

VISUALIZATION OF THE EARTH'S IMPACT STRUCTURES CATALOG

MIKHEEVA A.

Institute of Computational Mathematics and Mathematical Geophysics, NOVOSIBIRSK, RUSSIAN FEDERATION

For the research into general laws of the spatial distribution of the impact structures compiling the catalog (<http://bourabai.kz/impact/index1.html>) and for the analysis of their parameters, it is offered to use one of the independent versions of the control and visualization system for natural phenomena.

Currently, the presented catalog is one of the most complete among all published ones and contains 1521 records (223 proven, 251 probable, 951 possible and 96 questionable craters). Sources of new data not included into any one of known catalogs and supplemented by the author are the following: publications in the literature (papers, books), reference journals (RJ) VINITI "Geology and geophysics", as well as private messages of researchers.

A geographical subsystem of the system allows one to choose a working area of various scales from a review map of the whole world up to maps of separate astroblem zones or fault blocks and, also, to obtain accompanying cartographic information. The latter can include: impact craters locations (Figure 1), fault zones and fractures of the Earth's crust, volcanoes locations, etc. [1]

The tenth part of structures of this catalog (148 of 1521) are underwater or shelf. This speaks about a significant lack in our catalog of the events associated with global aquatory.

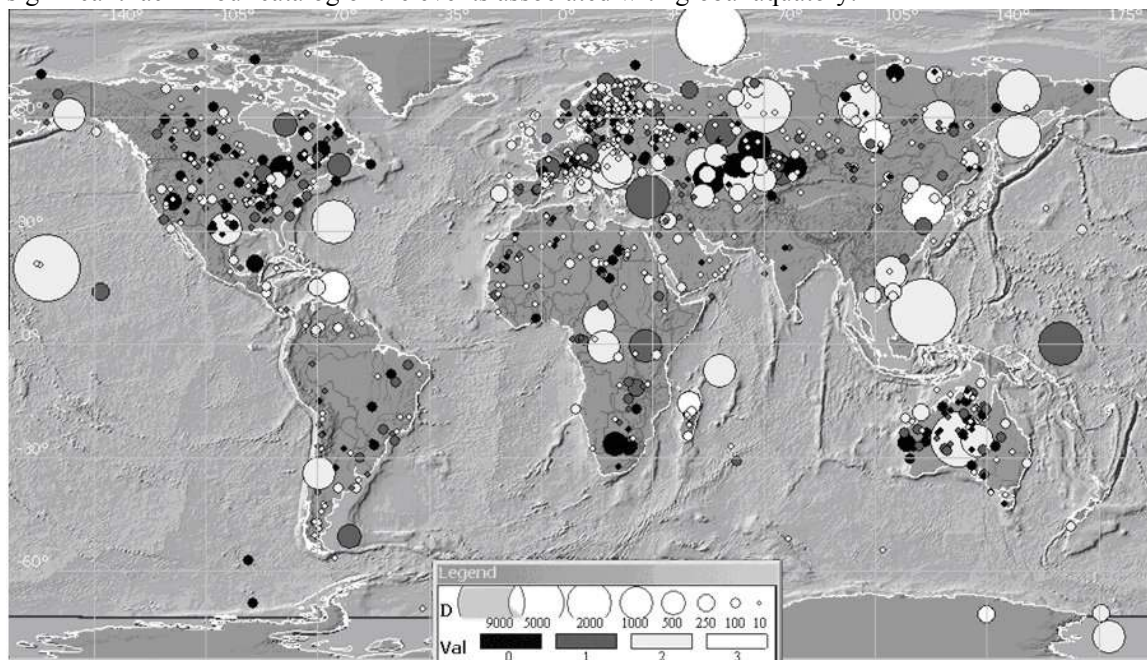


Figure 1. Visualization with the help of the EISC system of events from the impact structure catalog according to a given scale of diameter (D) and validity (Val).

In addition to the spatial visualization on a map, listing the catalog in the text form, the distribution graphs of various parameters, and the results of statistical data processing are placed in the system. Distribution of impact structures in various Earth's regions according to validity of craters (0-proven, 1-probable, 2-possible, 3-questionable) can be obtained. The temporal distribution of the impact structures diameters shows a considerable irregularity of events, whose great part (48% of craters) has no definition of the age at all.

Using the proposed EISC-system, some other graphs were plotted: a graph of the size of craters vs. their age, by which it is possible to estimate the time of impact structures relaxation, a graph, describing morphological properties Depth (Dep) vs. Diameter (D) of impact craters and graphs of repeatability of events from various samples. A regular distribution of the repeatability graph points is observed only for 628 events with the diameter $D \geq 5$ km.

Irregularity of distribution of craters according to their age and size shows the incompleteness of a set of the detected craters because of the problem of safekeeping the ancient surface structures and a poor covering of studies of the majority of the Earth's territories, and, especially, of the oceanic aquatory. A good regularity in graphs of repeatability of events with $D \geq 5\text{km}$ (Figure 2) proves a satisfactory representativeness of our catalog in this range, due to the completeness of a set of big structures and giablens [2,3].

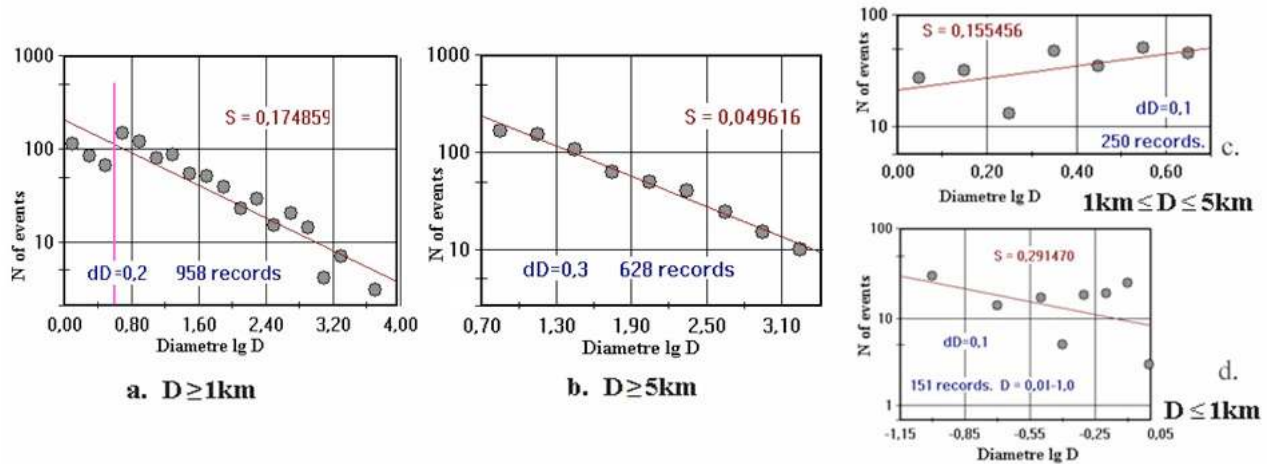


Figure 2. A repeatability graph of the Earth's impact events for the whole historical period and diameters of their craters: $D \geq 1\text{km}$ (a); $D \geq 5\text{km}$ (b); $1\text{km} \leq D \leq 5\text{km}$ (c) and $D \leq 1\text{km}$ (d). The regular distribution is observed only for 628 events with diameter $D \geq 5\text{km}$ (graph b).

References:

1. Mikheeva A.V. (2009). Impact structures visualization means of geoinformation system EEDB (Expert Earthquake Database). Book of Abstracts of the International Conference "Asteroid - Comet Hazard – 2009", September 21 - 25, 2009, St. Petersburg, Russia. P.246-248.
2. Zejlik B.S. (1978). About an origin of the arched and ring structures on the Earth and other planets (impact-explosive tectonics), M.: Geoinform, 58 p.
3. Zeilik B.S. (2009). The outer space defense to preserve life on the Earth, or Ring structures as geological evidences of volcanic activities and space catastrophes. ISSN 0869-7175, N.2