

**CONCEPTION OF ASSESSMENT OF MINING TREMOR EFFECTS
ON TECHNICAL WEAR OF BUILDINGS**

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Abstract

The paper presents a conception, developed by the authors, of assessment of mining tremor effects on the technical wear of buildings. The technical wear is split into the sum of a degree of damage to a structure's elements and a degree of usual wear of a building, excluding damage to structural elements. The authors introduce indices meant to express complex influence of seismicity on buildings. The indices account for both the largest seismic impact and the aggregated influence of tremors affecting a building during its life-period. The paper also presents the preliminary results of research carried out on a group of 466 residential buildings situated in the Legnica-Głogów Copper Mining District, which were subject to a number of mining tremors. The correlation analysis shows that while the degree of damage depends upon the largest seismic impact, weaker but frequent seismic-induced vibrations can accelerate the usual wear.

KEYWORDS: mining tremors, mining effects, technical wear of buildings, building damage

FORECASTING OF INCREASED INDUCED SEISMICITY IN THE ZINKGRUVAN MINE, SWEDEN, BY USING TEMPORAL VARIATIONS OF b-VALUES

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Abstract

A digital three-dimensional seismographic network has been installed in the Zinkgruvan mine, south-central Sweden, in November 1996. On average, about 2-3 rockbursts per day, in the magnitude range from -1.6 to 2.6 , are located and quantified by the network. We used data covering a four-year period (3432 events) to measure temporal variations of b-values and study their potential as precursors to increasing seismicity in the mine. The b-value was calculated by using sliding time-windows containing 50 events. Three mining areas were studied separately. We found that all (5 cases) statistically significant drops in $b(t)$ can be associated with subsequent increase of seismicity. On the other hand, two large rockbursts were not preceded by any significant decrease of b . All the three mine regions studied show similar results. In general, drops in b-values reveal an U-shape curve in $b(t)$ - diagrams. Most of the associated seismicity takes place close to the bottom point of the $b(t)$ -curve. We do not see any correlation between the shape (depth, width) of the U-shape anomalies and the magnitude or number of associated rockbursts.

KEYWORDS: b-value, mine-induced seismicity, rockbursts, forecasting

COMPARISON OF THE ELASTIC PROPERTIES OF THE KOLA SUPERDEEP BOREHOLE CORE SAMPLES AND THEIR SURFACE ANALOGUES OBTAINED BY STATIC AND DYNAMIC MEASUREMENTS

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Abstract

This paper presents the first results of the complex research into the physical and mechanical properties of Proterozoic and Archean rocks from the core of the Kola Superdeep Borehole (SG-3) section and their surface analogues. The elastic properties of the six rock samples were investigated by the static method (testing by standard method of rock mechanics) and by the dynamic method (testing by the ultrasonic pulse method) and the results obtained by both methods have been compared. The density, grain density, porosity, moisture content, uniaxial and triaxial strengths, deformation modulus, Young's modulus and Poisson's ratio were determined by the static method at the Institute of Rock Structure and Mechanics of the Academy of Sciences of the Czech Republic (IRSM AS CR). The elastic properties were investigated by the dynamic method at the Institute of Geology of Ore Deposits, Petrography, Mineralogy, and Geochemistry of the Russian Academy of Sciences (IGEM RAS).

KEYWORDS: Kola Superdeep Borehole, surface analogues, physical properties, strength, elastic properties, wave velocities

**CENOZOIC ALKALINE VOLCANIC SERIES IN WESTERN OHŘE (EGER) RIFT:
AGE RELATIONS AND GEOCHEMICAL CONSTRAINTS**
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Abstract

The following Cenozoic alkaline volcanic rock series were recognized in W Bohemia on the basis of geological and geochemical methods:

Oligocene-Miocene (31-20 Ma) volcanics of the Ohře Rift,

1.1. the Doupovské hory Mts. characterized by predominantly unimodal series of olivine nephelinite – leucite/analcime basanite to tephrite – (phonolite) (31-26 Ma) – Mg # (65-18), Σ REE (318-472 ppm), LaN/YbN (30-50) and Eu/Eu* (0.7-0.9),

1.2. the Ohře Rift region between the Doupovské hory Mts. and the Mariánské Lázně Fault Zone (and continuation of volcanic products as far as to the Franconian Line) characterized by the unimodal series of melilite-bearing olivine nephelinite – olivine nephelinite – tephrite (24-21/16/ Ma) – Mg # (76-56), Σ REE (192-370/466/ ppm), LaN/YbN (22-42/56/) and Eu/Eu* (0.9-1.1).

Volcanics of similar geochemical character also occur in the Krušné hory and Smrčiny Mts.

2. Middle to Late Miocene (17-8/7/ Ma) volcanics of the Tepelská vrchovina Highland and Slavkovský les Mts. at the uplifted NE flank of the Cheb-Domažlice Graben developed in two coexisting series (Ulrych et al. in print):

2.1. weakly alkaline series: basanite? – trachybasalt – (basaltic) trachyandesite – trachyte – (rhyolite?) (/15.9/12.8-11.4/6.5/ Ma) – Mg # (69-8), Σ REE (225-587 ppm), LaN/YbN (16-40), Eu/Eu* (0.3-1.0), and

2.2. strongly alkaline series: (melilite-bearing) olivine nephelinite – tephrite (16.5-8.3 Ma) – Mg # (74-46), Σ REE (172-421 ppm), LaN/YbN (21-43) and Eu/Eu* (0.7-0.9).

3. Quaternary (0.4-0.1 Ma) volcanics of the Cheb area at the junction of the structures of the Ohře Rift and the Cheb-Domažlice Graben with melilite-bearing olivine nephelinite – olivine nephelinite – Mg # (73-69), Σ REE (445-473 ppm), LaN/YbN (51-54) and Eu/Eu* (0.8-1.0).

Parental magmas of all these rocks series are inferred to have originated by low-grade melting of metasomatized mantle source initiated at >31 Ma. Volcanic activity continued intermittently from Early Oligocene to Pliocene. Mostly primitive rocks of Cenozoic volcanic rock series of the Ohře Rift and of the Cheb area give evidence of a limited degree of primary magma fractionation. Expressive fractional crystallization and insignificant assimilation of crustal material played a substantial role in the formation of the weakly alkaline series of the Middle to Late Miocene volcanism associated with the Cheb-Domažlice Graben only.

KEYWORDS: alkaline volcanic rock series, Cenozoic, Ohře (Eger) Rift, Cheb-Domažlice Graben, W Bohemia, K-Ar ages, geochemistry

CHEMOSTRATIGRAPHIC DETERMINATION OF EQUIVALENT STRATA AND FORMATIONS IN BOHEMIAN CRETACEOUS BASIN

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Abstract

A systematic petrological investigation of sediments has recently been carried out in the Bohemian Cretaceous Basin. Qualitative and quantitative determination of chemical and mineral composition of lithological types in drilling logs was an integral part of the study. Late Cretaceous sediments from explorative boreholes were studied in areas showing different facies development. The best preserved stratigraphic range served as a criterion for selection of samples to be examined. Specific changes in composition of relevant sediments enable to divide local formations into chemostratigraphic units of lower order. The chemical and mineral composition was found different and also specific to the given unit. Consequently, the sedimentary units can be correlated within the entire basin according to their compositional equivalence. The correlation enables to establish equivalent strata and formations in areas showing completely different facies development. The composition of individual units, particularly that of CaCO₃, was found to be independent on changes in facies. The chemostratigraphic method may be a useful tool for revision of stratigraphic discrepancies in classification of the Ohře and the remaining facies areas of the Bohemian Cretaceous Basin. The results of chemostratigraphic correlation can also be applied to neighboring areas of the platform covered with Late Cretaceous sediments.

KEYWORDS: Bohemian Cretaceous Basin, chemostratigraphic correlation, sedimentary units, chemical and mineral composition, carbonate, quartz, clay minerals

GEOCHEMICAL COMPARISON BETWEEN TOPAZ-BEARING GRANITES OF THE CENTRAL AND WESTERN KRUŠNÉ HORY MTS.

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Abstract

Comparative approach concerning highly fractionated, fluorine- and phosphorus-rich granites from both the Central and Western Erzgebirge plutons (Saxony) and a solitary granite stock at Podlesí (Czech Republic) has shown remarkable similarities in (i) elevated P₂O₅ content (>0.4 % P₂O₅), (ii) enrichment in incompatible elements such as Li, Rb, Cs, Nb, Ta and W, (iii) low contents of Ba and Sr. The interaction of post-magmatic, F-rich fluids with cooling granite melt is marked by the presence of “lanthanide tetrad effect”, quantified by the value of the first and the third tetrad (TE_{1,3}), that is the highest at the Ehrenfriedersdorf deposit. With the exception of the residual albite-rich granite from the Geyer stock, these granites are indicated by a negative Eu anomaly (Eu/Eu* = 0.008–0.6), relatively lower LaN/YbN ratio and elevated Y/Ho ratio. The Th/U ratio is relatively low in granites from Ehrenfriedersdorf (0.21), Geyer (0.53) and Podlesí (0.30) in contrast to those from the Greifenstein stock (1.15–2.07) and the Eibenstock granite massif (0.6–1.0).

KEYWORDS: Bohemian Massif, P- and F-rich granites, Peraluminous, Lanthanide “tetrad effect”