

2nd Mid-European Clay Conference

The 2nd *Mid-European Clay Conference (MECC'04)* was held between 20-24th September 2004, in Miskolc, Hungary. The idea to hold common conferences was accepted by the national clay groups of four neighbouring countries, Poland, Slovakia, Hungary and Croatia, during the EUROCLAY Meeting in Cracow, Poland, in 1999. The first conference was held in 2001 at Stará Lesná, in the High Tatra Mts. in Slovakia.

The present conference was jointly organised by the Hungarian Clay Group, a member group of the Hungarian Geological Society, and the Faculty of Earth Science and Engineering of Miskolc University. The chief organisers were Tamás Weiszbürg (practical aspects), István Viczián (scientific programme) and Ferenc Mádai (local organisation). The Hungarian organising committee was assisted by an International Scientific Board consisting of 18 leading specialists of various fields of clay research. The conference was a medium-size international meeting with 139 participants from 21 European countries and from 3 countries overseas. Naturally the most numerous groups represented the organising countries, 36 Hungary, 15 Slovakia, 15 Poland and 14 Croatia. 12 people came from the Czech Republic and 7 from Romania.

A pre-meeting workshop was arranged in Smolenice, Slovakia on 18-19th September with the theme *Current Knowledge on the Layer Charge of Clay Minerals (LCCM'04)* with a total number of 55 participants and 30 presentations. The organiser of this workshop, Peter Komadel summarised the main results during the Miskolc conference.

The days 21st and 22nd September were devoted to the sessions. Altogether 9 invited lectures and 43 other oral presentations were given in two parallel sessions and 66 posters were displayed for two days. On 22nd September a short excursion was organised to visit the newly explored Sarmatian bentonite deposit at Sajóbáony, near Miskolc. On the last two days there were field trips, on 23rd September to the Miocene volcanic area of Tokaj Mts. with hydrothermal kaolin and illite deposits and on 24th September to the low-grade metamorphic sequence of the Bükk Mts. and to a lignite quarry at Visonta, where Pliocene-Quaternary palaeosols overlying the lignite were shown.

The presentations were arranged in 6 sessions, showing the wide diversity of the subjects belonging to the clay science. In the following a few themes discussed in the sessions are mentioned (in brackets the authors).

Crystal structure and analytical techniques. The mostly discussed topics were various spectroscopic methods (IR, Raman), accordingly problems of ordering, substitutions and energetic relations of cations and OH groups (Robert, Petit, Frost, Kristóf). IR analysis seems to be applicable to quantitative analysis of phases present in reservoir rocks, using the DRIFT method (Clegg, Breen). Special techniques in X-ray diffraction, thermal and electron microscopic methods were applied by a number of authors, e.g. X-ray microdiffraction and application of heated support (Bezdučka, Hradil), TG-MS analysis (Breen), atomic force microscope (Dellisanti). X-ray diffraction is still being applied to the study of mixed-layer clay minerals, e.g. mixed-layer kaolinite/smectites (Dudek). There is much progress in the study of crystal chemistry of some clay mineral groups such as glauconites (Weiszbürg, Tóth) and talc (Wiewióra, Wilamowski).

Colloidal properties and surface chemistry. As a consequence of the Smolenice workshop, the main topics were also here the source and heterogeneity of the layer charge and its effect on colloidal properties of smectites (Christidis, Czímerová, Tombácz), in particular on the elastic properties of coagulated aggregates (Majzik). A review of the electrokinetic properties was given by Sondi, including also geological applications like the behaviour of suspended river sediments. Reactions of smectites with organic molecules were reviewed by

Laird and their interactions with polymers by Lagaly. Several presentations discussed pillared clays (Popovici, Szabó, Timofeeva) and adsorption of various cations such as heavy metals (Németh), As, V (Doušová), Mn (Komlósi), Sr (Nemes). Listed among the special technological applications are the production of mesoporous molecular sieves (Bahrnowski, Derkowski) and of nanocomposites (Bujdák, Weiss).

Clays in soils and weathering, palaeosols. The main soil types studied reflect the climatic and paedologic conditions of the region: solonetz (Alekseeva), red clays (Fekete, Vincze) and podzol (Skiba). Examples of the effects of long lasting agricultural land use on hydroxy-interlayered smectite and vermiculite of soils were presented by Bain. Šucha reported on modelling of weathering various types of illites in laboratory conditions. The formation of magnetic minerals (magnetite, maghemite) in chernozem soils in various palaeoclimatic conditions was studied by Alekseev. The age of the palaeosols beneath prehistoric barrows (khourgans) was determined by archaeological investigations. Another magnetic mineral, greigite was determined indirectly by magnetic measurements in Miocene sedimentary rocks (Babinszki).

Geology of clays. Several sedimentary formations were studied for their clay mineral content from the Cambrian of Saint-Petersburg until the Pannonian age sediments of the Pannonian Basin (Grizelj) or the Middle Miocene Primate locality in Kenya (Watkins). In such cases clay mineralogy is an effective tool of palaeo-environmental interpretation. Two special recent sedimentary environments were investigated in Russia: the effect of biogenic silica production in Lake Baikal (Novotná, Štyriaková) and the seabed sediments of the Norwegian Sea where ice-rafted sediments and hydrocarbon fluids from mud volcanoes control the clay mineral contents (Krupskaya).

The smectite to illite transformation is currently being used as geothermometer in diagenetic and low temperature metamorphic conditions (Šrodoň, Rocha) and for hydrocarbon prospecting in Poland (Górniak) and Nigeria (Akande). The anchimetamorphic region of the tectonic unit around Bükk Mts., near Miskolc is the classical area of the application of the Kübler and Árkai indexes (Árkai). The investigations are now being extended to the neighbouring countries such as the Medvednica Mts. in Croatia (Judik, Tibljaš). The non-equilibrium nature of anchizonal slates from Argentina is reflected by various modes of interleaving and interlayering of mica, chlorite and sometimes smectite unit layers (Nieto).

In the volcanic environment various contact metamorphic (Szeliga) and hydrothermal effects (Csámer, Fehér) give rise to clay mineral formation. The Füzérradvány illite in the Tokaj Mts. (described as early as 1937 and called "sarospatite" since 1941) is the result of a combined hydrothermal-sedimentary process (Viczián). Recently new occurrences of ammonium-illite were detected in the Central Slovakian volcanic area (Šucha). Saponite, Mg,Fe-montmorillonite and zeolite have crystallised in vesicles of alkali basalts in Lower Silesia (August).

Clays as raw materials. Several reports on industrial clay deposits indicate the still existing demand of clays as raw materials. Examples are the Sajóbáony bentonite deposit in Hungary (Püspöki), bentonite and kaolin occurrences in Slovakia (Andrejkovičová), Czech Republic (Hruskova), Romania (Gorea and Kristály) and Albania (Jusufati). In areas where clay deposits are partly exhausted, like in Portugal, other materials, e.g. low-grade metamorphic schists, volcanic lapilli or andosols may replace clays in manufacturing ceramic materials for the construction industry (Gomes).

Environmental application of clays. Waste depositories. The application of clays for barriers confining waste disposals is a question which appears regularly in the meetings dealing with clays. Retention properties of French expansive clays were investigated by Proust. Bentonite was suggested to have the best confining properties by a number of authors (Maubeuge, Landis, Janotka, Kónya, Nagy). Adsorptive properties are useful for retention of

toxic heavy metals in soils (Mádai, Sipos), treatment of hazardous waste of the petroleum industry (Durn) and removal of radioactive contamination (Frost, Popovici and Crețescu). Another wide field of the environmental application of clays is the role of clays in solution of engineering problems. A good example is the Ankara Clay which is a Miocene-Pliocene red clay formation with special engineering properties in the underground of the Turkish capital (Türkmenoğlu). Another environmental application is the risk of landslides caused by bentonitised volcanic rocks, like in Hollóháza, Tokaj Mts. (Zelenka and Kovács-Pálffy).

The abstracts of the conference were published in volume 4, 2004 of the *Abstract Series* of the journal *Acta Mineralogica-Petrographica*, published by the University of Szeged. This particular volume was edited by T. Németh and A. Terbócs. The volume is available at the Editor of the journal,

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