Academy of Sciences of the Czech Republic

Institute of Geology
Annual Report 2003

CONTENTS

Editorial Note: This report is based on contributions of the individual authors; contents and scientific quality of the contributions lies within the responsibility of the respective author(s).
The report was compiled and finally edited by L. Slavík and P. Bosák. English version was kindly revised by J. Adamovič.

KATALOGIZACE V KNIZE - NÁRODNÍ KNIHOVNA ČR

Geologický ústav (Akademie věd ČR)
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- **geologie**
- **geologický výzkum -- Česko**
- **ročenky**

55 – Vědy o Zemi. Geologické vědy

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1. Preface

The year 2003 was relatively quiet time filled with intensive and enthusiastic work. The structural changes introduced in 2002 were fully tested during the daily operation of the Institute and they now seem to be a good step forward. However, the year 2003 was also exceptional from one point of the view. The institutional research plan of the Institute was prolonged by one year, i.e., until the end of 2004. This governmental project enables the function of the Institute as it covers total salaries, health and social insurance, maintenance, small-scale investment and facility reconstructions, i.e. the common life of the scientific institute. Sources to cover the scientific activities come from Czech and foreign grant agencies, foundations, funds, from co-operation with industrial bodies, etc. As the running institutional research plan will expire in 2004, all staff of the Institute worked hard on the preparation of results from the period 1999–2003, i.e., since the last evaluation of the Institute activity, in late 2003 and on the preparation of a new institutional plan for 2005–2010. This was a very important step, as – if reviewed in a positive way – it will offer a relatively long time for the development of new research trends and methods.

Pavel Bosák, DSc.
Director of the Institute

2. General Information

Institute of Geology AS CR concentrates on the scientific study of the structure, composition and history of the Earth's lithosphere and the evolution of its biosphere. Although the Institute does not have the opportunity to cover all geological disciplines (in the widest sense) or regionally balanced geological studies, the methods of its activity span across a relatively broad spectrum of problems in geology, geochemistry, paleontology and paleomagnetism. The Institute takes part in the understanding of general rules governing evolutionary processes of the lithosphere and biosphere at regional as well as global scale; for this purpose, the Institute mostly employs acquisition and interpretation of relevant facts coming from the territory of the Czech Republic.

The Geological Institute of the Czechoslovak Academy of Sciences (ČSAV) was founded on July 1, 1961. Nevertheless its structure had developed in period of 1956 to 1960. During 1956 and 1957, several independent departments originated: Cabinet for Cartography, Laboratory of Paleontology, Laboratory of Engineering Geology, Laboratory for Pedology and Cabinet for Crystallography. In 1958, they merged, together with geographical departments, into Workplaces of Geological and Geographical Section of the ČSAV. On July 1, 1960, Institute of Geochemistry and Raw Materials of the ČSAV was established. This Institute covered technical and organisation affairs of adjoined geological workplaces until their unification into Geological Institute of the ČSAV on July 1960.

On August 1, 1964 the Institute of Geochemistry and Raw Materials of the ČSAV was integrated into the Geological Institute. On July 1, 1969 the Institute of Experimental Mineralogy and Geochemistry of the ČSAV was established. A part of the staff of the Geological Institute joined the new institute. On January 1, 1979 the Institute of Experimental Mineralogy and Geochemistry was integrated into the Geological Institute.

On March 1, 1979, the Geological Institute was united with the Mining Institute of the ČSAV under the Institute of Geology and Geotechnics of the ČSAV, and finally split from the latter on March 1, 1990 again. On January 1, 1993 the Academy of Sciences of the Czech Republic (AS CR) was established by the transformation from the ČSAV, and the Geological Institute became a part of the AS CR.

The Institute of Geology is a wide-spectrum institute developing essential geological, paleontological, petrological, mineralogical and other disciplines, recently accentuating environmental geology and geochemistry. The major research areas especially developed in the Institute have been as follows:

- Petrology and geochemistry of igneous and metamorphic rocks
- Lithostratigraphy of crystalline complexes
- Volcanology and volcanostratigraphy
- Structural geology and tectonics
- Paleogeography
- Terrane identification
- Taxonomy and phylogeny of fossil organisms
- Paleobiogeography of Variscan Europe
- Paleoecology (incl. population dynamics, bioevents)
- Paleoclimatology as evidenced by fossil organisms and communities
- Biostratigraphy and high-resolution stratigraphy
- Basin analysis and sequence stratigraphy
- Exogenic geochemistry
- Exogenic geology, geomorphology and (paleo)karstology
- Quaternary geology and landscape evolution
- Paleomagnetism
- Magnetostratigraphy
- Petromagnetism

Scientific laboratories

The research potential of the Institute is divided into 7 units:

1. Laboratory of Terrane Architecture and Lithosphere Evolution
2. Laboratory of Platform Evolution
3. Laboratory of Paleoebiology and Paleoecology
4. Laboratory of Environmental Geology
5. Laboratory of Environmental Geochemistry
6. Laboratory of Paleomagnetism
7. Laboratory of Physical Methods

Specialized laboratories

The following specialized laboratories have been set up:

1. Paleomagnetic laboratory (Head: Ing. Petr Pruner, DrSc.)
2. Micropaleontological laboratory (Heads: RNDr. Jiří Bek, CSc. and RNDr. Ladislav Slavík, CSc.)
3. X-ray and DTA/TG laboratory (Head: RNDr. Karel Melka, CSc.)
4. Electron scanning and microprobe laboratory (Head: Ing. Anna Langrová)
5. Laboratory of rock processing and mineral separation (Head: Václav Sedláček)
6. Laboratory for thin and polished sections (Head: Ing. Anna Langrová)
7. Microscopic laboratory (Head: Mgr. Michal Filippi)
8. Sedimentary laboratory (Head: RNDr. Anna Žigová, CSc.)
9. Fission track laboratory (Head: Mgr. Jiří Filip)

The scientific concept of the Institute of Geology and the evaluation of its results lie within the responsibility of the Scientific Council that includes both the internal and external members. Besides research, staff members of the Institute are involved in lecturing at universities and in the postgraduate education system. Special attention is also paid to popularisation of the most important scientific results in the public media.

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3. Connections

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4. Staff (as of December 31, 2003)

Management

RNDr. Pavel Bosák, DrSc.	Director of the Institute
Ing. Ottomar Gottstein, CSc	Deputy Director (finances)
Doc. RNDr. Jaromír Ulrych, DrSc.	Deputy Director, Scientific Secretary
Doc. RNDr. Jindřich Hladil, DrSc.	Chairman of the Scientific Council

Administrative departments

Management Section

Jana Pořtová (assistant to the Director)

Information Centre and Library

RNDr. Helena Purkyňová – Head (librarian)
Mgr. Václava Škvorová (librarian)
Lenka Kulhavá (librarian)

Technical-Economic Section

Ing. Ottomar Gottstein, CSc. – Head
Alena Sokolová – Deputy Head

Technical Department

Ing. Ottomar Gottstein, CSc. – Head
Lubomir Arandjelović (computer specialist)
Ing. Miroslav Fridrich (computer specialist)
Karel Jeřábek (garage attendant, driver)
Petr Vachalovský (technical service)
Martin Horváth (civil military service)
Petr Schnabl (civil military service)
Petr Záras (civil military service)

Economic Department

Alena Sokolová – Head (accountant, human resources)
Miroslav Karlík (storeman)
Jana Klímová (accountant)
Božena Trenzeluková (phone operator, mail service)

Operation and Maintenance Department

Jiří Dobrovolný – Head (technician, X-ray, thermal analyses)
Antonín Čejka (technical service)
Magdaléna Čejková (janitor)
Karel Jeřábek (janitor)
Věra Plešáková (janitor)
Ivana Konopáčová (janitor)
Jaroslav Kratochvíl (technical service)
Martin Mráček (boiler operator)

Scientific laboratories

Laboratory of Terrane Architecture and Lithosphere Evolution

Scientific Staff:

Doc. RNDr. Jindřich Hladil, DrSc. – Head (Devonian stratigraphy and reefs, carbonate sedimentology)
RNDr. Petr Štorch, DrSc. – Deputy Head (Ordovician and Silurian stratigraphy, graptolites, paleogeography)
RNDr. František Patočka, DrSc (petrology, geochemistry)
Ing. Jiří Fiala, CSc. (structural geology, metamorphic petrology)
Mgr. Monika Novotná (structural geology, tectonics and metamorphic petrology)
RNDr. Ladislav Slavík, CSc. (Devonian stratigraphy, conodonts)
Mgr. Martin Svojtka, Ph.D. (geochronology, geochemistry)
RNDr. Zdeněk Vejnar, DrSc. (structural geology, metamorphic petrology)

Technical Staff:

Ing. Jaroslava Pavková (secretary, technician)
Josef Forman (technician)

Laboratory of Platform Evolution

Scientific Staff:

Doc. RNDr. Jaromír Ulrych, DrSc. – Head (igneous petrology, geochemistry)
Mgr. Jiří Adamovič, CSc. – Deputy Head (basin analysis, tectonics)
RNDr. Vladimír Cajz, CSc. (volcanology)
Mgr. Jiří Filip, CSc. (fission track dating)
RNDr. Luboš Lang, CSc. (igneous petrology, mineralogy)
prom. geol. Jiří Novák, CSc. (petrology)

Technical Staff:

Ing. Jaroslava Pavková (secretary, technician)
Jana Rajlichová (technician)
Václav Sedláček (technician)

Laboratory of Paleobiology and Paleoecology

Scientific Staff:

RNDr. Radek Mikuláš, CSc. – Head (ichnofossils)
RNDr. Marcela Svobodová, CSc. – Deputy Head (Cretaceous palynology)
RNDr. Jiří Bek, CSc. (Devonian and Carboniferous spores)
RNDr. Petr Čejchan (paleoecology)
Mgr. Jiřina Dašková (Cenozoic palynology)
prom. geol. Arnošt Galle, CSc. (Devonian corals and paleogeography)
RNDr. Václav Houša, CSc. (Jurassic and Cretaceous stratigraphy, calpionellids and ammonoids)
RNDr. Magda Konzalová, CSc. (Proterozoic, Early Paleozoic, Jurassic, Cretaceous and Tertiary palynology)
Doc. RNDr. Zbyněk Roček, DrSc. (origin and evolution of the Amphibia, Tertiary Anura and Sauria)
RNDr. Miloš Siblík, CSc. (Mesozoic brachiopods)
RNDr. Milada Vavrdová, CSc. (Proterozoic, Paleozoic and Mesozoic palynology and plankton)

RNDr. Jaroslav Zajíc, CSc. (Carboniferous and Permian vertebrates and stratigraphy, acanthodians)
RNDr. Jiří Žítt, CSc. (Cretaceous and Tertiary paleoecology and sedimentology, echinoids and crinoids)

Technical Staff:
Ing. Bronislava Vávrová (secretary, technician)
Josef Brožek (photographer)

Laboratory of Exogenic Geology

Scientific Staff:
RNDr. Václav Cílek, CSc. – Head (Quaternary geology)
Mgr. Jaroslav Hlaváč – Deputy Head (Quaternary geology, malacozoology)
RNDr. Pavel Bosák, DrSc. (karstology, paleokarstology, basin analysis)
Mgr. Michal Filippi (mineralogy, environmental geochemistry)
Mgr. Eva Kadlecová (Cenozic vertebrate paleontology)
Mgr. Lenka Lisá (Quaternary sedimentology)
RNDr. Vojen Ložek, DrSc. (Quaternary geology, malacozoology)
RNDr. Eliška Růžičková (petrology, Quaternary geology)
Mgr. Zuzana Vařilová (geochemistry)
RNDr. Anna Žigová, CSc. (pedology, paleosols)
Mgr. Ondřej Zeman (hydrogeology)

Technical Staff:
Jana Macháčková (secretary, technician)
Miroslav Karlík (technician)

Laboratory of Exogenic Geochemistry

Scientific Staff:
Mgr. Tomáš Navrátil – Head (aquatic and environmental geochemistry)
Doc. Ing. Petr Skřivan, CSc. – Deputy Head (exogenic and environmental geochemistry)
Ing. Irena Dobešová (environmental geochemistry)
Mgr. Petr Drahota (environmental geochemistry)
Ing. Ottomar Gottstein, CSc. (geochemistry of magmatic and metamorphic rocks)
Ing. Luděk Minařík, CSc. (geochemistry)
Mgr. Marek Vach, PhD. (environmental geochemistry)

Technical Staff:
RNDr. Miloš Burian (chemical analyst)
Jitka Špičková (technician)

Laboratory of Paleomagnetism

Scientific Staff:
Ing. Petr Pruner, DrSc. – Head (geophysics, paleomagnetism)
RNDr. Jaroslav Kadlec, Dr. – Deputy Head (Quaternary geology)
Mgr. Martin Chadima (geophysics, paleomagnetism)
prom. fyz. Otakar Man, CSc. (geophysics)
RNDr. Günter Kletetschka, Ph.D (paleomagnetism, geophysics)
Bc. Stanislav Šlechta (geophysics)

Technical Staff:

Jana Drahotová (technician)
Tomáš Kohout (technician)
Jiří Petráček (technician)
RNDr. Daniela Venhodová (technician)

Laboratory of Physical Methods

Ing. Anna Langrová – Head (microprobe and scanning microscope analyst)
RNDr. Zuzana Korbelová – Deputy Head (microprobe and scanning microscope operator)
Ing. Vlasta Böhmová, Ph.D. (microprobe and scanning microscope operator)
Jiří Dobrovolný (X-ray and thermal analyses)
Jaroslava Jabůrková (preparation of thin/polished sections)
Ivana Konopáčová (preparation of thin/polished sections)
RNDr. Karel Melka, CSc. (X-ray and thermal analyses)

Scientific Council

Doc. RNDr. Jindřich Hladil, DrSc. (Institute of Geology AS CR) – Head of the Council
Ing. Petr Pruner, DrSc. (Institute of Geology AS CR) – Deputy Head of the Council
RNDr. Václav Cílek, CSc. (Institute of Geology AS CR)
RNDr. Jan Krhovský, CSc. (Ministry of the Environment of the Czech Republic)
Doc. RNDr. Zdeněk Kukal, DrSc. (Czech Geological Survey, Council for Research and Development)
RNDr. Radek Mikuláš, CSc, (Institute of Geology AS CR)
Mgr. Tomáš Navrátil (Institute of Geology AS CR)
Prof. RNDr Milan Novák, Ph.D. (Faculty of Science, Masaryk University, Brno)
Doc. Ing. Petr Skřivan, CSc. (Institute of Geology AS CR)
Mgr. Martin Svojtka, Ph.D. (Institute of Geology AS CR)
RNDr. Petr Štorch, DrSc. (Institute of Geology AS CR)
RNDr. Vladimír Rudajev, DrSc. (Institute of Rock Structure and Mechanics AS CR)
RNDr. Lilian Švábenická, CSc. (Czech Geological Survey)
Doc. RNDr. Jaromír Ulrych, DrSc. (Institute of Geology AS CR)

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Prof. György Buda (Department of Mineralogy, L. Eötvös University, Budapest, Hungary)
Dr. Pavel Čepek (Ackerrain 18, Burgwedel, Germany)
Prof. Petr Černý (Department of Earth Sciences, University of Manitoba, Winnipeg, Canada)
Prof. Jaroslav Dostal (Department of Geology, Saint Mary's University, Halifax, Canada)
Prof. Peter E. Isaacson (Department of Geology, College of Mines and Earth Resources, University of Idaho, Moscow, USA)
Dr. Horst Kämpf (GeoForschungsZentrum, Postdam, Germany)
Prof. Dr hab. Ryszard Kryza (Institute of Geological Sciences, Wroclaw University, Poland)
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Prof. Dr. Franz Pertlik (Institut für Mineralogie und Kristallografie, Universität Wien, Geozentrum, Austria)
Prof. Henning Sørensen (Geological Institute, University of Kobenhagen, Denmark)
Prof. John A. Winchester (Department of Geology, University of Keele, Great Britain)

Note: Czech scientific and pedagogical degrees are equivalents of:

Czech degree	**Equivalent**
prom.geol., prom. fyz., Mgr.	MSc
RNDr., PhDr.	no equiv.
CSc.	Ph.D.
DrSc.	DSc
Doc.	Assoc. Prof.
Ing.	Dipl.-Ing.

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5. Staff News

January

6.1.2003	Zdeňka Vrtišková (janitor) joined the Institute
1.1.2003	RNDr. Günter Kletetschka, Ph.D (paleomagnetism, geophysics) joined the Institute

May

2.5.2003	Dr. Sebastien Steyer (vertebrate paleontology) joined the Institute
19.5.2003	Vlasta Keiserová (janitor) left the Institute
31.5.2003	Zdeňka Vrtišková (janitor) left the Institute

June

1.6.2003	RNDr. Daniela Venhodová (technician) joined the Institute
2.6.2003	Martin Pilař (civil military service) joined the Institute
2.6.2003	Josef Chmelař (accomplished the civil military service)
9.6.2003	Věra Plešáková (janitor) joined the Institute

July

14.7.2003	Hana Špirková (technician) left the Institute

August

1.8.2003	Mgr. Petr Drahota (environmental geochemistry) joined the Institute
31.8.2003	Mgr. Jana Štěpánková (paleomagnetism) left the Institute

Setpember

1.9.2003	Mgr. Lenka Lisá (Quaternary sedimentology) joined the Institute
1.9.2003	Kateřina Michálková (assistant to the Director) joined the Institute
30.9.2003	Dr. Sabastien Steyer (vertebrate paleontology) left the Institute
30.9.2003	Marcela Nováková (assistant to the Director) left the Institute

October

31.10.2003	Prof. RNDr. Jiří Pešek, DrSc. (coal geology, basin analysis) left the Institute

November

18.11.2003	Jana Pořtová (assistant to the Director) joined the Institute
26.11.2003	Kateřina Michálková (assistant to the Director) left the Institute
30.11.2003	Milena Kozumplíková (technician) left the Institute

December

2.12.2003	Martin Pilař (accomplished the civil military service) left the Institute
21.12.2003	RNDr. Miroslav Fajst, CSc. (petrology) died
31.12.2003	Ing. Olga Kvídová, CSc. (exogenic and environmental geochemistry) left the Institute

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6. Undergraduate and Graduate Education

Undergraduate and Graduate Courses at Universities Given by Staff Members of the Institute of Geology AS CR:

Bosák P.: *Karstology and Paleokarstology*. Graduate Course, Faculty of Science, Charles University, Prague.

Cílek V.: *Anima urbis*. Undergraduate course, Faculty of Humanistic Studies, Charles University, Prague.

Cílek V.: *Landscape, language and history*. Undergraduate course, U.S. Academic Consortium (USAC). Faculty of Liberal Arts, Charles University, Prague.

Cílek V.: *Summer School in CR. Field course*. Simon Fraser University. Vancouver, Canada.

Cílek V.: *Town and its environment*. Erasmus and ECES (Eastern and Central European Studies) International Programme, Faculty of Liberal Arts, Charles University, Prague.

Dašková J.: *Methods of paleontological research (part – Microscopic work, forms and applications)*. Undergraduate course, Faculty of Science, Charles University, Prague.

Dašková J.: *Systematic paleontology (part – palaeobotany)*. Undergraduate course (practice), Faculty of Science, Charles University, Prague.

Dašková J.: *Systematic paleontology for teachers (part – micropaleobotany)*. Undergraduate course, Faculty of Science, Charles University, Prague.

Fajst M.: *Environmental regional geology of the Czech Republic*. Undergraduate course, Faculty of Science, Charles University, Prague.

Fajst M.: *Geological problems of crystalline formations*. Undergraduate course, Faculty of Science, Charles University, Prague.

Fajst M.: *Field geological course for teachers (biology, geology)*. Undergraduate field course, Faculty of Science, Charles University, Prague.

Hladil J. & Nehyba S.: *Sedimentology*. Undergraduate course, Faculty of Science, Masaryk University, Brno.

Hladil J.: *Carbonate microfacies*. Undergraduate course, Faculty of Science, Charles University, Prague.

Hladil J.: *Field course on carbonate facies*. Open Graduate course, Faculty of Science, Masaryk University, Brno.

Houša V.: *Principles of taxonomy and nomenclature*. Undergraduate course, Faculty of Science, Charles University, Prague.

Kachlík V. & **Fajst M.**: *Field course of regional geology*. Undergraduate course, Faculty of Science, Charles University, Prague.

Kachlík V. & **Fajst M.**, el al.: *Field course of geological mapping*. Undergraduate course, Faculty of Science, Charles University, Prague.

Kadlec J.: *Causes and consequences of Quaternary climatic changes*. Undergraduate and Graduate course, Faculty of Science, Charles University, Prague.

Kadlec J.: *Geology of the Quaternary*. Undergraduate course, Faculty of Science, Charles University, Prague.

Ložek V.: *Development of nature in the Quaternary*. Undergraduate course, Faculty of Science, Charles University, Prague.

Mikuláš R.*: Ichnology and ichnofabric of sedimentary rocks*. Undergraduate course and practice (optional), Faculty of Science, Charles University, Prague.

Mikuláš R.*: Principles of Geology for Archaeologists*. Undergraduate course, Faculty of Philosophy (Archaeology), Charles University, Prague.

Pešek J.: *Coal geology seminar*. Graduate course, Faculty of Science, Charles University, Prague.

Pešek J.: *Economic geology*. Undergraduate course, Faculty of Science, Charles University, Prague.

Pešek J.: *Regional geology*. Undergraduate course, Faculty of Science, Charles University, Prague.

Pešek J.: *Types of non-metallic and coal deposits*. Undergraduate course, Faculty of Science, Charles University, Prague.

Pruner P.: *Paleomagnetism in plate tectonics*. Undergraduate and Graduate course, Faculty of Science, Charles University, Prague.

Roček Z.: *Comparative anatomy of vertebrates*. Undergraduate course, Faculty of Science, Charles University, Prague.
Roček Z.: *Evolution of vertebrates*. Undergraduate course, Faculty of Science, Charles University, Prague.
Roček Z.: *Morphology of animals*. Undergraduate course, Faculty of Science, Charles University, Prague.
Roček Z.: *Review of fossil vertebrates*. Undergraduate course, Faculty of Science, Charles University, Prague.
Skřivan P.: *Environmental chemistry.* Compulsory field courses, Faculty of Forestry, Czech Agricultural University, Prague.
Sokol J. & **Cílek V.**: Prague as the living history. Undergraduate course. Faculty of Humanistic Studies and CERGE, Charles University, Prague.
Ulrych J.: *Special Mineralogy*. Graduate course, Technological Faculty VŠCHT, Prague.
Vach M.: *Atmospheric protection.* Undergraduate course, Faculty of Forestry, Czech Agricultural University, Prague.
Vach M.: *Chemistry of the Environment*. Undergraduate course, Faculty of Forestry, Czech Agricultural University, Prague.
Žigová A.: *Geography of soils and protection of soil resources of the Czech Republic*. Undergraduate course, Faculty of Science, Charles University, Prague.

Supervision in Undergraduate Studies

Danko P. (MSc. thesis), Faculty of Science, Charles University, Prague (*supervisor **Z. Roček***)
Ferbar P. (MSc. thesis), Faculty of Science, Masaryk University, Brno (*supervisor R. Melichar, co-supervisor/advisor **P. Štorch***)
Gvoždík V. (MSc. thesis), Faculty of Science, Charles University, Prague (*supervisor* **Z. Roček**)
Horváthová L. (MSc. thesis), Faculty of Science, Charles University, Prague (*supervisor **T. Navrátil***)
Hubačík M. (MSc. thesis), Faculty of Science, Masaryk University, Brno (*supervisor R. Melichar and co-supervisor/advisor **J. Hladil***)
Charvátová K. (MSc. thesis), Faculty of Science, Masaryk University, Brno (*supervisor **J. Hladil***)
Jambor P. (MSc. thesis), Faculty of Science, Charles University, Prague (*supervisor **Z. Roček***)
Janečka J. (MSc. thesis), Faculty of Science, Masaryk University, Brno (*supervisor R. Melichar, co-supervisor/advisor **P. Štorch***)
Koptíková L. (MSc. thesis), Faculty of Science, Charles University, Prague (*supervisor F. Vacek and co-supervisor/advisor **J. Hladil***)
Kubínová P. (MSc. thesis), Faculty of Forestry, Czech Agricultural University, Prague (*supervisor* **M. Vach**)
Majorová H. (MSc. thesis), Faculty of Science, Charles University, Prague (*supervisor **Z. Roček***)
Mareš J. (MSc. thesis), Faculty of Forestry, Czech Agricultural University, Prague (*supervisor **M. Vach***)
Mühldorf J. (MSc. thesis), Faculty of Science, Charles University, Prague (*supervisor **J. Kadlec***)
Ondráček P. (MSc. thesis), Faculty of Science, Charles University (*supervisor* **J. Zajíc**)
Ročková H. (MSc. thesis), Faculty of Science, Charles University, Prague (*supervisor* **Z. Roček**)
Slavík O. (BSc. Thesis), Faculty of Humanistic Studies, Charles University, Prague (*supervisor* **V. Cílek**)
Stehlík F. (BSc. thesis), Faculty of Science, Charles University, Prague (*supervisor **J. Kadlec***)
Stehlík F. (MSc. thesis), Faculty of Science, Charles University, Prague (*supervisor **J. Kadlec***)
Šemberková H. (BSc. thesis), Faculty of Humanistic studies, Charles University, Prague (*supervisor* **V. Cílek**)
Špičková J. (MSc. thesis), Faculty of Science, Charles University, Prague (*supervisor **I. Dobešová***)
Štolfová K. (MSc. thesis), Faculty of Science, Charles University, Prague (*supervisors K. Martínek & **R. Mikuláš***)
Zahradníček O. (MSc. thesis), Faculty of Science, Charles University, Prague (*supervisor **Z. Roček***)

Supervision in Graduate Studies

Baroň I. (Ph.D. thesis), Faculty of Science, Masaryk University, Brno (*supervisor **V. Cílek***)
Čáp P. (Ph.D. thesis), Faculty of Science, Charles University, Prague (*supervisor J. Marek, co-supervisor/advisor **P. Štorch***)
Černý R. (Ph.D. thesis), Faculty of Science, Charles University, Prague (*supervisor **Z. Roček***)
Dašková J. (Ph.D. thesis), Faculty of Science, Charles University, Prague (*supervisors Z. Kvaček, **M. Konzalová***)
Drábková J. (Ph.D. thesis), Faculty of Science, Charles University, Prague *(supervisor **J. Bek**)*
Drahota P. (Ph.D. thesis), Faculty of Science, Charles University, Prague. (*supervisor **P. Skřivan***).
Ekrt B. (Ph.D. thesis), Faculty of Science, Charles University (*supervisor O. Fejfar*, *co-supervisor **J. Zajíc**)*
Geršl M. (Ph.D. thesis), Faculty of Science, Masaryk University, Brno (*supervisor **J. Hladil***)
Gilíková H. (Ph.D. thesis), Faculty of Science, Masaryk University, Brno (*supervisor **J. Hladil** and co-supervisors/advisors **F. Patočka,** J. Leichmann*)
Havelková P. (Ph.D. thesis), University of South Bohemia České Budějovice (*supervisor **Z. Roček***)
Hlaváč J. (Ph.D. thesis), Institute of Geology, AS CR, Prague (*co-supervisors **V. Ložek** and **V. Cílek**)*
Královec K. (P.D. thesis), Faculty of Science, Charles University, Prague (*supervisor* **Z. Roček**)
Kvítková L. (Ph.D. thesis), Faculty of Science, Masaryk University Brno (*supervisor* **E. Růžičková**)
Lachmanová M. (Ph.D. thesis), Faculty of Science, Charles University, Prague (*supervisor **J. Pešek***)
Mach K. (PhD. Thesis), Faculty of Sciences, Charles University, Prague (*supervisor* **J. Pešek**)
Mikšíková L. (Ph.D. thesis), Faculty of Science, Charles University, Prague (*supervisor **V. Cílek***)
Navrátil T. (Ph.D. thesis), Institute of Geology, AS CR, Prague (*supervisor **P. Skřivan***).
Němečková M. (Ph.D. thesis), Faculty of Science, Masaryk University, Brno (*supervisor* **F. Patočka**)
Peprný M. (Ph.D. thesis), Faculty of Sciences, Charles University, Prague (*supervisor* **Z. Roček**)
Piras S. (Ph.D. thesis), Universita degli Studi di Modena e Reggio Emilia, Modena, Italy (*supervisor E. Serpagli and **P. Štorch***)
Rojík P. (Ph.D. thesis), Faculty of Science, Charles University, Prague (*supervisor **J. Pešek***)
Schiller W. (Ph.D. thesis), Faculty of Science, Charles University, Prague (*supervisor **J. Ulrych***)
Špičková J. (Ph.D. thesis), Institute of Geology, AS CR, Prague (supervisor ***P. Skřivan***).
Štorc R. (Ph.D. thesis), Faculty of Science, Institute of Palaeontology and Geology, Charles University, Prague (*supervisor* **J. Žítt**)
Trbušek J. (Ph.D. thesis), Faculty of Science, Palacký University Olomouc (*supervisor **Z. Roček***)
Vacek F. (Ph.D. thesis), Faculty of Science, Charles University, Prague (*supervisor **P. Bosák***)
Vařilová Z. (Ph.D. thesis), Faculty of Science, Charles University, Prague (*supervisor **V. Cílek***)
Vater M. (Ph.D. thesis), Zoological Institute, Slovak Academy of Sciences, Bratislava (*supervisor* **Z. Roček**)

Membership in academic boards at Universities

RNDr. Pavel Bosák, DrSc. – Member of Scientifc Board, Faculty of Science, Masaryk University, Brno. Member of the Board of Graduate Studies in Geology, Faculty of Science, Charles University, Prague. Member of the Board for Interdisciplinary study of Quaternary at the Board of Graduate Studies in Geology, Faculty of Science, Masaryk University, Brno. Vice-Chaiman and member of the Committee for degree of Doctor of Sciences in geological sciences.
RNDr. Václav Cílek, CSc. – Member of the Scientific Board, Faculty of Humanistic Studies, Charles University, Prague.
Doc. RNDr. Jindřich Hladil, DrSc. – Member of the Board of Graduate Studies in Geology, Faculty of Science, Charles University, Prague and Faculty of Science, Masaryk University, Brno. Member of the Committee for Finals of Undergraduate Students in Geology, Faculty of Science, Masaryk University, Brno. Alternating member of the Committee for degree of Doctor of sciences in geological sciences.
RNDr. Jaroslav Kadlec, Dr., Member of the Board of Undergraduate and Graduate Studies in Geology, Faculty of Science, Charles University, Prague.
RNDr. František Patočka, DrSc. – Member of the Board of Graduate Studies in Geology, Faculty of Science, Charles University, Prague, and Faculty of Science, Masaryk University, Brno. Alternating member of the Committee for degree of Doctor of Sciences in geological sciences.
Prof. RNDr. Jiří Pešek, DrSc. – Chairman of the Board of Graduate and RNDr. Studies in Geology and Paleontology, Faculty of Science, Charles University, Prague.
Ing. Petr Pruner, DrSc. – Member of the Board of Graduate Studies in Geophysics, Faculty of Science, Charles University, Prague. Alternating member of the Committee for degree of Doctor of Sciences in geological sciences.
Doc. RNDr. Zbyněk Roček, DrSc. - Member of the Board of Graduate Studies in Zoology, Faculty of Science, Charles University, Prague. Alternating member of the Committee for degree of Doctor of Sciences in geological sciences and Zoology and Animal Physiology.
Doc. Ing. Petr Skřivan, CSc. – Member of the Scientific Board (Section of Geology) of the Faculty of Science, Charles University, Prague; Member of the Board of Graduate Studies in Applied and Landscape Ecology, Faculty of Forestry, Czech Agricultural University, Prague.
RNDr. Petr Štorch, DrSc. – Member of the Scientific Board (Section of Geology), Faculty of Science, Charles University, Prague. Alternating member of the Committee for degree of Doctor of sciences in geological sciences.
Doc. RNDr. Jaromír Ulrych, DrSc. – Member of the Board of Graduate and RNDr. Studies in Mineralogy and Geochemistry, Faculty of Science, Charles University, Prague. Alternating member of the Committee for degree of Doctor of sciences in geological sciences.
RNDr. Anna Žigová, CSc. – Member of the Board of Graduate Studies in Physical Geography, Charles University, Prague.

Degrees obtained by the staff of the Institute of Geology AS CR

Mgr.

Mgr. Jitka Špičková: *Evaluation of the influence of local and distant sources on the chemical composition of atmospheric deposition in the area of the Bohemian Karst*. Institute of Geochemistry, Mineralogy and Natural Resources, Faculty of Science, Charles University, Prague (May, 2003).

Mgr. Tomáš Kohout: *The Influence of Terrestrial Processes on Meteorite Magnetic Records*. Department of Applied Geophysics, Faculty of Science, Charles University Prague (June, 2003).

7. Awards and Fellowships

Doc. RNDr. Zbyněk Roček, DrSc.: Annual prize of the Czech Literary Fund for the best scientific book in 2002.
Doc. RNDr. J. Ulrych, DrSc.: Diploma of the J.E. Hibsch Geological Society, Ústí nad Labem

8. Positions in International Organizations and Editorial Boards

Bek J.: Councillor, Organization of Czech and Slovak palynologists, since 1994.
Bek J.: Vice-President, International Federation of Palynological Societies, since 2001.
Bosák P.: Member, Commission for Physico-Chemistry and Hydrogeology of Karst, the International Speleological Union, since 1978.
Bosák P.: Member, Commission on Paleokarst and Speleochronology, the International Speleological Union, since 1986.
Bosák P.: Secretary General, International Union of Speleology, elected in 1993, re-elected 1997, 2001.
Dašková J.: Member, Organization of Czech and Slovak palynologists, since 2002
Hladil J.: Corresponding Member, Subcommission on Devonian Stratigraphy of the IUGS, since 1993.
Hladil J.: Council Member and Representative of Europe-III Group of Countries, IASFCP, the International Association for Study of Fossil Cnidaria and Porifera, elected in 1995.
Hladil J.: Secretary, the CzNC IGCP, International Geological Correlation Programme, elected in 1994.
Kadlec J.: INQUA – Member, Comission of Terrestrial Processes, Deposits and History.
Kadlec J.: Coordinator for the Czech Republic, the IGBP - Core Project 7: Past Global Changes.
Konzalová M : Member, American Association of Stratigraphic Palynologists.
Konzalová M.: Member, International Organisation of Palaeobotany.
Konzalová M.: Member, International Federation of Palynological Societes.
Ložek V.: Foreign Member, Polish Academy of Arts and Sciences (Polska Akademia Umiejętności, Kraków,), election approved by the Polish President in 1999.
Ložek V.: Member, Commission on Holocene, INQUA - Commission of Loess Studies, since 2003.
Melka K.: Czech/Slovak Representative, ECGA, the European Clay Groups Association, since 1991.
Melka K.: Liaison officer, AIPEA, Association Internationale pour l' Etude des Argiles, since 1995.
Mikuláš R.: Czech Representative, IGCP 471, Evolution of Western Gondwana during the Late Palaeozoic, since 2003.
Mikuláš R.: Member, Working Group of the Teatise on Invertebrate Paleontology, Part W, Trace Fossils, since 2001.
Pešek J.: National representative, European Coal Geology Union, U.K., Cardiff
Pešek J.: Member, Subcommision on Carboniferous Stratigraphy of the IUGS
Pruner P.: Member, American Geophysical Union.
Pruner P.: Member, European Geophysical Society.
Roček Z.: Vice-president, Societas Europaea Herpetologica, elected in 1998.
Roček Z.: Member of the Executive Committee, International Society of Vertebrate Morphology, elected in 2001.
Roček Z.: Member of the Executive Committee, World Congress of Herpetology, since 1994.
Růžičková E.: Corresponding member of COGEOENVIRONMENT, since 1992 (Commission on Geol. Sciences for Environmental Planning), since 1992.
Růžičková E.: Member, the IGBP National Committee, since 1993.
Siblík M.: Corresponding Member, Subcommision of Triassic Stratigraphy of the IUGS, since 1999.
Slavík L.: Corresponding Member, Subcommission on Devonian Stratigraphy of the IUGS, since 1999.
Štorch P.: Corresponding Member, Subcommission on Silurian Stratigraphy of the IUGS, since 1992.
Svojtka M.: Geochemical Society Member (The Geochemical Society,Washington University), since 2002.
Ulrych J.: Member, Permokarboner Kreis (Würzburg, FRG)

Editorial Boards

Bosák P.: *Český kras,* Beroun; co-editor, regional journal published by the Museum of the Czech Karst in Beroun, Czech Republic, since 1976.
Bosák P.: *Geologica Carpathica*; co-editor, impacted journal of the Carpathian-Balkan Geological Association, Geological Institute, Slovak Academy of Sciences, Bratislava, since 2000.
Bosák P.: *Geologos*, Wydzial Geologii, Uniwersytet Adama Mickiewicza, Poznań, Poland; Member of editorial board, since 2000.
Bosák P.: *International Journal of Speleology* (international journal, published by Societa Speleologica Italiana, L'Aquilla, Italy); Member of Advisory Board, since 1994.
Bosák P.: *Speleo (Prague)*, society bulletin published by the Czech Speleological Society, Prague, Czech Republic; Member of editorial board, since 1990.
Bosák P.: *Speleofórum*, Czech Speleological Society, Prague, Czech Republic*;* co-editor, since 1998.
Bosák P.: *Theoretical and Applied Karstology,* Institutul de Speologie „Emil Rakovita“, Bucuresti, Romania; Member of editorial board, since 2000.
Bosák P.: *UIS Bulletin*, information bulletin of the International Union of Speleology, Prague, Czech Republic; Editor-in-Chief, since 1993.
Cílek V.: *Slovenský kras*, Liptovský Mikuláš, Slovakia; Member of Editorial Board, since 2000.
Hladil J.: *Geologica Carpathica*, Bratislava, Slovakia; Member of Editorial Board, since 2001.
Kadlec J.: *Bulletin of Geosciences*, Czech Geological Survey; Member of Editorial Board, since 2003.
Kadlec J.: *Geolines*, Institute of Geology, AS CR, Member of Editorial Board, since 2001.
Ložek V.: *Studia Quarternaria*, Kraków, Poland; Member of Editorial Board, since 1999.
Melka K.: *Clay Minerals*, Journal of the European Clay Groups, London; Member of Editorial Board, since 1999.
Mikuláš R.: *Geolines,* Institute of Geology, AS CR; Member of Editorial Board.
Patočka F.: *Geolines*, Institute of Geology, AS CR, Member of Editorial Board, since 1995.
Patočka F.: *Geologia Sudetica*, Wroclaw, Poland; Member of Editorial Board, since 1997.
Pruner P.: *Acta Universitatis Carolinae*, *Geologica*, Charles University, Prague; Member of Editorial Board.
Pruner P.: *Geolines*, Institute of Geology, AS CR; Member of Editorial Board.
Roček Z.: *Bulletin de la Société Herpétologique de France*, Paris, France, Member of Editorial Board (since 1992)
Roček Z.: *Živa*, Prague; Member of the editorial board, since 1995.
Štorch P.: *Geological Journal*, Liverpool, Manchester, UK; Associated editor, since 1993.
Štorch P.: *Newsletters on Stratigraphy*, Berlin, Stuttgart; Associated editor, since 1999.
Svojtka M.: *Acta Universitatis Carolinae, Geologica* (Charles University, Prague); Member of Editorial Board.
Svojtka M.: *Geolines*, Institute of Geology, AS CR; Editor-in-Chief.
Zajíc J.: *Bulletin of Geosciences*, Czech Geological Survey; Member of Editorial Board since 2001.

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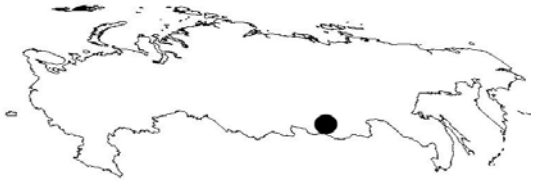
9. List of Grants and Projects undertaken in the Institute of Geology

Foreign Grants and Joint Projects

Czech-Italian Ministeries of Education Integrated program KONTAKT, Project no 23 – ES 1. Fossils as time indicators: Integrated conodont-graptolite biostratigraphy of selected Lower Palaeozoic sections of Czech Republic (Barrandian area) and Italy (Carnic Alps and Sardinia). (*E. Serpagli & A. Ferretti*, University of Modena and Reggio Emilia, ***P. Štorch*** & ***L. Slavík***)

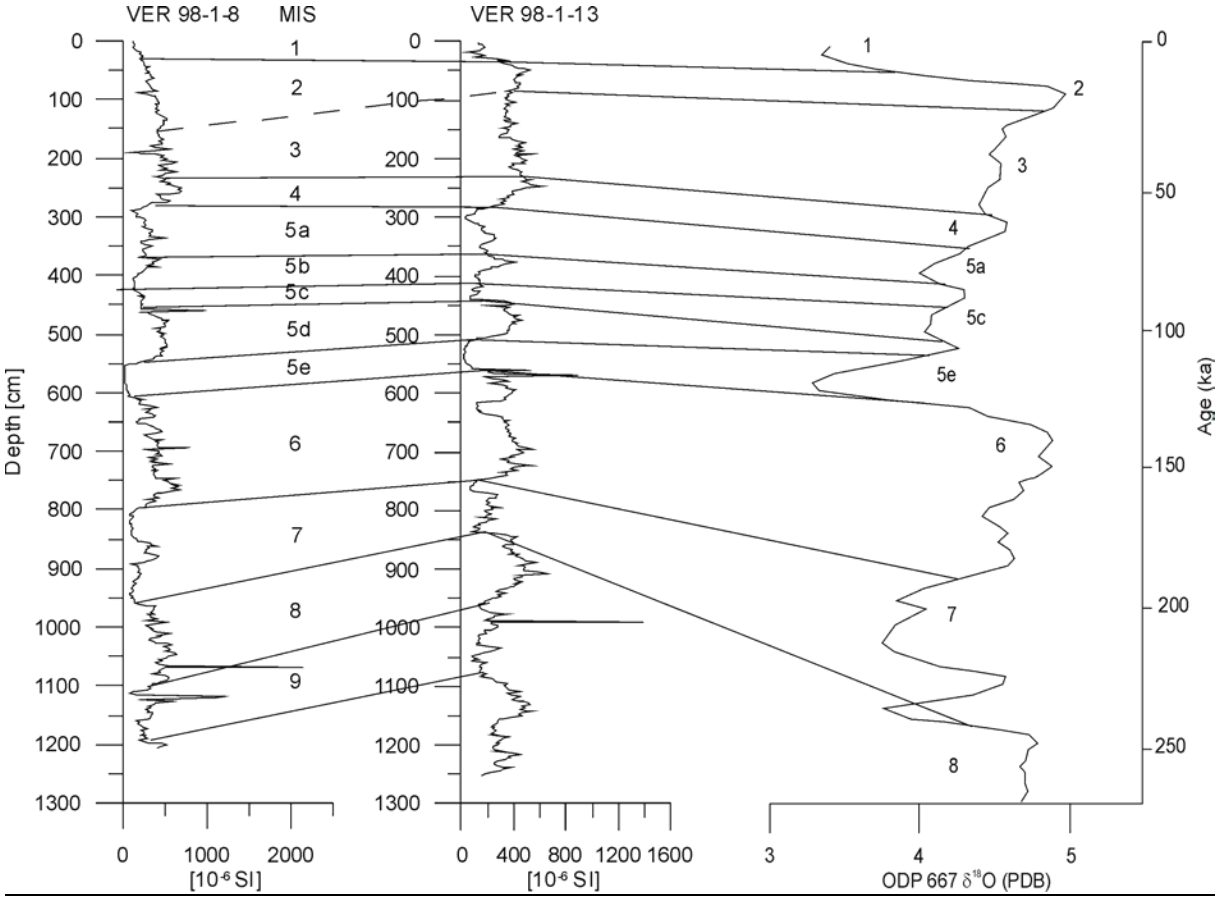
Early Ludlow graptolites and biostratigraphy were studied in the western part of the Barrandian Silurian (by S. Piras, under joint supervision provided by E. Serpagli and P. Štorch). A section excavated E of Bykoš suggests that the index graptolites of two lowermost Ludlow biozones – *Neodiversograptus nilssoni* and *Lobograptus progenitor* – overlap for more than three-fourths of their stratigraphic ranges. Associated graptolite fauna does not change much in the course of this interval. Partly bleached shales exhibit particularly common and diverse plectograptids (five species of *Plectograptus, Spinograptus*, and *Holoretiolites*). The section was further sampled for palaeomagnetic (P. Pruner) and microplankton (P. Morávek) studies. Wenlock/Ludlow boundary interval examined at Nesvačily exhibits stepwise recovery and radiation among the graptolite fauna following the latest Wenlock biotic crisis. Late *ludensis/gerhardi* and early *nilssoni* biozones have been marked by stepwise emergence of several graptolite stems (*Bohemograptus, Neodiversograptus* and *Lobograptus*) as well as further diversification within Plectograptinae and *Colonograptus*. *Gothograptus nassa*, in turn, survived well up to the *nilssoni* Biozone.

5th Framework Research Programme of the European Community
EVK2-CT-2000-00057 CONTINENT+NAS, Amendment No. 2, Institute of Geology, ASCR partner No. 6: High-resolution continental paleoclimate record in the Lake Baikal: A key-site for Eurasian teleconnections to the North Atlantic Ocean and monsoonal system (*principal co-ordinator H. Oberhänsli, GeoForschungsZentrum, Potsdam, FRG,* ***P. Pruner*** & ***J. Kadlec***)



The Baikal Lake sediments are well suited for rock magnetic and paleomagnetic study because the lake contains a long, continuous stratigraphic record and lies at a high latitude (54°N). Rock magnetic and paleomagnetic parameters were studied on pilot and hydraulic piston cores drilled in the Academician Ridge in the N segment of the basin. The aim of the study was to establish a new approach for dating the sediments of the Baikal Lake and an age model, combining luminescence, radiometric techniques and sediment paleomagnetic signals for the last 150 ka. All samples were subjected to the successive rock magnetic analyses; the natural remanent magnetization (NRM), and the characteristic remanent magnetization (ChRM) determined after AF demagnetization. The rock magnetic parameters (MS, SIRM and S-ratio) were used to identify variations in the concentration, grain size and mineralogy of the magnetic material. The ChRM directions were clearly dominated by normal polarity, positive inclinations, indicating the Brunhes Chron age of the sediments. Four short intervals of deviating declinations and inclinations within the Brunhes Chron were documented. The observed excursions were interpreted as the Laschamp excursion (~40 ka), the Blake excursion (~118 ka), the Jamaica excursion (~190 ka) and the Biwa II excursion (~260 ka). Four intervals of low MS values, and four peaks of S-ratio were documented. The MS record reflects environmental changes (e.g., the rate of weathering or erosion in the lake catchment) and post-depositional changes of magnetic minerals. Higher MS values are connected with higher concentration of magnetite grains and lower content of diatom remains reflecting

cold stadial conditions. Lower MS values result from post-depositional changes in magnetic mineral assemblages. These MS drops are also influenced by high concentrations of diatom remains in the sediments reflecting climatic amelioration during interstadial and interglacial periods. The MS variations were unequivocally correlated with marine isotopic stages (MIS) showing global ice volume changes during the Quaternary. The S-ratio peaks indicate lower content of low-coercivity ferrimagnetics and were correlated with the low MS (warmer) intervals.



The magnetic susceptibility variations correlated with marine isotopic stages (MIS 1 to MIS 9). (P. Pruner & J. Kadlec)

International project of the University of València, Servei d'Investigació: Correlation of conodont faunas from the Hercynian facies from Spanish Pyrenees and Bohemia (Czech Rep.) *(J.I. Valenzuela-Ríos, Departamento de Geología, Universitat de València, RE, Spain &* ***L. Slavík****)*

Traditional problems and complications with the upper boundary and especially the imperfect standard conodont zonation of the Pragian Stage, which cannot be applied in most of the European sections including the type area (Barrandian), prompted us to start a detailed study of this Stage. We can present a tentative first correlation of the lower Pragian based on conodont faunas from the Barrandian (Czech Republic) and Pyrenean (Spain) sections. These regions displaying Hercynian (or Bohemian) type of facies development show a striking similarity in several aspects. Particularly, this concerns composition and stratigraphic distribution of the lower Pragian conodont faunas that occur across different types of facies (from typically shallow-water, even

reefal facies, to pelagic carbonates of open-sea character). The successive occurrences of *Icriodus steinachensis* Al-Rawi and representatives of the genus *Pelekysgnathus* Thomas support this correlation. Besides, there is a common scarcity of early Pragian zonal indexes – morphotypes of *Eognathodus sulcatus* Philip. Our analysis confirms that even lower Pragian definition bears a lot of complications. Our conodont study of both regions, however, showed that now we cannot be sure about three relevant issues: 1) the real beginning of the Pragian Stage; 2) the position of the earliest *sulcatus* morph, that up to know corresponds to the eta morph of Murphy et al., 1981 = *E. s. eosulcatus* Murphy, 1989 which happens to be a junior synonym of *E. irregularis*; 3) the base of the *kindlei* Zone.

Project of the Japan Society for the Promotion of Science. Grant for bilateral cooperation between Japan and foreign country. The root zone dynamics under the continent collision zone. The role of crustal melting at extremely high-pressure and high-temperature conditions. *(T. Hirajima, M. Obata, T. Mori, Y. Hiroi, Kyoto University, Japan &* ***M. Svojtka****)*

Equilibrium pressure–temperature (P–T) conditions were estimated for kyanite-bearing eclogite from Nove Dvory, Czech Republic, by using garnet-clinopyroxene thermometer and garnet-clinopyroxene-kyanite-coesite (or quartz) barometer. The estimated P–T conditions are 1,050–1,150 °C, 4.5–4.9 GPa, which is mostly the same as previously estimated values for garnet peridotite from Nove Dvory (≈ 1,100–1,250 °C, 5–6 GPa). Such very high-P conditions, which correspond to about 150-km depth, have been obtained for garnet peridotites in the Gföhl Unit of the Bohemian Massif, but pressure conditions of eclogites associated with the garnet peridotite have not been well known. This is the substantial finding of eclogite that gives such very high-P conditions in the Gföhl Unit of the Bohemian Massif. The Gföhl Unit mainly consists of felsic granulite or migmatitic gneiss, but these rock types do not display high-P (> 2.5 GPa) evidence. It is not clear whether both the peridotite body and the surrounding felsic rocks in the Gföhl Unit were dragged down to very deep levels, but at least some garnet peridotites and associated eclogites in the Gföhl Unit have ascended from about 150-km depth.

Czech – Hungarian Bilateral Project: Comparative volcanostratigraphy of the Neoidic volcanics of the Bohemian Massif and the Pannonian Basin (*Project leaders K.Balogh, Institute of Nuclear Research, Hungarian Academy of Sciences, Debrecen, Hungary &* ***J. Ulrych***)

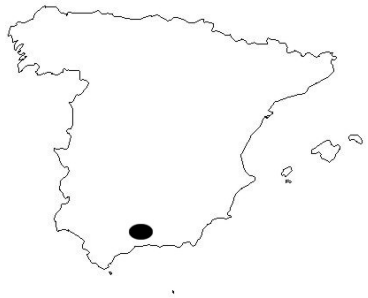
Subproject: Rock-forming minerals of alkaline volcanic series associated with the Cheb-Domažlice Graben, W Bohemia (***J. Ulrych, J.K. Novák,*** *F.E. Lloyd, K. Balogh & G. Buda*)

The Middle to Late Miocene intraplate alkaline volcanism of W Bohemia is associated with the uplift of the NE flank of the Cheb-Domažlice Graben. Two coexisting cogenetic volcanic series have been recognised there: (i) weakly alkaline series basanite – trachybasalt – (basaltic) trachyandesite – trachyte – rhyolite (15.9–11.4 Ma) and (ii) strongly alkaline series olivine nephelinite – tephrite (16.5–8.3 Ma). The chemistry of the minerals characteristically reflects the differentiation development of the above rock series. The crystallization of olivine phenocrysts (Fo_{66-76} and Fo_{49-52}), melilite, Ti-magnetite and (Ti,Fe^{3+})-diopside to fassaite are associated with the early magmatic crystallization of the mafic rocks. The (Mn,Ti)-magnetite, diopside and incipient crystallization of zoned phenocrysts of ternary feldspars: (i) high-temperature K-oligoclase core, (ii) prevailing anorthoclase (perthite), and (iii) rare Na-sanidine rims of the late crystallization are characteristic of the salic rocks. Kaersutite in the mafic rocks and Mn-magnesioriebeckite, Mn-winschite and Mg-biotite in the salic rocks represent ongoing crystallization. Nepheline belongs to the products of the continuous and late crystallization (at temperatures <700 °C) together with melilite in ijolite pegmatoidal segregations in the mafic rocks. Plagioclase continuous crystallization (labradorite-andesite in mafic and andesine with K-andesine to K-oligoclase rims in transitional types) belong to the

same stage. Feldspars and quartz in matrix of the salic rocks terminate this crystallization. Late magmatic crystallization is represented by analcimes replacing plagioclases and nepheline, carbonates of calcite–rhodochrosite series and barite in the mafic rocks. The presence of Mn-oxyhydroxide, nontronite, rare sulphur and organic matter reflects the postmagmatic stage.

Project of the University of Málaga (2000-2003), Ministerio de Educación y Cultura del Reinado Español: No. BTE 2000-1150 Low-and very low-grade metamorphic reactions in the Maláguide Complex and the transition zone with the Alpujárride Complex

Subproject: Metamorphic chlorite and "vermiculitic" phases in mafic dykes from the Maláguide Complex (Betic Cordillera, Spain) (***J.K. Novák***)



The internal zones of the Betic Cordillera (southern Spain) comprise three juxtaposed nappes, which from bottom to the top and in order of decreasing metamorphic grade are: the Nevado-Filábride, the Alpujaárride, and the Maláguide. Mafic igneous dykes distributed along boundaries of the Malaguide and Alpujarride complexes and within the transitional Benamoccura zone are probably related to the Miocene post-orogenic extentional collapse of the Betic-Alborán Domain. Chemical classification indicates the presence of orogenic basalt, basaltic andesite, andesite, and trachyandesite, but metamorphic overprinting was evidenced by both microscopical examination and mineral chemistry. The hydrous metamorphic assemblages, which are restricted regionally, are characterized by the presence of: /i/ chlorite + metamorphic vermiculite, /ii/ actinolite, /iii/ talc + tremolite, and /iv/ epidote + zeolite. Metamorphic vermiculite and vermiculite-like mineral phases were revealed not only in metaclastites of the Maláguide complex, but also in porphyritic diorite (hypabyssal equivalent of basaltic andesite) as pseudomorphs after pyroxene and/or amphibole phenocrysts as well as neoblasts in the matrix. In contrast to alteration products of biotite weathering (in soils) or those of hydrothermal action, this vermiculite variant originated during a prograde metamorphic episode (chlorite-to-biotite transformation).

No. MŠ-Kontakt ME426 Czech-Chinese bilateral project: Geochemistry of trace elements in coal and their impact on environmental and human health (*Leaders:* ***J. Pešek****, Charles University in Prague, Faculty of Science and Baoshan Zheng, Academia Sinica, China*)

More than 60 % of the electric energy produced in the Czech Republic is generated from Tertiary lignites. The ash and sulfur contents of these lignites vary considerably between 3–45 % and 0.33–19.9 %, respectively. Concentrations of trace elements in coal ash (in ppm) depend on the content of ash, mineral and maceral composition of single samples: Ag <2–4.8, As 9.2–2020, Au <10, B <20–2,440, Ba 677–4,950, Be 8–50.3, Bi <0.1–5.5, Cd 0.22–4.6, Co 16.8–172, Cr 70–383, Cs 5.5–30.9, Cu 87.3–944, Ga 15.4–86.4, Ge 2.1–3,620, Hg <0.02–15.6, Mn 71.7–1,890, Mo 1.2–23.7, Nb 8.3–275, Ni <4–330, Pb 0.9–90.3, Rb 9.9–124, Sb 0.26–22. 5, Sc 31.2–136, Se 0.29–5.3, Sn <3–77.2, Sr 76–21,200, Te 0.17–1.4, Th 15.7–95.6, Tl 0.12–5.3, U 4.5–61.1, V 226–1,760, Y <1–146, Zn 62.5–1,040, Zr 60.9–1,030. The new results showed significantly higher concentrations of B, Ba, Cd, Co, Cr, Ga, Ge, Hg, Ni, Pb, Rb, Sc, Sn, Sr, Th, U, V and Y in ash of lignites from the Sokolov Basin and considerably increased contents of Ag, B, Ba, Co, Cr, Ga, Ge, Mn, Mo, Nb, Ni, Pb, Sb, Sc, Sn, Th, U, Zn and Zr in ash of lignites of the North Bohemian Basin. When comparing the contents of trace elements in our samples with reported highest concentrations, then only Cs, Nb and Rb considerably exceeded the earlier determined contents.

Grant project of University College of Cape Breton, Sydney, Canada: In situ pecopterid microspores from near the Westphalian D/Cantabrian boundary in Sydney Coalfield, Nova Scotia, Canada (*Leader: E. L. Zodrow, Centre for Natural History, University College of Cape Breton, Sydney, Canada,* ***J. Bek****, J. Pšenička, West-Bohemian Museum, Pilsen, Ch. Cleal, National Museums and Galleries of Wales, Department of Biodiversity, Cathays Park, Cardiff, UK & A.R. Hemsley, Laboratory for experimental Palynology, Department of Earth Sciences, Cardiff University, UK*)

Subproject: Tree ferns at Point Aconi, Sydney Coalfield: Evidence from variability of microspores (***J. Bek***)

The research represents an interdisciplinary approach to integrating palynological with palaeobotanical information, relating to a Carboniferous plant genus *Acitheca* Schimper. Comprehensively studied was the Canadian-Czech database of the species of *Acitheca* (576 specimens of which 196 are fertile), and concomitantly reviewed were Brongniart's *Pecopteris polymorpha* types that were newly redescibed in the light of modern insight into the pecopterid problem. The database encompasses late Westphalian D to Autunian-aged specimens, noting in general that *Acitheca* is a very abundant species. Added to the usual study (classical) of foliar compression/impression morphologies were taxonomic parameters specifically derived from epidermal topography and its stomatal types relating to foliage and synangia, a first-time achievement in Carboniferous-pecopterid palaeobotany, and *in situ* reproductive organs and their palynological constituents.
The results showed that Canadian and Czech specimens show foliar differences compared to the types, that reproductive organs show spores ontogenetically differentiated that can be comprehensively grouped with at most three *sporae dispersae* generic palynomorphs, which, however, may cut across many other non-marattialean plants, and that spore-size variability for *Acitheca* is the largest for any of the known Carboniferous marattialean species.
The study will continue with discussions on restricted diversity of *Acitheca* (three species in the study areas, generally six), hypothesized connection with extant marattialeans, and suggestions on an arborescent acitheca-plant as a natural genus. However, the tantalizing question that remains unanswered is whether or not Schimper's *Acitheca* is a synonym of "*Acitheca polymorpha*".

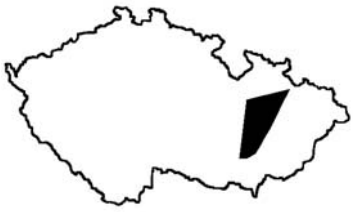
Programme of the European Scientific Foundation
EEDEN (Environments and Ecosystem Dynamics of the Eurasian Neogene) / NECLIME (Neogene Vegetation and Climate Reconstructions) (*Projects leaders J. Eder, Museum of Natural History, Stuttgart, J.E. Meulenkamp, Inst. Earth Sci., Utrecht Univ., The Netherlands & V. Mosbrugger, Inst. and Mus. of Geology and Palaeontology, Tuebingen, Germany*)

Subproject: Tertiary freshwater and wetland ecosystems of the North Bohemian lignite Basin. *(Z.Kvaček, Faculty of Science, Charles University, Prague,* ***M. Konzalová,*** *J. Sakala,* ***J. Dašková*** *& J. Prokop, Faculty of Science, Charles University, Prague)*

Among aquatic elements, algal threads were newly recorded as very rare and accessory elements obtained from the deposits of higher water level, along with cysts of algae. Both types occur mostly as admixture within terrestrial plants and algal detritus assemblages, dominated by pollen or spores. Sometimes they occur together with microfragments of conducting parts of higher plants tissues, cuticles and undifferentiated cloth-like smooth fragments without any diagnostic features. *Ovoidites* (R. Pot.) W. Kr., commonly known from

the limnic and paludal environments, similarly as *Monogemmites* W. Kr., can be mentioned as representative freshwater planktonic organisms from the study area. Water ferns, forming floating covers on water, often complement a similar association. They are testified by macrospores of *Salvinia cerebrata* Nikit., derived from extinct Tertiary *Salvinia,* macrospores of *Azolla*, an American fern genus with present distribution in the State of Carolina, pollen of pondweeds (*Potamogeton*) and wild grasses *Gramineae – Graminidites* sp. div., representing the rim communities. *Gramineae* are represented by only single finds or low percentages in the assemblages of the studied area of the basin. Their accompanying trees and shrubs are predominantly composed of *Alnus* and *Myrica.* The interpretation of these assemblages corresponds well with shrub and reed-moor ecotypes now growing in the coastal and deltaic areas along the North American Atlantic coast. A partly comparable assemblage was recovered also in the mammalian horizon of the MN Zone 3 (Lower Miocene) west of the studied Bílina area.

IGCP Project 471 Evolution of Western Gondwana during the Late Palaeozoic (*Project leaders C.O. Limarino, L.A. Buatois (INSUGEO, Argentina*)
Subproject: The Culm Facies of the northern Moravia, Czech Republic: Environmental and paleogeographic constraints (***R. Mikuláš**, J. Zapletal, O. Bábek & T. Lehotský, Faculty of Science, Palacký University, Olomouc*)



The Culm facies, named after the English attribution Culm Measures, represents a specific variety of flysch sediments, characteristic of sedimentary basins bordering active margins of the Variscan orogeny. The facies is characterized by rapid influx of clastic material. The Culm facies as a whole resembles the Mesozoic and Cenozoic flysch in many aspects but both the density and diversity of traces are much lower. The reasons for such a low degree of bioturbation may be the following: 1, distance of the compared facies in geologic time; invertebrates did not colonize all deep-water, dysoxic and/or current-exposed settings yet. 2, extreme dynamics of the Culm facies, resulting in shorter and unevenly distributed (in both space and time) colonization windows. 3, low level of nutrients both in the turbidites and in the background sediment.

National Science Foundation of the USA
COBASE Grant: Cretaceous Anurans of Southern Utah (*J.G. Eaton, Department of Geosciences, Weber State University, Ogden, Utah, USA &* ***Z. Roček***)

Various Upper Cretaceous localities of southern Utah yielded anuran, and to a lesser extent urodelan and saurian disarticulated bones. Although a part of the material is badly crushed, it is obvious that they belong among the richest and stratigraphically most representative collections of late Mesozoic anurans on the North American continent. These can be compared to similar collections from the Late Cretaceous localities in Central Asia. It can be expected that if more delicate washing methods would be used, fragile skeletal remains of tiny amphibians would be better preserved. Even at this early stage of scientific investigation it is certain that the collection contains undescribed anuran taxa.

Czech-Austrian Joint Programme "KONTAKT" (Ministry of Education, Youth and Sports)
No. 2003-2: Documentation of the new Jurassic brachiopod localities in the UNESCO World Heritage area Hallstatt-Dachstein/Salzkammergut (***M. Siblík*** & *H. Lobitzer, Geologische Bundesanstalt Wien)*

The aim of the project is to gain more detailed information on the new Jurassic palaeontological sites in the Hallstatt-Dachstein/Salzkammergut area by means of their brachiopod fauna, microfacies and paleoenvironment. The Liassic brachiopod faunas from the localities on the Dachstein Plateau (Wildkarkogel, N. Ochsenkogel) and from Mitterwand are very similar to each other, the rhynchonellid and terebratulid species prevail, spiriferid species are scarce (ca. 15%).The most common among the rhynchonellids are: *Cuneirhynchia fraasi* (Opp.), *Prionorhynchia polyptycha* (Opp.), and *Calcirhynchia* (?) *plicatissima* (Quenst.), among the terebratulids *Lobothyris* ex gr*. punctata* (Sow.), *Zeilleria mutabilis* (Opp.), *Zeilleria stapia* (Opp.), and *Zeilleria alpina* (Geyer). Smooth species like *Liospiriferina alpina* (Opp.) and *Liospiriferina obtusa* (Opp.) occur commonly among spiriferinids. Ribbed spiriferinids are rare (*Dispiriferina*). The assemblages are of Sinemurian age and are similar to those at the classical locality of Hierlatz or to the lower one on Erlakogel near Ebensee. Several new localities were ascertained at the Mitterwand, where a good collection of striate rhynchonellids *Striirhynchia subechinata* (Opp.) was assembled.

Czech-Austrian Joint Programme "KONTAKT" (Ministry of Education, Youth and Sports)
No. 2002-5: Palaeoenvironment and biostratigraphy of the classical Gosau Group within the Hallstatt-Dachstein-Salzkammergut UNESCO World Heritage Site (***M. Svobodová,*** *H. Lobitzer, Geologische Bundesanstalt Wien, L. Hradecká & L. Švábenická, Czech Geological Survey, Prague)*

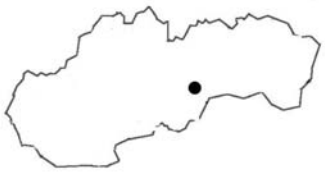
Palaeoenvironmental and biostratigraphic investigations were carried out on the samples of marlstones from the classical localities of the Gosau Formation – Eisenbach, Hofergraben, Wolfgangsee (Northern Calcareous Alps, Upper Austria). Using palynomorphs, foraminifers, and calcareous nannofossils, the sediments of the "Hofergrabenmergel" of the Hochmoos Formation in Gosau were dated to the Upper Coniacian/Santonian. Two samples of the marly top-layers above economically exploited sandstones from Gosau grinding stone quarry of the classical area of the Ressen Formation (Upper Gosau Subgroup) were studied for the presence of palynomorphs and calcareous nanofossils. The presence of nannofossil species *Broinsonia parca parca* evidenced Zone UC14a, lower part of the Lower Campanian. From the paleoecological point of view, the presence of ceratioid dinocyst type *Odontochitina operculata* and *Dinogymnium* characterizes shallow marine conditions.

Bilateral cooperation between the Institute of Geology AS CR and the Centre de Paleontologie stratigraphique et Paléoécologie, CNRS, Université Claude-Bernard, Lyon
Project: Diversification of Normapolles during the Cenomanian and Turonian: An example from Bohemian-Saxonian Basin and SE France (*H. Méon, G. Guignard, Centre de Paleontologie stratigraphique et Paléoécologie, CNRS, Université Claude-Bernard, Lyonn &* ***M. Svobodová****)*

The aim of this project was to document the rise and dispersal of the angiosperm pollen from the Normapolles group during the Cenomanian and Turonian. We documented a rise and dispersal of the first Normapolles genera – *Atlantopollis* and *Complexiopollis* during the Late Middle Cenomanian in marginal marine environment in the boreholes of the Bohemian Cretaceous Basin and in the Vienne Department, western France. Several primitive types of the genus *Complexiopollis* and *Atlantopollis* were found in the *jukes-brownei* Zone. Normapolles pollen are rare in the Cenomanian and Lower Turonian sediments of the

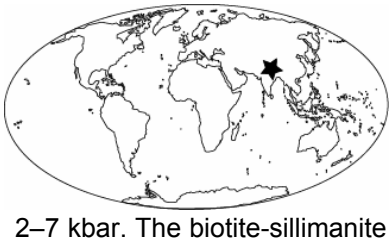
Bohemian Cretaceous Basin but abundant, of bigger size and more diverse in France. Some new taxa as *Trudopollis* or *Vacuopollis* appear during the Middle Turonian, and this trend is striking especially in the Late Turonian.

Czech-Slovak Joint Programme. Agreement of scientific co-operation between Administration of Slovak Caves, Liptovský Mikuláš and Institute of Geology, AS CR
Project: Palaeomagnetic dating of karst fills in selected caves of Slovakia (***P. Pruner, P. Bosák, J. Kadlec, O. Man, D. Venhodová, V. Cílek****, P. Bella, Administration of Slovak Caves, Liptovský Mikuláš, Slovakia, H. Hercman, Institute of Geological Sciences PAN, Warszawa, Poland, D.C. Ford & McMaster University, Hamilton, Canada)*



Ochtiná Aragonite Cave is a 300 m long cryptokarstic cavity with simple linear sections linked to a geometrically irregular spongework labyrinth. The meta-limestones, partly metasomatically altered to ankerite and siderite, occur as isolated lenses in insoluble rocks. Oxygen-enriched meteoric water seeping along the faults caused siderite/ankerite weathering and transformation to ochres that were later removed by mechanical erosion. Corrosion was enhanced by sulphide weathering of gangue minerals and by carbon dioxide released from decomposition of siderite/ankerite. The initial phreatic speleogens, older than 780 ka, were created by dissolution in density-derived convectional cellular circulation conditions of very slow flow. Thermohaline convection cells operating in the flooded cave might also have influenced its morphology. Later vadose corrosional events have altered the original form to a large extent. Water levels have fluctuated many times during its history as the cave filled during wet periods and then slowly drained. Mn-rich loams with Ni-bearing asbolane and birnessite were formed by microbial precipitation in ponds remaining after the floods. Allophane was produced in the acidic environment of sulphide weathering. La-Nd-phosphate and REE enriched Mn-oxide precipitated on geochemical barriers in asbolane layers. Ochres containing about 50 wt.% of water influence the cave microclimate and the precipitation of secondary aragonite. The oldest aragonite generation is preserved as corroded relics in ceiling niches truncated by corrosional bevels. TIMS and alpha counting U series dating has yielded ages of about 500–450 and 138–121 ka, indicating that there have been several episodes of deposition, occurring during Quaternary warm periods (Elsterian 1/2, Eemian). Spiral and acicular forms representing the second generation started to be deposited in the Late Glacial (14 ka – Alleröd) times. The youngest aragonite, frostwork, continues to be deposited today. Both of the younger generations have similar isotopic compositions, indicating that they originated in conditions very similar, or identical, to those found at present in the cave.

Czech-Japan Joint Programme "KONTAKT" (Ministry of Education, Youth and Sports CR)
Project No. ME679: Correlation between European and Asian Hercynides: a consistent model of exhumation? (***M. Svojtka*** *& T. Hirajima, Kyoto University)*



The complex of sillimanite-, kyanite- and cordierite-bearing gneisses, calc-silicates and amphibolites (Barun gneisses) above the MCT zone in eastern Nepalese High Himalaya is intruded by protolith of migmatitic orthogneisses and overlain by biotite-sillimanite paragneisses. The rocks have experienced a clockwise P-T evolution in response to crustal thickening during the collision (T_{max} = 800 °C, P = 8–10 kbar) followed by decompression and crustal melting at P = 2–7 kbar. The biotite-sillimanite paragneisses in the upper part of the slab were intruded by tourmaline leucogranites of the Makalu massif in the early Miocene – late Oligocene times. We have studied the source of metasedimentary rocks and low-temperature history of the crystalline units in the upper part of the Barun Valley using laser ablation ICPMS U-Pb and fission-track (FT) dating of zircon grains. The U-Pb ages of detrital zircon grains recovered from the biotite-sillimanite paragneiss range from 340–1,700 Ma with several age maxima at ca 500, 700 and 900–1,100 Ma. The U-Pb age data suggest the sedimentary sources of the studied gneisses in the northern part of the Indian plate. The dating also

constrains the minimum deposition age of the protolith of the paragneisses to the early Carboniferous times. Zircon grains from the biotite-sillimanite paragneiss, migmatitic orthogneiss and glacial river sediments from the elevation of 4,600–5,000 m were subject to FT analysis. The fission track lengths in all studied samples are characterized by broadly smooth unimodal distribution with a peak around 10 micrometers (1 sigma) and a positive skewness, interpreted as resulting from a steady slow cooling through the zircon partial annealing zone (PAZ, 230–310 °C). The FT zircon cooling ages for the orthogneiss and paragneiss samples were 7.1 ± 1 Ma and 12.1 ± 1 Ma (1 sigma), respectively, corresponding to an average exhumation cooling rate of ca 26 °C.Ma^{-1} from the late – middle Miocene to the present time. The FT ages of zircons from river sediments (10 ± 0.8 Ma and 9.7 ± 1 Ma, 1 sigma) represent a mixture of the FT zircon cooling ages of rocks exposed in the upper part of the Barun Valley and yield an average cooling rate of 25 °C.Ma^{-1} for the High Himalayan crystalline units in the Makalu region.

Czech-Slovenian Joint Programme "KONTAKT" (Ministry of Education, Youth and Sports CR)
Project No. 2001/009: Evolution of karst and caves based on study of cave fills, Slovenia (***P. Pruner, P. Bosák*** *& A. Mihevc, Institute of Karst Research, ZRC SAZU Postojna, Slovenia*)

Geomorphological evolution of the Podgorski Karst, SW Slovenia reconstructed from palaeomagnetic research of sedimentary fill of the Črnotiče II site: The profile of interior cave facies in the Črnotiče II profile is about 9 m high (Classical Karst, Karst Edge). The sequence is composed of cyclically arranged fluvial sediments (conglomerates, sands, silts, clays) in the lower part and by laminated to banded silts to clays in the upper part. Both parts are separated by pronounced unconformity associated with deep erosion of the lower part of the profile and tectonic tilting. The fill is covered by chaotic boulder breccia with red loamy matrix – collapsed roof. One segment of the cavity wall was covered by tiny tubes of polychaete worms comparable to Recent fresh-water *Marifugia cavatica*. Both profiles show normal magnetozone with only one narrow reverse excursion in each. The correlation of the obtained magnetostratigraphy log can indicate the Gauss chron (ca 2.5 to 3.6 Ma) or another long normal chron. The Črnotiče II site was filled in a substantially short time. The Podgorski karst plateau underwent a complicated geomorphic development since the Miocene with distinct phases of repeated phreatic speleogenesis, vadose evolution, filling, fosslisation, exhumation, block tilting and rotation, uplift and planation. Two principal types of caves exist in the Podgorski karst plateau: old horizontal caves with allogenic fill, and vertical shafts with fill derived from autochthonous sources. Fills of fossil horizontal unroofed caves can be roughly dated back to 4.2–5.2 Ma (Črnotiče I stromatolitic limestones) and 2.5–3.6 Ma (Črnotiče II site). The age difference is indicated also by the declination values reflecting the anticlockwise rotation of the Podgorski plateau by about 19^{o} in the time between the deposition of the fills at both sites. Old horizontal caves represented deep subterranean drainage routes of allogenic water streams directed from flysch regions into limestones. The evolution of vertical drawdown shafts with dominance of younger autochthonous fill resulted from vadose speleogenesis connecting the surface with phreatic zone. Later uplift detached horizontal caves from the hydrological system and fossilized them. Intensive planation processes affected the surface during later evolution, with accelerated intensity in glacial periods, causing the origin of a leveled surface and collapses of cave roofs. Fill of shafts by surface-derived angular gravel mixed with terra rossa-derived matrix took part during the Middle to Late Pleistocene interglacials. U-series ages from carbonate cement (211 ± 43 and 211 ± 13 ka) date the cessation of vertical vadose speleogenesis as the consequence of continuous uplift.

Hungarian Scientific Research Fund (OTKA), Grant No. T 035004: The study of the Quaternary development of the Gömör-Torna Karst and the paleomagnetic research of the sediments from the Baradla Cave

Subproject: Paleomagnetic analysis of sediments from the Baradla Cave, Aggtelek National Park, Hungary (***P. Bosák***, ***J. Kadlec***, ***P. Pruner***, *J. Móga, Department of Geography, Eötvos Loránd University, Budapest, Hungary & H. Hercman, Institute of Geological Sciences, Polish Academy of Sciences, Warsaw, Poland)*

Paleomagnetic and radiometric datings of the fluvial cave sediments preserved in the Baradla Cave indicate the age of deposition younger than 0.78 Ma, which is in agreement with published radiometric datings of speleothems. Sediments belonging to the same period detected also in the Domica Cave (i.e., in the upstream part of the cave system on Slovak side of the border). However, relics of much older fluvial deposits and corroded speleothems are preserved in the Domica Cave. Older fills are absent from the Baradla Cave. Both parts of the cave system reveal clear paragenetic features, which resulted from repeated blockage of cave stream outlets by sediments and/or ice. It is probable, that blockage occurred also within the cave, which is expressed by short phreatic channels bypassing the main filled corridors. The age of the cave system has been still unknown, but the present cave fills represent the result of the last infill phase during the Late Pleistocene. The fill is now slowly eroded away. The invasion vadose passages are connected with the morphogenesis after the deposition of coarse clastics of the Poltár Formation (Pliocene).

Grant Agency of the CR

No. 205/02/P014 Lochkovian conodont zonation (Refinement of conodont biostratigraphy of Lochkovian stage in its classical area of definition - implications for world stratigraphy) (***L. Slavík***)

The main purpose of the project is to establish regional conodont zonation of the Lochkovian stage in the Barrandian area and to fill up a substantial gap in biostratigraphic information. The expected establishment of the regional Lochkovian conodont zonation will contribute remarkably to the solution of ongoing revision of standard global conodont zonal scale for Lower Devonian. As suggested by extensive data processing (105 conodont samples in total from 5 stratigraphic sections), at least three pilot sections are sufficiently covered by biostratigraphic material, and the abundance of conodonts increases stratigraphically upwards. The representatives of the genus *Ancyrodelloides* enter in the uppermost part of the Lochkovian Formation. Their surprising presence in the end of the Lochkovian together with the absence of the "*Pedavis pesavis* group" (late Lochkovian zone-diagnostic taxa) prove a significant gap in sedimentation at this stratigraphic level in the Barrandian area. This fact complicates the solution of late Lochkovian zonation, however, it helps to refine eustatic and paleoenvironmental considerations. On the contrary, the obtained conodont fauna contains less endemics, but many cosmopolitan taxa, which enable effective worldwide correlations. This concerns particularly the similarity of upper Lochkovian conodont faunas from Barrandian sections with those from Spanish Central Pyrenees, where a new global middle and upper Lochkovian zonation has its fundamentals (e.g., Segre I section). Revision of conodont material from upper Lochkovian of the Barrandian area housed in the University of Valencia revealed several important points concerning the original definition of the Lochkovian/Pragian boundary. Material from an auxiliary stratotype section (Černá rokle near Kosoř) furnished an *Eognathodus* with a clear sulcus from bed 76, where the revised Lo/Pg boundary (0.7 m below the original) was then placed, and an *Eognathodus* that can be attributed to the morphotype eta from bed 72 (about 0.5 m below the current L/P boundary at this section). The conodont study of upper Lochkovian also shows that now we can be sure neither about the real beginning of the Pragian Stage according to definition (biostratigraphical index *vs*. stratotype).

No. 205/02/1121 Plant assemblages of the Radnice and Prkenný Důl-Žďárky members of the Late Palaeozoic continental basins of Bohemia (Westphalian) (*S. Opluštil, Faculty of Science, Charles University, Prague, **J. Bek, J. Dašková**, J. Pšenička, West-Bohemian Museum, Plzeň, Z. Šimůnek, J. Drábková & M. Libertín, Czech Geological Survey*)

The localities of Štilec near Žebrák and Ovčín near Radnice were selected for macrofloral and palynological study. Though coeval, plant assemblages from the two localities are different. Plant assemblages of the Štilec locality are relatively uniform with low plants about 1–1.5 m long. Fern *Kidstonia heraclensis* and calamite *Asterophyllites longifolius* dominated. Low diversity of plant assemblages and the absence of arborescent plants suggested that these were pioneer-swamp assemblages. Plant assemblages from the Ovčín locality are more diverse, having 20 natural species of herbaceous genera like *Selaginella, Sphenophyllum* and *Corynepteris*, shrubbby and sub-arborescent taxa like *Cordaites borrasifolius, Spencerites, Medulosa* and arborescent lycopods of genera *Lepidodendron, Lepidofloyos* and *Paralycopodites.* A specimen of arborecent lycopod *Lepidodendron selaginoides* is the biggest find of this species in the world; this find was reported in the media several times.

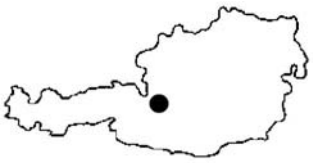
Project: No. 205/03/1124 Biochronology and taxonomy of the Middle Devonian polycystine Radiolaria of the Barrandian (***P. Čejchan***)

Middle Devonian radiolarian, which have been reported from the Barrandian indicate an ocurrence of a rich and diverse radiolarian fauna of quite unique stratigraphic position among the world's Paleozioc radiolarian localities. However, this fauna has not been studied monographically yet. Both albaillellid and entactiniid polycystine radiolarians are present within the fauna. Previous studies indicate the presence of several evolutionary lineages of ceratoikiscids, with several new species characteristic of the Eifelian age. Radiolarian fauna is accompanied by megafauna of goniatites, bivalves, trilobites, etc., and, best of all, also by conodonts. Thus, the hopefully newly established local radiolarian zones would be able to be directly correlated with the standard conodont and goniatite zonations. In the first year of the project, the author carried out a detailed systematic micropalaeontological sampling of the Choteč Formation of the western part of the Barrandian Devonian. He ascertained new localities yielding fossil radiolarians, which could be isolated and determined. Using enhanced methods of chemical preparation, he was able to extract fossil biota from some rock types that yielded only negative results formerly. Polycystine radiolarian biota occurs also at some stratigraphic levels from which it has not been known previously. The author documented the radiolarian biota from novel stratigraphic levels: radiolarians so far determined represent the taxa Entactiniidae, Astroentactiniidae, ?Spongentactiniidae a Ceratoikiscidae. Some lower-level taxa are new.

No. 205/01/0639 Tertiary freshwater and wetland ecosystems of the North Bohemian lignite Basin (*Z.Kvaček, Faculty of Science, Charles University, Prague,* ***M. Konzalová,*** *J. Sakala,* ***J. Dašková*** *& J. Prokop, Faculty of Science, Charles University, Prague*)

Some new significant basinal elements of the flowering plants assignable to the honeysucle, *Loniceraceae*, were detected in the coal seams. Their modern representatives are growing as lianas or bushes and their fossil relatives form probably a notable part of the terrestrial communities in the North Bohemian Lignite Basin (NBB). Another basinal component is represented by herbaceous ferns, which were newly recognized and confirmed as one of the widely spread communities confined to many horizons of growing peat bogs. Although the ferns occur in the palynological records in three or four main groups only, they are rich in individuals and belong to full basinal elements. They were common as peat herbs and partly as lianas. Among ferns, *Hydropteridophytes* (water ferns) also show distinct communities in some horizons. They were recently also recovered in several sections of the Neogene relics in western Bohemia, in lacustrine-fluvial deposits generally linked with the rift basins in N Bohemia and with the South Bohemian basins. The occurrences of their reproductive organs (rests of macrospores) of the same taxa of water ferns as in NBB evidence analogous environments rich in moisture and adequate temperature/climatic conditions. Rich covers of *Salvinia* and *Azolla* water ferns form a part of peat-swamp mire vegetation of the Atlantic North America areas, which are comparable with the NBB azonal vegetation in many aspects.

No. 205/03/1123 Brachiopods of the Northern Calcareous Alps in the fossil record at the Triassic/ Jurassic boundary *(**M. Siblík**)*

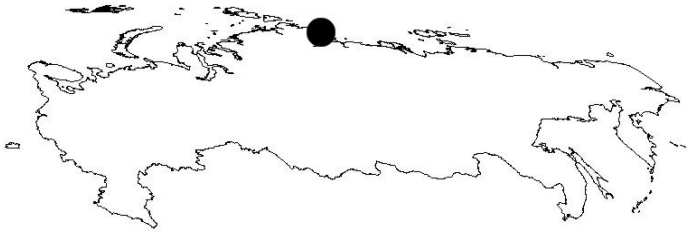


The main point of the project is the study of the development of brachiopod assemblages from the uppermost Triassic to lowermost Jurassic, around the T/J boundary, when the global reduction of marine assemblages took place. The taxonomical revision of the newly found material is based on a detailed study of the interiors of brachiopod shells. The results may enable better recognition of the evolution of the brachiopod group during the global end-Triassic crisis, and extend the present knowledge of past marine environment and palaeogeography. Expected are also new data to the still existing discussions about possible survival of some Triassic species in the Lowermost Liassic. Main task in 2003 was to gain comparative brachiopod material from some well-known Triassic/Jurassic boundary sections and localities such as Goldgrub near Losenstein, Hinteriss area W of Achensee with the localities Vorderskogel, Altjoch, Schlossgraben and Tölzerhütte, and Vorderer Ampelsbach near Achenkirch. Sections yielded mostly Kössen-type brachiopods of the uppermost Triassic only (the common *Fissirhynchia fissicostata* (Suess), *"Rhynchonella" subrimosa* (Schafh.), *Zugmayerella* sp. with lamellibranchs and ammonites at Altjoch and with Choristoceras in Schlossgraben. *Rhaetina gregaria* and *Oxycolpella* are very rare. The Lowermost Liassic brachiopods were ascertained only at Vorderskogel (*Lobothyris andleri* (Opp.)) and in Ampelsbach (*Lobothyris andleri* (Opp.), *Tetrarhynchia inopinata* Sibl. and *Callospiriferina* sp.). Based on their internal structures, terebratulids known in the Kössen facies inside the Dachstein Limestone at Knerzenalm near Blaa Alm (Totes Gebirge) were determined as *Rhaetina gregaria* (Suess).

No. 205/01/1582 Microfossils from the Lower Cretaceous pelitic sediments in the Štramberk area (Outer Western Carpathians): biostratigraphy, paleoecology (***M. Svobodová**, L. Hradecká, L. Švábenická, Czech Geological Survey, Prague & P. Skupien, Technical University Ostrava*)

Lower–Middle Cretaceous dark grey to black pelitic sequences of the Silesian Unit overlying the Tithonian–Lower Berriasian Štramberk limestone body have been studied based on the fossil record and distribution of palynomorphs, foraminifers and calcareous nannofossils. The occurrence of Valanginian–Hauterivian microfossil assemblages was documented in the Plaňava Formation of the Kotouč quarry in Štramberk by diverse spores and gymnosperm pollen, e.g., *Concavissimisporites verrucosus, Staplinisporites caminus, Callialasporites dampieri, Callialasporites trilobatus, Corollina torosa*. Dinocyst assemblage was characterized by *Circulodinium brevispinosum, Cribroperidinium orthoceras, Kiokansium polypes, Systematophora scoriacea.* Foraminiferal assemblages yielded prevailingly benthic specimens of *Lenticulina.* Hauterivian age was evidenced by *Citarina seitzi.* Valanginian Zone CC3 was evidenced by the nannofossil species *Calcicalathina oblongata*, Late Valanginian – Early Hauterivian Zone CC4 by association of *Eifellithus striatus.* Late Barremian deposits were evidenced by dinocysts (e.g., *Odontochitina operculata*) and sporomorphs in one sample in the Obecní lom Quarry, other two samples contained the dinocyst assemblage (*Bourkidinium* sp., *Pseudoceratium pelliferum, Systematophora scoriacea*) corresponding to Late Valanginian – Hauterivian age. Both calcareous nanofossils and foraminifers were not present in these deposits. Late Albian – Late Cenomanian microfossils were documented in the Kotouč Quarry at levels IV, V and VIII. The uppermost Albian Zone BC27/UC0a is characterized by *Watznaueria barnesae, Eifellithus turriseifelii.* The lowermost Cenomanian Zone BC27/UC0c is marked by *Gartnerago theta, Prediscosphaera cretacea.* Late Albian – Cenomanian assemblages were also identified at the Bystrá locality near Frenštát (Godula development) by dinocysts (e.g., *Odontochitina costata, Pervosphaeridium pseudhystrichodinium*) and angiosperm pollen grains from the Normapolles group (*Complexiopollis* div. sp.).

No. 205/02/1576 High-resolution magnetostratigraphic and micropalaeontological correlation across the Jurassic/Cretaceous boundary strata in the Tethyan and Boreal realm (***P. Pruner, V. Houša, M. Chadima, O. Man, S. Šlechta*** *& M. Košťák, Faculty of Science, Charles University, Prague*)



A global standard Jurassic/Cretaceous (J/K) boundary could not be determined during the last decades due to the fact that it is impossible to correlate the Tethyan and Boreal realms because of completely different biota. To solve the above mentioned problem, it was decided to elaborate several high-resolution magnetostratigraphic and micropaleontological profiles in both realms. Two reverse subzones were detected within the magnetozones M20n and M19n at three profiles in the Tethyan realm (Brodno near Žilina, western Slovakia; The Bosso Valley, Umbria, central Italy; Puerto Escaño, Province of Córdoba, southern Spain). The reverse subzones proposed to be named ”Kysuca Subzone” in M20n and ”Brodno Subzone” in M19n were precisely localized. Stratigraphically significant calpionellid events occupy an identical position in relation to magnetozones and subzones derived from all the sections.The transition from N (R) to R (N) polarity of the Earth´s palaeomagnetic field was inferred indicating the duration of the transition within a time interval of ± 5ka. At present, we investigate J/K profile in the Boreal realm which is located in the north of Middle Siberia on the Nordvik Peninsula. Fossils are very abundant there, but all completely different compared to the Tethyan realm biota. This section was proposed as the standard section of the Boreal Berriasian. The innovation of progress was to introduce the method of magnetostratigraphic investigation to determine the component Natural Remanent Magnetization based on the thermal demagnetization spectrum.

The Boreal profile on the Nordvik Peninsula. (P. Pruner et al.)

No. 205/02/0449 Cave deposits and development of karst features in the Berounka River valley in the Bohemian Karst (*K. Žák, Czech Geological Survey,* ***J. Kadlec*** & ***V. Cílek***)

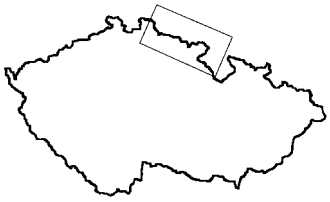
Oriented samples were collected from two sedimentary sections in the Koněpruské Caves. Mostly normal paleomagnetic polarities dominated in the sediments indicating Late Pliocene or Early Pleistocene age of deposition. This interpretation is supported by flowstone datings and previous paleontological data. The paleomagnetic data (normal polarities) obtained from floodplain deposits at the Kruhový Quarry suggest the early Mid Pleistocene age of fluvial processes.

No. 206/01/1580 Asteroidea (Echinodermata) from the Upper Cretaceous of Bohemia (***J. Žítt***)

Based on isolated skeletal elements, about 29 species were identified in the yet unknown asteroid faunas of the Bohemian Cretaceous Basin (nearshore facies, Upper Cenomanian – lower Middle Turonian). The following families are represented in the studied assemblages: Goniasteridae (13 species), Pycinasteridae (4 species), Stauranderasteridae (5 species), Sphaerasteridae (1 species), Astropectinidae (2 species), Benthopectinidae (1 species), Asteriidae (1 species), Fam. indet. 1 (with *Arthraster cristatus*)), Fam. indet. 2 (with "*Oreaster*" *decoratus*). "*Oreaster*" *decoratus* Geinitz and *Haccourtaster* sp.n. 1 and 2 seem to be the most important finds now. The studied assemblages show a high species diversity both in the Upper Cenomanian and the Lower to Middle Turonian. The highest diversity was found in a single horizon at Velim-Václav (15 species) and Zbyslav (12 species). These numbers apparently reflect not only the dynamics of benthic populations through the time interval of the respective sedimentation but also the wide range of habitats in nearshore rocky-bottom zones. More or less complete asteroid skeletons (NM, Prague; Korycany Member, Upper Cenomanian) belong to a large pycinasterid (?) species. Complete asteroid specimens imprinted in coarse sandstones (Middle Turonian, eastern Bohemia) are referred to *Stellaster (?) schulzei* Cotta et Reich. Several genera of living asteroids provided comparative morpho-functional data. A computer catalogue of dissociated skeletal elements of the studied fossil asteroids was established. The data from the disc version will continuously supply the author´s asteroid web sites.

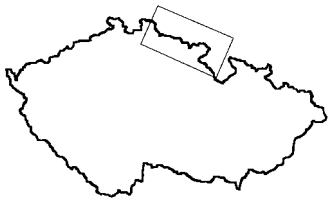
Grant Agency of the Academy of Sciences CR

No. A3111102/013 Pre-Variscan and Variscan tectonomagmatic development of the West Sudetes: the Ještěd Ridge as an example (*V. Kachlík, Faculty of Science, Charles University, Prague,* ***M. Fajst & F. Patočka***)
Subproject: Sheared metagranitoids in the Ještěd Range Mts.: the role in the westward propagation of the Variscan orogenic wedge in the West Sudetes (*V. Kachlík, Faculty of Science, Charles University, Prague,* ***M. Fajst*** *&* ***F. Patočka***)



Strongly deformed and mylonitized (and additionally recrystallized) metagranitoids of Neoproterozoic age of protolith were found in broad neighborhood of Kryštofovo Údolí in the Ještěd Unit, which forms an apparently allochthonous part of the Krkonoše-Jizera Crystalline Complex. These rocks can be traced as horizons of lens-shaped bodies, which separate slices of Paleozoic metasediments. The evidence of this age determination is based on geochemical studies of rocks in micro-boudins as well as whole-rock analyses. This finding is most probably a direct evidence of nappe structures in the Ještěd Paleozoic. According to previous opinions published by J. Chaloupský et al., these rocks were interpreted as pebbly clastic sediments, which would have a significance of putative marine transgression markers that covered the erosion surfaces after hypothetical hiatuses in Paleozoic sequences. The present geological survey with mapping of these rocks in detail suggest that rock compositions of units in these areas correspond to relatively continuous development of Paleozoic sedimentary facies. Of course, the original stratigraphic columns compiled from all metamorphosed and deformed relicts are partly different as concerns the NE Krkonoše Mountains and Ještěd Ridge, as they are Cambrian – Early Devonian and Cambrian?-Silurian – Early Carboniferous, respectively.

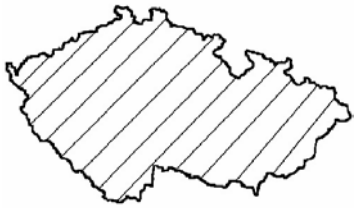
No. A3013209 Weathering products trapped in pure limestone on carbonate platforms: record of climate and early diagenesis (***J. Hladil, P. Bosák, L. Slavík, A. Langrová, P. Pruner, O. Man, A. Galle****, M. Geršl, H. Gilíková & K. Kučerová-Charvátová, Masaryk University, Brno*)



Proportion of non-carbonate material from atmospheric deposits. The trace-element and rare earth element geochemistry of dispersed weathering products trapped in carbonates was tested for solution of two tasks: (1) separation of wide regional to global eolian atmospheric deposits from local aquatic suspensions and (2) characterisation of both inherited and synsedimentary tectonic settings. The studies of carbonate units from different parts of the Sudetes suggest that former microcontinents amalgamated in this area originated from different parts of seas and had a different and eventful history during the Middle and Late Devonian. The significant proportions of atmospheric deposits were found practically in all sedimentary and (meta)sedimentary carbonates of this as well as neighboring areas (e.g., Lusatia and Barrandian). It is only an unrealistic myth that atmospheric depositions were negligible. This myth is based on present (interglacial) average values for the entire Earth surface area, which are approximately $1.5 \cdot 10^{-13}$ kg m^{-2} s^{-1} (i.e., ~ 5 kilograms per square meter and million of years). However, it can be easy demonstrated, using the present reviews about deposition of eolian dust and mineral aerosols, that areas with carbonate production have a great supply of these atmospheric deposits, which fluctuates in long-term averages from $1.5 \cdot 10^{-10}$ to $1.5 \cdot 10^{-9}$ kg m^{-2} s^{-1} (i.e., ~ 5 to 50 tons per square meter and million of years). It corresponds, by 20 $m.Ma^{-1}$ accumulation rate of pure carbonate, for instance, to a maximum possible proportion of this substance (trapped in carbonate), which is equal to 10–50 %. However, this amount is commonly reduced (washed and dissolved) to ½ – ¼ of original mass, i.e. ~ 2.5–5 to 12.5–25 % of the rock mass. This implies also that the originaly airborne non-carbonate material is usually much more abundant in carbonate sequences than typically aquatic mud from river deltas. See the paper, which can exemplify the related results – Hladil J., Patočka F., Kachlík V., Melichar R. & Hubačík M. (2003):

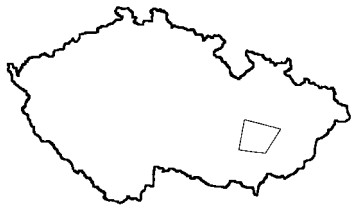
Metamorphosed carbonates of Krkonoše Mountains and Paleozoic evolution of Sudetic terranes (NE Bohemia, Czech Republic). – Geologica Carpathica 54, 5: 281-297. Bratislava, Slovakia.

No. IAA3013006/00 New feldspar cooling-rate speedometer based on experimental data and its implication on selected rocks of the Bohemian Massif (***M. Svojtka,*** *M. Vach* & *M. Drábek, Czech Geological Survey, Prague*)



The composition of feldspar grains from igneous rocks is frequently altered by chemical diffusion. Therefore, the data on diffusion rates of cations in feldspars in the subsolidus may help to explain the T-t history of rocks. Heating experiments were performed under dry conditions at atmospheric pressure and in the temperature range of 800–1,000 °C. The temperature was measured with Pt-PtRh thermocouples with a precision of ± 3 °C. As starting material were used K-feldspar (13.6–14.8 wt.% K_2O) with albite exsolution lamellae (30 mm) of composition 11.5–12.5 wt% Na_2O. Feldspar samples were packed in Pt-foil to avoid contact with the surrounding ceramic. In the experiments, diffusion was measured along several crystallographic orientations: normal to (001) and (010), parallel to (110). Diffusion profiles were measured on an electron microprobe with an ED system before and after heating. The step between measured points was 2 and 4 mm. Laser spots and BSE imaging were used for orientation in the sample studied. Lamellar feldspars appear promising for the determination of cooling history. Diffusion profiles measured in identical spots before and after heating appear to be more suitable than statistically determined diffusion coefficients. An equation for a semi-infinite medium with a constant concentration on the surface (for elemental concentration at grain boundaries different from zero and assuming a constant temperature) were used for the determination of diffussion coefficients. Diffusion coefficients in K-feldspar at 1,000 °C vary depending on crystallographic orientation: $D_{Na}(001) = 10^{-11.8}$; $D_{Na}(100) = 10^{-12.3}$ to $D_{Na}(010) = 10^{-13.2}$ cm^2s^{-1}. The most favorable direction for the determination of K-feldspar geospeedometer appears to be the direction [001].

No. A3013207 Devonian corals of the Bohemian Massif (***A. Galle, J. Hladil*** & ***L. Slavík***)

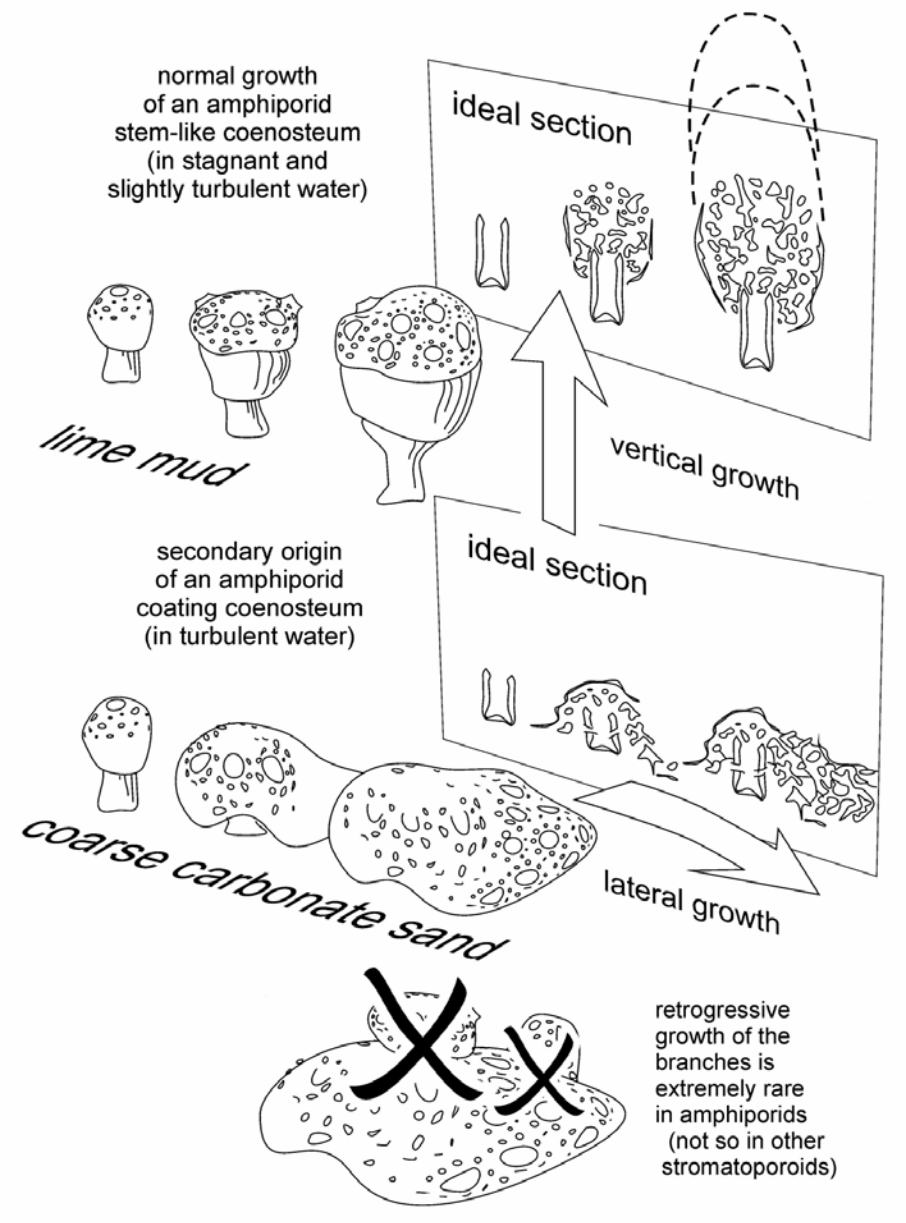


A systematic description of the rugosan taxa from the Moravian Devonian was completed. They display strong relations not only to Central and West European rugose faunas but also to those from Iberia, Russian Platform, and the Urals. Moravian Devonian rugosans are less numerous and less diverse if compared to Devonian faunas of Germany, Poland, or Russian Platform. It is true also in the case of Late Frasnian radiation which occurred prior to Late Frasnian and Famennian extinction.

Subproject: New documents about the origin of rock-forming Mid-Paleozoic sponge morphs (***J. Hladil****, in cooperation with* ***L. Slavík*** *– biostratigraphic correlation framework*)

Amphiporids are thin finger- or straw-shaped sponge morphs, which massively colonized shallow-water plains in Middle Devonian epeiric seas. Although these organisms were classified as stromatoporoids in the last one hundred years (formerly interpreted as "hydrozoans" and during last decade as "sponges"), the present investigations of their early growth stages put serious doubts on these traditional ideas and suggest that amphiporids have a completely different origin. Several Middle to Late Devonian amphiporids form a small bottom disc first, then a primary tube, and with the last stage the typical spongy tissues, which gradually swell to reach the full diameter of normal amphiporids. The most common species among all amphiporids – *Amphipora ramosa* – has partly different early growth stages, where the disc and primary tube are sub-compact, forming thick irregular can- or sack-shaped capsulae. The saber-shaped pillars and spongy to vesicular tissues usually develop earlier, during first one or two millimetres of growth. The presence of bottom disc and primary tube in early stages of growth do not agree with the common "sponge" classification of amphiporids and clearly points to some

ancient protozoan ancestors of archaeocyaths and cnidarians. The amphiporids are probably a separate evolutionary lineage, which originated as early as during the end-Proterozoic times but was waiting nearly 200 million years for their main bloom. The investigation of early growth stages at separate species suggest, that the spectrum of the most common Middle Devonian amphiporid species has a considerable disparity. For example, *A. rudis* and *A. ramosa* are only distant relatives within this group of amphiporids. Compare the illustrated journal abstract, which can exemplify the related results – Hladil J. (2003): Amphipora ontogeny. 9th International Symposium on Fossil Cnidaria and Porifera, Graz (Austria), August 3-7, 2003, Abstracts. – Berichte des Institutes für Geologie und Paläontologie der Karl-Franzens-Universität, 7: 35. Graz, Austria.



Successive formation of bottom disc, primary tube and spongy tissues of amphiporids: relationships of adult skeleton shapes to the character of substrate and calm or turbulent water. (J. Hladil et al.)
The growth of coating shapes of amphiporids can be also triggered by extreme activity of grazers, borers or intraskeleton commensalists. Reconstructions are based on thin-section material from the Givetian and Frasnian (Devonian) of the Moravian Karst.

No. KJB3111305 Spatial and temporal changes of sandstone provenance in the Krkonoše Piedmont Basin and their tectonosedimentary implications (*K. Martínek, Charles University, Prague,* ***M. Svojtka*** *&* ***R. Mikuláš***)

The project aims to define the provenance of the Krkonoše Piedmont Basin deposits (NE Bohemia), sediment dispersal pathways and erosional history of source areas based on the heavy mineral analysis, U/Pb ages of detrital zircon and fission track analysis of detrital apatites. The first part of the project carried out in 2003 was aimed at two aspects: i) the study of ichnofabric and ii) fission track samples preparation for dating.
The study of ichnofabrics showed that the bioturbation probably appeared under two basic situations: 1) sediments deposited on soil and vegetal cover were affected by surficial bioturbate textures (*Mermia* isp.); which were usually soon eliminated by mechanic structures (namely raindrop imprints) and sporadically by footprints of terrestrial animals. Bases of these layers was moderately reworked by in-fauna and vegetation; 2) frozen ichnofabric profiles, often at the base of channels. The surfaces are are only rarely covered with fine grooves (*Mermia*); low tiers consists of simple feeding traces (*Planolites*) and sporadically also of back-filled tunnels (*Scoyenia*). In the fossil record, the first ichnofabric is typical for muddy to silty sediments of crevasse splays in the Permian of the Krkonoše Piedmont Basin, while the second one is typical for sequences of fluviatlie, coarse-to-medium grained sandstones. For fission track study, zircons and apatites were extracted from samples using crushing, sieving, Wilfley table and a standard heavy liquid and magnetic separation. The last magnetic fraction was handpicked. Only oval apatite grains were used for further analysis. Muscovite thin detector with extremely low uranium content was attached on the mineral mounts to register induced FT's in precisely known geometry. The same external detector was used on the mounts of dosimeter glass CN5. All samples were irradiated in the facilities of Gent University Research Reactor with nominal thermal, epithermal and fast neutron fluxes of 1.018×10^{16} cm^{-2} s^{-1}.
The samples will be counted (track lengths and angles) and T-t path reconstructed after reduction of neutron fluxes.

No. A3048201 Geochemistry of the phonolite-trachyte magmas: their sources and fractionation trends – examples from the Bohemian Massif (*Z. Řanda, J. Frána, J. Kučera – Nuclear Physics Institute AS CR,* ***J.K. Novák*** *&* ***J. Ulrych***)

Subproject: On the origin of pseudoleucite from Cenozoic phonolite dyke from Loučná, Krušné hory Mts., Bohemia (***J. Ulrych****,* ***E. Pivec*** *&* ***A. Langrová***)

Euhedral (trapezohedral) pseudoleucite megacrysts and pseudoleucite aggregates occur in Cenozoic porphyritic phonolite. Pseudoleucite comprises aggregates of several components, the chief of which (80–90 % modal) is K-feldspar. Ba-rich sanidine (BaO = 1.6 wt.%) has been partly replaced by disordered K-feldspar with a structural state intermediate between orthoclase and sanidine, and is preserved only in the orthoclase crystal cores. Minor components are dioctahedral 1M muscovite and relict analcime. The pseudoleucites are inferred to have grown in several stages: (1) Initial crystallization of leucite. (2) Transformation of leucite to analcime through reaction with sodium-rich fluids ("pseudoleucite reaction"). (3) An increase in P_{H2O} then initiated the crystallization of K-feldspar at the expense of both leucite and analcime. The original (high-temperature) mineralogy and chemistry of both pseudoleucite and the host phonolite were subsequently strongly modified by late-stage hydrothermal processes.

Subproject: Geochemistry of Cenozoic Loučná-Oberwiesenthal Complex in the Krušné hory Mts. (***J. Ulrych, A. Langrová, J.K. Novák, M. Lang*** & *Z. Řanda*)

The Loučná-Oberwiesenthal complex represents the largest volcanic remnant in the Krušné hory Mts. (Saxothuringian Zone) comprising olivine-free nephelinite – teprite – phonotephrite – phonolite volcanic products. Nephelinites and tephrites from Loučná (31 Ma) contain alkali pyroxenite and ijolite xenoliths. The phlogopite-bearing alkali pyroxenites are protogranular or porphyroclastic in texture with dominant clinopyroxene (Si-deficient Al-Fe^{3+}diopside). Schorlomitic garnet, titanomagnetite, phlogopite and perovskite represent minor phases. Variable contents of zeolitized salic phase/s of feldspathoid (nepheline?) type imply transitions from alkali pyroxenites into ijolites. Multicomponent variation diagrams and REE patterns represent LREE–enriched rock types. Megacrysts of Al-Fe^{3+}diopside (up to 20–30 mm in size) found in some samples are xenocrysts of the tephrite host rock. The ijolites are characterized by zeolitized (analcimized) feldspathoid (nepheline?) as a dominant phase. Minor Al-Fe^{3+}diopside and accessory perovskite, Sr-apatite, magnetite, and sphene are the primary phases, calcite, strontianite and chalcedony in vesicles belong to secondary minerals.

No. A3013302 Tectonic and volcanic controls on hydrothermal silicification in marginal zones of the Ohře Rift (***J. Adamovič, J. Ulrych, V. Cajz, J.K. Novák, R. Mikuláš*** & *J. Zachariáš, Charles University, Prague*)

Three types of hydrothermal silicification in marginal zones of the Ohře Rift were distinguished: (1) silicification of sandstones in narrow zones along contacts of polzenite dykes, often associated with columnar jointing of sandstone, (2) silicification of broader tectonic zones in proximity of phonolitic bodies and in their hangingwall, 3. areally extensive silicification below sealing horizons, associated with fluoritization and baritization. Three processes were distinguished in sandstones: (i) pressure solution of quartz grains, (ii) overgrowths of quartz grains with secondary quartz cement until complete filling of pores, (iii) filling of voids and joints with chalcedony. A similar profile of porosity reduction was encountered in sandstones in the proximity of basaltic and phonolitic intrusions: due to alkaline quartz dissolution, secondary porosity develops in the proximal zone of compressed sandstone, distally passing to the zone of silica oversaturation with porosity close to zero. Silicification effects were documented to the distance of 30–40 m from the phonolite intrusion. In the further course of the project, the newly formed cement will be characterized in terms of its chemistry, temperature and convective paths of fluids as a possible example of volcanism-related mineralization in rift basins.

No. A3013102 Structural aspects of the evolution of volcanic centres: the České středohoří Mts. as an example (***V. Cajz, J. Adamovič,*** *J. Mrlina & B. Chán, Institute of Geophysics ASCR*)

Subproject: Tectonic setting identification (***V. Cajz & J. Adamovič***)

As the study of a relatively small area of the volcanic centre revealed a great role of tectonics for the emplacement of the rocks of the dyke swarm, continued studies were aimed to recognize the tectonic setting in a wider area around the centre. The centre itself was also composed of vents producing basaltic material of superficial volcanic products, at that time. These products are divided into two significantly different units due to lithostratigraphy. This was used with adventage for the identification of important tectonic structures. This research brought completely new view on tectonics inside the rift limits in the studied area. In the transverse course to the rift, only several previously known faults were confirmed and some of new ones were recognized. Especially faults subparallel to the rift course were identified, but their character does not allow to intrepret them as the superficial manifestation of the supposed central rift fault. The field method of

investigation allowed to identify mostly normal component of movement on faults, but strike-slip component was also found. The detailed course of the newly identified rift-subparallel fault field (Tašov Fault and Babiny Fault) shows a great influence of strike-slip movement. The volcanic centre seems to have formed between two transverse structures (Zubrnice Fault and Verneřice Fault) the course of which is parallel to the Ploučnice Fault – the significant structure in the rift-fill history.

No. IAA3111103 Concentration of sulfur and trace elements in the world average bituminous and anthracite coal seam (***J. Pešek***)

Late Paleozoic bituminous coal in the Czech Republic is burnt in only two power plants whose emissions are closely watched because of possible ecological damage. These coals are characterized by generally low contents of sulphur (not exceeding 1%) and considerabe variation in the concentrations of trace elements. The analysed coal samples showed a wide spectrum of ash contents from 2.8 to 48 %. The differences in ash and sulphur contents, mineralogical and petrographic composition of coal are reflected in different proportion of trace elements in the coal ash (in ppm): Ag <2–61.9, As 5.8–237.4, Au <10, B <20–140, Ba 457–6,170, Be <1–122.1, Bi <0.8–5.7, Cd 0.15–7.1, Co 10–296, Cr 13.1–287, Cs 1.1–164, Cu 17–1,254, Ga 1.2–60.6, Ge 1.8–37.9, Hg 0.01–0.36, Mn 56–3470, Mo 4.5–66.0, Nb 0.71–24.6, Ni 28–684, Pb 2–9,550, Rb 4.1–293, Sb 1.1–26.1, Sc <4–66.5, Se 0.38–3.4, Sn 4.1–60.5, Sr 183–1,660, Te 0.22–1.9, Th <8–80, Tl 1.1–44, U 1.1–39.9, V 15.1–1,500, Y 13.1–116, Zn <4–890, Zr 17.9–826. When comparing contents of trace elements found in our samples with those so far reported in the ash of bituminous coal from basins of the Czech Republic (cf. Bouška 1981), it can be stated that the concetrations of Ag, Ba, Be, Co, Mn and Sn observed in our samples are generally slightly higher, except for Ag, which exceeds the earlier contents by as much as ten times. It is to be also noted that the contents of Ag, Cs, Nb, Pb, Rb and Tl are generally much higher than the highest values reported in the past.

No. A3013306 Paleoecological pattern of Coal Seams of the Lampertice Member, Jan Šverma Mine, Intra-Sudetic Basin (Langsettian) (***J. Dašková, J. Bek,*** *S. Opluštil, Faculty of Science, Charles University, Prague, J. Pšenička, West-Bohemian Museum, Plzeň, Z. Šimůnek, J. Drábková, Czech Geological Survey & M. Libertín, National Museum, Prague*)

Opencast mining in the former Jan Šverma Mine provides very good and the last chance for paleoecological research of Upper Carboniferous (lower Westphalian) swamp biotopes of the Intra-Sudetic Basin. The project combines sedimentological, geological and palaeontological methods of research. In this year the data acquired within the 2001–2002 were digitized. The paleobotanical material was collected and saved in the collections of the National Museum and Czech Geological Survey. Maceration and taxonomical studies of palynological material were also started. Coal-mining activities will continue only for a few next years. The main aims of the project are: characterization of fossil plant assemblages, their specific and generic composition, paleoecological characteristics of biotopes, characteristics of sedimentary environments and main sedimentary processes of swamps of the studied coal seams and clastic systems where coal seams originated.

No. A3013206 Larval development and metamorphosis of extinct amphibians *Palaeobatrachidae* and *Pipidae* (Anura) (***Z. Roček***)

A detailed account of the development of skeletal and some soft-tissue structures is based on 171 fossil tadpoles and metamorphosing froglets of *Palaeobatrachus* from the Late Oligocene of the Czech Republic (Bechlejovice locality). Their exceptionally good preservation resulted from fossilization in diatomites. The fossil developmental series was compared with normal development of the contemporary anuran *Xenopus laevis* (Pipidae) represented by cleared and stained (alizarin/toluidin-blue) whole-mount specimens. The comparison revealed that in spite of the differences in the sequence of ossification and its timing (e.g., ossification of the otic capsules and ribs was retarded in *Xenopus* whereas dermal ossification was retarded in *Palaeobatrachus*), in the number of free ribs, and in the composition of the sacral region (the synsacrum in *Palaeobatrachus* involves two posterior presacrals, whereas there is a single sacral in *Xenopus*), both genera were similar in a great number of anatomical features that appear during development. The most important difference is the shape of vertebral centrum (procoelous in *Palaeobatrachus*, opisthocoelous in all Pipidae) which is formed in comparatively early developmental stages. A view that could result from anatomical comparisons is that *Palaeobatrachus* could be derived from the Pipidae, but this is doubtful due to biostratigraphic and palaeogeographic discrepancies. The earliest palaeobatrachids were recorded from the Late Cretaceous of Europe but pipids could not invade northern continents after the early Cretaceous when the Tethys Sea prevented interchanges of anuran faunas. Also, all palaeobatrachids retain primitive anatomical features (e.g., five pairs of ribs) that were more derived even in the earliest pipids from the Lower Cretaceous of Israel.

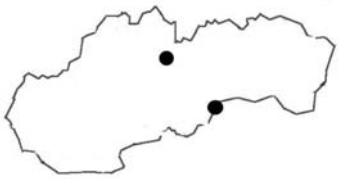
No. B3013203 Recent biogeochemical cycling of II.a group of elements in a forested landscape with granite bedrock: a comparative study (*Principal investigator* ***T. Navrátil***, *contributions* ***I. Dobešová, P. Skřivan, M. Burian, A. Žigová, M. Filippi*** & ***M. Karlík***)

The main rock-forming minerals of the experimental catchment bedrock, monzogranite and syenogranite, are quartz, plagioclase, orthoclase and biotite. The abundance of II.A group elements in the bedrock decreases in the order Ca > Mg > Ba > Sr > Be. The most important source of Be, Ca and Sr is plagioclase. Orthoclase is equally important as a source of Sr and is the major source of Ba. The highest concentrations of Mg were found in biotite, the only mafic rock-forming mineral present. The regolith rock was depleted in II.A elements in the following descending order: Ca (54 % lower concentration), Ba (40 %), Be (31%) and Mg (17 %). Surprisingly, the concentration of Sr was maintained perhaps due to resistance of orthoclase to weathering and/or the incorporation of released Sr into secondary minerals. The acid soils at LP catchment are depleted most notably in Ca with respect to the bedrock composition. Elevated leachable (0.1M HNO_3) concentrations of Mg, Ca, Sr and Ba occurred in the organic horizon as a result of biological recycling. The absence of a similar accumulation of Be in the organic horizon suggests its rapid mobilization from the organic material during and after its decomposition. Beryllium leachable concentrations increased downwards in the soil profile due to its pronounced mobilization under acid conditions. The leachable concentrations of Mg, Ca, Sr and Ba decreased in the middle part of the profile, then increased just above the bedrock due to weathering inputs.

The mean annual concentrations of Be, Ca, Mg and Sr in streamwater of LP catchment gradually decreased due to differing reasons. The mean Be concentrations decreased as a result of lower levels of acid deposition and consequential increased pH of streamwater. The behavior of beryllium in LP streamwater is the most similar to that of Al. The concentrations of both Be and Al are controlled before all by the streamwater pH value. Concentrations of Ca and Mg decreased due to the decrease of SO_4^{2-} concentration in the streamwater. The decrease in the SO_4^{2-} concentration in turn is due to the decreased acid deposition loading to the catchment. The concentrations of Be, Mg, Ca and Sr increase during episodic events especially due to concurrently increasing SO_4^{2-} concentration. Barium

concentrations in the streamwater were higher than theoretical equilibrium concentrations calculated with respect to the K_{sp} of $BaSO_4$. The excess Ba in the streamwater is probably the result of decreased pH, which has the effect of increasing the K_{sp} of $BaSO_4$. The solubility product of $BaSO_4$ seems to limit the Ba concentrations in the LP circum-neutral shallow groundwater.

No. A 3011201 Magnetostratigraphy and mineral magnetic study of cave and river deposits in Central Europe (***P. Bosák, J. Kadlec, P. Pruner, O. Man*** & ***M. Chadima***)



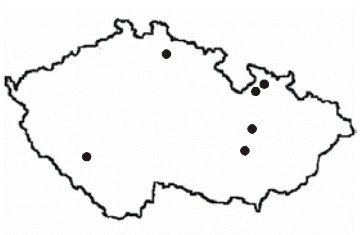
Paleomagnetic polarity was measured both in clastic and chemogenic cave deposits in karst areas in Slovakia, Hungary and Slovenia. The age of hydrological processes in the caves can be estimated based on paleomagnetic data and radiometric dating of speleothems. Up to eleven cave levels filled with allochthonous sediments occur at different altitudes in the Nízké Tatry karst valleys. The fluvial cave sediments are intercalated with, or capped by, flowstone layers in the sedimentary sections. These sediments were deposited during the Brunhes, Matuyama, Gauss and Gilbert chrons. Further analyses will allow to assess factors which influenced mineral magnetic properties of the sediments (e.g., weathering, erosion, source area). The age of deposition in the Domica–Baradla cave system could be estimated to Middle to Late Pleistocene based on our results.
Based on the obtained polarity data from sediments exposed in the caves in the Nízké Tatry Mts. we are able to distinguish sediments deposited during the Brunhes, Matuyama and Gauss chrons. The highest cave levels contain the oldest cave deposits. The cave levels were filled with fluvial sediments in dependence on deepening of the Demänovská and Jánska valleys caused by Neogene and Pleistocene uplift of the Nízke Tatry Mts. The stratigraphic interpretation was partly verified by U-series datings of speleothems preserved in the sedimentary sections. Except for the horizontal cave levels located in the karst valleys, additional cave systems were formed at extremely high altitudes in the Nízké Tatry Mts. Preliminary data show predominantly reverse paleomagnetic orientations in fluvial sediments preserved in these high-located caves. Based on this knowledge we suppose the fluvial activity in these caves and deposition of clastic sediments during the Gilbert chron.

No. A8002406 Start of the human activities in the Doubrava River flood plain (*I. Pavlů, Institute of Archaeology ASCR &* ***J. Kadlec***)

The joint project conducted together with the Institute of Archaeology ASCR has continued on schedule. Ground-penetrating radar measurements were applied to determine the architecture of Holocene fluvial deposits – both channel and meander and flood-plain sediments near Habrkovice. The geophysical interpretation was verified by two excavated test pits 3 m deep. Charcoal exposed at the base of abandoned meander clay fill was dated by radiocarbon method in the Radiocarbon Laboratory in Poznan (Poland). The charcoal is 3,855 ± 35 years old. This datum indicates a change in river behaviour. The meanders started to fill with clay-dominated deposits during frequent floods, which resulted from deforestation in the catchment.

Grants of the Charles University, Prague

No. GAUK 197/2001/B-GEO/PřF The age of groundwater aquifers as reflected by isotope composition (^{3}H, $^{18}O/^{16}O$) (*J. Bruthans, Faculty of Science, Charles University, Prague &* ***O. Zeman***)



The application of isotope techniques (^{3}H, ^{18}O) on the study of groundwater mean residence time in karst regions with different geology, tectonics, morphology and intensity of karstification was focused on selected sites with the aim to find significant differences in mean residence time of groundwater. During 2001 and 2002, sampling on tritium and oxygen 18 was performed at eleven karst springs in various areas of the Czech Republic. Each sampling was accompanied by measurement of discharge, temperature and conductivity of spring water. Preliminary results indicate that no significant differences in mean residence time can be found in different areas. The mean residence time of karst groundwater is in most cases on the order of years or few decades.

No. GAUK 227/200/B-GEO/PřF Reconstruction of the environmental changes and the late Variscan development of the eastern part of the Bohemian Massif: Sedimentary and paleontological records of the Boskovice Graben (*K. Martínek, Faculty of Science, Charles University, Z. Šimůnek, J. Drábková, Czech Geological Survey, Prague, S. Nehyba, Faculty of Science, Masaryk University, Brno, S. Štamberg, Regional Museum of Eastern Bohemia, Hradec Králové,* ***J. Zajíc*** *&* ***R. Mikuláš****)*

Sections at the localities of Kladoruby **-** Dolní Pepřík, Moravský Krumlov, Neslovice Creek including Rybičková skála locality, and Oslavany, a profile along the Oslava River were measured and documented from the sedimentological, paleobotanical, palynological, ichnological, and zoopaleontological points of view. The faunal assemblages of investigated localities (during three years) allow to assign fossiliferous horizons to the local biozones based on the aquatic vertebrates. The oldest sediments containing fauna (Zbýšov Horizon; Oslavany and Moravský Krumlov localities) correspond to the base of the *Acanthodes gracilis* Biozone (Asselian or Lower Autunian). The Říčany Horizon (Neslovice Creek including Rybičková skála locality) is only slightly younger. The overlying Zbraslavec Horizon (Zbraslavec and Černá Hora localities), the Zboněk-Svitávka Horizon (locality Svitávka), and the Kochov Horizon (Kochov and Kladoruby localities) belong to the same biozone. The youngest fossiliferous horizons have no equivalents with stratigraphically valuable fauna both in the Krkonoše Piedmont and the Intra-Sudetic Basins. The Lower Prosečné Formation is probably of the same age in the Krkonoše Piedmont Basin. The localities of the Bačov Horizon (Bačov and Obora) belong to the youngest *Xenacanthus decheni* Biozone (Lower Sakmarian or Upper Autunian). Three new vertebrate taxa were distinguished. Their exact descriptions and names will be published soon. The new acanthodian species *Acanthodes* n. sp. comes from the locality Kladoruby - Dolní Pepřík and Košťálov in the Krkonoše Piedmont Basin. This species is based on extraordinarily long dermotrichia of the pectoral fin. The pair of the dominant species *Acanthodes gracilis* and infrequent *Acanthodes* n. sp. with long dermotrichia corresponds to the situation in the Saar-Nahe Basin with the dominant species *Acanthodes bronni* and the long-rayed *Acanthodes tholeyi*. The new actinopterygian species from the Zbýšov Horizon (especially from the Neslovice Creek) shows morphological features of the family Aeduellidae but differs from the genus *Aeduella*. Actinopterygians show close relationship both with actinopterygian fishes of French basins and the Saar-Nahe Basin. The third new vertebrate taxon was identified in the Bačov Horizon of the Obora locality. A representative of the amphibian family Eryopidae (one skull roof) is still undescribed.
The ichnologic study has revealed a horizon containing tetrapod tracks and trackways, which occur several metres below the fossiliferous bituminous limestones of the Bačov Horizon in the northern part of the Boskovice Graben. In the central (poorly preserved) part of the sedimentary fill of the graben (west of Brno), rich ichnofabric features were documented in fine-grained sandstones to siltstones,

showing occasional longer “colonization windows” in dynamic fluvial to lacustrine settings. A classic exposure of the southern portion of the sedimentary fill at Oslavany bears poor bioturbation structures in black “coal” claystones and moderately frequent manifestations of colonization of substrate of the present reddish siltstones and sandstones (?bases of river channels, crevasse splays).

No. GAUK 219/2002/B-GEO/PřF Influence of terrestrial events on the magnetic record of meteorites (*M. Kobr, Faculty of Science, Charles University, Prague &* ***T. Kohout***)

In early solar system history, there are several electromagnetic processes expected that may be capable of magnetizing the primitive solid particles condensating from the solar nebula. The record of these magnetic events can be observed during laboratory studies of meteorites found on the Earth. However, different terrestrial processes can affect the magneto-mineralogy, cause changes in magnetic parameters, and overprint the primary magnetic record.
Using different types of meteorites, we studied the effect of surface heating (when falling through the atmosphere, shock pressure generated by the friction of the atmosphere during the meteorite fall and the terrestrial oxidation and weathering. To document the results of our experiments, we use low- and high-temperature measurements of magnetic susceptibility, measurements of magnetic remanence and its stability and hysteresis parameters. The results show that the terrestrial processes are efficient factor in changing magnetic properties and can overprint the primary magnetic record. Therefore, extreme care has to be taken when selecting samples for primary magnetic component study. In the future, we will use laboratory-obtained physical properties of non-affected meteorites to interpret the space-borne data obtained during space mission to asteroids – parent bodies of meteorites.

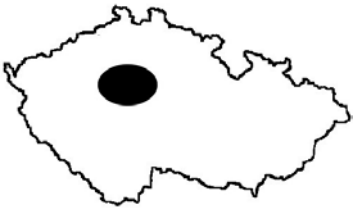
Grants of the state departments

Grant of the Ministry of the Environment
Project No. OG MŽP 18/01 Slope movement hazards in the Litoměřice county – scientific research of neovolcanics (*co-ordinated by P. Kycl, Czech Geological Survey, Prague*)
Subproject: Scientific research of neovolcanics (***V. Cajz***)

Volcanics in the teritory of the former Litoměřice County were subjected to a new geological survey and to basic research orientated at their ability to accelerate or stabilize frequent slope movement activities. Based on this investigation, specialized maps of hazards are prepared to be used by the local authorities and by the Ministry of the Environment. Volcanic rocks participate in the slope movement hazards directly by rockfalls and together with other non-volcanic rock types by yielding the materal for landslides. The slope movement hazards are more frequent on the margins of the Tertiary volcanic complex, where its base is exposed, than inside the complex. Solid volcanics, esp. those with irregular and columnar jointing, are more prone to rockfall if exposed by erosion on steep slopes. Volcaniclastics, which are mostly incoherent and primarily argillic (fine-grained hyaloclastites), are highly prone to landsliding. As erosion exposes the base of the volcanic complex and creates steep slopes, both types of slope movements may occur. Large blocks of volcanics were identified to be sliding on top of the underlying Cretaceous sediments. Geological, tectonic and geomorphic setting were found to be the most important controls on the generation of slope movements in this area.

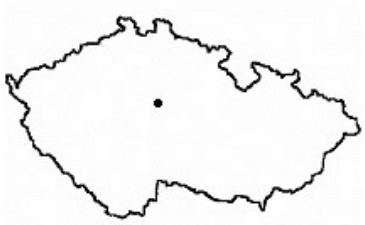
MŠMT Project (Ministry of Education, Youth and Sports)
Project No. OG–9/02: Stratigraphic architecture of the Cenomanian of the Bohemian Cretaceous Basin: relationships of the sedimentary systems and reactivation of the Cretaceous underlying structures (*principal investigator D. Uličný, J. Laurin, L. Špičáková, Institute of Geophysics AS CR, Prague, S. Čech, Czech Geological Survey, Prague, R. Grygar, Technical University Ostrava, J. Košler, Faculty of Science, Charles University, Prague &* ***M. Svobodová***)

Subproject: Palynological analysis of the Cenomanian deposits (***M. Svobodová***)
No. 0045/03: Palynological analysis from the boreholes in the areas of Poděbrady and Mělník-Benátky and boreholes Sedmihorky (RO-43), Dolní Bousov (DB-1)



Most of the studied samples of dark grey claystones and sandy claystones were deposited in the fluvial to marginal marine environment. Sediments belong to the Peruc-Korycany Formation. Changes in palynomorph assemblages provided the evidence of the fluvial–lacustrine environment in parts of boreholes DB-1, OP-5, Paceřice, RO-43, Ds-1, Hs-1, VÚj-1. Sporomorph association was characterized mainly by pteridophyte spores of gymnosperm and angiosperm pollen. The presence of zygnematacean aquatic algae evidences fluvial environment. Halophyte gymnosperm pollen of family Cheirolepidiaceae – *Classopollis classoides,* common inaperturate gymnosperms *Taxodiaceaepollenites hiatus,* and marine microplankton *Circulodinium distinctum, Spiniferites ramosus, Cleistosphaeridium* sp. indicate marsh vegetation in “backswamps” (HP-19, HP-20, OP-5).
The age of most of the studied boreholes was Middle Cenomanian with the exception of some parts of boreholes Písková Lhota (OP-5) and Sedmihorky (RO-43) where angiosperm assemblage corresponded to Late Cenomanian. The xeromorphic character of vegetation was ascertained in parts of boreholes BJ-18 and Jb-1 on the basis of the presence of gymnosperm pollen *Ephedripites, Sequoiapollenites* and some thick-walled spores.

Project of Ministry of the Environment - Czech Geological Survey
Project No. CGS 6314: Geomon 2002 (*principal investigator D. Fottová, CGS Prague, GLI Order No. 0039, responsible person* ***P. Skřivan***)



Long-term monitoring of the chemistry of bulk precipitation, beech- and spruce throughfall (precipitation below the tree canopies) in the Lesní potok catchment (Kostelec n. Čer. Lesy area) was orientated at the assessment of principal deposition characteristics of main atmospheric pollutants, as well as on several selected minor and trace elements. Patterns of the annual deposition fluxes of Mn, Pb, Be, Cd, SO_4^{2-}, N_{total}, Cl^- and F^- in bulk precipitation throughout the hydrological years 1993 and 2003 showed the impact of their dominant emission sources in the atmosphere, as well the impact of the evolution of the meteorological situations. The typical – prevailingly anthropogenic – substances Pb, Cd, SO_4^{2-}, N_{total} and F^- show gradual decrease in their dependence on declining emissions from mobile (vehicular) emission sources (Pb) and boilers of Czech power stations burning low-quality lignite, resulting from their completed desulphurization (all the above mentioned elements except for Mn). The patterns of SO_4^{2-} and F^- deposition fluxes are practically identical with the minimum in 1999. In 2002 and 2003 they were affected by extremely high (2002) and low (2003) precipitations. A decrease in SO_4^{2-} and F^- deposition fluxes (by 80 % between 1993 and 2003) was followed by comparable decrease in the atmospheric input of H^+ ions. A decrease in deposition fluxes of N_{total}, involving also the emissions of mobile (vehicular) sources is less significant. Annual fluxes of volatile atmospheric compounds of S, N and F were the lowest in 1999. The following four years revealed a slight gradual increase or oscillations in the discussed components, caused by the possible temporary closure of some of the desulphurization facilities and/or by the strong oscillation of principal meteorological characteristics (mainly the precipitation intensity and wind rate). The depositional fluxes of manganese, both in bulk precipitation and in throughfall, show irregular oscillations throughout 1993 and 2003 and are strongly affected by the metabolic activity of the forest vegetation.

Industrial Grants

Czech-Moravian Cement Co. (Mokrá), Project No. 7003. Study of the Cenozoic sediments in the caves in southern part of Moravian Karst (***J. Kadlec***)

The research was focused on mineral magnetic properties and malacozoological content of loess intercalated by fossil soil horizons exposed in the area of the Mokrá Quarry. Two sections were studied. The first one is formed by last glacial loess overlain by a Holocene soil horizon. The second section consists of the last interglacial soil overlain by loess. Remanent magnetization and magnetic susceptibility (MS) were measured in orientated samples over the boundary soil/loess. The obtained reverse polarities indicate Blake excursion (118–112 ka). The MS data reflect different mineral magnetic compositions influenced by weathering and microbial processes during the pedogenesis.

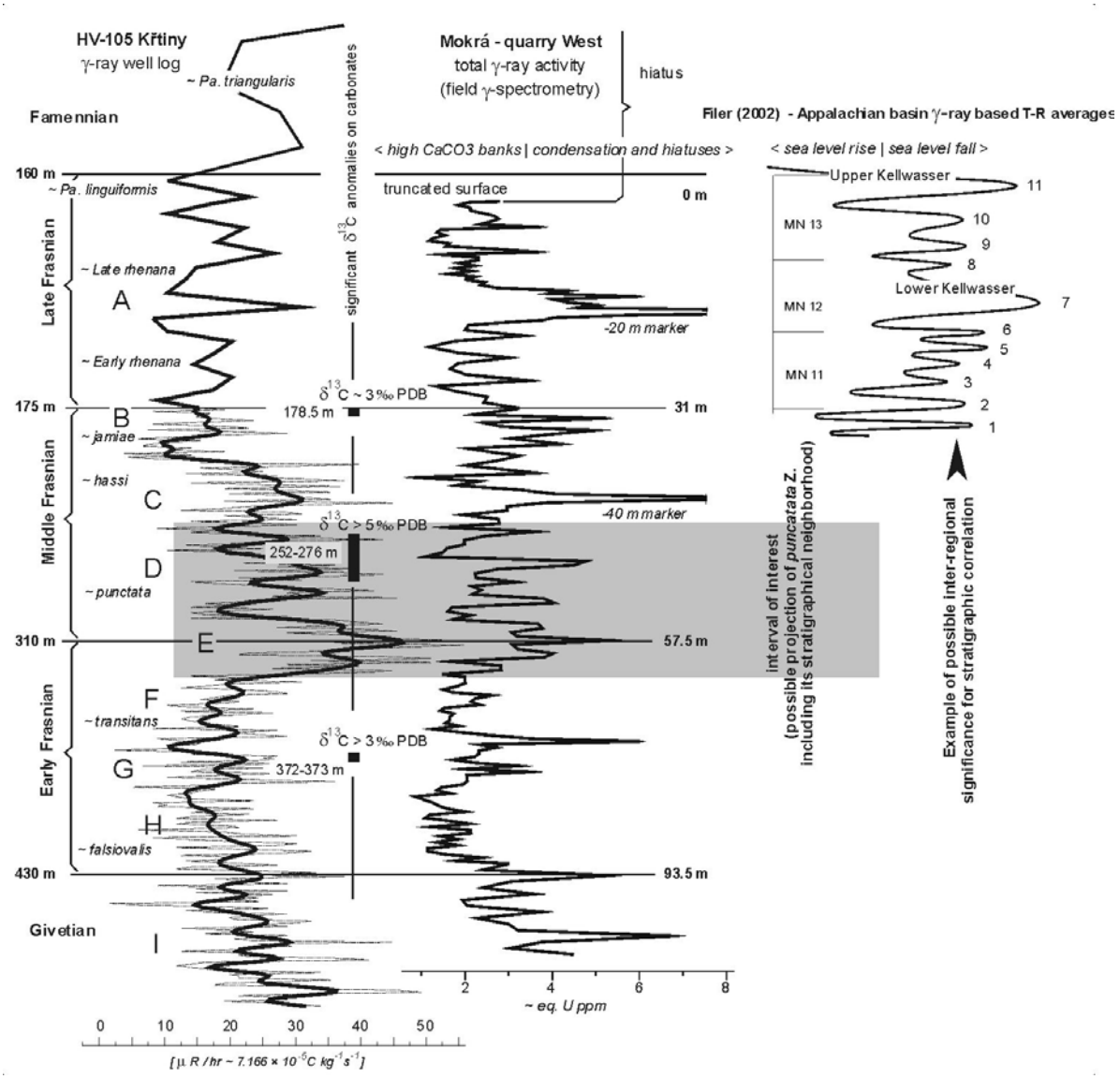
Institute of Nuclear Research Řež a.s.
Subproject No. 7012: Natural analog Ruprechtov – sedimentological study (*M. Hercík, Inst. Nucl. Research Řež a.s.,* ***P. Bosák*** & ***J. Adamovič***)

New boreholes drilled in the Miocene sedimentary and volcanosedimentary fill of the Hroznětín Basin in the Ohře Rift region were documented and correlated. Large horizontal variations in the development of coal seams and thicknesses of weathering (kaolinization) profiles on porphyritic granites to syenogranites of the Erzgebirge type were found, which indicates rapid shifts in depositional environment and small-scale segmentation of the basin into tectonic blocks. Reverse and normal faults, sometimes accompanied with tectonic brecciation, were frequently found in the cores. Uranium mineralization on top of the kaolinized granite eluvium is of weathering type, no major remobilization can be expected.

Czech-Moravian Cement Co. (Mokrá), Project No. 7004. Research of rock components of Devonian limestones in Mokrá quarries (***J. Hladil****, in cooperation with M. Geršl, J. Hladíková, Czech Geological Survey, Prague & J. Frána, Institute of Nuclear Physics, AS CR*)

Environmental disturbances in early Middle Frasnian (*punctata* Zone) – Alamo Comet was likely accompanied by other bolides. The correlation of high-resolution stratigraphical logs from Mokrá (γ-ray spectrometry, magnetic susceptibility and trace element geochemistry) was originally interlocked only with a large network of deep boreholes E and SE of Brno. In 2003, the Mokrá records were correlated with newly prepared digital data from HV-105 Křtiny borehole (with numerous age markers). This crosscheck using the Moravian Karst loop of stratigraphic sections strongly increased the correlation reliability and resolution. The unique composition and succession of geophysically defined stratigraphic patterns (with relatively well fixed time levels) provided a chance to expand this accurate correlation deep into platform territories. This was particularly useful for tuning of correlation in stromatopoid–coral beds of the *punctata* Zone. The major perturbance in this interval occurs at above the middle (~0.7) of this zone at Mokrá (truncated surface and flooding surface). It corresponds to shedding of breccia flows and condensed cover in HV-105. The $\delta^{13}C_{carb}$ values are different but always highly fluctuating and with positive anomalies: > +5 ‰ PDB in HV-105, ~3 ‰ N of Ochoz but < 0.5 ‰ on the shoals of Mokrá. Roughly at this level, the similar major $\delta^{13}C_{carb}$ excursions were observed worldwide (e.g., Ardennes, Holy Cross Mts. or S China). These major environmental perturbations have the same timing as the impact of an extraterrestrial body, which is known as the Alamo Impact,

which occurred offshore a carbonate platform (today in Nevada, 150 km N of Las Vegas). In spite of the calculated ~300-m-high tsunami, or abundance of accretionary lapilli, ejecta bombs and shocked minerals (according to J. Morrow), the Ir concentrations were only slightly increased (probably a cometary impactor?). However, two other additional perturbations in late part of the *punctata* Z. were extracted from Ochoz and Mokrá records (Moravia, Czech Republic), and one little precedent is also possible. And just this closely preceding and two later perturbations are well marked with increased Ir concentrations up to 1–2 ppb ($\mu g.kg^{-1}$) [= x40 higher than concentrations related to the Alamo Impact proper]. It was preliminarily concluded that these perturbations correspond to other smaller impactors which arrived on the Earth with the same very dispersed group of bodies (time interpolation ~382 ± 5 Ma?), but contained also stony mass.



Natural γ-ray record of atmospheric deposits trapped in pure limestone: correlation potential across the Frasnian (Late Devonian) carbonate facies and regions (*combined illustration to IAA3013209 and CMC4800004116) (J. Hladil, M. Geršl et al.*)

Correlation of the Křtiny HV-105 borehole (left) and Mokrá Quarry West section (middle). Note the great similarity between reef-margin–forereef (Křtiny) and shallow marine plains (Mokrá) and note the same for the complex Upper Frasnian NGR pattern in Moravia and very distant and separated Appalachian Foredeep (upper right). A-I: classified NGR intervals.

Velkolom Čertovy schody Quarry Co. Project No. 7814: Čertovy schody Quarry: Biogeochemical monitoring (***I. Dobešová***, contributions: ***P. Skřivan, O. Kvídová*** & ***M. Burian***)

The atmospheric deposition fluxes of selected chemical elements were monitored in the broader region of the Bohemian Karst throughout the years 1997 and 2002. Results obtained in the karst region were compared with fluxes from the reference rural region near Kostelec nad Černými lesy in central Bohemia. The pre-concentration of samples applied since 2002 in the determination of As, Be, Cd, Cr, Cu and Zn brought about important improvements in the calculation of their deposition fluxes. The comparison of fluxes of the above mentioned elements calculated in 2002 from their genuine analytical concentrations with fluxes evaluated previously from the estimated values (below the detection limit) has shown both positive and negative deviations, according to the magnitude of the real concentration of the given element in the collected samples. The seven years-lasting monitoring of the deposition of 20 chemical elements and ions at 7 sampling sites in the region of Bohemian Karst, as well as in the reference rural region near Kostelec nad Černými lesy, revealed a considerable decrease in the deposition fluxes in a number of cases. The positive changes are explained by improvements in the electricity-producing facilities and other industrial technologies, as well as by the innovation of the gasoline powered vehicular engines. In the most recent years, which are characterized by a relatively constant degree of atmospheric contamination, we witness the significance of climatic and/or meteorological impacts on the deposition characteristics of various chemical substances present in the atmosphere. A comprehensive correlation analysis of the individual components of monitored samples verified (especially for the cumulative samples of bulk precipitation) its versatility in the assessment of the character and sources of atmospheric deposition provided that a sufficiently large aggregate of analytical data is available.

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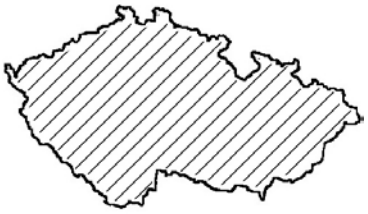
Programme of Advancements in Scientific Research in Key Directions

(a) K3012103 Project No. 03: Processes on the surface of the Earth and in its interior, its gaseous and plasma envelope and in the ambient space (*Project co-ordinator A. Špičák, Institute of Geophysics, Academy of Sciences, Prague*)

Subproject: Dynamics of the evolution of continental lithosphere (*coordinator **V. Cajz,** contributions: **J. Fiala, J. Filip, M. Konzalová, O. Man, K. Melka, J.K. Novák, E. Pivec, P. Pruner, L. Slavík, J. Ulrych, M. Vavrdová,** & **Z. Vejnar***)

Summary:



Research in the West Bohemian Shear Zone brought additional data on the evolution of the Central European Variscides – they document dramatic crustal thickening and high topography in the Bohemian Massif. This zone forms a steep collapse structure where prominent subsidence of the eastern block resulted in juxtaposition of the relatively cold Cadomain basement of the Teplá–Barrandian Unit and the high-metamorphosed Moldanubian rocks. In the proximity of the West Bohemian Shear Zone, Variscan synkinematic plutonites are present in both terranes. As indicated by thermobarometric calculations, the Mutěnín pluton was emplaced into the Moldanubian crust at a depth of 23 ± 4 km, while the Babylon pluton in the Teplá–Barrandian Unit was emplaced to a depth shallower than 12 km. The two depths along with the data on mineral cooling ages imply a subsidence by max. 10 km in the period between 340 and 320 Ma. This major subsidence results from extreme crustal thickening by doubling its thickness during continent collision and subsequent thermal plastification in its lower part. Such process allowed sinking of the cold Teplá–Barrandian upper crust into the hot, partly melted Moldanubian substrate. Alkaline character of the Mutěnín diorite suggests that the thermal softening of the lower crust was probably a result of emplacement of mantle melts at around 340 Ma.

Siliciclastic rocks from the footwall of the Moravian Devonian provided very well preserved plant microfossils. Dispersed miospores and fossil marine microplankton indicate Upper Givetian to Lower Frasnian ages. Microfossils confirmed the marine origin of the analysed sequences and the pertinence of the Brunovistulicum to the Fennosarmatian Platform. During the Cambrian and Early Ordovician, Brunovistulicum probably shifted towards low south latitudes, in a direction opposite than the peri-Gondwanan microcontinents. Attribution of the Brunovistulicum to East Avalonia thus seems to be problematic from this perspective. Microfossils also contributed to the timing of the final closure of the Tornquist Ocean.

Paleogeographic reconstructions were focused on the correlation of data from profiles in Ordovician rocks of the Barrandian (Bohemian Massif) and the Crozon Peninsula and Rennes Basin (Armorican Massif). Paleorotations in the BM are well documented for individual blocks of Ordovician rocks, reaching values of max. 170° (relative to values for Permian rocks). Low south paleolatitudes (27–29°) were interpreted from high-temperature components of magnetization of Lower to Middle Silurian silicites from the Barrandian. Paleomagnetic study of Variscan diastrophic sediments of individual blocks of the Moravo-Silesian Zone brought additional evidence for paleorotation (100–190^{o}) relative to the “stable” block NE of the TESZ. Ordovician rocks from the Crozon Peninsula and Rennes Basin subjected to paleomagnetic studies indicate major differences in the paleomeridian values (paleorotation) but very close values of south paleolatitudes between the Barrandian area and the Crozon area.

Paleogeographic data obtained from the study of Phanerozoic rocks of the Bohemian Massif and Western Carpathians permitted to study continental drift in two orogenic belts. The correlation of paleodeclination and paleolatitude values inferred from the positions of paleomagnetic poles was referred to a single reference point of the two areas. The studies showed the similarity of model interpretations of paleotectonic rotations in the Alpine and Variscan orogenic belts. These paleorotations results from deformations due to block collisions. The effect of paleotectonic rotations on paleomagnetic pole positions conditioned by block collision induces wide dispersal in pole positions but relatively small translations.

The reliability of results of paleomagnetic research of continental lithosphere evolution is a function of, a.o., the methods of interpretation of the measured data. Therefore, development of a novel method was completed in 2003 for the decomposition of the measured remanent magnetization into components corresponding to different times and conditions of magnetization origin. This new method allows to determine not only the direction but also the magnitude of each of the components, which was not possible with the existing methods. In addition, solution of an algorithm of plotting of a magnetostratigraphic profile from the identified directions of remanent magnetization was elaborated.
Sheet silicates of metasediments were studied in the Barrandian Proterozoic, and illite crystallinity was determined for selected samples to show the anchizonal character of metamorphism with temperatures in excess of 210 ºC. The alteration of metapelites implies a lower degree of anchizonal metamorphism in the E and SE and a higher anchizonal degree in the W and NW of the Barrandian area. Besides this general trend, more highly crystallized illite can be locally found also within the reach of contact metamorphism of the Central Bohemian pluton.
Studies employing the apatite fission track method were applied to a new topic: volcanic products of central and western Bohemia. This method, however, allows to determine the age of these rocks with a high standard deviation only (i.e. wide scatter), and the determination of time-temperature history is hampered by the low concentration of ^{238}U in the studied mineral apatite and also by the relatively low (Tertiary) age of the rocks. Nevertheless, not all samples
The study of young volcanic rocks concentrated on geochemical characteristics of lower crustal xenoliths. The studies were conducted simultaneously on xenolith material from the Loučná–Oberwiesenthal Complex in the Saxothuringicum terrane and a similar material of the phonolite association in the Lugicum terrane. The basic Loučná–Oberwiesenthal Complex of mantle origin represents Ti-rich subprovince of alkaline rocks associated with the near Krušné hory Fault. Phases that concentrate rare elements in the host rock as well as in clinopyroxenite-ijolite xenoliths are (Nb, Th, REE)-rich perovskite and (Sr, REE)-apatites. Rift-related phonolite association of the Lužické hory Mts. shows maximum concentration of incompatible elements such as in P, Nb, Ta, Zr, U, Th, REE, Rb, Cs the proximity of the Lusatian Fault. Concentrations of these elements in Ti-poor phonolites is connected with the silicate mineral hainite and the newly determined (La, Ce)-carbonate phase; eudialyte represents another main phase concentrating these elements. Hainite and perovskite are the prevailing late magmatic (hydrothermal) mineral phases concentrating rare elements in alkaline volcanics of the Cenozoic Central European Volcanic Province in the Bohemian Massif.

SELECTED INDIVIDUAL RESULTS:

Crystalline complexes of the western part of the Bohemian Massif (***Z. Vejnar*** & ***J. Fiala***)

The West Bohemian shear zone forms a steep collapse structure along which east-side-down normal movements led to the juxtaposition of the relatively cold Cadomian basement of the Teplá-Barrandian Unit against high-grade Moldanubian rocks. The determined intrusion depths of synkinematic plutons situated in both units results in a minimum vertical displacement between 340 and 320 Ma.
Compare: Zulauf, G., Bues, C., Dörr, W., Vejnar, Z., 2002. 10 km minimum throw along the West Bohemian shear zone: Evidence for dramatic crustal thickening and high topography in the Bohemian Massif (European Variscides). International Journal of Earth Sciences (Geologische Rundschau), 91, 850-864.
Seven excursion localities of primary significance document the results of new studies undertaken in the crystalline complexes of the western part of the Bohemian Massif. They are mostly of shear nature at unit boundaries, the polyphase Cadomian and Variscan metamorphism and deformation, the contact influence of the Cambrian plutonites and the geochronology of intrusion and deformation activities.
See: Zulauf, G., Vejnar, Z., 2003. Variszische Fahrstuhltektonik und cadomisches Basement im Westteil der Böhmischen Masse (Variscan lift tectonics and Cadomian basement in the West-part of the Bohemian Massif - Exkursion I am 25, April 2003). Jahresbericht und Mitteilungen der oberrheinischen geologischen Vereinigung, Neue Folge, 85, 295-315.

Postmagmatic (Zr, Ti, REE) - mineralization in developed phonolite differentiates (***J. Ulrych, A. Langrová*** & ***J.K. Novák***)

Rare mineralization of P, Nb, Ta, Zr, Ti, U, Th, REE in Cenozoic (per)alkaline rocks of the Bohemian Massif is concentrated in various mineral phases as apatite, perovskite, zircon, hainite, eudialyte, calzirtite, perrierite, eschynite a.o. The mantle-derived nephelinitic Loučná-Oberwiesenthal Complex (nephelinite-tephrite-phonolite-leucite tinguaite) in Saxonthuriangian terrane reprezent a titanian-rich subprovince of alkaline rocks adjacent with the near Krušné hory Fault. Phases concentrating rare elements in both host rocks and clinopyroxenite-ijolite suite of cognate (?) xenoliths are (Nb, Th, REE)-rich perovskites and (Sr, REE)-rich apatites. The rift phonolite association of the Lužické hory Mts. in the Lugicum terrane reveals the maximum concentration of incompatible elements as P, Nb, Ta, Zr, U, Th, REE, Rb, Cs in regions adjacent to the Lusatian Fault. The concentration of these elements in titanian-poor phonolites is associated with a special silicate hainite (endemic in the Bohemian Massif, locus typicus Tolštejn Mt.) and newly recognized (La,Ce)-carbonate phases; eudialyte represents the other major phase concentrating these elements (locus typicus Sokol Mt.). Hainite and perovskite are the prevailing late-magmatic (hydrothermal) phases concentrating rare elements in alkaline volcanics the Cenozoic Central European Volcanic Province in the Bohemian Massif.

Application of fission-track dating method on apatites of post-tectonic granites and neoidic volcanics of the Bohemian Massif (***J. Filip***)

Tectonothermal history of the Barrandian basin, its late Proterozoic basement and overlying Carboniferous basins of central and western Bohemia was examined using fission track dating method (AFTA) applied preliminarily on paleovolcanic rocks of these areas. As evidenced by AFTA data, the studied sequences experienced maximum heating during the Late Devonian to Early Carboniferous which was followed by significant cooling. The cooling can be interpreted as intensive erosion of the Variscan orogenic pile. The AFTA also evidenced that the Carboniferous sedimentary cover over the area was presumably insignificant. Throughout prolonged period from the Permian to the Cretaceous, the strata enjoyed regime of remarkable thermal stability characterizated by relatively low temperatures. This thermal pattern can be interpreted in terms of non-deposition and moderate deposition. From 40–20 Ma onward, the rocks were subjected to accelerated cooling that probably reflects extensive Tertiary uplift of the whole Bohemian Massif.

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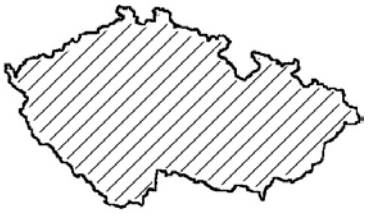
(b) K3046108 Project No. 08: Climatic and human impact on the development of natural environment (*Project co-ordinator K. Balík, Institute of Rock Structure and Mechanics, Academy of Sciences, Prague*)

Subproject: Proxy-record of climatic changes preserved in river and cave sediments (*coordinator* ***J. Kadlec,*** *contributions:* ***I. Dobešová, M. Filipi, O. Kvídová, O. Man, L. Minařík, T. Navrátil, P. Pruner, E. Růžičková, P. Skřivan, M. Vach*** & ***A. Žigová***)

Summary:
The ongoing monitoring of atmospheric inputs of selected chemical elements into the system through atmospheric deposition, outputs through surface- and subsurface water, and internal fluxes (throughfall and litterfall) continued in the experimental study area of the “Lesní Potok Catchment” in the Kostelec n. Č. lesy area providing further data that were elaborated for Pb, Be, As (mobilized through anthropogenic activities) and for strongly metabolized Mn. The



enrichment and redistribution of the microelements in soil result from present weathering of the crystalline bedrock (Be, Mn), anthropogenic immissions (As and Pb) and metabolic activity of the forest vegetation (Mn). The impact of acid atmospheric deposition represents henceforth the dominant contemporary *anthropogenic impact*, even though the input of protons into the monitored region decreased by 80 % between 1994 and 2003. The comparison of hydrological years 2002 and 2003 with extremely different precipitation amounts served for the evaluation of contemporary *climatic impacts* on the biogeodynamics of the studied elements. The (as yet incomplete) analytical data indicate that the deposition input of the elements differs approx. two-fold, while the output from the system differs up to six-fold. Such high difference results not only from the low water discharge, but also from higher degree of neutralization of deposited protons in the soil profile.
Mineralogical and geochemical research of soils and anthropogenic deposits contaminated by arsenic (Case study from the Mokrsko and Přebuz localities) was focused mostly on the summary of the present results. The concentration of selected arsenate minerals from soils using heavy fluid separation and the Raman spectroscopy were used as the new techniques for fast and simple identification of arsenates dispersed in soils and old mine dumps.
The magnetic susceptibility record measured in continuous core section from the bottom of the Plešné Lake, Šumava Mts., reflects climatic and environmental changes during the last 15 ka. Anisotropy of magnetic susceptibility measured in Tertiary flood-plain deposits in central Bohemia indicates flow directions and post-depositional deformations.

SELECTED INDIVIDUAL RESULTS:

The function of sediments in stream water buffering (***M. Vach*** & ***T. Navrátil***)

An experimental acidification was performed in the Lesní potok catchment. The experiment revealed strong buffering capacity of the stream bottom sediments. The adsorption/desorption processes were modelled by means of mathematical approach. Modeled intercations – cation leaching from the stream sediment and subsequent resorption – are based on common reaction:

$$Me^S + H^+ \longleftrightarrow Me^+ + H^S$$

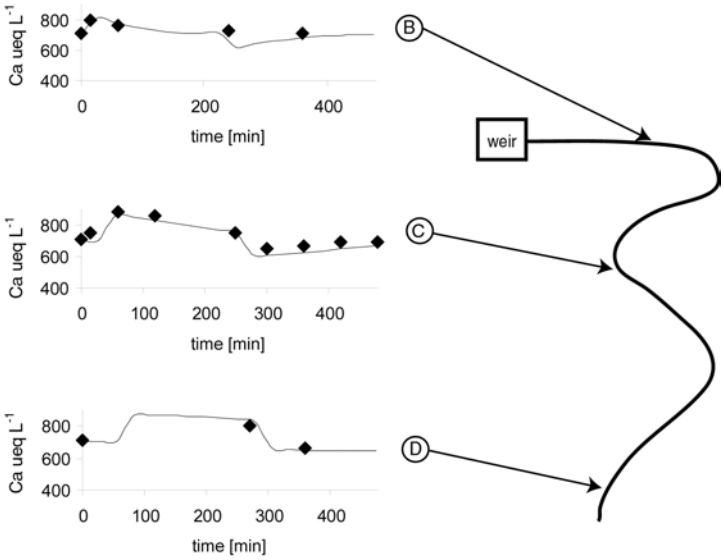
With inclusion of other factors (flow rate, excess of H^+ ions, bulk chemistry of liquid phase, etc.) and thermodynamic parameters, the final formula determining the resulting metal concentration in the stream water is:

$$c_{Me^+}(L,\tau) = e^{-z}\left[c^0_{Me^+} + k_1\left(c^0_{H^+} + \alpha.c^0_{Me^+}\right)\int_0^L\left(c^0_{Me^S} - \int_0^\tau (c_{Me^+}(l,t))_l\, dt \right)e^z\, dl \right]$$

$$z = \alpha.(k_2 - k_1)\int_0^\tau \left(c_{Me^+}(l,t) - c^0_{Me^+}\right)dt + \alpha.k_1 c^0_{Me^S} l + k_2 c^0_{H^S} l$$

where
c_{H+} is the activity of hydrogen ions in the stream water,
c_{Me+} is the concentration of the modeled cation in the stream water,
c_{Me}^S, c_H^S is the portion of leachable concentration of the modeled cation *Me*, respectively H^+ bound to the solid phase (sediment).

The presented figure confirms the good agreement between the measured concentrations of Ca at 3 sampling sites downstream throughout the acidification experiment and the theoretical curves computed by means of the formula presented above.



Diamonds (measured values), lines modeled curves; B, C and D sampling points on stream.
(M. Vach & T. Navrátil)

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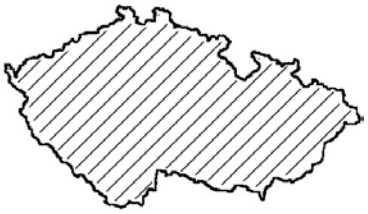
(c) K6005114 Project No. 14: Biodiversity and the function of ecological systems (*Project coordinator: J. Kirschner, Institute of Botany AS CR*)

Subproject: Environmental crises in the geological past: co-evolution of biological and geological environment (*coordinator* ***V. Cílek,*** *contributions:* ***J. Bek, P. Čejchan, J. Filip, A. Galle, J. Hladil J. Hlaváč, V. Houša, E. Kadlecová, L.Lisá, V. Ložek, R. Mikuláš, Z. Roček, M. Siblík, L. Slavík, M. Svobodová P. Štorch, Z. Vařilová J. Zajíc, O. Zeman*** *&* ***J. Žítt***)



The research was focused on processes taking place during transitional periods of the Earth´s past, namely on Silurian and Devonian environmental events and Quaternary processes. Possibly the most important or the most topical results dealing with present hydrological extremes in river valleys can be summarized as follows:

Influence of climate changes on the deposition of Quaternary clastic sediments – case study for the region of the Czech Republic (***E. Růžičková***)

1) The Czech version of the previously monograph "Quaternary clastic sediments of the Czech Republic" was completed and printed (Růžičková E. – Růžička M. – Zeman A. – Kadlec J.: Kvartérní klastické sedimenty České republiky). Six main groups of Quaternary sediments from the territory of Czechia are described and their textures and structures are documented in numerous photos. The division of colluvial deposits is given based on transport and deposition processes. A unified system of description of individual sediment types is recommended with respect to their grain size composition.

2) The geological, mineralogical and geochemical study of the marker silt horizons in the overbank fluvial sediments of the Upper flood plain terrace along the Labe river continued. Analyses of additional samples taken from newly documented localities support the idea of the presence of volcaniclastic material. If confirmed,the layers could be taken as important key horizons from palaeogeographic and stratigraphic points of view.

Recent geological development of fluvial systems in Central Europe (***V. Ložek, V. Cílek, J. Hlaváč, A. Žigová*** & ***L. Lisá***)

The research was focused on the synthesis of floodplain development since the end of the last glacial cycle. Due to the climatic oscillation 12–16 ka ago, intensive downcutting and the origin of furrows incised in hard valley basement took place. The higher episodic discharge and the elevated flood frequency seems to be almost a regular phenomenon due to the sudden spring melting and the existence of permafrost that allowed only a limited seepage. The "catastrophic" mode of valley origin was prevalent in the Pleistocene; however, in Early Holocene, the valleys became soon filled with accumulated material and further erosion caused the evolution of 2–3 erosional steps. The former braided system of parallel streams developed into meandering rivers with a single predominant streamline. The gradual sediment aggradation of the average thickness of 10–12 m can be observed during the Holocene. The basic changes were happening especially after medieval revolution of the late 13th century. These climatic periods can be observed during the last thousand years as follows:

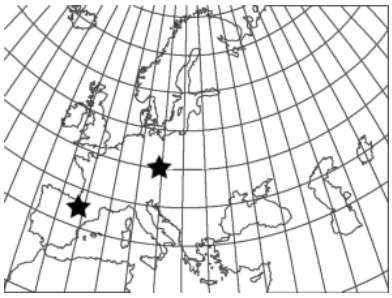
1. Warm medieval optimum 875–1200 during which internal colonization and intensive soil erosion took place, resulting in flood-plain aggradation.
2. Cold period od 1200–1466 characterized by alternating but generally cold climates and important erosional episode of the 15th century.
3. Warm period of 1466–1618 characterized by alternating climates and some of the warmest winters of the whole millennium.
4. Little Ice Age of 1618–1899 characterized by alternating climates and some of the coldest decades of the millennium associated with erosional events.
5. Warm 20th century during which the central European rivers are substantially changed by human activities.

SELECTED INDIVIDUAL RESULTS:

Hails of bolides and meteorites have nearly zero impact on faunal diversity – new evidence from Late Pleistocene ~120 ka B.P. (***J. Hladil****, in cooperation with J.L. Carew, College of Charleston, USA & J. Frána, Institute of Nuclear Physics, Prague*)

The detailed trace element geochemistry studies of material from the The Gulf Section (San Salvador Island, NE of Great Bahama Bank) unveiled anomalous contents of Ir, Ni, and Zn in the latest intertidal to early eolian sediments above the substage-5e coral reefs. As inferred from the architecture and elevation of these substage-5e banks, the relevant horizon lies still significantly under the substage-5d paleosols and originated most likely at ~120 ka. Proportionality of separate chemical-element markers largely fluctuates and was controlled by different mobility of organic and inorganic salts during leaching and cementation processes in land vadose zone. The fresh limestone rocks sampled in the interval of ~1.5 m above the lowest-tide sea level yielded the highest concentrations of Ir (> 3 ppm – $mg.kg^{-1}$), the concentrations in both relicts above and redepositions to rock pores below have steeply decreasing distributions and within 1 m beneath these concentrations drop to background values. The maximum concentration of Ni (21 ppm) has 0.1m shift (down), and Zn occurs with oscillation cementation bands, 13 and 11 ppm, 0.2 and 0.4 m below the Ir horizon. This short-time event of atmospheric deposition contains features of extraterrestrial material. The world register (Earth Impact Database, 2003. <http://www.unb.ca/passc/ ImpactDatabase/> (8 December 2003) reports two craters roughly dated to ?100 ka: Amguid / Algeria / 26°05'N: 04°23'E (diameter ~0.5 km) -- J. Afr. Earth. Sci. 18(4), 263-295 (1994), and Rio Cuarto / Argentina / 30°52'S: 64°14'W (diameter ~4.5 km) -- Geology 22(10), 889-892 (1994). The best candidate is the North African Amguid, particularly if accompanied by erosionally obliterated other impactors in that area (due to prevailing winds from Africa). The general experience with Caribbean Late Pleistocene corals (and also planktonic and bethic foraminifers and nannoplankton) seems to confirm ~ x100–x1000 stronger effects of substage-5e (125 ka) and 5c (100 ka) climatic changes on the biodiversity (including random single-species extinctions) than can be ascribed to this newly indicated ~120ka hail of bolides and meteorites (and relevant atmospheric/hydrospheric perturbations).

Correlation of Early Devonian conodont materials from the Barrandian area and Spanish Pyrenees (***L. Slavík***)



Correlation of the conodont material from both areas (Barrandian and Pyrenees) revealed that *Icriodus steinachensis* beta first occurs together with the lowest *E. sulcatus*, and with respect to present information worldwide the lowest entry of the former doesn't take place anywhere before the latter. This was confirmed by two Barrandian sections (Velká Chuchle and Cikánka). Although the stratigraphic significance of eta and beta morphotypes of *I. steinachensis* has been questioned, the data from the Barrandian sections confirmed their certain stratigraphic potential in Europe. Accordingly, the lowest record of *I. steinachensis* beta (bed 39) in the Pyrenees can be used to approximate the L/P boundary. A promising stratigraphic marker for the lower Pragian in both regions is *Pelekysgnathus serratus brunsvicensis* Valenzuela-Ríos. In the Barrandian, it seems to have a larger stratigraphic range because it enters just above the last *E. sulcatus* near the beginning of the Praha Formation, but it could also be attributed to the more condensed sections in the Barrandian. Several forms of *Pelekysgnathus* ex.gr. *serratus* also occur in both regions; however, their stratigraphic potencial has yet to be tested. The rest of the Pragian is still puzzling due to only random occurrence of stratigraphic markers in both regions.

High-resolution graptolite biostratigraphy and correlation of selected Lower Silurian formations of peri-Gondwanan Europe (***P. Štorch***)

Stratigraphically and paleobiogeographically important graptolite association comprising *Metaclimacograptus flamandi* (Legrand), *Parapetalolithus meridionalis* (Legrand) and *Torquigraptus australis* Štorch was identified in the core samples of A1-66 and A1-43 wells in Ghadames Basin of Libya. Former two species were described from Algeria. All three taxa are common and widespread in the middle Telychian strata of Spain (Central Iberian Zone and Western Iberian Cordillera) and France (Brittany) where they are associated with diverse graptolite fauna enabling further, precise and worldwide biostratigraphic correlation. Present faunal association indicates mid Telychian age (upper *crispus*, *griestoniensis* and lowermost *crenulata/tullbergi* biozones) of the relevant strata and suggests close paleobiogeographical links between North African pericratonic basins and Armorican shelves since it has not been found outside this realm.

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10. Organization of conferences and scientific meetings

Conferences and Symposia organized in 2003

International Workshop: Limestone mining and sustainable development, Beroun and Czech Karst, Czech Republic, April 15-17, 2003. Organised by the Administration of Landscape Protected Area of the Czech Karst, Karlštejn (I. Pondělíček, O. Jäger), Institute of Geology AS CR, Prague (V. Cílek, P. Bosák), Velkolom Čertovy schody, joint-stock company, Tmaň (V. Korbel, I. Novák), Lhoist CR, Ltd., Prague, and Českomoravský cement, joint-stock company, Beroun (HeidelbergerZement Group). Field workshop devoted to reclamation of limestone quarries, with the focus on the region of the Czech Karst (central Bohemia). About 25 participants from 4 countries took active part on the event.

9th International Symposium on Fossil Cnidaria and Porifera, Graz, Austria, August 3-7, 2003 *(incl. Moravian Karst, Czech Republic, August 8-11, 2003).* Organized by the Karl-Franzens-University, Graz. Organizing committee: B. Hubmann, W. Piller, M. Rasser, B. Riegl, H. Fritz, G. Csaszar, **J. Hladil,** R. Leinfelder, J. Mello, B. Ogorelec, A. Russo & J. Stolarski. About 150 participants from 29 countries took part on the symposium.

Meeting of the Hibsch Geological Society, Ústí nad Labem, October 20, 2003. 24 participants including international specialists took part.

Conferences and Symposia under preparation

10th Coal Geology Conference, Praha, June 7–11, 2004. Organized by the Institute of Geology, AS CR (**J. Pešek** – chairman, **P. Bosák**). About 100 scientists as potential participants responded to preliminary conference announcement.

Symposium Morphological transformations during the transition to dry land. Organised by **Z. Roček** and J. Clack (University Museum of Zoology, Cambridge, United Kingdom) as a part of the ***7th International Congress of Vertebrate Morphology at Florida Atlantic University, Boca Raton, Florida (27 July 2004 – 1 August 2004*)**. 21 participants are invited.

4th International Bioerosion Workshop, Praha, August 29 – September 4, 2004. Organized by the Institute of Geology AS CR, Prague, National Museum, Prague, and Conference Partners, Prague. Scientific Committee: **R. Mikuláš**, **J. Hladil, J. Žítt**, V. Turek, J. Kvaček (National Museum, Prague) and J. Marek (Faculty of Science, Charles University, Prague). 40 participants have already pre-registered. The principal aim of the meeting is to confront the experience of workers in modern ecosystems (especially reefs) with the practice of those who decipher the fossil record.

XVIIth Conference on Clay Mineralogy and Petrology, Praha, September 13–17, 2004. Organized by the Czech National Clay Group in collaboration with some institutions including Institute of Geology AS CR (**K. Melka, P. Bosák, J.K. Novák**) and IRSM AS CR (M. Šťastný - chairman).

5th World Congress of Herpetology, 2005. Organized by the World Congress of Herpetology. Executive Committee member: **Z. Roček**. The Executive Committee is in the stage of considering bids received from Cape Town (South Africa), Montreal (Canada) and Vancouver (Canada).

The 6th European Paleobotany Conference, Praha, September 7–11, 2006. Organized by the National Museum, Prague, Faculty of Science, Charles University, Prague, and the Institute of Geology AS CR, Prague; Organizing Committee: J. Kvaček, S. Opluštil, Z. Kvaček, J. Sakala, V. Teodoridis, M. Libertín, **J. Dašková, J. Bek.** Now the conference is in the first part of preparation – the first circular will be presented in Argentina (The International Palaeobotany Conference).

The general C.I.M.P. Meeting (International Commission of Paleozoic Microflora), Prague, September 12–16, 2006. Organized by the Institute of Geology AS CR (**J. Bek**) and the Faculty of Sciences, Charles University, Prague (O. Fatka - chairman).

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11. Publication activity of the Institute of Geology

In 2003, the Institute of Geology published two issues of **GeoLines** – conference proceedings. Each issue is thematically consistent, containing several papers to a common topic. The journal accepts papers within their respective sectors of science without national limitations or preferences. However, in case of extended abstracts, the conferences and workshops organized and/or co-organized by the Institute of Geology are preferred. The papers are subject to reviews.

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GeoLines 15(2003)

The special issue of Geolines is dedicated to Prof. Hibsh at the occasion of his 150th birthday. Hibsh 2002 symposium was held at Teplá, Ustí nad Labem and Mariánské Lázně, June 3-8, 2002. Edited by J. Ulrych, J. Pavková and J. Adamovič. The proceedings contain the complete bibliography of Prof. J.E. Hibsch, evaluation of his contribution to the scientific cognition of his time, and heritage for the present. Scientific contributions to the European geology of F. Cornu and A.B. Castelli coming from Bohemia are also included.

GeoLines 16 (2003)

Proceedings (106 abstracts and excursion guides of the Bohemian Cretaceous Basin) of the 8th Meeting of the Czech Tectonic Studies Group and 1st Meeting of the Central European Tectonics Group (held at Hrubá skála Chateau, Czech Republic, April 24-27, 2003). Edited by D. Uličný and M. Svojtka.

The Institute of Geology, based on agreements, supported the publication of two reviewed journals.

Geologica Carpathica 54, 1-6 (2003)
International geological journal published by the Geological Institute, Slovak Academy of Sciences, Bratislava, Slovakia, co-published by the Polish Geological Institute, Warsaw, Poland and Institute of Geology, AS CR, Prague. Printing office: Veda, Publishing House of the Slovak Academy of Sciences, Bratislava, Slovakia = http:/www.geologicacarpathica.sk/

Journal of the Czech Geological Society 48, 1–2, 3–4 (2003)
Reviewed geological journal published by the Czech Geological Society, Prague, Czech Republic and co-published by the Institute of Geology AS CR, Prague.

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12. Publication activity of staff members of the Institute of Geology

12a) Papers published in 2003

* publications in journals with impact factor (IF value according to a list from 2002)

3.738* **Kletetschka G., Kohout T.** & Wasilewski P.J. (2003): Magnetic remanence in the Murchison meteorite. – *Meteoritics & Planetary Science*, 38, 3: 399-406. USA.

2.756* **Svojtka M.**, Tagami T., Košler J., Miková J. & Burianková K. (2003): Source and thermal evolution of High Himalayan rocks in the Makalu region interpreted from U-Pb and fission-track dating of zircon. – *Geochimica Cosmochimica Acta*, 67, 18: A462. Oxford.

2.756* **Svobodová J.**, Drábek M., **Svojtka M.** & **Böhmová V.** (2003): Testing of feldspar cooling geospeedometer - experimental study. – *Geochimica Cosmochimica Acta*, 67, 18: A462. Oxford.

1.720* Čihák R., Královec K. & **Roček Z.** (2003): Developmental origin of the frontoparietal bone in *Bombina variegata* (Anura: Discoglossidae). – *Journal of Morphology*, 255: 122-129. New York.

1.430* Ruiz Cruz M.D. & **Novák J.K.** (2003): Metamorphic chlorite and „vermiculite" phases in mafic dikes from the Maláguide Complex (Betic Cordillera, Spain). – *European Journal of Mineralogy*, 15: 67-80.

1.400* Šimůnek Z. & **Bek J.** (2003): Noeggerathiaceae from the Carboniferous of the Bohemian Massif. – *Review of Palaeobotany and Palynology*, 125: 249-284. Amsterdam.

1.400* Pšenička J. & **Bek J.** (2003): Cuticles and spores of *Senftenbergia plumosa* (Artis) Bek and Pšenička from the Carboniferous of Pilsen Basin, Bohemian Massif. – *Review of Palaeobotany and Palynology*, 125: 200-312. Amsterdam.

0.843* **Navrátil T., Vach M.**, Norton S.A., **Skřivan P.,** Hruška J. & Maggini L. (2003). Chemical response of a small stream in a forested catchment, central Czech Republic, to a short-term in-stream acidification. – *Hydrology and Earth System Sciences*, 7, 3: 411-423.

0.800* Pšenička J., **Bek J.**, Zodrow E.L., Cleal Ch.J. & Hemsley A.R. (2003): A new late Westphalian fossil marattialean fern from Nova Scotia. – *Botanical Journal of the Linnean Society*, 142: 199-212. London.

0.656* **Roček Z.** (2003): Larval development in Oligocene palaeobatrachid frogs. – *Acta Palaeontologica Polonica*, 48: 595-607. Warszawa.

0.571* **Pruner P.**, Kapička A. & Petrovský E., Eds. (2003): *Studia Geophysica et Geodaetica (Special Issue dedicated to Miroslav Krs)*, 47, 2: i.-ii. Praha.

0.571* **Man O.** (2003): Analysis of multi-component natural remanent magnetization based on the thermal demagnetisation spectrum. – *Studia Geophysica et Geodaetica*, 47, 2: 359-370. Praha.

0.571* **Bosák P., Pruner P.** & **Kadlec J.** (2003): Magnetostratigraphy of cave sediments: Application and limits. – *Studia Geophysica et Geodaetica*, 47, 2: 301-330. Praha.

0.532* **Žítt J.** (2003): *Novasalenia* gen. nov.: a remarkable Late Cenomanian echinoid from the Bohemian Cretaceous Basin (Czech Republic). – *Cretaceous Research*, 24: 23-30. London.

0.438* Rage, J.-C. & **Roček, Z.** (2003): Evolution of the anuran assemblages in the Tertiary and Quaternary of Europe, in context of palaeoclimate and palaeogeography. – *Amphibia-Reptilia,* 24: 133-167. Leiden.

0,372* Salavcová L., Nekvindová P., Červená J**., Langrová A.**, Drahoš V. & Špirková J. (2003): Lithium migration based febrication of few-planar glass waveguides. – *Solid State Phenomena*, 90-91: 577-582.

0.246* **Minařík L., Skřivan P., Novák J.K.,** Fottová D. & **Navrátil T.** (2003): Distribution, cycling and impact of selected inorganic contaminants on the ecosystem of the Forest Brook catchment in Central Bohemia, Czech Republic. – *Ekológia 2003*, 22, 3: 305-322. Slovak Academic Press. Bratislava.

0.200* **Ulrych J.**, Fediuk F., **Lang M.** & Martinec P. (2003): Late Paleozoic volcanics of the Czech part of the Intra-Sudetic Basin, Bohemian Massif: Petrological and geochemical characteristics. – *Chemie der Erde, Geochemie*, 63, 4: 329-348. Jena.

0.147* Winchester J.A., **Patočka F.**, Kachlík V., Melzer M., Nawakowski C., Crowley Q.G. & Floyd P.A. (2003): Geochemical discrimination of metasedimentary sequences in the Krkonoše-Jizera Terrane (West Sudetes, Bohemian Massif): paleotectonic and stratigraphic constraints. – *Geologica Carpathica*, 54, 5: 267-280. Bratislava.

0.147* **Vavrdová M.**, **Mikuláš R.** & Nehyba S. (2003): Early Cambrian siliciclastic sediments in southern Moravia (Czech Republic) and their palaeogeographic constraints. – *Geologica Carpathica*, 54, 2: 67-79. Bratislava

0.147* **Ulrych J., Štěpánková J.**, Lloyd F.E. & Balogh K. (2003): Middle to Late Miocene alkaline volcanic series associated with the Cheb-Domažlice Graben, W Bohemia: geochemistry and mineralogy. – *Geologica Carpathica*, 54, 1: 1–12. Bratislava.

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0.125* **Hladil J.**, **Bosák P.**, **Slavík L.**, Carew J.L., Mylroie J.E. & Geršl M. (2003). A pragmatic test of the early origin and fixation of gamma-ray spectrometric (U, Th) and magneto-susceptibility patterns (Fe) related to sedimentary cycle boundaries in pure platform limestones. – *Carbonates and Evaporites*, 18, 2: 89-107. Troy, NY, USA.

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12c) Lectures and poster presentations

Adamovič J.: Recent development of geological studies in hydrothermal activities in the Bohemian Cretaceous Basin. *Lecture. Second Seminar of the J.E. Hibsch Geological Society, 20 October 2003, Ústí nad Labem.*

Bek J. : History, present and future of Palaeozoic in situ spore studies. *Lecture. 73 Jahrestagung der Palaontologischen Gessellchaft, October 11-15, 2003, Mainz. Germany.*

Bek J., OpluštilS., Thomas B.A. & Pšenička J.: *Selaginella*-like cones and their spores from the central and western Bohemian Carboniferous continental basins of the Czech Republic. *Lecture. The XVth International Congress on Carboniferous and Permian Stratigraphy, August 10-16, Utrecht. The Netherlands.*

Bek J.: Palaeozoic in situ spore studies: history and development. *Lecture. The XVth International Congress on Carboniferous and Permian Stratigraphy, August 10-16, Utrecht. The Netherlands.*

Bosák P.: Gypsum areas in Czech Republic, Islamic Republic of Iran and Socialist People´s Libyan Arab Jamahiriyah: Short Overwiev. *Invited Lecture. International Symposium Gypsum Karst Areas in the World: Their Protection and Tourist Development, August 26-28, 2003. Bologna, Italy.*

Cajz V.: Recent development of geological studies in the central part of the České středohoří Mts. *Lecture. Second Seminar of the J.E. Hibsch Geological Society, 20 October 2003, Ústí nad Labem.*

Cílek V.: Landscape and gardens. *Invited lecture. 29th seminar of landscape and garden architects, 10 September 2003. Klatovy.*

Cílek V.: Landscape in Man, Man in Landscape. *Invited lecture. Seminar for art teachers. Open Society Fund, 06 September, Pardubice.*

Cílek V.: Our climatic future. *Lecture. Christian Academy, 11 February, 2003, Emauzy.*

Cílek V.: Potential climatic hazzards. Lecture. *Interdisciplinary Seminar of West Bohemian University, 15-16 January 2003. Nečtiny.*

Cílek V.: Quarry reclamation. Invited lecture. *International meeting for quarry reclamation. 16 April 2003, Beroun.*

Cílek V.: Sandstone formations. Excursion and invited lecture. *Week for Broumov region. 26 July 2003, Broumov.*

Cílek V.: Climate, future and uncertainty. Invited lecture. *Czech union for technical studies. Novotného lávka. 23 April 2003, Praha.*

Cílek V.: Climate and ethnic migration. Excursion and lecture. *USAC, 9 April 2003, Svatý Jan pod Skalou.*

Cílek V.: Landscape and memory. Lecture. *Faculty of humanistic studies, Centre for environmental research. 10 March 2003, Praha.*

Cílek V.: Prague, its environment and genius loci. Invited lecture. *Naropa University, Prague seminar, 1 May 2003. Boulder, USA.*

Dašková J., Drábková J., **Bek J.,** Libertín M. & Opluštil S.: Revision of *Chaloneria* and their spores from the Pennsylvanian continental basins of the Czech Republic. Lecture. *The XVth International Congress on Carboniferous and Permian Stratigraphy, August 10-16 2003, Utrecht. The Netherlands.*

Dolníček Z., **Chadima M.** & **Pruner P.**: Stanovení stáří tišnovských barytových žil paleomagnetickou metodou. Lecture. *Seminář Mineralogie Českého masivu a Západních Karpat 2003, 28-30 May 2003, Olomouc, Horní Údolí.*

Drábková J., **Bek J.**, Opluštil S., **Dašková J.**, Libertín M. & Šimůnek Z.: The comparison of in situ megaspores and dispersed megaspore assemblages from the Pennsylvanian (Duckmantian-Stephanian age) of the Czech Republic. Poster. *The XVth International Congress on Carboniferous and Permian Stratigraphy, August 10-16 2003, Utrecht. The Netherlands.*

Drahota P., Skřivan P. & Pertold Z.: Weathering rates at Mokrsko gold deposit. Lecture. *UK and Europe Research Meeting. RIO TINTO TECHNOLOGY, October 13-14, 2003, Bristol.*

Filippi M.: Concentration of selected arsenate minerals from soils using heavy fluid separation. Lecture. *Corference of postgraduate students and young scientist, April 24-25, 2003, Herľany, Slovakia.*

Hirajima T., Sai H. & **Svojtka M.**: Mineralogical character of Gföhl Granulite. Lecture. *(performed by T. Hirajima). 110th Annual meeting of Geological Society of Japan, August 1-5 2003, Shizuoka, Japan.*

Hiroi Y., Hirajima T. & **Svojtka M.**: Three polymorphs of Al_2SiO_5 minerals in Gföhl granulites with special reference to andalusite in shear zones. Lecture. *(performed by Y. Hiroi). 110th Annual meeting of Geological Society of Japan, August 1-5 2003, Shizuoka, Japan.*

Hladil J. & Voltr J.: Transition elements in tabulate coral skeletons: seawater vs. sediment. Lecture. *(performed by J. Hladil). 9th International Symposium on Fossil Cnidaria and Porifera, August 3-7, 2003, Graz, Austria.*

Hladil J.: Amphipora ontogeny. Lecture. *(performed by J. Hladil). 9th International Symposium on Fossil Cnidaria and Porifera, August 3-7, 2003, Graz, Austria.*

Hladil J.: Devonian and Carboniferous of the Moravian Karst (Czech Republic). Guidebook. *The Post-Symposium Field Trip B-2 (August 7-11, 2003), the 9th International Symposium on Fossil Cnidaria and Porifera. ISFCP Documents, Limited Edition*, 15 p., Graz, Austria, and *http://home.gli.cas.cz/hladil/www/B2-Guidebook-MK.pdf* .

Hladil J., Bosák P., Carew J.L., Zawidzki P., Lacka B., Charvátová K., Mylroie J.E., **Langrová A.** & **Galle A.** (2003): Microbially induced magnetosusceptibility anomalies below the surface of emerged carbonate banks – observed pathway of their origin (San Salvador Island, The Bahamas). Poster *(performed by J. Hladil). EAE Joint General Assembly, Session CL36, 6-11 April, 2003, Poster P-1410*, Nice, France.

Hladil J., Gemperle A., Carew J.L., **Bosák P., Slavík L., Pruner P.**, Charvátová K., Mylroie J.E. & Jell J.S.: Fossilization of nanobes studied by transmission electron microscopy and constraints related to their population – Recent and late Quaternary reerfbanks (San Salvador Island, the Bahamas; Heron Island, Australia). Poster. *EGS-AGU-EUG Joint Assembly, April 6-12, 2003, Nice, France.*

Hlaváč J.: Environmental Crisis at the Middle/Upper Holocene Boundary in the Bohemian Karst and Polomené Hory. Invited lecture. *Conference "Environmental Changes under the Neolitization*

Process in Central Europe: Before and After", November 28-29, 2003. Institute of Archaeology, Hungarian Academy of Sciences, Budapest. Hungary.

Hlaváč J.: Archaeology and zoology – interdisciplinary co-operation. *Invited lecture. Undergraduate Course. Faculty of Humanistic Studies, University of Western Bohemia. 18 November 2003, Plzeň.*

Hlaváč J.: Acicula parcelineata (Clessin, 1911) – New fossil molluscan species of the Czech Republic. *Lecture. Conference Molluscan Forum 2003, The Malacological Society of London, November 6., 2003. London, Great Britain.*

Hradecká L., Lobitzer H., Ottner F., Schlagintweit F., **Svobodová M.** &Švábenická L.: Biostratigraphie und Ablagerungsbedingungen der Hofergrabenmergel am Locus Classicus in Gosau (Hochmoos-Formation, Oberconiac/Santon). *Lecture. Workshop "Erde-Mensch-Kultur-Umwelt", August 28-31, 2003, Gmunden, Austria.*

Kadlec J.: Carlsbadská jeskyně a Mamutí jeskyně v USA. *Lecture. April 14, 2003, Gymnasium Nové Město na Moravě.*

Kadlec J.: Chronologické paradoxon terasových sedimentů Berounky. *Lecture. Konference 9. Kvartér 2003, December 9, 2003, Brno.*

Kadlec J., Pruner P. & **Chadima M.**: Magnetostratigraphy of sediments preserved in caves located in the Nizke Tatry Mts. and correlation with the Vah River terrace system, Slovakia. *Poster. EGS-AGU-EUG Joint Assembly, SE MG6, 06-11 April 2003, Nice, France.*

Kadlec J., **Pruner P., Chadima M., Schnabl P.** & **Šlechta S.**: Magnetostratigraphy of sediments preserved in caves located in the Nízké Tatry Mts. *Lecture. Výskum, využívanie a ochrana jaskýň. 4th Scientific Conference with International Participants, October 5-8, 2003, Tále, Slovensko*.

Kadlec J.: Příčiny klimatických změn v kvartéru. *Lecture. Cyklus přednášek pro studenty archeologie Filosof. fak. Západočeské university, November 11, 2003, Plzeň.*

Kletetschka G., Connerney J.E.P., Just J., Ness N.F., & Acuna, M.H.: Shock effects on Martian crustal magnetization near large impact basins. *Lecture. Eos Trans. AGU 2003 Fall Meeting, San Francisko, California, 8-12 December, 2003, USA.*

Kletetschka G., **Kohout T.** & Wasilewski P.J.: TRM/SIRM of magnetic minerals. *Poster. EGS-AGU-EUG Joint Assembly, SE MG11, 06-11 April 2003, Nice, France.*

Kletetschka G., Ness N.F., Connerney J.E.P., Acuna M.H., Wasilewski P.J.: Martian magnetic anomalies in light of fundamental properties of magnetic minerals. *Poster. EGS-AGU-EUG Joint Assembly, SE GD8, 06-11 April 2003, Nice, France.*

Kletetschka G. & Wasilewski P.J.: Magnetic interaction and cooling rate. *Poster. EGS-AGU-EUG Joint Assembly, SE MG11, 06-11 April 2003, Nice, France.*

Kohout T., Donadini F., **Kletetschka G.**, Kobr M., Pesonen L.J., **Pruner P.** & Wasilewski P.J.: Evidence for Terrestrial Magnetic Contamination of the Chondritic Meteorites. *Poster. Eos Trans. AGU 2003 Fall Meeting, San Francisko, California, 8-12 December, 2003, USA.*

Kohout T., Kletetschka G., Kobr M., **Pruner P.** & Wasilewski P.J.: The influence of terrestrial environment on meteorite magnetic records. *Poster. EGS-AGU-EUG Joint Assembly, SE MG1, 06-11 April 2003, Nice, France.*

Konzalová M.: Some of newly recorded palynotaxa in the Bohemian Neogene Basins. *Lecture. EEDEN Environments and Ecosystem Dynamics of the Eurasian Neogene. Birth of the New World. Internat. Meeting and Workshop, November 12-16, 2003, Stará Lesná, Slovakia*.

Libertín M. & **Bek J.**: The revision of sphenophyllalean cones and their spores from the Pennsylvanian continental basins of the Czech Republic. *Lecture. The XVth International Congress on Carboniferous and Permian Stratigraphy, August 10-16, 2003, Utrecht, The Netherlands.*

Man O.: Normal or reverse? The minimum angular deviation criterion of the classification. *Poster. EGS-AGU-EUG Joint Assembly, SE MG1, 06-11 April 2003, Nice, France.*

Melka K.: Informace o konferenci EUROCLAY 2003. *Lecture. Seminar of the Czech National Clay Group, December 4, 2003. Praha.*

Naemura K., Sai H., Hirajima T. & **Svojtka M.**: Petrology of garnet peridotite in Blansky Les massif in the Bohemian Massif. *Lecture. (performed by K. Naemura). 110th Annual meeting of Geological Society of Japan, August 1-5, 2003, Shizuoka, Japan*.

Nakamura D., Naemura K., Usuki T., Hirajima T. & **Svojtka M.**: Kyanite-bearing eclogite associated with garnet peridotite body in Nove Dvory, Czech Republic. *Lecture. (performed by D.. Nakamura). 110th Annual meeting of Geological Society of Japan, August 1-5, 2003, Shizuoka, Japan.*

Novák J.K.: Recent development of geological studies in the Krušné hory Mts. *Lecture. Second Seminary of the J.E. Hibsch Geological Society, 20 October 2003, Ústí nad Labem.*

Opluštil S., Pšenička J., **Bek J.** Šimůnek Z., Libertín M. & **Dašková J.**: Structure of the mid-Westphalian peat-forming rain preserved in volcanic ash from the continental basins of central and western Bohemia. *Lecture. The XVth International Congress on Carboniferous and Permian Stratigraphy, August 10-16, 2003, Utrecht, The Netherlands.*

Opluštil S., Pšenička J., **Bek J.**, Libertín M., **Dašková J.**, Drábková J. & Šimůnek Z.: Whetstone horizon - the Westphalian fossiliferous tuff layer from the continental basins of Central and western Bohemia. *Lecture. 14th International Workshop on plant taphonomy, November 5-7, 2003, Chemnitz, Germany*.

Patočka F., Pruner P., Štorch P. & Man O.: Correlation of siliciclastic rock chemistry and palaeomagnetic results from the Barrandian Lower Palaeozoic (Teplá–Barrandian unit, Bohemian Massif): palaeotectonic evolution of depositional environment. *Lecture. International Conference "Geology Without Frontiers:Magmatic and Metamorphic Evolution of Central European Variscides", Czech Geological Society, May 28 – June 1, 2003, Blansko, Czech Republic.*

Pruner P. & **Kadlec J.**: Mongolsko a Vnitřní Mongolsko ČLR očima geologů. *Lecture. Přednáška pro Klub přátel Asie „Pražská jurta", April 22, 2003, Praha.*

Pruner P., Bosák P., Mihevc A., **Kadlec J., Man O.** & **Schnabl P.**: Preliminary report on palaeomagnetic research on Račiška pečina Cave, SW Slovenia. *Lecture. 11th International Karstological School "Classical Karst". Karst Terminology. Guide booklet of the excursions and abstracts of lectures or poster presentations, July 2003, Postojna.*

Pšenička J., **Bek J.** & Rossler R.: Reproductive organs and anatomical structures of *Zeilleria zodrowi* sp. nov. From the Late Pennsylvanian of the Pilsen Basin, Czech Republic. *Lecture. The XVth International Congress on Carboniferous and Permian Stratigraphy, August 10-16, 2003, Utrecht, The Netherlands.*

Pšenička J., Opluštil S., **Bek J.** & Rossler R.: Anatomically preserved compressions from the tuff bed of the Whetstone Horizon at the Doubrava locality (Bolsovian, Late Pennsylvanian), Czech Republic. *Lecture. The XVth International Congress on Carboniferous and Permian Stratigraphy, August 10-16, 2003, Utrecht, The Netherlands.*

Pšenička J., Zodrow E.L., **Bek J.** & Cleal Ch.J.: Progress report on Late Pennsylvanian pecopterid palaeobiology: Czech Republic-Canada. *Lecture. The XVth International Congress on Carboniferous and Permian Stratigraphy, August 10-16, 2003, Utrecht, The Netherlands.*

Schnabl P., Pruner P., Kadlec J., Chadima M. & **Šlechta S.**: Magnetostratigrafické studium pleistocénních sedimentů Bajkalu. *Lecture. Konference 9. KVARTÉR 2003, December 9, 2003, Brno.*

Siblík M.: Brachiopod fauna of the Dachstein Limestone (Upper Triassic) of the Hochschwab. *Poster. 6th International Symposium Shallow Tethys, 25-28. August, 2003, Budapest.*

Siblík M.: Triassic and Jurassic brachiopod fauna of the classical Mesozoic area near Hallstatt (Upper Austria). *Poster. International Conference Erde-Mensch-Kultur-Umwelt, 28-31 August, 2003, Gmunden, Austria.*

Siblík M.: Triassic/Jurassic brachiopods from the Austrian Eastern Alps. *Poster. 3. Field workshop, IGCP project 458 "Triassic/Jurassic boundary events", 12-15. October, 2003, Stará Lesná, Slovakia.*

Svobodová M., Hradecká L., Skupien P. & Švábenická L.: Sporomorfy, dinoflageláti, foraminifery a vápnitý nanoplankton albsko-cenomanského stáří ze Štramberka a Bystré (slezská jednotka, vnější Západní Karpaty). *Lecture. 4th Czech and Slovak Paleontological Conference, June 17-18, 2003, Ostrava.*

Svobodová M. & Skupien P.: Comparison of the Upper Cretaceous deposits of the Peruc-Korycany and Bílá Hora Formations (Bohemian Cretaceous Basin) and Silesian Unit (Outer Western Carpathians), Czech Republic. *Lecture. Workshop of IGCP Project No. 463 "Upper Cretaceous Oceanic red Beds: Response to Ocean/Climate Global Change", 18-23 August, 2003, Bartin, Turkey.*

Švábenická L., **Svobodová M.**, Ottner F. & Lobitzer H.: Die Ressen-Formation des Schleifsteinbruchs am Ressen und der Lokalität Asterbach-Brücke (Gosau, Oberösterreich). *Lecture. Workshop „Erde-Mensch-Kultur-Umwelt", August 28-31, 2003, Gmunden, Austria.*

Ulrych J.: Recent development of geological studies in the České středohoří Mts. Lecture. *Second Seminar of the J.E. Hibsch Geological Society, 20 October 2003, Ústí nad Labem.*

Usuki T., Hirajima T. & **Svojtka M.**: Asymmetric zonings in garnet from Gföhl granulites Kyanite-bearing eclogite. Lecture. *(performed by T. Usuki). 110th Annual meeting of Geological Society of Japan, August 1-5, 2003, Shizuoka, Japan.*

Vařilová Z.: Complex, nature-friendly management of rock-fall risk in NW Bohemia. Poster. *EWC II - Early Warning Conference II, October 16-18, 2003, Bonn.*

Zodrow E.L., Pšenička J. & **Bek J.**: *Oligocarpia bellii* in situ reproductive organs, spores and cuticles (fern sphenopterid, Late Pennsylvanian), Sydney Coalfield, Nova Scotia, Canada. Poster. *The XVth International Congress on Carboniferous and Permian Stratigraphy, August 10-16, 2003, Utrecht, The Netherlands.*

12d) Unpublished reports

Bosák P. & **Pruner P.** (2003): *Zpráva k projektu KONTAKT 2001-2003 2001/009. Česko-slovinský mezivládní program vědecko-technické spolupráce. Evolution of karst and caves based on study of cave fills, Slovenia. Vývoj krasu a jeskyní na základě studia jeskynních výplní, Slovinsko*. – MS, Institute of Geology, ASCR: 1-99. Praha.

Bosák P. (Ed., 2003): *Chemistry of the atmospheric precipitation in the region of the Czech Karst with emphasis to the vicinity of the VČS Quarry (monitoring in 2002). Report on research with VLČS, a.s. in 2002*. – MS, Institute of Geology, ASCR: 1-27. Praha.

Cajz V. & Rapprich V. (2003): *Závěrečná zpráva (2003) – Specializovaný vulkanologický výzkum hornin středohorského vulkanosedimentárního komplexu a solitérních vulkanitů v bývalém okrese Litoměřice pro účelovou geologickou studii náchylnosti ke svahovým pohybům*. – MS, Czech Geological Survey: 1-8. Praha.

Cílek V. (2003): *Analýza rizik a oponentura závěrečné zprávy „Geoekologické faktory trasy plynovodu"* – MS, Transgas a.s.: 1-8. Praha.

Cílek V. (2003): *Protipovodňová ochrana obce Křešice u Litoměřic*. – MS, Místní úřad Křešice: 1-6. Křešice.

Hlaváč J. (2003): *Analýza měkkýšů na lokalitě Praha, "Anděl – Park".* – MS, zpráva pro ZIP o.p.s.: 1-5. Plzeň.

Hlaváč J. (2003): *Malakologická analýza z lokality Plzeň – Pražská ulice (podzemní prostory před budovou čp. 309).* – MS, zpráva pro ZIP o.p.s., 1-5. Plzeň.

Hlaváč J. (2003): *Molluscs (Mollusca) of the National Park Bayerischer Wald – Germany*. – MS, dep. in Nationalparkverwaltung Bayerischer Wald, Grafenau: 1-45. Grafenau, Germany.

Hlaváč J. (2003): *Nález fosilních měkkýšů v pohřebišti u Jízdárny Pražského Hradu*. – MS, zpráva pro Archeologický ústav AVČR: 1-2. Praha.

Hlaváč J. (2003): *Tanatocenózy měkkýšů v archeologických objektech v Hostivaři (Praha) – Knovizská kultura.* – MS, zpráva pro ZIP o.p.s.: 1-14. Plzeň.

Hlaváč J. (2003): *Tanatocenózy měkkýšů v archeologických objektech v Kněževsi u Prahy (knovízská kultura)*. – MS, zpráva pro Ústav archeologické památkové péče Středních Čech, 1-15. Praha.

Kadlec J. (2003): *Sedimentologické studium nivních sedimentů na dolním toku řeky Doubravy.* Etapová zpráva č. 2. – MS, Institute of Geology ASCR: 1-4. Praha.

Kadlec J. (2003): *Výzkum spraší a fosilních půd v jižní části Moravského krasu*. – MS, Archiv GLÚ AVČR: 1-6. Praha.

Kohout T. (2003): *The Influence of Terrestrial Processes on Meteorite Magnetic Records*. – MS, MSc. Thesis: 1-67. Department of Applied Geophysics, Faculty of Science, Charles University Prague.

Lisá L. (2003): *Sediments of Brno underground collector system*. – MS, Institute of Archaeological Research and Preservation of Historical Monuments Brno: 1-16. Brno.

Novák J.K. (2003*): Petrografický popis vyvřelin a pyroklastik z lokality Bito Ramble východně od Kingstonu, Jamajka.* – MS, Institute of Geology AS CR: 1-17. Praha.

Novák J.K. (2003): *Prognóza surovinové báze ve státu Belize*. – MS, Institute of Geology AS CR: 1-52. Praha.

Pruner P. & Bosák P. (2003): *Evolution of karst and caves based on study of cave fills, Slovenia*. *Závěrečná zpráva pro MŠMT ČR k projektu Kontakt 2001-2003, 2001/009 – Česko-slovinský*

mezivládní program vědecko-technické spolupráce. – MS, Institute of Geology, AS CR: 1-16 + supplements. Praha.

Svobodová M. (2003): *Palynologická analýza sedimentů z cenomanu české křídové pánve. II.Etapová zpráva pro studii MŽP: Stratigrafická architektura cenomanu české křídové pánve: vztahy sedimentárních systémů a reaktivace struktur podloží křídy).* – MS, Institute of Geology ASCR and Institute of Geophysics ASCR: 1-13. Praha.

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13. Laboratories

Laboratories of the Institute are not independent units. They are incorporated within the structure of scientific departments and within the unit of Service Laboratories of Physical Methods. The chapter summarizes the list of the most important laboratory equipment.

Paleomagnetic laboratory (head Ing. Petr Pruner, DrSc.)
MAVACS demagnetizer (1981)
- Triaxial Helmholz Induction Coil System HELICOS (1981) supported by Iduction Coil Control Unit ICCON
- Rotating Coil Magnetometer ROCOMA (1992, 1993)
- Inductors ROCOMA to MAVACS (1999, 1999)

Spinner magnetometer JR-5A (1993, 1998)
Dual speed spinner magnetometer JR-6A (2003)
Astatic magnetometer LAM-24 (<1980)
Astatic magnetometer LAM-22 (<1980)
Kappabridge KLY 2 (1992)
Kappabridge KLY 3S, CS-23 and CS-L furnance apparatus (2001)
AF demagnetiser LDA-3 (2000, 2003)
Anhysteretic Magnetizer AMU-1A (2003)
Demagnetizer KC (1992)
Kappameter KT5 (1992)
MINOSECAR cutting machine (1992,1993)

X-ray and DTA/TG laboratory (head RNDr. Karel Melka, CSc.)
PHILIPS X´Pert APD (1997)
CHIRANA Mikrometa II PŘI 32 (1963)
DRON UM1 (1983)
DERIVATOGRAPH Q 1500 Monimex (1982, computerized in 1998)
Goniometer Weissenberg KS A 2 (1964)
Goniometer BUERGER (1968)
Gandolfi chamber (1978)
Guinier T ENRAF-NONIUS chamber (1969)

Electron scanning and microprobe laboratory (head Ing. Anna Langrová)
Microprobe CAMECA 100 (2002)
Microprobe JEOL JXA-50A (1972)
EDAX System PHILIPS (1996)
Accesory devices for preparation of samples

Laboratory of rock processing and mineral separation (head Václav Sedláček)
Electromagnetic separator SIM-I (1968)
Electromagnetic separator (1969)
Laboratory table WILFLEY 13 B (1990)
Vibration processor VT 750 (1992)
Crusher CD 160*90 (1991)
Laboratory mill RETSCH (1970)
Crusher ŽELBA D 160/3 (1999)
Mill SIEBTECHNIK (1995)

Laboratory for thin and polished sections (head Ing. Anna Langrová)
MINOSECAR (1962, 1970)
DISCOPLAN (1990)
PEDEMOX PLANOPOL (1989)
Montasupal (1977)
DP.U.4 PDM-Force (1993)

Microscopic laboratory (head Mgr. Michal Filippi)
System for picture analysis: Steromicroscope NIKON SM2-U with adapters and CCD camera JVC TK 1381 (1998)
Streomicroscope Nikon SMZ 800 (2003)
Polarization microscope ORTHOPLAN Photometre LEITZ (1983)
Microscope MEF REICHERT (1964)
10x Polarization microscope AMPLIVAL ZEISS (1971, 1973, 1974, 1975, 1981, 1990)
Microscope DIALUX-PO 550012 LEITZ (1966)
3x Polarization microscope POLMI (1963, 1967)
4x Polarization microscope MEOPTA (1965, 1966, 1969)
3x Ore polarization microscope MIN (1961, 1967, 1968)
Ore polarization microscope MIN 8 (1967)
Ore polarization microscope MIN 9 (1968)
3x Microscope MPD (1966)
Microscope MST (1967, 1974)
Biological microscope OPTON (1991)
Microscope NIKON ALPHAHOT 2/HP (1995)
Microscope NF PK (1964)
4x Microscope (1963, 1968, 1969)
9x Polarization microscope (163, 1965, 1966, 1967)
27x Stereomicroscope (1957-1963, 1965-1968, 1973)
Spectrophotometrical microscope MSF 1 REICHERT (1970)
2x Microscope C36 (1958, 1975)
Microscope A36 (1960)
2x Microscope B36 (1961)
Binocular microscope (1959)
Stereomicroscope SM XX (1968)
2x Projection microscope (1968, 1969)
Microscope DNO 714 (1994)

Fisson track laboratory (head Mgr. Jiří Filip, CSc.)
Analytical system for fisson track – Microscope AXIOPLAN ZEISS and Trackscan system 452110 AUTOSCAN (1999)
Polishing and griding machine MTH APX 010 (2003)

Laboratory of exogenic geology (head Doc. Ing. Petr Skřivan, CSc.)
AAS Spectrometer VARIAN SpectrAA 300 (1991)
lamps As, Be, Cd, Cu, Cr, Fe, Mn, Ni, Co, Pb, Sr, Zn, Rb, Ba+GTA96+VEA76
Analytical weights SARTORIUS Basic analytical (1992)
Filtration blocks B-2A Epi/FL (1996)
Gamma-Ray Spectrometer GS 256 (1988)
Analytical weights BALANCE 2000G (1999)
Decomposition unit PLAZMATRONIKA SERVICE S.C. (1995)
Set of vacuum lysimeters PRENART (1999)

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14. Financial Report

(in thousands Czech Crowns)

A. INCOMES	
1. From the annual budget of the Academy of Sciences CR	23,921
2. From the Grant Agency of the ASCR (accepted research projects)	3,204
3. From the Grant Agency CR (accepted research projects)	1,786
4. From the internal research projects of the Acad. Sci.	2,304
5. From other state sources (Ministry of Environment, etc.)	173
6. Applied research	2,728
7. Investments (for laboratory facilities)	2,561
8. Investments (for buildings)	439
TOTAL INCOMES	**37,116**

B. EXPENSES	
1. Scientific staff - wages, medical insurance	13,734
2. Research and scientific activites	7,928
3. Administration and technical staff - admin.expenses,wages,medical insurance	6,858
4. General expenses (postage shipping, maintenance of buildings, energies, transport, office supplies, miscellaneous, etc)	4,515
5. Library (subscriptions etc.)	600
6 Editorial activites (Geolines, Annual Report, Journal Czech Geol. Soc.)	217
7 Investments (for laboratory facilities)	2,561
8 Investments (for buildings)	439
9 Profit	264
TOTAL EXPENSES	**36,852**