



Using the method of measurement of the Earth's natural pulsed electromagnetic field for the study of tectonic fault zones

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Summary

We present results of using the method of measurement of the Earth's natural pulsed electromagnetic field (ENPEMF) for the study of tectonic fault zones on the territory of Horodenka district of Ivano-Frankivsk region in Ukraine. There are several known tectonic fault zones and their locations on the territory under study.

Introduction

The most informative is the anisotropy factor as it eliminates anomalies of obstacles (interferences) and enhances real anomalies of geological objects. It was also proved that different frequencies of electromagnetic field carry information from different depths: low frequency for large depth study and high frequency for small depth study.

Tectonic disturbances (landslides, karsts) cause a number of dangers and risks to the life of the population in certain areas and territories. In this regard, it is an urgent task the substantiation of the effectiveness of the application of new geophysical methods, in particular the method of the Earth's natural pulsed electromagnetic field (ENPEMF), for diagnosing above-mentioned processes.

Theory and/or Method

The ENPEMF method is based on the phenomenon of the generation of electromagnetic tensions by minerals-dielectrics. The tension of the rocks causes at the atomic level the conversion of mechanical energy into electric one. Professor Vorobyov O.O. has found that the source of such radiation is manifested in the regions of formation of cracks. This was confirmed in laboratory and field studies by other scientists.

The aim of the work is to substantiate and establish the effectiveness of applying the method of the natural pulsed electromagnetic field of the Earth for the detection of areas of tectonic disturbances.

The object of the study is transverse tectonic faults, located in the area of the river Dnister in the district of Luka and Rakovets villages in Horodenka district of Ivano-Frankivsk region, Ukraine.

Examples

To realize the task, a new equipment was tested - the radio-wave indicator of the stress-strain state of "RWISSS-ZM".

The equipment makes it possible to continuously record the signal according to the profile. The technical characteristics of the device provide the registration of the flux density of ENPEMF (number of pulses per second) in the frequency range of 2 - 50 kHz at a frequency of 0 to 10,000 imp/sec.

When performing fieldwork, all registered parameters (sampling time, range of sensitivity, direction of antennas) remained the same.

Conclusions

Based on the results obtained, graphs were built for the distribution of ENPEMF intensity values, which were measured at different frequencies.

As a result, the effectiveness of the ENPEMF method for the isolation of zones of tectonic faults has been confirmed. Different frequency intervals of ENPEMF influence the depth of research (high frequencies - lower depth, low frequencies - greater depth). Deep tectonic disturbance between upper bangs and upper chalk at a frequency of 2-12 kHz has been confirmed. Other faults that exist in the upper baden are confirmed at a frequency of 36-50 kHz, that is, they are not deep. All other low-amplitude anomalies of ENPEMF can be related to the long tributaries of the river Dnister.

References

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