

Seismic tomography in civil engineering investigation

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Abstract

Seismic processing begins to appear as a new method not only in the applied geophysics of great depth but even in geophysics in civil engineering, hydrogeology and environment. The application of seismic tomography in civil engineering investigation is described. This task was done for PC computers. The main ideas of mathematical and software solution are given. The obtained solutions enable not only the tomography processing of crosshole measurements but it is possible to model various geological situations. Examples of crossgalleries processing and results from extending seismic logging are given. These types of measurements are the most common in civil engineering investigation. There is one example from the noninline measurement too. The results of described solution is not only the velocity contour line map but even the map with seismic curved rays among shot points and receivers.

Gravity prospecting for bedrock topography. Groundwater contamination at Nové Město nad Metují

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Abstract

Hydrogeological survey revealed groundwater contamination in the vicinity of the machine factory at Nové Město nad Metují town. It was necessary to select convenient location for hydrological borehole to record the incidental propagation of polluted water into the Metuje river and away downstream to the Metuje river valley, where is (2 km off polluted area) water supply for the town and vicinity. Gravity measurement in the built up area and its quantitative interpretation were successfully applied to solve this problem.

Engineering geophysical exploration in the Ostrava agglomeration

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Abstract

The Ostrava agglomeration is characterized by a great number of specific problems following from long – term mining activities and a great industrial load. As a result, the deep mechanical failure of the rock massif and running deformation changes complicating the total revitalization and urbanization of large areas occur together with loading of the environment by the production of a large amount of waste materials from mines, preparation plants, foundries and power stations. For the purpose of protection and creation of the environment in such an area, the knowledge, as perfect as possible, of components of geological environment and their mutual influencing, is essential. Including the geophysical methods in the complex of necessary exploratory works contributes considerably to the possibility of assessing and prognosticating the space and space-time changes in the geological environment at restriction, or replacement of the more expensive methods with the cheaper, and often more operative, methods providing equivalent information, or information of better quality, especially from the standpoint of continuity and space.

Seismological analysis demonstration of strong rockburst

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Abstract

In this paper there are presented results of induced seismicity research in Ostrava–Karvina Coal Basin, especially approaches of strong rockburst analysis. For determination of fault plane solution is used method of inverting P-wave first amplitudes; for determination of source parameters is used spectral analysis. All results of seismological interpretation are compared with geological and mine-geomechanical conditions.

Seismological monitoring in Ostrava area

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Abstract

Ostrava area is known by intensive induced seismicity that is monitored by a number of seismic stations. Comprehensive description of their instrumentation and functions of individual monitoring levels are presented in this paper.

The actual state and possibilities of the airborne geophysics in the a.s. Geofyzika Brno (1994)

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Abstract

The airborne geophysical mapping applied by the Geofyzika a.s., Brno since 1957 involves the magnetic and gamma ray spectrometric surveys. These two simultaneously applicable methods recently used mostly in geological mapping can, nowadays, also supply the information about the environment contamination caused by activities of human being. Our present equipment enables us to distinguish the magnetic anomalies evoked by dumps, wastes and/or industrial localities from those caused by deep geological structures, the natural radioactive elements and man-made radioactive elements deposited after nuclear accidents. The airborne application of the above mentioned methods can gather these principal data from large areas during a feasible short time. Approximately 50 per cent of the territory of the Czech Republic has been mapped by the airborne proton magnetics with the airborne gamma-ray spectrometry. Examples of geophysical mapping of geological and environmental objects are given.

**Aerial monitoring of the environment
surrounding uranium mines Stráž p. Ralskem – Hamr in Czech Republic**

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Abstract

The use of remote sensing methods in monitoring of an environment is increasing. The results are obtained, when various types of exploration methods are available. This paper presents the use of airborne gamma-ray and magnetic methods, which was included in a wide scope of works referring to environmental problems in uranium mining area Stráž p. Ralskem – Hamr. Company PICODAS Prague Ltd. introduced here a new sophisticated airborne instrumentation as well as up-to-date data processing and data presentation techniques. The airborne geophysics has proven to be able to detect radioactive contamination and important geological trends defining the geological structure of monitored area. A brief overview of results and examples of graphic outputs are presented.

**Set of geological and special purpose ecological maps 1 : 50 000.
Proposal substantiation**

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Abstract

Since 1985 Geological Survey, Prague has been working together with other organizations on the project with a view of the environment. It is based on making geological and special purpose maps in the scale 1: 50 000 from the territory of the whole Czech Republic. From the special purpose maps there are made hydrogeological maps, maps of mineral deposits, map of soil and soil conditions, engineering geology maps, maps of dumping ground, maps of geochemical reactivity of rocks, maps of surface water, maps of nature protected areas, maps of geophysical indication and interpretation and maps of environmental geofactore. The whole set (11 kinds of maps) provides roughly speaking 20 – 80 informational unita per 1 km². By October 1994 about 1 500 sheets of these maps in authorized originals had been made. The Czech Republic comprises altogether 207 topographical sheets. The whole set can be extensively used in ecological approach to solving agricultural, building industry, urbanistic, hydrological economy and management in the region.

Some results of the Bratislava environment. Abiotic component project

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Abstract

In 1990–93 period, "the Bratislava-environment, abiotic component" project has been performed in Great Bratislava region. This region covers 500 km² approx. and it is a typical product of the period of dynamic and extensive economic development with all its negative secondary factors and ignorance of the environment. The whole project was financed by Ministry of Environment of the Slovak Republic, division of geological research and survey. Many state institutes, University teams and private companies took part in project activities. The major targets of the project: to define the state-of-the-art of individual abiotic environmental components, namely geofactors; on the basis of data obtained, to carry out medical-toxic-hygienic analysis of the Bratislava region; to propose effective measures for improvement of environment to an acceptable level. The main project activities were as follows: remote sensing (air photos, satellite images) interpretation; research of the lithosphere (subsurface and deep structures) by means of the geophysical methods (gravity, resistivity, seismic and magnetic surveys); geochemical survey (soils, stream sediments, surface and ground waters, snows, atmogeochemistry); airborne gamma ray spectrometry (U, Th, K, ¹³⁴Cs, ¹³⁷Cs), radon survey (soils and waters); geological mapping; seismo-tectonic analysis; determination of the electromagnetic smog level (caused namely by elmg. field of radio transmitters); determination of the anthropogenic magnetic activity; compilation of the risk geofactors map and maximum pollution map; creation of the databank and digitalisation of the maps compiled; medical-toxic-hygienic analysis of the data obtained. The results of above mentioned project activities have showed that Bratislava region is extremely tectonically predisposed. This phenomenon increases radon risk and seismic hazard of the area in question. It increases content of some heavy metals (Pb, Zn) in molecular form at low atmosphere (observed by atmogeochemistry) too. By geochemical survey, a content of heavy metals and other anorganic risk elements and organic components higher than international and Slovak limits has been observed in some stream sediments, waters and snow samples is both, natural and anthropogenic. The radiation-hygienic conditions are favourable in Bratislava region, while high radon risk has been observed in 5.6 per cent of the project area. The digitalisation of the topographic and special maps allow us to change their scales from 1:10 000 to (for example) 1:200 000 for various purposes. The database form enables to connect maps and data with results of the neighbouring

countries.

Measurement of concentration of isotope ^{220}Rn in soil gas

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Abstract

For some time there has been a discussion specialised about the occurrence of radioisotope of radon ^{220}Rn (so called thoron) in soil gas, about possibilities of its reliable measurement and about its importance (e.g. Burian, Merta 93). Since our department of the Faculty of Science, Charles University, has been dealing with this problem for an extensive period of time, we would like to share our experience in this sphere and the results of our recent experiments. The results of our experiments and of field measurement lead to the conclusion about reliability of the data acquired by the testified method of specification of both the isotopes ^{220}Rn and ^{222}Rn .
