "small" windows from time (which is also a transition in the lower frequency range), allows to detect hidden synchronization effects. The determination of these effects is impossible with analysis of the initial data using traditional methods.

Usage of fractal analysis is a good alternative method for decipher the seismic noise structure. Since the early 1990s this method is used both in turbulence analysis and in the study of financial and medical time series.

Fractal analysis of microseismic noise could be a good method also to detect earthquake indicators. A scientific goal is to detect a common signals based on different earthquakes focal mechanisms and ignore the "individual" behavior of the elements of the monitoring systems.

Determination of the clear signs for future strong earthquakes on Bulgarian territory and the neighboring countries is a main task for the project "Exploration of changes in some geophysical fields preceding the occurrence of earthquakes in the Balkans", Grant DN 14-1/11.12.2017, financed by Bulgarian National Science Fund.

Acknowlwdgements: This research has been supported by the National Science Fund of Bulgaria, contract No. ДН 14/1 from 11.12.2017