

Geochemical evaluation of the Veřovice Shales in the western part of the Carpathians

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The Veřovice Fm strata occur in the Silesian and Subsilesian nappes of the Western Outer Carpathians from Veřovice (south of Štramberk, Moravia) up to the area south of Kraków. Among the Veřovice Fm rocks, predominant are black claystones, often siliceous, with layers and concretions of sphaeroidite. Their thickness reaches 250-500 m. The rocks under the studies constitute the uppermost part of the formation and are dated as the Late Aptian – Early Albian. The Veřovice Fm strata represent the global anoxic event OAE 1b. Anoxic conditions of sedimentation, together with low sedimentation rate and low supply of terrigenous material, were advantageous for deposition and preservation of organic matter.

The Veřovice Fm rocks were sampled in the Silesian Unit. Measured total organic carbon content (TOC) is significant and exceeds 4%, with the mean of about 1%. Particularly high TOC was observed in sections of Lipnik near Bielsko-Biała. Comparably high values were recorded in sections of Rzyki near Andrychów where TOC ranges from 0.38 to 3.0 %. The obtained results correspond to the known measurements carried out for the Veřovice strata in Zasań near Myślenice (1.56 to 3.72%) and in Veřovice (0.31 to 3.66%). Such organic carbon contents, as well as the hydrocarbon contents (S_1+S_2) reaching 7 mg/g rock, evidence good source potential of this formation. Results of the Rock-Eval pyrolysis matter in the Veřovice Fm reveal Type III kerogen with exceptionally low hydrocarbon potential determined by the hydrogen index. Results of the analysis of *n*-alkanes and isoprenoids suggest admixture of Type II kerogen. This has been indicated, among others, by maximum in the range of long-chain hydrocarbons and values of CPI lower from one or equal to one, which are characteristic of hydrocarbons generated by organic matter deposited in sediments having acid matrix. Thermal maturity of the claystones indicate a very wide range of maturity, from the initial stage of the “oil window” (435 – 450 °C) up to the initial stage of the “gas window” (>465 °C). Also values of reflectance $R_{cal(MPI)}$ calculated on the basis of the aromatic compound analysis are varying widely, from about 0.9 to 1.5%. The values of thermal maturity univocally indicate effective source potential of the Veřovice Fm.

The above results of geochemical studies evidence that the Veřovice Fm. may represent potential source rocks for systems that comprise reservoir rocks of different ages in the Outer Carpathians.

Gem minerals and materials from the Neolithic and Chalcolithic periods in Bulgaria and their impact on the history of gemmology

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Studies of prehistoric (Neolithic to Chalcolithic period) artefacts from the territory of Bulgaria during the past decade revealed a lot of specific gem and decorative minerals and materials: nephrite, malachite, serpentinite, turquoise, jadeite, jet, carnelian, agate and jasper (including heliotrope). Nephrite artefacts in Bulgaria, as well as in some other countries on the Balkans, are widespread during the Neolithic and rare during the Chalcolithic – the nephrite sources are under discussion. A Balkan “nephrite culture” is introduced, which is supposed to be the earliest in the world, compared to the well known Chinese “nephrite cultures”. The Varna Chalcolithic necropolis (middle of the V mill. BC) is known with the earliest and largest amount of gold artefacts in the world, including also some copper objects from the copper mines near Stara Zagora. A large amount of beads are also identified as made

by malachite (in rare cases with azurite), serpentinite, carnelian, agate, coal (jet), marble and shells. Some of the carnelian beads from Varna display 16+16 facets along their elongation, which is the first record for a constant and complex faceting of hard mineral known so far. An early prehistoric weight system links mineral beads and gold artefacts (the weight unit “van” is introduced, 0.4 g = 2 carats). The first report of turquoise beads for SE Europe is related to the Orlovo prehistoric site (Haskovo district). The “Thracian stone” in ancient sources is identified also as heliotrope, which is known since the Chalcolithic in the Eastern Rhodopes. Some of the artefacts are masterpieces of art and as stage of perfection, thus pointing to the Balkans as a cradle of prehistoric gemmology.

The use of GNSS technologies for application in mining, geology and geodesy in Bulgaria

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A review on the use of GPS technologies for application in mining and geology on territory of Bulgaria is presented in this paper. Some particular results concerning the application of GPS in opencast mining in Bulgaria are presented and analyzed. The essentials of them are periodical survey of mine working; investigation of slope strain; management of output and transportation of mining mass. In the area of geology and geophysics are discussed some results on application of GPS on: geological mapping and assaying; gravity investigations; deformation of earth’s crust; investigation of landslide processes; coordination of platforms for oil and gas production etc. Plans for future work on the above issues are discussed too. The problem of the combined processing of GPS and other types of classical geodetic measurements concerning the higher accuracy of the result is still topical. In the proposed paper a better accuracy in the vertical component of the GPS-networks has been sought. It is suggested that the results from the spirit levelling expressed by heights should be used. Observation equations of heights (orthometric or normal) can be included in the mathematical model for processing of GPS measurements. In these equations a simplified model of geoid (quasigeoid) is involved. A numerical example for the combined processing of GPS measurements with EDM and spirit levelling heights has been presented. The results confirm the expected higher accuracy of the height component.

Efficiency of the Chiprovtsi mining site remediation with regard to heavy metal and arsenic environmental pollution

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A Program for the liquidation of the inefficient ore-mines in Bulgaria was started by the government in 1992. One of the main goals of the program is to eliminate the negative consequences of the mining industry to the environment. Restoration and remediation measures are envisaged for the mining sites only but not for the affected areas outside as the heavy metal polluted rivers and their floodplains. Evaluation of the efficiency of the environmental recovery of the mining affected landscapes in the upper part of the Ogosta River basin, NW Bulgaria, is the overall purpose of this study. Three mines (Au; Fe; Pb-Ag)