Annual Conference of PhD Geology Students

Kasmetinė geologijos krypties doktorantų konferencija

24 November 2016, Vilnius

2016 m. lapkričio 24 d., Vilnius

ORGANIZED BY DEPARTMENT OF GEOLOGY AND MINERALOGY, FACULTY OF NATURAL SCIENCES, VILNIUS UNIVERSITY

KONFERENCIJĄ ORGANIZAVO VILNIAUS UNIVERSITETO GAMTOS MOKSLŲ FAKULTETO GEOLOGIJOS IR MINERALOGIJOS KATEDRA

PRELIMINARY RESULTS OF LIEPORIAI PALAEOLAKE SEDIMENTS ACCORDING TO SUBFOSSIL CHIRONOMID ANALYSIS / *PRELIMINARŪS PALEOEŽERINIŲ NUOSĖDŲ PJŪVIO CHIRONOMIDAE ANALIZĖS REZULTATAI*

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Chironomids are well represented by their remains in aquatic sediments, and together with diatoms, cladocera and ostracods they have contributed immensely to our understanding of past changes in aquatic environments (Walker, 1993).

Subfossil chironomid analysis was applied to a sediment core from Lieporiai, a boggy meadow surrounded by open fields at the present day. Lieporiai site is located in the northern part of Lithuania on the south-western edge of Šiauliai city. A rich Chironomidae fauna was found in the studied sediments, and the taxa *Corynocera ambigua*, *Cricotopus, Dicrotendipes, Glypotendipes* were dominant. Some changes in Chironomidae fauna composition were noticed throughout the sediment section. In the lowermost part of the section, *Corynocera ambigua* was the dominant taxon. It is a pioneer taxon which thrives in cold, oligotrophic conditions. The same environmental conditions are proved by appearance of diatom representatives of *Staurosira* genus and *Chara* macrofossils (comments by D. Kisielienė and V. Šeirienė). Obtained data indicate the initial stages of lake development.

In the uppermost part of the section, the rise of the trophic status of the lake is indicated by the increase of the taxa *Cricotopus*, *Dicrotendipes*, *Glypotendipes*. In the top of the section, Chironomidae fauna almost disappeared, and it can be due primarily to the formation of oxygen deficiency in bottom water layers in deep-water zones of lakes accompanied by the development of eutrophication processes, which cause gradual suppression of chironomid larvae in the top layer (Walker, 1995).

The changes in species composition show that the ecological conditions in Lieporiai palaeolake changed from oligotrophic to eutrophic. It should be noticed that recent Chironomidae studies are not complete, and hopefully further investigations will give more detail information on environmental changes.

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GEOCHEMICAL RESPONSES TO PALEOENVIRONMENT CHANGES: ČEPKELIAI PEATBOG SEDIMENT, SE LITHUANIA / *GEOCHEMINIS ATSAKAS Į PALEOAPLINKOS KAITĄ: ČEPKELIŲ AUKŠTAPELKĖS NUOSĖDOS PIETRYČIŲ LIETUVOJE*

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Despite long-term investigations and a relatively good understanding of paleoenvironmental changes, the sedimentary response of lacustrine systems however is poorly detailed or the existing chronology is limited in many cases as well as the complexity of the methods applied. In order to fill the existing gap, geochemical analysis and loss-on-ignition (LOI) and magnetic susceptibility (MSus) analyses were made in a core from the Čepkeliai peatbog, a palaeolake in SE Lithuania. As previously an age model with available C^{14} data had been done, a rough estimate of sediment accumulation rate was performed.

Results of LOI and MSus indicate various stages (long/short increasing/decreasing trend) in sedimentation. As an example, a high influx of mineral matter, mostly terrigenous sediments, or strong magnetic susceptibility suggests unstable landscape, while the decrease of this material shows stabilization of the input where the end of lake sedimentation appears and wetland formation starts. A high organic matter percentage, yet comparatively lower than the latter sedimentation period's accumulation rate, gives a hypothesis of an oxygenated environment when most of the produced organic is mineralized. This sedimentation process is finalised with peat bog formation when deposition rate increases.

Geochemical analysis records variations at different depths of the sediment core. It reflects not only in the elemental data, but in elemental correlations and ratios as well. Firstly, to begin data analysis, sediments were subdivided into Local Chemical Element Assemblage Zones (ChEAZ) using the MultiVariate Statistical Package (MVSP). Secondly, each zone was analysed again, and an individual statistical analysis was performed. Thirdly, the elements were classified into groups by their main associations representing: (1) clay minerals – Al, K, Rb, (2) carbonates – Ca, Sr, Mg, (3) silicaclasts – Si, Zr, and (4) other elements – As, Fe, Ti, Mn, P, S. Finally, the elemental ratios were calculated in order to reveal the changes that would otherwise be masked by dilution with the organic matter.

It is believed that based on the newly obtained data several intervals related with the long-term climatic fluctuations and short-term changes, as 8.2 kyr event for example, were identified. Geochemical analyses documented: variations of terrigenous matter inputs (Zr/Ti, Si/Ti, K/Ti and K/Rb), integrated result of physical erosion, landscape and soil development, vegetation changes, basin hydrology and moisture variations, sources of allochthonous inputs (Ca/Sr, Ca/Mg, Mg/Sr, Si/Zr), productivity (Ca/Ti and Sr/Ti) and redox conditions in the sediment (Mn/Ti, Fe/Ti, Fe/As), which were linked to the regional climatic framework including water level changes and lake/wetland trophic stages.

Keywords: lacustrine, complex studies, sedimentary response, chemical elements, correlation, multivariate statistics

VARIETIES AND CHEMICAL COMPOSITION OF MAGNETITE IN THE VARENA IRON DEPOSITS / *VARĖNOS GELEŽIES RŪDOS TELKINIO MAGNETITO ATMAINOS IR JŲ CHEMINĖ SUDĖTIS*

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In this paper, we are presenting the results of detailed microscopic and chemical investigations of magnetite by a Cameca 100X microprobe at the Warsaw University and by Quanta 250 Energy Dispersive Spectroscopy (EDS) at the Nature Research Centre in Vilnius, Lithuania. The new results were compared to the previously obtained (Skridlaite, 1993). They allowed to distinguish several stages of magnetite formation and to make some preliminary implications on the origin of the ores.

Four generations of magnetite were distinguished in the studied ores from the Varena iron ore deposit (D8 drilling). The earliest, spinel inclusion-rich magnetite cores (Mag-1) might have formed during an early metamorphism and/or related skarn formation. Voluminous second magnetite (Mag-2) had replaced olivine, pyroxenes, spinel and other skarn minerals at c. 540 °C (Mag-Ilm geothermometer) and is poor in trace elements (Si, Al, Mg, Ti, V etc) implying the presence of hydrothermal fluids. The latest magnetites (Mag-3 and Mag-4) originated from the late thermal reworking by dissolution-reprecipitation processes. Some of the latest magnetites (Mag-4) are mostly related to the sulfide veins.

According to chemical compositions, the studied magnetites have similar abundances of trace elements as the skarn magnetites do, even though in the discrimination diagram (Dupuis and Beaudoin, 2011) only the magnetites from 982 and 980 drillings plot in the Skarn field. The D8 Mag-1 plots mostly in the Porfyry and Kiruna ore fields. However, the studied magnetites (Mag-1) are more than twice richer in Mg than the Porphyry and Kiruna ores. Enrichment in Al, Ti and V because of spinel and ilmenite inclusions may have caused the Mag-1 to plot in the Porphyry, while the decrease in Al, Ca, Mn and other traces caused the Mag-2 to plot in the Kiruna ore fields.

Even though there are no precise age constructions for the iron ore formation process, it may be related to metamorphic, metasomatic and later hydrothermal processes, the last of which is assumed to have occurred during the c. 1.50 Ga within-plate AMCG magmatism. The sulfide ores might come from the 1.504 Ga (Sundblad et al., 1994) Kabeliai intrusions belonging to the Mazury AMCG complex.

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