An attempt to set the relation between chemical composition and microbiological activity in AMD reservoirs in the Łęknica region (the Muskau Arch, western Poland)

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The Muskau Arc is a large horseshoe-shaped glaciotectonic belt formed mainly during the Mid Polish Glaciation. Lignite deposits containing pyrite were excavated there to the early seventies. The abandoned mining areas were filled with acidic water, forming so-called "anthropogenic lakeland".

The aim of this study is to assess the impact of weather conditions and biological activity of selected microorganisms on the variability of chemical composition of acid mine drainage reservoirs. Water was sampled over one year period (from July 2009 to September 2010) from 11 selected locations. Water and ambient temperature, pH, Eh, EC, color, turbidity were determined in the field and samples were taken for major cations, anions and trace elements. In addition, 5 locations for microbiological research have been selected. These part consisted of qualitative determination of bacterial and fungal microflora in the waters with particular attention to microorganisms involved in the processes of iron transformation.

The results of the study show that most of the measured parameters have not only time but also spatial variability. The time variability results from seasonal changes in ambient condition as well as extreme weather events such as spring thaw and summer floods. One of the reasons for spatial variability is the variability in sources of water for distinct reservoirs. The results also show a positive correlation between :

- population size of *Acidithiobacillus ferrooxidans* bacteria and the concentration of such components as Fe and SO_4^{2-}.
- concentration of such components as Ca^{2+} and SO_4^{2-}, which may indicate that concentration level of these ions is closely linked with precipitation and dissolution of gypsum processes

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Sulfur isotope composition of the Bagirkacdere lead-zinc deposit, Biga Peninsula, Turkey

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Bagirkacdere lead-zinc deposit is one of the important deposits which are being mined on the Biga Peninsula. The vein type deposits are hosted by Triassic metamorphic rocks (Nilufer Unit of Karakaya Complex; [1]). The vein zones were emplaced within the meta-sedimentary rocks (phyllite, schist and marble) and are mainly concordant and partly discordant to foliation and/or schistosity planes. The mineralized zones contain galena, sphalerite, chalcopyrite, pyrite, marcasite, covellite, and specular hematite as ore minerals, with quartz and calcite as gangue minerals.

The $\delta^{34}S_{VCDT}$ values of galena range from -2.2 to 0.6 (average -1.07) ‰. The $\delta^{34}S_{VCDT}$ values of H_2S in equilibrium with sulphide minerals were estimated to be in the range of 2.4 to 0.14 ‰ (average 1.05‰) by evaluating the minimum and maximum $\delta^{34}S$ values of galena. For the calculation of $\delta^{34}S_{VCDT}$ values of H_2S, the average temperature of the hydrothermal fluids during the sulphide mineralization episode was assumed as 250 °C, which is obtained from the homogenization temperature measurements during fluid-inclusion studies, and the equations suggested by Li & Liu [2] was used. The $\delta^{34}S$ values of both sulphide and H_2S, which are close to 0‰, suggest a sulphur reservoir dominated by magmatic origin.

In addition, $\delta^{18}O$ and the δD data of the fluids, trapped quartz crystals, indicate that the hydrothermal fluids were completely originated from meteoric water [3]. The combined fluid inclusion and stable isotope data indicate that the reduced sulphur, depositing the sulphide minerals, was leached by heated meteoric waters during circulation within the igneous basement rocks.

[1] Bingöl, E., *et al*. (1973). *Mineral Research and Exploration Institute of Turkey (MTA) Publications*, 70–77. [2] Li, Y. & Liu, J. (2006). *Geochimica et Cosmochimica Acta,* **70**, 1789-1795. [3] Bozkaya, G.& Aydin, N. (2011). Cumhuriyet University Research Project. M-382.