Geophysical Research Abstracts
Vol. 20, EGU2018-11810, 2018
EGU General Assembly 2018

Study of natural disasters and social phenomena regularities

Anna Dolgaya and Kirill Fereferov

Institute of volcanology and seismology FEB RAS, Laboratory of tectonics and geophysics, Petropavlovsk-Kamchatsky, Russian Federation (ann-dolgaya@yandex.ru)

The paper shows the data on natural disasters and social phenomena (natural and social catastrophes) and analysis results of their distribution regularities. The research was based on the database of events, constructed by authors. This database contains N=2755 events for the period from 3800 BC to 2016. All events were classified by three parameters: type of event, its intensity ("strength") and scale (territorial) level. Also each catastrophe was characterized by year, place, short description and the source of information about it.
All events were divided into two groups and twelve types:
1) natural disasters: earthquakes, volcanic eruptions, hurricanes and floods, droughts, climatic anomalies, other natural disasters;
2) social phenomena: wars and battles, revolutions and rebellions, genocides, epidemics, man-made fires and other social phenomena.
"Strength" scale of catastrophic events was based on logarithmic scale (J) which uses socially important parameters: human casualties P and material losses Q ($). The maximum intensity of the events (for modern time) corresponds to J=I ($1.5 \cdot 10^{13} < Q \leq 1.5 \cdot 10^{15}$, $1.5 \cdot 10^{8} < P \leq 1.5 \cdot 10^{10}$), and minimum intensity (in this study) is J=III ($1.5 \cdot 10^{9} < Q \leq 1.5 \cdot 10^{11}$, $1.5 \cdot 10^{4} < P \leq 1.5 \cdot 10^{6}$).
For ease of processing the database we developed data-processing system which allows to input, look through, sort, filter, export data and perform statistical analysis of catastrophes in the database.
The analysis of the different data sets, including selections of only natural disasters, only social phenomena and all the events together, was carried out. It is shown that all data sets under study have similar properties: they are described by distribution laws with similar slopes of events repeatability plots $\Delta \lg N / \Delta J \approx -0.6$, similar periods and the ability to cluster in small time slots. Clusterability of events appears as "attraction" and / or the interaction between natural disasters and social phenomena.
The research of temporal patterns of natural disasters and social phenomena was conducted using Fourier and spectral correlation analysis of time series. The study showed that for both sets there are two groups of periods: "short" 50 ± 10 and 150 ± 20 years, and "long" in the range of $210 \div 1650$ years. The periodicity analysis of different types of natural (earthquakes, volcanic eruptions, etc.) and social catastrophes (wars, epidemics, etc.) make it possible to reveal common period $T = 260 \pm 50$ years.
All this data in total allowed us to propose the concept of unified geosocial process.
The work is supported by RFBR grant №16-37-00229.