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Second scientific conference: **"Climate change in the geological past"**
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PREFACE

The conference was attended by more than eighty active participants, presenting 48 lectures and 13 posters. Because of great interest and broad themes, the conference took place in two parallel groups in eight thematic sessions. Lectures of general interdisciplinary scope were presented during two plenary sessions.

The current issue is dedicated as the Proceedings of the Second Conference "Climate change in the geological past" held and organized by the Polish Geological Institute – National Research Institute in Warsaw. Most of the papers referred to the Cenozoic climate changes. Many of presented studies were focused on the changes that took place in the Holocene and Middle–Late Pleistocene. Results of various research methods were used for reconstruction of climate and environmental changes, including studies of oxygen and carbon stable isotopes in mammal teeth as well as palaeontological (mainly palaeobotanical) and geochemical investigations. These studies were conducted using the SHRIMP IIe/MC ion microprobe and proved the role of climate changes in mammals' migration in Europe during the Pleistocene. An interesting reconstruction of the Neanderthal man environment in the Stajnia Cave, S Poland, was presented. The importance of pollen of thermophilic plants for the palaeoclimate reconstruction in the Early Cenozoic was also presented. The papers of this issue can be briefly characterized in the stratigraphic order as follows:

Barbara Słodkowska and Maria Ziembińska-Tworzydło revised the Paleogene and Neogene pollen grains belonging to the edmundi morphotype and suggested their significance for palaeoclimate reconstructions. Edmundi morphotype pollen grains are assigned mainly to two extant plant families – the Araliaceae and the Mastixiaceae, and compared to pollen of some subtropical genera *Diplopanax* and *Mastixia* (Mastixiaceae), and *Aralia*, *Fatsia* and *Schefflera* (Araliaceae). The type species of fossil pollen grains of *Edmundipollis* (*E. edmundi*) has been compared to *Diplopanax* pollen. It was shown that if the conclusions on climate are based only on the presence of plants living in the subtropical and tropical climate, we get palaeoclimate type Cfa–Cwa. Therefore, to apply the climate reconstruction it is necessary to consider the entire spectrum of palaeoflora.

Renata Stachowicz-Rybka, Irena Agnieszka Pidek and Marcin Żarski presented a stratotype pollen succession for the Ferdynandovian Interglacial. The classic site at Ferdynandów, E Poland, was re-examined with high-resolution palynological, plant macroremains, and sedimentological analyses. The studies allowed for a more precise reconstruction of vegetation and palaeoclimate. This section has resolved the problem of the stadial-interstadial oscillations between the two warm (interglacial) units in the early Middle Pleistocene Marine Isotope Stages (MIS) 13–15.

Mateusz Baca, Adam Nadachowski, Grzegorz Lipecki, Paweł Mackiewicz, Adrian Marciszak, Danijela Popović, Paweł Socha, Krzysztof Stefaniak and Piotr Wojtal reported the problem of Late Pleistocene climatic changes for mammals' migrations in Central Europe. In the Late Pleistocene, the climatic fluctuations had a significant impact on the pattern and mechanisms of distribution of many animals and plants species that are better known thanks to the precise dating of fossil remains and ancient DNA study. For example, four mammal species: mammoth, cave bear, saiga and lemming, show the complexity of these phenomena. In the last glacial period, these mammals several times changed their ranges in central Europe due to strong climate and environmental oscillations. The migrations became the natural/main mechanism of response of these animals to these climate changes. In the Late Pleistocene, human activity joined these natural processes.

Problems of the Late Pleistocene and Holocene environmental evolution of the Wkra River Valley, central Poland, were presented by Monika Niska, Jerzy Jonczak and Joanna Gadziszewska. The environmental changes in the Wkra River Valley were reconstructed based on radiocarbon and geochemical dating and contents of basic components, including silica, carbonates, organic matter and some elements (C, N, P, K, Ca, Mg, Fe, Al, Mn, Cu, Zn, Ni, Pb and TOC, and TOC/N and TOC/P ratios). Moreover, pollen and Cladocera analyses of deposits filling a palaeo-oxbow lake were presented. Radiocarbon data indicate that peat accumulation started in the latest Vistulian and continued to the mid-Holocene. Dry and wet phases have been distinguished in the lake development, and the authors attempted to correlate them with other localities in Poland, widely discussing episodes of climatic change.

Tomasz Mirosław Karasiewicz, Piotr Hulisz, Agnieszka M. Noryśkiewicz, Renata Stachowicz-Rybka, Adam Michalski, Michał Dąbrowski and Wojciech W. Gamrat determined the impact of palaeoenvironmental changes on the sedimentation and the properties of sediments filling the bottom of a kettle hole at Jurki (NE Poland). As an isolated depression with vertical water fluctuations, it is usually very sensitive to natural and anthropogenic environmental changes. Sedimentological, geochemical and palaeobotanical studies as well as radiocarbon dating allowed for distinguishing several developmental phases of the kettle hole. Analysis of the bottom part of the sediments is a key element in the reconstruction of palaeoclimatic, palaeohydrological, palaeobotanical, and ar-

chaeological conditions. Vertical diversity of the deposits corresponds to environmental and climate changes, hydrographic conditions, vegetation cover and anthropogenic processes over the last several thousand years.

Based on the analysis of glacial morpholineaments, Joanna Rychel and Marcin Morawski presented the palaeogeographic reconstruction of the deglaciation process during the Odranian Glaciation in the Białystok Plateau and the Sokółka Hills, NE Poland. The comprehensive characteristics of linear postglacial landforms, including their identification, classification, origin and chronological relations, enabled spatial reconstruction of glacial processes, postglacial landscape development, and glacial landscape evolution. The reconstruction of the last glacial advance and retreat in the study area can be used in further, regional discussions on the character and dynamics of the last glaciation in this region. The impact of climatic and glaciodynamic factors on the nature and dynamics of the ice sheet was confirmed by observations in many localities and by the basement configuration of Quaternary sediments.

Marcin Żarski, Hanna Winter, Adam Nadachowski, Mikołaj Urbanowski, Paweł Socha, Krystyna Kenig, Bogusław Marcinkowski, Ewa Krzemińska, Krzysztof Stefaniak, Wioletta Nowaczewska and Adrian Marciszak reported the results of geological, geochemical, palaeobotanical, palaeozoological, archaeological and isotope analyses coupled with absolute age determinations (OSL, U-Th and C^{14}) carried out in the Stajnia Cave, S Poland. It is one of the most important archaeological sites due to the finds of the first remains of Neanderthals in Poland, and several tens of thousands of flint artefacts from the Middle Palaeolithic. The age is correlated with an interval spanning the Early Plenivistulian (Early Glacial) to the Late Plenivistulian (Late Pleniglacial). Archaeological relics related to the Neanderthals have been discovered in a layer with absolute age of about 52,000–45,000 years BP. Then the climate was cold, characteristic of tundra areas with typical vegetation and fauna, and the mean temperature of the warmest month did not exceeded 12°C.

Ewa Krzemińska, Arkadiusz Sołtysiak and Zbigniew J. Czupyt showed that the $^{18}O/^{16}O$ isotope composition of human enamel can be determined *in situ* by the SHRIMP IIe/MC ion microprobe with a combination of analytical and spatial resolution methods, which is unobtainable by conventional microsampling methods. It has been tested on human teeth from Tell Majnuna, a 4th millennium BCE (Before the Current Era) cemetery in Northern Mesopotamia. The $\delta^{18}O$ isotopic profile corresponds to the conditions of relatively arid Middle East climate, with high seasonal differences in rainfall and temperature on a multi-year scale, and it documents a natural seasonality of the semi-arid steppe climate.

Invite you to interesting reading.

Barbara Słodkowska and Wojciech Granoszewski