Academy of Sciences of the Czech Republic

Institute of Geology
Annual Report 2001

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.

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1. Preface

The first year of the New Millennium was relatively quiet with no substantial changes in the staff and Institute structure. The Institute staff worked hard, which is reflected also in the production of the Institute.
The year 2001 was also succesful in our editorial policy. We entered the group, which produces journal *Geologica Carpathica* (IF of 0.156) and another group producing the *Journal of the Czech Geological Society* (reviewed national title), enlarging the possibility of presentation of our production. Our title *GeoLines* has not been touched by these procedures, still beeing produced by our Institute. At the end of 2001, we published a book of an outstanding karstologist – Vladimír Panoš – only a short time before his death.
International contacts increased, including our involvement within international scientific programmes and projects or grants. The international co-operation represents the main task of our activity, especially facing the possible joining the EU in the next 2 to 6 years.

Pavel Bosák, DSc.
Director of the Institute

2. General Information

The Institute of Geology of the Academy of Sciences of the Czech Republic (abbr. GLI AS CR) was founded in 1961. It concentrates on research activities in the principal branches of geological sciences. Major research areas especially developed in the Institute are 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
- Quaternary geology and landscape evolution
- Paleomagnetism
- Magnetostratigraphy
- Petromagnetism

The research potential of the Institute is divided into 6 units:

Scientific departments

1. Endogenic Geology and Geochemistry
2. Stratigraphy and Paleontology
3. Exogenic Geology and Geochemistry
4. Paleomagnetism

Service units

1. Service Laboratory of Physical Methods
2. Information Centre (Library and Computer Network)

The following specialized laboratories have been set up:

Specialized laboratories

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)
6. Laboratory of rock processing and mineral separation (head Václav Sedláček)
7. Laboratory for thin and polished sections (head Ing. Anna Langrová)
8. Microscopic laboratory (head Mgr. Monika Němečková)
9. Sedimentary laboratory (head RNDr. Anna Žigová, CSc.)
10. Fission track laboratory (head Mgr. Jiří Filip, CSc.)

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 popularization 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, 2001)

Management

RNDr. Pavel Bosák, DrSc.	Director of the Institute
Ing. Ottomar Gottstein, CSc	Vice-Director (finances)
Doc. RNDr. Jaromír Ulrych, DrSc.	Vice-Director (research)
RNDr. Petr Štorch, DrSc.	Chairman of the Scientific Council

Head Office:

Josef Brožek (photographer)
Antonín Čejka (technical service)
Ing. Miroslav Fridrich (computer specialist)
Josef Chmelař (civil military service)
Martin Chadima (civil military service)
Václav Javůrek (computer specialist)
Karel Jeřábek (garage attendant, driver)
Jaroslav Kratochvíl (technical service)
Martin Mráček (boiler operator)
Marcela Nováková (assistant to the Director)
Stanislav Šlechta (civil military service)
Božena Trenzeluková (phone operator)
Petr Vachalovský (technical service)

Scientific departments

Department of Endogenic Geology and Geochemistry

Scientific Staff:

RNDr. František Patočka, DrSc. – Head of the Department (petrology, geochemistry)
Mgr. Martin Svojtka, Ph.D. – Deputy Head of the Department (geochronology, geochemistry)
Mgr. Jiří Adamovič, CSc. (basin analysis, tectonics)
RNDr. Miroslav Fajst, CSc. (petrology)
RNDr. Vladimír Cajz, CSc. (volcanology)
Ing. Jiří Fiala, CSc. (structural geology, metamorphic petrology)
Mgr. Monika Němečková (structural geology, tectonics and metamorphic petrology)
Mgr. Petra Vítková (petrology)
prom. geol. Jiří Novák, CSc. (petrology)
RNDr. Edvín Pivec, CSc. (igneous petrology and mineralogy)
Mgr. Jana Svobodová, Ph.D. (igneous and metamorphic petrology, geochemistry)
Doc. RNDr. Jaromír Ulrych, DrSc. (igneous petrology, geochemistry)
RNDr. Zdeněk Vejnar, DrSc. (structural geology, metamorphic petrology)

Technical Staff:

Josef Forman (technician)
Ing. Jaroslava Pavková (secretary of the Department, technician)
Jana Rajlichová (technician)
Václav Sedláček (technician)

Department of Stratigraphy and Paleontology

Scientific Staff:

RNDr. Radek Mikuláš, CSc. – Head of the Department (ichnofossils)
RNDr. Marcela Svobodová, CSc. – Deputy Head of the Department (Cretaceous palynology)
RNDr. Jiří Bek, CSc. (Devonian and Carboniferous spores)
RNDr. Petr Čejchan, CSc. (paleoecology)
prom. geol. Arnošt Galle, CSc. (Devonian corals)
Doc. RNDr. Jindřich Hladil, DrSc. (Devonian stratigraphy and reefs)
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. Luftulla H. Peza, DrSc. (Mesozoic molluscs)
Doc. RNDr. Zbyněk Roček, DrSc. (origin and evolution of the Amphibia, Tertiary Anura and Sauria)
RNDr. Miloš Siblík, CSc. (Mesozoic brachiopods)
RNDr. Ladislav Slavík, CSc. (conodont biostratigraphy)
RNDr. Petr Štorch, DrSc. (Ordovician and Silurian stratigraphy, graptolites)
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 of the Department, technician)

Department of Exogenic Geology and Geochemistry

Scientific Staff:

RNDr. Václav Cílek, CSc. – Head of the Department (Quaternary geology)
RNDr. Anna Žigová, CSc. – Deputy Head of the Department (pedology, paleosoils)
Ing. Irena Dobešová (geochemistry)
Mgr. Michal Filippi (geochemistry)
Ing. Ottomar Gottstein, CSc. (geochemistry of magmatic and metamorphic rocks)
Mgr. Jaroslav Hlaváč (Quaternary geology, malacozoology)
RNDr. Jaroslav Kadlec, Dr. (Quaternary geology)
Ing. Olga Kvídová, CSc. (exogenic and environmental geochemistry)
RNDr. Vojen Ložek, DrSc. (Quaternary geology, malacozoology)
Ing. Luděk Minařík, CSc. (geochemistry)
Mgr. Tomáš Navrátil (aquatic and environmental geochemistry)
RNDr. Eliška Růžičková (petrology, Quaternary geology)
Doc. Ing. Petr Skřivan, CSc. (exogenic and environmental geochemistry)
Mgr. Zuzana Vařilová (geochemistry)

Technical Staff:

Jaroslava Bednářová (editorial services – maternal leave)
RNDr. Miloš Burian (chemical analyst)
Magdaléna Čejková (charlady)
Miroslav Karlík (technician)
Jana Macháčková (secretary of the Department, technician)

Department of Paleomagnetism

Scientific Staff:

Ing. Petr Pruner, DrSc. – Head of the Department (geophysics, paleomagnetism)
RNDr. Jaroslav Kadlec, Dr. (Quaternary geology)
prom. fyz. Otakar Man, CSc. (geophysics)
Mgr. Jana Štěpánková (geophysics - maternal leave)

Technical Staff:

Martin Blažíček (technician)
Tomáš Kohout (technician)
Jana Drahotová (technician)
Věra Havlíková (technician)
Jiří Petráček (technician)

Service Units

Service Laboratory of Physical Methods

Ing. Anna Langrová – Head of the Laboratory (microprobe and scanning microscope analyst)
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. Zuzana Korbelová (microprobe and scanning microscope operator)
RNDr. Karel Melka, CSc. (X-ray and thermal analyses)
Mgr. Jiří Filip, CSc. (fission track dating)

Information Centre and Library

RNDr. Helena Purkyňová – Head of the Department (librarian)
PhDr. Liliana Peza (librarian)
Mgr. Václava Škvorová (librarian)

Economic Department

Ing. Ottomar Gottstein, CSc. – Head of the Department
Jana Klímová (accountant)
Alena Sokolová (accountant, human resources)

Scientific Council

RNDr. Petr Štorch, DrSc. (Institute of Geology AS CR) - Head of the council
Prof. RNDr. Petr Čepek, CSc. (Faculty of Science, Charles University)
Prof. RNDr. Zlatko Kvaček, DrSc. (Faculty of Science, Charles University)
RNDr. Václav Cílek, CSc. (Institute of Geology AS CR)
RNDr. Jaroslav Kadlec, Dr. (Institute of Geology AS CR)
Doc. RNDr. Jindřich Hladil, DrSc. (Institute of Geology AS CR)
Doc. RNDr. Zdeněk Kukal, DrSc. (Czech Geological Institute, Governmental Council for Research and Science)
RNDr. František Patočka, DrSc. (Institute of Geology AS CR)
Ing. Petr Pruner, DrSc. (Institute of Geology AS CR)
RNDr. Vladimír Rudajev, DrSc. (Institute of Rock Structure and Mechanics AS CR)
RNDr. Vladislav Babuška, DrSc. (Institute of Geophysics AS CR)
RNDr. Lilian Švábenická, CSc. (Czech Geological Institute)
Doc. RNDr. Jaromír Ulrych, DrSc. (Institute of Geology AS CR)

Foreign consultants

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)
Prof. Henri Maluski (Université Montpelier II, Montpelier, France)
Prof. Ronald Parsley (Department of Geology, Tulane University, New Orleans, USA)
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., Ing., 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

1.1.2001	Mgr. Zuzana Vařilová (geochemistry) joined the Institute
2.1.2001	Bc. Stanislav Šlechta (civil military service) joined the Institute

April

17.4.2001	Michal Krůta (accomplished the civil military service)
30.4.2001	RNDr. Miroslav Coubal, CSc. (petrology) left the Institute

June

22.6.2001	RNDr. Daniela Venhodová (paleomagnetism) left the Institute

July

1.7.2001	Ing. Bronislava Vávrová (technician) joined the Institute

August

31.8.2001	Jaroslava Bednářová (Quaternary geology) left the Institute

September

1.9.2001	Ing. Vlasta Böhmová, Ph.D. (scanning microscope operator) joined the Institute
1.9.2001	Bc. Jitka Špičková (geochemistry) joined the Institute
13.9.2001	Radim Blažek (accomplished the civil military service)

October

1.10.2001	Zdena Pekárková (charlady) joined the Institute
1.10.2001	Vlasta Kaiserová (charlady) joined the Institute

December

3.12.2001	Josef Chmelař (civil military service) joined the Institute
31.12.2001	Ing. Václav Suchý, CSc. (sedimentology) left the Institute
31.12.2001	Marcela Šmídová (technician) left the Institute
31.12.2000	Jaroslava Tejčková (technician) 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:

Bek J.: *Evolution of Paleozoic spores*. Graduate course, Faculty of Science, Charles University, Prague.

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

Cílek V.: *Landscape and urban development.* Graduate Course, Colorado State University, USA. Summer school, Prague.

Cílek V.: *History and Landscape – field studies*. Undergraduate Course, Simon Fraser University, Vancouver, Canada, Summer school, Prague.

Cílek V.: *Town and its environment*. Undergraduate and Graduate Course, 3rd Faculty of Humanistic Studies, Charles University, Fall 2001. Prague.

Cílek V.: *Urban environment*. Undergraduate and Graduate course, Faculty of Liberal Arts, Charles University, ECES (Eastern and Central European Studies) and Erasmus Programmes 2001, Prague.

Fajst M.: *Course of Geological Survey*. Undergraduate course, Faculty of Science, Charles University, Prague.

Fajst M.: *Field course*. Undergraduate course, Faculty of Science, Charles University, Prague.

Fajst M.: *Methods of geological studies*. Undergraduate course, Faculty of Science, Charles University, Prague.

Fajst M.: *Regional-geological aspects of environmental protection in the CR*. Open Undergraduate course, Faculty of Science, Charles University, Prague.

Filippi M.: *Ore deposits*. Undergraduate course, (part of Geology of the deposits course), Institute of Geochemistry, Mineralogy and Mineral Resources, Faculty of Science, Charles University, Prague.

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

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

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

Kadlecová E.: *Osteology for palaeontologists*. Undergraduate course, Faculty of Science, Charles University, Prague.

Loydell D.K., Ryan M. & **Štorch P.**: *Geological field mapping course, Svatý Jan pod Skalou, September 2001*. Undergraduate course (practice), University of Portsmouth.

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

Nehyba S. & **Hladil J.**: *Sedimentology*. Undergraduate course, Faculty of Science, Masaryk University, Brno.
Němečková M.: *Course of geological survey*. Undergraduate course (practice), Faculty of Science, Masaryk University, Brno.
Němečková M.: *Petrography of sedimentary rocks*. Undergraduate course (practice), Faculty of Science, Masaryk University, Brno.
Roček Z., Švátora M., Exnerová A. & al.: *Comparative anatomy of vertebrates*. Undergraduate course, Faculty of Science, Charles University, Prague.
Roček Z., Švátora M. & Exnerová A.: *Morphology of animals*. Undergraduate 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.
Roček Z.: *Review of fossil vertebrates*. Undergraduate course, Faculty of Science, South Bohemian University, České Budějovice.
Štorch P.: *Principles and methods of stratigraphy*. Undergraduate and graduate course, Faculty of Science, Charles University, Prague.
Ulrych J.: Special Mineralogy. Graduate course, Technological Faculty VŠCHT, Prague.
Vítková P.: *Basic geology for teachers*. Undergraduate course (practice), Faculty of Science, Charles 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

Beran L. (MSc. thesis), Department of systematic zoology, Faculty of Science, Charles University, Prague (*supervisor **V. Ložek***)
Blondes M. (Individual study, annual report), Pomona College. California, USA (*supervisor **V. Cílek***)
Brůna J. (MSc. thesis), Faculty of Science, Masaryk University, Brno (*supervisor **Z. Roček***)
Čapková M. (BSc. Thesis), Faculty of Humanistic Studies. Charles University. Prague (*supervisor: **V. Cílek***)
Danko P. (MSc. thesis), Faculty of Science, Charles University, Prague (*supervisor **Z. Roček***)
Fialová B. (MSc. thesis), Faculty of Forestry, Czech Agricultural University, Prague (*supervisors **O. Kvídová** and **P. Skřivan***)
Hubačík M. (MSc. thesis), Faculty of Science, Masaryk University, Brno (*supervisors R. Melichar and **J. Hladil***)
Juřičková J. (MSc. thesis), Department of systematic zoology, Faculty of Science, Charles University, Prague (*supervisor **V. Ložek***)
Lehotský T. (MSc.thesis), Faculty of Science, Palacký University Olomouc (*supervisors O. Bábek and **R. Mikuláš***)
Majorová H. (MSc. thesis), Faculty of Science, Charles University, Prague (*supervisor **Z. Roček***)
Mládková L. (MSc thesis), Faculty of Forestry, Czech Agricultural University, Prague (*co-supervisors **L. Minařík** and **P. Skřivan***)
Mühldorf J. (MSc. thesis), Faculty of Science, Charles University, Prague (*supervisor **J. Kadlec***)
Ondráček P. (MSc. thesis), Faculty of Science, Charles University (*supervisor P. Kraft*, *co-supervisor **J. Zajíc***)
Pluskalová J. (MSc.thesis), Faculty of Science, Palacký University Olomouc (*supervisors O. Bábek and **R. Mikuláš***)
Rudolfová J. (MSc. thesis), Faculty of Science, Masaryk University, Brno (*supervisor **Z. Roček***)
Šandera M. (MSc. thesis), Faculty of Science, Charles University, Prague (*supervisor **Z. Roček***)
Špičková J. (MSc thesis), Faculty of Science, Charles University, Praha (*supervisor **I. Dobešová***).

Štolfová K. (MSc.thesis), Faculty of Science, Charles University, Prague (*supervisors K. Martínek and **R. Mikuláš***)
Zahradníček O. (MSc. thesis), Faculty of Science, Charles University, Prague (*supervisor **Z. Roček***)

Supervision in Graduate Studies

Adamovič J. (CSc. - Ph.D. thesis), Institute of Geology, AS CR, Prague (*supervisor **P. Bosák***)
Baroň I. (Ph.D. thesis), Faculty of Science, Masaryk University, Brno (*supervisor **V. Cílek***)
Cajz V. (CSc.- Ph.D. thesis), Institute of Geology, AS CR, Prague (*supervisor **J. Ulrych***)
Čejchan P. (CSc. - Ph.D. thesis), Institute of Geology AS CR, Prague (*supervisor **J. Žítt***)
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 and **M. Konzalová***)
Ekrt B. (Ph.D. thesis), Faculty of Science, Charles University (*supervisor O. Fejfar*, *co-supervisor **J. Zajíc***)
Filip J. (CSc.- Ph.D. thesis), Institute of Geology, AS CR, Prague (*supervisor **Z. Vejnar***)
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. Leichmann and **J. Hladil***)
Hlaváč J. (Ph.D. thesis), Faculty of Science, Charles University, Prague (*co-supervisors **V. Ložek** and **V. Cílek***)
Kundrát M. (Ph.D. thesis), Faculty of Science, Charles University, Prague (*supervisor **Z. Roček***)
Kvítková L. (Ph.D. thesis), Faculty of Science, Masaryk University Brno (*co-supervisor **E. Růžičková***)
Němečková M. (Ph.D. thesis), Institute of Geology, AS CR, Prague (*external supervisor **F. Patočka***)
Slavík L. (CSc. - Ph.D. thesis), Institute of Geology, AS CR, Prague (*supervisor **J. Hladil***)
Slepičková-Štěpánková J. (Ph.D. thesis), Faculty of Science, Charles University, Prague (*co-supervisor **P. Pruner***)
Štorc R. (Ph.D. thesis), Faculty of Science, Charles University, Prague (*co-supervisor **J. Žítt***)
Trbušek J. (Ph.D. thesis), Vlastivědné muzeum Olomouc (*supervisor **Z. Roček***)
Vach M. (Ph.D. thesis), Institute of Applied Ecology, Faculty of Forestry, Czech Agricultural University, Prague (*supervisor **P. Skřivan***)

RNDr. Pavel Bosák, DrSc. – Member of the Scientific Board, Faculty of Science, Masaryk University, Brno; Member of the Committee for Interdisciplinary Study of Quaternary, Faculty of Science, Masaryk University, Brno; Member of the Board of Graduate Studies in Geology, Faculty of Science, Charles University, Prague
RNDr. Václav Cílek, CSc. - Member of the Board of Graduate Studies in Earth Sciences, Faculty of Science, Masaryk University, Brno, 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, Charles University, Prague.
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.
Ing. Petr Pruner, DrSc. - Member of the Board of Graduate Studies in Geophysics, Faculty of Science, Charles University, Prague.
Doc. RNDr. Zbyněk Roček, DrSc. - Member of the Board of Graduate Studies in Zoology, Faculty of Science, Charles University, Prague, Member of the Committee of the Ministry of Education of the Czech Republic for Doctoral Dissertations (DrSc) in Geology.
Doc. Ing. Petr Skřivan, CSc. - Member of the Scientific Board (Section of Geology) of the Faculty of Science, Charles University, Prague, Member of the Professional Board for the Post-doctoral Study in the field “Applied and Landscape Ecology” of the Faculty of Forestry, Czech Agricultural Univ., Prague.

Doc. RNDr. Jaromír Ulrych, DrSc. - Member of the Board of Graduate Studies in Mineralogy and Geochemistry, Faculty of Science, Charles University, Prague.
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

DrSc. (DSc.)

RNDr. František Patočka, CSc.: *Cambro-Ordovician rifting of the Cadomian continental lithosphere and Variscan accretion of successory fragments: principal events in the Palaeozoic history of the Bohemian Massif.* Institute of Geology, AS CR, Prague (Sept. 26, 2001)

Ing. Petr Pruner, CSc.: *Palaeotectonic rotations and amalgamation of blocks in the light of palaeomagnetic data, with special reference to the Bohemian Massif, Western Carpathians, Northern China and Mongolian blocks*. Institute of Geology AS CR, Prague (Nov. 6, 2001)

Doc. RNDr. Jaromír Ulrych, CSc.: *Intrusive Centres of Neoidic Volcanism in the Bohemian Massif: Geochemical, mineralogical and petrological characteristics*. Institute of Geology, AS CR, Prague (Oct. 22, 2001)

RNDr**.** Petr Štorch, CSc.: *Graptolite faunas of the uppermost Ordovician and Silurian of the peri-Gondwanan Europe with particular references to Barrandian: high-resolution stratigraphy, faunal dynamics and palaeobiogeographical links.* Institute of Geology AS CR, Prague (Nov. 22, 2001)

CSc.(Ph.D.)

Mgr. Jiří Adamovič: *Ferruginization in sandstones of the Bohemian Cretaceous Basin*. Institute of Geology, AS CR, Prague (May 29, 2001)

RNDr. Vladimír Cajz: *Emplacement of the dyke swarm in the České středohoří Mts. volcanic centre*. Institute of Geology AS CR, Prague (May 29, 2001)

RNDr. Petr Čejchan: *A novel paleoecological indirect gradient analysis tool using Bayesian estimate of density and graph theoretical hypothesis generator*. Institute of Geology AS CR, Prague (May 24, 2001)

Mgr. Jiří Filip: *Uranium fission track analysis and its application for thermochronology*. Institute of Geology AS CR, Prague (Nov.14, 2001)

RNDr. Ladislav Slavík: *Pragian conodont fauna and zonation in the Barrandian area*. Institute of Geology AS CR, Prague (May 24, 2001)

Ph.D.

Mgr. Martin Svojtka: *Geochronology and structural evolution of granulites in the southern Moldanubian Zone, Bohemian Massif, Institute of Geochemistry, Mineralogy and Mineral Resources.* Faculty of Science, Charles University, Prague (March 5, 2001)

7. Positions in International Organizations and Editorial Boards

Bek J.: Councillor of the Organization of Czech and Slovak palynologists, since 1994.
Bek J.: Vice-President of the International Federation of Palynological Societies, since 2001.
Bosák P.: Secretary General, International Union of Speleology (UIS), since 1993, re-elected in 2001
Cílek V.: National representative, Past Global Changes: Pole-Equator-Pole III profile. UN project, since 1993
Galle A.: Czech representative, IPA, International Paleontological Association
Hladil J.: Appointed Committee Member in Working Group for Subdivision of the Frasnian Stage at the SDS, Subcommission on Devonian Stratigraphy, since 1999.
Hladil J.: Voted Council Member and Representative of Europe-III Group of Countries, IASFCP, the

International Association for Study of Fossil Cnidaria and Porifera, since 1995.
Hladil J.: Voted Secretary of the CzNC IGCP, International Geological Correlation Programme, since 1994.
Kadlec J.: The IGBP - Core Project 7: Past Global Changes: Coordinator for the Czech Republic.
Ložek V.: Foreign Member, Polish Academy of Arts and Sciences.
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.: Member of the Working group on Treatise on Invertebrate Paleontology, Trace Fossils, since 2000.
Roček Z.: Member of Executive Committee of the International Society of Vertebrate Morphologists, since 2001.
Roček Z.: Member of the Executive Committee of the World Congress of Herpetology, since 1994.
Roček Z.: Member of the International Herpetological Committee, since 1989.
Roček Z.: Vice-President, Societas Europaea Herpetologica, since 1995.
Růžičková E.: Corresponding member of COGEOENVIRONMENT, since 1992 (Commission on Geol. Sciences for Environmental Planning).
Siblík M.: Corresponding Member, Geological Survey in Vienna, Austria, since 1999.
Siblík M.: Corresponding Member of the Subcommission of Triassic stratigraphy of the IUGS, since 1999.
Slavík L.: Corresponding Member of the SDS (Subcommission on Devonian Stratigraphy of IUGS), since 1999.
Štorch P.: Corresponding Member of the International Subcommission on Silurian Stratigraphy, IUGS, since 1992.

Editorial Boards

Bosák P.: *Český kras*, Beroun, Member of Editorial Board, since 1976 and Editor, since 1998
Bosák P.: *Geologica Carpathica*, Co-editor, since 2001
Bosák P.: *Geologos*, Poznań, Member of Editorial Board, since 2000
Bosák P.: *International Journal of Speleology*, L´Aquilla, Member of Advisory Board, since 1994
Bosák P.: *Speleo (Praha)*, Member of Editorial Board, since 1990
Bosák P.: *Theoretical and Applied Karstology*, Bucuresti, Member of Editorial Board, since 2000
Bosák P.: *UIS Bulletin*, Editor-in-Chief, since 1993
Ložek V.: *Studia Quarternaria*, Kraków, Poland, since 1999
Melka K.: *Clay Minerals*, Journal of the European Clay Groups, London, Member of editorial board, since 1999
Cílek V.: *Encyclopedia of Life Support Systems*, Honorary Theme Editor, UNESCO
Pruner P.: *Acta Universitatis Carolinae*, *Geologica* (Charles University, Prague), Member of Editorial Board
Kadlec J.: *Geolines* (Institute of Geology, AS CR), Member of Editorial Board
Cílek V.: *Slovenský kras* (Liptovský Mikuláš, Slovensko), Member of Editorial Board, since 2000
Mikuláš R.: *Geolines* (Institute of Geology, AS CR), Member of Editorial Board
Patočka F.: *Geologia Sudetica* (Wroclaw, Poland), Member of Editorial Board, since 1997
Patočka F.: *Geolines* (Institute of Geology, AS CR), 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*, since 1992
Roček Z.: *Živa* (AS CR Praha), Member of Editorial Board, since 1995
Svojtka M.: *Acta Universitatis Carolinae, Geologica* (Charles University, Prague), Member of Editorial Board
Svojtka M.: *Geolines* (Institute of Geology, AS CR), Editor-in-Chief
Štorch P.: *Geolines*, Member of Editorial Board
Štorch P.: *Geological Journal*, Liverpool, Manchester, Member of Editorial Board, since 1993
Štorch P.: *Newsletters on Stratigraphy*, Berlin, Stuttgart, Member of Editorial Board, since 1999
Zajíc J.: *Bulletin of the Czech Geological Survey*, Member of Editorial Board, since 2001

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8. Department of Endogenic Geology and Geochemistry

Foreign Grants and Joint Projects

Grant in aid for scientific research 0765/2001-2002, Japan Society for the Promotion of Science

P-T evolution of lower crustal blocks in upper crustal levels in the European and Asian Hercynides, and their comparison: Contrasts between orogens? (***M. Svojtka*** *& M. Obata, Kyoto University, Japan*)

The granulite-facies rocks in the Hidaka metamorphic belt in Hokkaido (northern Japan) consists of the Western and Main Zone, the latter being thrust over the former along the Hidaka Main Thrust. The grt-opx granulite and garnet-cordierite-biotite granulite gneiss of the Main Zone were studied. The granulite-facies rocks were metamorphosed under the conditions of ca. 850 °C and 6–7 kbar. The P-T conditions indicate prograde pressure-temperature path of the Main Zone of Hidaka metamorphic belt. In this zone granulite-facies rocks includes leucosomes (opx-plg-quartz or opx-cordierite-plg-quartz), which are explained by biotite-breakdown anatectic reactions such as biotite + An poor plagioclase + quartz ± garnet + vapor = orthopyroxene ± cordierite + An-rich plagioclase + melt during the peak metamorphic event.

The project of the joint program of Ministeries of education of the French and Czech Republics BARRANDE 2001-002-1

From crystalline massif to a pebble in (meta)conglomerate: dating by Ar-Ar method in low-strain domains (Datations Ar-Ar de zones protégées diverses l'echelles: du massif au galet) *(H. Maluski, Lab. de Géochronologie CNRS-UMR, Montpellier, France****, F. Patočka*** *& V. Kachlík, Faculty of Science, Charles University, Prague)*

The tonalitic orthogneisses and orbicular granites from the Český Krumlov Varied Group of the South Bohemian Moldanubicum were already dated by U-Pb method on zircons at 2.1 Ga and represent the oldest intrusive event in the history of the Bohemian Massif.
The orthogneisses and orbicular granites are essentially identical in geochemical features as it is evidenced by the concentrations and relations of immobile trace elements (e.g., Th, Nb, Zr a Y) and lanthanides (REE). The ORG-normalized trace element compositions of these rocks are similar to both syn-collisional and within-plate granitoids. The second type of tectonic setting of the protolith origin is favoured due to the overal trend to alkalic (trachyandesitic) composition demonstrated by $Nb/Zr–Zr/TiO_2$ diagram, and by high alkali concentrations (Na_2O+K_2O = 6 to 8 wt.% at SiO_2 abundances typically between 65 and 70 wt.%). According to the relations Nb/Y–Th, Nb/Yb–Th/Yb and Th/Zr–Zr/Y, the metagranitoids together with conform amphibolites (= geochemical equivalents of within-plate tholeiitic basalts) seem to be a co-magmatic bimodal association comparable to modern suite of basalt + andesite(dacite) to trachyandesite type.
The orthogneisses and orbicular granites display several significant geochemical features, which are specific for very ancient (Early Proterozoic to Archaean) granitoids: negligible negative Eu-anomalies (>0.8), very high La/Th values (>>2.7), low concentrations of Th (<10 ppm for the most part) at the given SiO_2 abundances, and internal fracionation of HREEs accompanying significant LREE/HREE differentiation as documented by high Gd_N/Lu_N and La_N/Lu_N values. These features correspond very well to the measured magmatic age of the rocks – ca. 2 Ga.

*Czech-Hungarian Project: Comparative volcanostratigraphy of the Neoidic volcanics of the Bohemian Massif and the Pannonian Basins (K. Balogh, Institute of Nuclear Research, Hungarian Academy of Sciences & **J. Ulrych**)*

Subproject: Geochemistry of the stratified volcanosedimentary complex in the central part of the České středohoří Mts., North Bohemia *(**J. Ulrych, V. Cajz**, K. Balogh, Instute of Nuclear Research, Hungarian Academy of Sciences, Debrecen, Hungary & V.Erban, Czech Geological Institute, Prague).*

On the basis of a new volcanological model and geochemical investigation in the České středohoří Mts., the following volcanostratigraphical formations were recognized: (i) the Lower Fm. – lavas and volcaniclastics of basanitic character (36-26 Ma; Mg# = 57–76; $^{87}Sr/^{86}Sr$ = 0.703128–0.703526 and $^{143}Nd/^{144}Nd$ = 0.512738–0.512849) corresponding to primitive upper mantle products; (ii) the Upper Fm. – lavas and volcaniclastics of trachybasaltic type (31–25 Ma; Mg# = 41–58, $^{87}Sr/^{86}Sr$ = 0.704428–0.704649 and $^{143}Nd/^{144}Nd$ = 0.512679–0.512742) representing differentiated and partly crustal-contaminated evolved products; (iii) the Uppermost Fm. – flow(s) of basanite (24 Ma), similar in geochemical characteristics to those of the Lower Fm. Volcaniclastic products of the Lower Fm. (Mg# = 51–69) and the Upper Fm. (Mg# = 45–51) also substantially differ in bulk composition. The volcaniclastics underwent alteration to a different degree, which has significantly changed their geochemical signatures. Enrichment and depletion in elements, normalized to the massive rocks of the same formation, are highly variable. However, contents of Ti, Al, Si, Fe and (Mn) are relatively stable and these elements represent typical immobile components, whereas Ca, Na, K and Mg contents are lower; contents of H_2O and CO_2 are significantly higher. Trace elements as Nb, Ta, Zr, Hf, REE and Y seem to behave as immobile, whereas Sr, Cu, Ni, Co, Cr, (Th, U) as mobile. the alteration products are mostly represented by minerals of the smectite and zeolite groups.

Grant Agency of the CR

No. 205/99/0907 Recent geodynamics of the western Bohemia in relation to the Earth's crust architecture (unique natural laboratory) *(J. Horálek, Institute of Geophysics, AS CR, **J. Ulrych, V. Cajz, E. Pivec, J.K. Novák** & Č. Nekovařík, Czech Geological Institute, Prague*)

Subproject: Cenozoic alkaline volcanic rock series in W Bohemia: age, relations and geochemical constraints *(**J. Ulrych, V. Cajz, J.K. Novák**, K. Balogh, Institute of Nuclear Research, Hungarian Academy of Sciences, Debrecen, Hungary & J. Frána, Nuclear Physics Institute, Academy of Sciences of the Czech Republic, Řež)*

On the basis of geological and geochemical methods, the following alkaline volcanic rock series were recognized in W Bohemia:

1. Oligocene-Miocene (31–21/16/ Ma) volcanism of the Western Ohře Rift.

1.1. the Doupovské hory Mts. characterized by predominantly unimodal strongly alkaline series of olivine nephelinite – leucite/analcime basanite to tephrite – phonolite (31–26 Ma) – Mg # (65–18).

1.2. the Ohře Rift area between the Doupovské hory Mts. and the Mariánské Lázně Fault Zone (and continuation of volcanism up to the Franconian Line) characterized by the unimodal series of (melilite-bearing) olivine nephelinite – tephrite (24–21/16/ Ma) – Mg # (56–76).

2. Middle to Late Miocene (16.5–8.3/7.5/ Ma) volcanism of the Tepelská vrchovina Highland and Slavkovský les Mts. at the NE flank of the Cheb-Domažlice Graben:

2.1. weakly alkaline series: basanite – trachybasalt – (basaltic) trachyandesite – trachyte – (rhyolite?) (/15.9/12.8–11.4 Ma) – Mg # (69–8).

2.2. strongly alkaline series: (melilte-bearing) olivine nephelinite – tephrite (16.5-8.3/6.5/ Ma) – Mg #

(74–46).
3. Quaternary (0.4–0.1 Ma) volcanism of melilite-bearing olivine nephelinite – olivine nephelinite composition occurring at the intersection of the structures of the Western Ohře Rift and the Cheb-Domažlice Graben – Mg # (69–73).
The parental magmas of the all rocks series are inferred to have originated by continuous low-grade melting of metasomatized mantle source initiated at >31 Ma. Only slightly differentiated basaltic rocks of all series give evidence on a limited degree of magma fractionation. Fractional crystallisation and assimilation of crustal material played a substantial role in the formation of the Middle to Late Miocene volcanism associated with the Cheb-Domažlice Graben.

Subproject: Middle to Late Miocene alkaline volcanic series associated with the Cheb-Domažlice Graben, W Bohemia: geochemistry and mineralogy *(**J. Ulrych, J. Štěpánková, J.K. Novák**, F.E. Lloyd, PRICE, Reading University, Reading, U.K & K. Balogh, Institute of Nuclear Research, Hungarian Academy of Sciences, Debrecen, Hungary*)

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 (NNW-SSE). The volcanic activity was synchronous with the graben formation dated by its pre-Middle Miocene? (>11.7 Ma) to Late Pliocene sedimentary fill. Two coexisting cogenetic volcanic series have been recognised there: (i) weakly alkaline series (WAS) basanite – trachybasalt – (basaltic) trachyandesite – trachyte – rhyolite (15.9–11.4 Ma) and (ii) strongly alkaline series (SAS) olivine nephelinite – tephrite (16.5–8.3/6.5? Ma. Similar patterns in nephelinite and basanite PM-normalized incompatible trace elements point to a single mantle source that was geochemically similar to EM. Negative Rb and K anomalies indicate residual amphibole in the source. Magma modelling showed that nephelinite and basanite formed by different degrees of partial melting of the mantle source, with amphibole, garnet, olivine and clinopyroxene in the residuum. The mantle source was probably represented by lithospheric mantle metasomatised by plume-like material. Evolution of the SAS is rather unclear because it is limited in extent. The WAS is well developed and its evolution can be modelled by fractionation of olivine, clinopyroxene, Fe-Ti oxide, a small proportion of plagioclase, and in late stages by alkali feldspar, Fe-Ti oxide, clinopyroxene and apatite.

Grant Agency of the Academy of Sciences CR

No. A3013802 Mineralogy, geochemistry and palaeomagnetism of the Variscan diastrophic sediments of the Bohemian Massif: provenance and paleotectonic implications *(**P. Pruner, F. Patočka, J. Hladil, D. Venhodová, O. Man** & **J. Slepičková**)*

Subproject: Variscan diastrophic siliciclastic sediments of the Moravo-Silesian Zone (Bohemian Massif): provenance and palaeotectonic setting (***F. Patočka, J. Hladil, P. Pruner**, L. Maštera, J. Otava, & H. Gilíková, Czech Geological Institute, Brno)*

The Moravo-Silesian Zone of the Bohemian Massif eastern margin is also an eastern branch of the Variscan Belt of Europe. The Devonian to Early Carboniferous basin fills (Variscan diastrophic Culm facies) of the MSZ are considered to be equivalent of the Rhenohercynian Zone. The folded and detached diastrophic sequences of the MSZ were thrust over Neoproterozoic Brunovistulicum and segmented by strike-slip faults. The palaeomagnetically evidenced clockwise rotation of the detached segments of the MSZ was 90° to 110° relative to the Baltica palaeolatitudes. The Late Carboniferous shear zone contributed to a conspicuously curved and narrow shape of the Variscan thrust belt in the SE termination of the "Bohemian arc".
Abundance of siliciclastics (greywackes/arkoses to greywackes/lithic sandstones) characterises the MSZ diastrophic sedimentary sequences. The geochemical data on the MSZ siliciclastic sediments

provided significant implications on provenance and palaeotectonic setting of the rock origin. The age of the MSZ sequences decreases towards the E. The westernmost basin fills are mostly of early Visean age with as old as possibly Givetian(?) basal part. The siliciclastics were derived from young continental island arc (CIA) showing also some features of oceanic island arc (OIA). The arc was situated on an old passive continental margin (of the Brunovistulian microplate?). A wide variety of basic to acid (meta)igneous rocks contributed to the siliciclastics. Middle to late Visean basin fills were sedimented in a setting of maturing CIA with scarcely preserved features of OIA. Mostly acidic arc involving a wide spectrum of rocks of granitic (rhyolitic-dacitic) geochemistry was a source of the siliciclastics. Somewhat more condensed spectrum of the same rock types characterized a tectonic setting of mature CIA already evolving to active continental margin (ACM) where a subsequent (late Visean) sequences of the MSZ sedimentary fills were accumulated. The youngest siliciclastics of the latest Visean to early Namurian(?) age were deposited in a CIA to ACM setting, and were provided by a homogeneous acidic arc source. A narrow spectrum of rocks geochemically equivalent to acid magmatites produced uniformity of the sediments.
The succession from CIA(±OIA) to CIA→ACM sources recorded in geochemical composition of the MSZ diastrophic siliciclastics seems to correspond to a series of events from the early to culminating stages of orogenic collision, and subsequent uplift and exhumation of tectonic slices. The source development may reflect the docking of the Teplá-Barrandian microplate on the Brunovistulicum during the final accretion of the Bohemian Massif terrane mosaic.

No. A3013906 Early Palaeozoic extension in the Central European realm: sedimentary, volcanic, fossil and palaeomagnetic record of the Barrandian (Bohemian Massif) (***P. Štorch, F. Patočka, P. Pruner*** & ***J. Štěpánková***)

Subproject: Early Palaeozoic siliciclastic sediments of the Barrandian (Teplá-Barrandian Terrane, Bohemian Massif): palaeotectonic implications (***F. Patočka*** & ***P. Štorch***)

The Teplá-Barrandian terrane is considered to be one of the easternmost relics of the Late Proterozoic (Cadomian) terrane chain incorporated into the Variscan Belt of Europe from the northern Armorican Massif to the NW half of the Bohemian Massif. A relatively simply folded and very low-grade metamorphosed Late Proterozoic basement is unconformably overlain by weakly deformed and unmetamorphosed sequences of Cambrian and Early Ordovician up to Middle Devonian ages, respectively. The Early Palaeozoic volcano-sedimentary sequence of the Barrandian, reaching up to several km in thickness, was accumulated on top of the Late Proterozoic basement after erosion subsequent to the Cadomian orogeny.
The geochemical data on siliciclastic sediments of both Cambrian and Early Ordovician to Middle Devonian sequences of the Barrandian provided significant implications on provenance and palaeotectonic setting of the rock origin. A pile of coarse to fine grained siliciclastic sediments, 1-2 km thick, was deposited in the Cambrian Příbram-Jince Basin of the Barrandian. Sediments were derived from intermediate to acid rocks of a Cadomian island arc based on oceanic lithosphere. Inversion of relief (Bohemian phase) interrupted the sedimentation and uplifted the Cambrian basin; the successory Prague Basin subsided nearby since the Tremadocian. Shallow-water siliciclastic sedimentation prevailed in the Ordovician and Early Silurian, and was replaced by the deposition of carbonate rocks beginning in the late Early Silurian. Above the Late Silurian and Early Devonian limestone suite a short-lived Early Givetian accumulation of flysch-like siliciclastics (an impingement of Variscan orogeny) completed the Barrandian sedimentation. In the Early Ordovician to Early Silurian, and possibly also in the Middle Devonian, clastic sediments of the Prague Basin were derived from progressively eroded continental island arc crust dominated by intermediate to acid igneous rocks. The supply of recycled sedimentary component was increasing through time. Synsedimentary basic volcanism contributed to the clastic material during the Ordovician and Silurian. The Early Palaeozoic siliciclastics of the Barrandian were deposited at an intracontinental extensional tectonic setting, which may be related to the northern Gondwana large-scale rifting and development of the peri-Gondwanan fragments.

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: The Ancestry and Affinity of Central Europe: New U-Pb (LA-PIMMS) Ages of Inherited Zircons From Early Palaeozoic Granitoids of the W Sudetes, NE Bohemian Massif (*Q.G. Crowley, School of Earth Sciences and Geography, Keele University, Staffordshire, UK, **F. Patočka** & R.R. Parrish, NERC Isotope Geoscience Laboratory, Keyworth, Nottingham, UK)*

Early Palaeozoic bi-modal magmatism is widespread across much of the N Bohemian Massif. Emplacement of granitic lithologies at ca. 500 Ma generally predates mafic magmatism. Large volumes of granitic magma were generated due to an increased geothermal gradient resulting from incubation of a mantle plume. Continuing lithospheric attenuation combined with upwellling of mantle asthenosphere and tensional forces resulted in fragmentation of the N Gondwanan margin and formation of discrete seaways with active spreading centres.
Geochemically the granitoids generally have a “volcanic-arc" signature, which has been inherited from the source region. There is no evidence of significant addition of new material directly from the mantle; these granitic rocks formed by crustal recycling. Furthermore there is no geological evidence for an active volcanic arc in this area in Late Cambrian to Early Ordovician times.
Nine separate granitic rocks were sampled from the Krkonoše-Jizera area, SE Czech Republic (Saxothuringian Zone). All contain abundant zircons with populations of multi-faceted, rounded, long prismatic and short prismatic morphologies. Backscattered SEM images of representative zircons indicate that many have distinct cores and rims. These zircons display multi-faceted zoned, or rounded homogeneous cores with narrow zoned overgrowths and prismatic terminations. One hundred and one separate zircon grains were dated using Laser-Ablation Multi-Collector Mass Spectrometry (LA-PIMMS). The majority of the inherited U–Pb ages are concordant and fall into the following categories: (1) 520–770 Ma (Cadomian), (2) 1.9–2.2 Ga (Birimian/Icartian/Eburian/Burkinian) and (3) ca. 3.0 Ga (Leonian). These three age populations are typical of the W African Craton and of the Armorican Terrane Assemblage in general. Some zircons yielded discordant Mesoproterozoic ages, however these can be attributed to either lead loss or mixing (i.e., separate domains in the zircon being analysed). Some previous U-Pb zircon and whole rock Sm–Nd studies of similar lithologies from the W Sudetes have attributed the presence of Mesoproterozoic ages to a peri-Amazonian provenance. However, it is proposed that these ages represent mixing between Archaean to Palaeoproterozoic aged cores and Neoproterozoic to Early Palaeozoic aged rims in the zircons. Moreover, ca. 3.0 Ga ages are not found in the Amazonian Craton. We therefore favour derivation of the Saxo-thuringian zone and associated members of the Armorican Terrane assemblage from a N African Gondwanan setting.

No. A 3013102 Structural aspects of the evolution of volcanic centres: the České středohoří Mts. as an example ***(V. Cajz)***

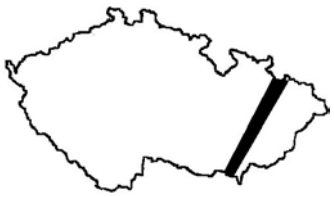
Subproject: Structural evolution of the České středohoří Mts. volcanic centre (***V. Cajz***)

The research in the České středohoří Mts. volcanic centre was focused on verification of dykes and on structural analysis of the radiating dyke swarm developed here. All the data of the dyke swarm orientation were statistically evaluated as for the rock type. The groups of lamprophyres (preferred directions 90, 75, 110, 0, 65, 130 and 155^{o}) and semilamprophyres (45, 120, 80, 65, 90, 0 and 155^{o}) are very close one to another from the structural point of view, and were probably emplaced under the effect of a similar regional stress regime. The structural pattern of felsic derivatives (60, 90, 120 and 150^{o}), which are younger, differs from both older groups, indicating a change in regional stress regime. This supposed change may correspond with the

subsequent development of magmatic activity of the Roztoky Intrusive Centre.
The new directional data of dyke orientations obtained from field survey (590 verified dykes, 280 measured dykes), revealed by structural analysis, were compared with a newly recognized tectonic setting inside the superficial products of the volcanic complex (90 tectonic structures in directions 35, 0, 80-90, 150 and 130°), using the same method. The close structural relationship of the radiating dyke swarm formation and the newly recognized tectonic features was found. Orientations of dykes of lamprophyres and semilamprophyres rather support the idea that their emplacement was controlled by regional stress regime than by structures induced by supposed diapiric effect of the hypabassal (essexitic) and/or carbonatitic intrusions, as believed before. The somewhat different control of stress regime is responsible for emplacement of felsic derivates.
Completion and presentation of the CSc. (PhD) Thesis “Emplacement of the dyke swarm in the České středohoří Mts. volcanic centre" was supported from this grant project.

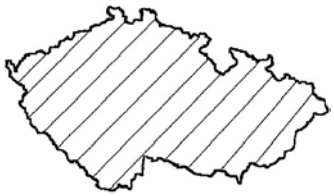
No. A3408902 Tremolite-bearing marbles as a specific lithotype for correlation of metacarbonate-bearing variegated units in the eastern part of the Bohemian Massif *(M. Novák, Faculty of Science, Masaryk University, Brno &* ***M. Němečková****)*

Subproject: Tremolite marbles in the Bohemian Massif and their prograde metamorphic reactions *(M. Novák, Faculty of Science, Masaryk University, Brno &* ***M. Němečková****)*



Samples of tremolite marbles were subjected to microscopic studies and microprobe analyses. Their mineral assemblage was found to consist of carbonates – calcite and dolomite, and of tremolite and phlogopite. Minor to accessory minerals also include Na-Al-Mg amphiboles (pargasite, edenite, magnesiohornblende) in tremolite rims and in separate grains, diopside, titanite, pyrite, plagioclase, K-feldspar, scapolite, apatite, tourmaline and rutile.
Calcite is the most common carbonate, forming several generations discernible particularly with the use of the cathodoluminescence method. Amphiboles are represented by four generations of tremolite. Phlogopite forms at least two types of different chemical composition. Diopside occurs in three or more different types. Metamorphic reactions occurred in a complex system NKCMAS(-H_2O, CO_2, F). Three stages of metamorphism were distinguished and characterized by particular systems CMAS (-H_2O, CO_2) and CMS (-H_2O, CO_2).
The P-T-X conditions of metamorphism M1 can be estimated with the presumption of p = 600 MPa at T_{max} <630 °C at X_{CO2} = 0.2-0.9. T_{min} >550 °C and X_{CO2} = 0.4. Younger metamorphism M2 is typical for the Moldanubicum where products M1 are often preserved in relics only. It is characterized by the formation of diopside. Retrograde M3 metamorphism produced especially talc after tremolite and probably also chlorite.

No. A3013006/00 New feldspar cooling rate speedometer based on the experimental data and its implication on the selected rocks of the Bohemian Massif *(****J. Štěpánková, M. Svojtka*** *& M. Drábek, Czech Geological Institute, Prague)*



Equations on feldspar cooling rate were limited on constant temperatures until the recent time. They were extended also for the cases of decreasing temperature now. Results from new experimental works are going to complete the procedure by precise constants. This will allow a common use of the geospeedometer for reconstruction of thermal histories of magmatic and metamorphic rocks. The recent principal results include the derivation of geospeedometer equations and generation of computer algorithm.
Both border diffusion and inter-diffusion processes were chosen as suitable for defining the geospeedometer. The inter-diffusion is applicabe for defining cooling-rate geospeedometer in alkali feldspars. The alkali feldspars are often perthitic due to exchange of major elements between

individual lamellae – the perthites usually follow one crystallographic orientation with the effect of elimination of differences in diffusion coefficients in various directions given by crystallography of the feldspars. The starting temperature of the cooling diffusion is given by time of separation of individual phases and may be well estimated from the feldspar composition. The inter-diffusion is relatively slow and suitable for estimating of cooling rate during late magmatic stages. The border diffusion is relatively rapid and continues to lower temperatures. It was used during derivation of the second type of geospeedometer, which is generally more difficult in application as it has to be based on thermometric data and solid knowledge of crystallographic orientations.

No. A3013910 Young volcanism-related ferritization of sedimentary rocks, Bohemian Cretaceous Basin (***J. Adamovič, J. Ulrych, M. Coubal*** & ***K. Melka***)

A combination of geophysical, geological and mineralogical methods was applied on the sandstone-hosted occurrences of Fe-oxyhydroxides in the BCB, complemented by the study of their chemical composition. Laminated quartz-poor ironstones and massive quartz-rich ironstones were distinguished and characterized as for the macromorphological types they form in the field. A close spatial relation was generally proved between the distribution of intrusive bodies of basaltic rocks and Fe-oxyhydroxides.
Quartz-poor ironstone was found to consist of goethite I, kaolinite, anatase, ±opal, ±detrital quartz, and a younger generation of goethite II ± lepidocrocite. Quartz-rich ironstone is dominated by detrital quartz with accessory detrital minerals, cemented by goethite ± lepidocrocite ± hematite. Microprobe analyses proved the presence of phosphates (Al-vivianite, Al-strengite) in quartz-poor ironstones. The average contents of Fe_2O_3 are 43.4 wt.% in quartz-poor ironstones and 24.3 wt.% in quartz-rich ironstones. Both types of ironstones are enriched in incompatible elements relative to quartzose sandstones and, in the case of $Fe_{tot.}$, As and Zn, even relative to fresh volcanic rocks.
Ferruginization in sandstones of the BCB is viewed as a polygenetic process with a primary hydrothermal impulse. Transport of ferrous iron in low-Eh fluids of late magmatic origin and its precipitation in zones of mixing with oxygenated meteoric waters seem to be the most probable mechanisms controlling the distribution of Fe-oxyhydroxides.

No. A301203903 Tectonomagmatic position and evolution of the Permian–Carboniferous volcanism in the Variscan Belt of Europe (***J. Ulrych, P. Bosák, J.K. Novák, E. Pivec,*** *P. Martinec, Geonika, Academy of Sciences of the Czech Republic, Ostrava* & *J. Pešek, Charles University, Prague*)

Subproject: Volcanic activity in late Variscan basins of Northern Bohemia: petrological and geochemical constraints *(**J. Ulrych, J. Štěpánková, J.K. Novák, E. Pivec*** & *V. Prouza, Czech Geological Institute, Prague).*

Upper Palaeozoic volcanic rocks from the Krkonoše Piedmont Basin (partly also the Mnichovo Hradiště Basin) can be subdivided into the following three groups: (I) basaltic trachyandesites and basaltic andesites > basalts, trachybasalts, (II) trachyandesites, andesites> trachydacites and (III) rhyolites. Volcanic activity started in the Late Carboniferous, producing calc-alkaline volcanics of group II in the southern part of the Krkonoše Piedmont Basin, and migrated north in the Permian, producing transitional volcanics of groups I and III. In the Krkonoše Piedmont Basin, volcanic rocks of intermediate compositions are of Carboniferous age, whereas felsic volcanics prevailed in the Permian. Mafic to intermediate rock members (groups I and II) represent mantle-derived products affected by crustal contamination during AFC processes. Although the primary magma composition is obscured by pervasive crustal assimilation, DM or HIMU sources are more probable than the EM source. Heat input into the crust from the mafic magmas and from the upper mantle led to the formation of anatectic crustal melts, as represented by group III rhyolites. Although

the Upper Palaeozoic volcanic rocks in the individual basins in N Bohemia come from similar sources and are basically of the same origin, they probably evolved in separate crustal magmatic chambers. Geochemical similarity of the rhyolites of group III with some late Variscan granites suggests their common source.

Grants of the Fund for University Development (FRVŠ)

Project No. 540/2001 – FRVŠ: Comparison of metamorphism in Polička Crystalline Unit and Zábřeh Crystalline Unit *(**M. Němečková**, D. Buriánek & M. Novák, Faculty of Science, Masaryk University, Brno)*

The Zábřeh (ZCC) and Polička (PCC) crystalline complexes have been placed into different geological units by most of the authors. In spite of this, the two complexes share many lithological and petrographic features.
They are formed by muscovite-biotite to biotite gneisses intercalated with quartzites, amphibolites and meta-carbonate rocks. Metamorphic rocks are intruded by tonalite to granodiorite bodies.
Cordierite-bearing rocks have been reported only from the northern part of the PCC. Composition of the biotite gneisses adjacent to cordierite chert is Pl + Q + Bt ± Ms. Mineral association of the cherts is: Pl + Q + Bt + Crd + Grt ± And ± St ± Chl. Peak conditions of the origin of this mineral association were 565 °C and 2.5 to 3 kbar. Its formation seems to be partly governed by the reaction St + Bt = Grt + Crd or reaction And + Bt = Crd + Grt. The ambient rocks show no signs of metamorphism of higher grade than that, which affected the cherts.
Cordierites are more common in gneisses of the ZCC. PT conditions of 635 °C and 5 kbar were registered in rocks with mineral association Grt + Bt + Sill +Crd ± Mu. The origin of this mineral association was probably mediated by the reaction Grt + Sill + Q + H_2O = Crd. Another typical association, Bt + Sill + Crd + Kfs ± Grt, was found to be associated with temperature of 680 °C and pressure of 5.5 kbar.
Metapelites characterized by mineral association Bt + Sill + Grt + Kfs are present in the neighbourhood of cordierite-bearing gneisses. These rocks indicate temperature of 693 °C and pressure of 6.9 kbar. Chemical zoning of garnet is indistinct, corresponding to diffusion zoning. Garnet grain margins probably do not reflect the peak metamorphic conditions.
Metapelites with mineral association Bt + St + Grt + Pl + Sill (Ky) represent another rock type, indicating PT conditions of 659 °C and 9.7 kbar.

Project No. 1793-FRVŠ: Pre-Variscan metaboninites in the Jílové Belt and Islet Zone of the Central Bohemian Pluton (***P. Vítková** & V. Kachlík, Faculty of Science, Charles University, Prague*)

Metaboninites and rocks with strong metaboninite affinity (HMBA) have been described in the Jílové Belt and the "Islet Zone" (especially in Mirovice, Kasejovice and Netvořice-Neveklov metamorphic islets). Metaboninites and HMBA usually form beds of variable thickness within large bodies of mafic metavolcanics. They have been metamorphosed to greenschist and/or low amphibolite facies. The magmatic mineral assemblage is obliterated due to regional and contact metamorphism, which produced amphibole, epidote and chlorite. Existing mineral association usually consists of augite and diopside (fresh or completely replaced by uralite), amphibole (predominant calcic types), chlorite and plagioclase (oligoclase and andesine). Olivine and opaque minerals are only accessory minerals.
Metaboninites and HMBA are rare high-Mg and low-Ti intermediate andesitic volcanic rocks, having a high Mg/(Mg+Fe^{2+}) ratio and great abundance of Ni and Cr. They are very potassium poor with low contents of incompatible elements, low Ti/Zr ratios and high Cr/Ni ratios. All of the samples have low abundance of Ti, Y and heavy REEs. The Islet Zone and the Jílové Belt metaboninites and HMBA

generally display typical tholeiitic or transitional to calc-alkaline patterns of the chondrite normalised trace element distributions. The REE contents are very low and the REE chondrite-normalised patterns are relatively flat.

The presence of metaboninites and HMBA in the Jílové Zone and the “Islet Zone" indicates a subduction zone operating during the Neoproterozoic along the Gondwana margin and the evolution of an arc system probably associated with changing subducting slab geometry. Occurrences of metaboninites can be interpreted as an eastward transition from an arc system to a BAB.

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9. Department of Stratigraphy and Paleontology

Foreign Grants and Joint Projects

Grant projects with international cooperation

Czech-American Joint Programm: Karst Geology and Pleistocene History Through Sea Level Events

Gamma-ray spectrometric (U, Th) and magnetosusceptibility patterns (Fe) on sedimentary cycle boundaries in pure platform limestones, San Salvador Island, Bahamas *(**Pavel Bosák, Jindřich Hladil, Ladislav Slavík, Petr Pruner, Daniela Venhodová, Martin Chadima**, Helena Hercman, Tomasz Nowicki, Laboratory of U-series, Department of Quaternary Geology, Institute of Geological Sciences, Polish Academy of Sciences, Warszaw, Poland, John E. Mylroie, Department of Geosciences, Mississippi State University, USA & J.L. Carew, Geology Department, College of Charleston, USA)*

Cycle terminations connected with sea-level lowstands, like protosol, paleosol, duricrust horizons, and paleokarst features (normal and unroofed caves and their fills) linked with principal boundaries of lithostratigraphic units of Holocene and Upper Pleistocene age were studied in Quaternary carbonate platform sediments of the San Salvador Island, Bahamas.

The gamma-ray spectrometric and magnetosusceptibility data reveal characteristic patterns in U-Th-Fe variation that are coupled with cycle boundaries. The patterns have existed since the early stages of their formation and diagenesis, and they have exhibited remarkably low changeability during subsequent diagenetic stages. The boundary of a sedimentary cycle on the carbonate platform is marked by a protosol/paleosol horizon (sea-level lowstand, maximum of emergence) that is typically characterized by two ^{238}U-related spikes. The lower anomaly reflects depletion (leaching) in uranium near the emergent surface with consequent enrichment in the underlying cementation zone, whereas the upper anomaly results from later enhancement by uranium derived from the sediment infill (flooding beds). The anomalous ^{232}Th values are concentrated very close to the boundary, in the middle of the X-ray anomalies. There is only a subtle infiltration shift downward in this spike, but the thorium signal may fade upward due to sediment recycling. Such a combination of one Th-spike between two U-spikes forms a very characteristic "trident-shaped pattern". The magnetosusceptibility anomalies at the boundary are bifurcated. A very narrow but extraordinarily strong magnetosusceptibility spike is coincident with the Th-spike, and another spike is developed below, in the cementation zone. When the buried cycle boundary forms the truncated floor of horizontal caves that are filled with carbonate sediments, the ^{238}U and ^{232}Th anomalies are widened, forming a remarkable "head-shaped bulge". In conditions of brine-diagenesis, a bottom infiltration is marked by separation of a subordinate lower spike. This secondary spike is seen in Th rather than in U. The shapes of the magnetosusceptibility curves are similarly bulged, but the increased values oscillate. The distribution in magnitude of the spikes is asymmetrical downward and a strong spike corresponds to infiltration/cementation in the floor (base-rock) of the cave.

One of the principal paleosol horizon and cementation profile (duricrust) developed between two eolianite dunes yielded a short reverse magnetized zone. As the Th/U age of above-lying dune is 103.70 +14.08/-12.64 ka, the reverse polarized part of hardened horizon may belong to the Blake event within the Brunhes normal polarized chron. The latest data indicate the duration of the Blake event between 112.3 and 117.9 ka. The evolution of paleosols in this period is in agreement with sea-level lowstand during the oxygen isotope substage 5d.

The study was partly supported from sources of the Grant Agency of the Academy of Sciences of the

Czech Republic (Grant No. 301-3-809: Assessment of regional and eustatic sea-level changes on the Devonian carbonate platform bordering southeastern edge of the Bohemian Massif).

American Chemical Society, The Petroleum Research Fund: Re-evaluation of mid-Paleozoic strata in southern Peru in context of Late Devonian Gondwanan glaciation (*P. E. Isaacson, Geological Department, University of Idaho, Moscow, E. Díaz Martínez, Departmento de Estratigrafia, Facultad de Ciencias Geologicas, Universidad complutense de Madrid, Madrid,* ***M. Vavrdová*** *&* ***J. Bek***)

Subproject: Palynology of selected sections in Western Gondwana (***M. Vavrdová*** *&* ***J. Bek***)

The beginning of the main Late Palaeozoic glaciation in Gondwana presents a good stratigraphic record in the western sector of the supercontinent, which was at high latitutes during the Devonian and part of the Carboniferous. Recent advances in the study of glacial marine deposits and their palaeoclimatic significance, together with the revised older (Late Devonian-Mississippian) ages of several American stratigraphic units previously considered to be Pennsylvanian, provide further evidence for the Late Devonian glaciation in westernmost Gondwana (Bolivia and Peru). The age of strata with evidence for glaciation is constrained by invertebrate and palynomorph biostratigraphy. Late Palaeozoic glacial centres began to form in western Gondwana (northern America and northern Africa) during the Late Devonian, and shifted towards eastern Gondwana during the Carboniferous.

Project KONTAKT 2001-4: Classical Triassic and Liassic brachiopod localities in the UNESCO World Heritage area Hallstatt-Dachstein-Salzkammergut (***M. Siblík*** *& H.Lobitzer, Geologische Bundesanstalt, Wien)*

The aim was to check the present situation on the old well-known localities of Mesozoic brachiopods in the area between Hallstatt and Gosau. The type locality of Anisian Schreyeralm Limestone on Schreyeralm and Schiechlinghöhe are still well accessible and yield not very numerous but characteristic well-preserved brachiopod fauna such as *Mentzelia ptychitiphyla* (Bittn.), *Norella refractifrons* (Bittn.) and the most common *Pexidella marmorea* (Bittn.). One of the classical Middle Jurassic sites of the "Klausschichten" in the vicinity of Hallstatt–Klausalpe could not be found in 2001. According to old references, it was a small occurrence and not easy to be traced. The position of the second locality Mitterwand (Dürrenalpe) was not precisely described in the older literature. It is possible, however, to find several isolated occurrences of grey and red biosparites with manganese spots or micrites with crinoid particles on the Mitterwand containing fragmentary terebratulids and rhynchonellid *Striirhynchia* sp. proving Middle Jurassic age (Bajocian–Bathonian).

IGCP Project 410. The Great Ordovician Biodiversification Event: Implications for Global Correlation and Resources *(B.D. Webby, Macquarrie University, Australia; F. Paris, Université de Rennes, France & M.L. Droser, University of California, USA)*

Subproject: Ichnopaleontological reflection of the Great Ordovician Biodiversification Event in the Barrandian and compared areas (***R. Mikuláš***)

In the muddy, oxygen-deficient sediments of the Llanvirnian of the Prague Basin, chemical disequilibrium between burrows and the host substrate were a common reason for the origin of nodules. As the ichnofossils are well preserved in the nodules, without deformation, the origin of the nodules during very early diagenesis must be assumed, in

some cases probably contemporaneous with the existence of the open burrow. The steepest chemical gradient can be expected close to the openings of the burrows. Therefore, these parts of burrows may have had the highest fossilization potential. The ichnogenera of *Skolithos*, *Planolites*, *Rhizocorallium* and *Glockerichnus* were recognized as possible agents of the nodule-forming process.

Programme of the European Scientific Foundation

EEDEN (Environments and Ecosystem Dynamics of the Eurasian Neogene) / NECLIME (Neogene Vegetation and Climate Reconstructions) *(Projects leaders: 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 Sciences, Charles University, Prague,* ***M. Konzalová,*** *J.Sakala, J. Dašková & J. Prokop, Faculty of Science, Charles University, Prague)*

The systematics and distribution data of sporo/pollen taxa were evaluated in their ranges through the Bohemian Neogene. Four selected groups of *Pteridophytes* and *Magnoliophytes* were evaluated on the basis of statistical data obtained from the representative bore-sections of the main basins and relics of the Bohemian Massif. It was recognized that *Taxodiaceae–Cupressaceae* were dominated swampy forest widespread mainly in the Lower Miocene of the North Bohemian Basin (Most Formation), in contrast to the South Bohemian Basins, similarly as *Arecaceae (Palmae)*. Herbaceous ferns and flowering plants display different range of distribution. Both groups show increasing amount in their records and frequency of single taxa to the Pliocene and Pliocene/Pleistocene boundary. Similar value in the histograms is reached by *Musci*. Their records are extremely rare in the North Bohemian basins (Sokolov and Most Basins) but are frequent in the Pliocene sections, where they were a major component of the communities. The quantitative analysis of the selected well-defined specimens demonstrates the value of method in application for long-range occurrences. The results refer to paleoclimate and bog-forest environments changes. The occurrences of the selected fern and flowering plant taxa were traced within the 23.8–20.5 Ma to 1.8 Ma.

Other established international research groups

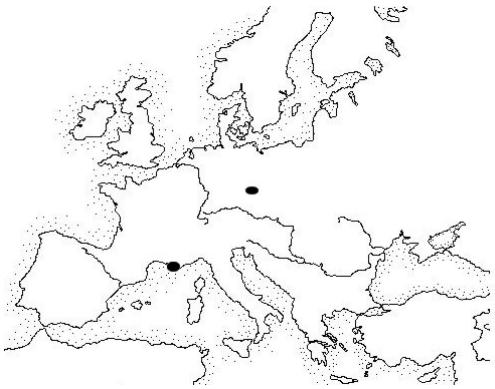
Bilateral cooperation between the Czech Geological Institute, Prague and Geological Institute, Vienna (Geologische Bundesanstalt – GBA, Wien): Study of the Upper Cretaceous foraminifers and palynomorph assemblages from the Gosau Group of the Northern Calcareous Alps (Dachstein area) *(L. Hradecká, L. Švábenická, Czech Geological Institute, H. Lobitzer, GBA, Vienna &* ***M. Svobodová****)*

Subproject: Study of the Upper Cretaceous palynomorph assemblages from Krampen near Neuburg (Steiermark) (***M. Svobodová****)*

Marlstones from the Krampen Quarry (Krampen 22) near Neuburg in Steiermark, Austria (type locality of ammonite genus *Pachydiscus neubergicus* Hauer – Maastrichtian) were studied from the palynological point of view. Dinoflagellate cysts dominate the assemblage (98 %) and consist of four genera: *Odontochitina (O. operculata), Isabelidinium* sp., *Dinogymnium (D. euclaense)* and *Microdinium* sp.

Low diversity of the assemblage may correspond to open marine conditions during the sedimentation. Most of the palynomorph taxa were long-ranging forms while biostratigraphically more important are the finds of *Dinogymnium euclaense,* which occurs in the Late Campanian–Maastrichtian. Rare pteridophyte spores and gymnosperm pollen occur. No angiosperm pollen were found. The state of preservation of the palynological content was poor.

Bilateral cooperation between the Institute of Geology AS CR and Centre de Paleontologie stratigraphique et Paléoécologie, CNRS, Université Claude-Bernard, Lyon
Project: Biodiversity of fossil pollen of the Normapolles group during the Cenomanian and Turonian from Central and SW Europe *(H. Méon, G. Guignard, Centre de Paleontologie stratigraphique et Paléoécologie, CNRS, Université Claude-Bernard, Lyon,* ***M. Svobodová****, Institute of Geology AS CR)*



The aim of our study is the comparison of the biostratigraphically important pollen grains of angiosperm plants from the Bohemian Cretaceous Basin and selected exposures from the Vocontian trough and Gard Department and to document the rise and dispersal of Normapolles genera during the Cenomanian and Turonian. First Normapolles originated during late middle Cenomanian in coastal environments. Two genera, *Complexiopollis* and *Atlantopollis* characterize late Cenomanian–early Turonian deposits at the localities Pecínov and Vergons. Several new genera i.e., *Trudopollis, Vacuopollis, Plicapollis, Pseudoplicapollis* etc. appear in the middle and upper Turonian. Not only new genera, but also the diversification in species is observed. The most different assemblage was provided by the upper Turonian sediments of the Úpohlavy quarry and outcrops from the Gard Department, because of different paleoecological conditions. Sporomorphs from Úpohlavy come from hemipelagic sediments while those at Gard come from continental ones.

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***)

Sidneia manleyi sp. nov. is yet another type of marattialean fern from the Pennsylvanian palaeotropical coal forests. It differs from most other marattialeans except Radstockia in having deeply incised pinnules. There are some features that encourage comparison with extant marattialeans such as *Marattia,* such as the oval configuration of the synangia. However, on the whole *Sidneia* seems to differ markedly from both contemporaneous and subsequent representatives of the order, and is further evidence for the diversity of Palaeozoic marattialeans. Its relationship to *Radstockia,* with which it seems to have most in common, must remain equivocal until more can be said about the type species of the latter (*R. sphenopteroides*), especially concerning the spores that it produced. If *Radstockia* produced trilete spores, then it will clearly be distinct from *Sidneia.* However, if

it can be shown to also have produced monolete spores, then it may be arguable that they should be regarded as cogeneric.
Radstockia is widely quoted as the earliest evidence of the Marattiaceae in the fossil record based mainly on the evidence presented by Taylor in his original description of *R. kidstonii*. In fact, Taylor was correctly circumspect about whether *Radstockia* was or was not a primitive member of the Marattiaceae, as the preservation did not permit a detailed evaluation of the structure of the synangia. The better preservation of *Sidneia* unfortunately does not clarify the situation; although it shares a number of features with extant marattiaceans, it also differs in a number of significant features. It seems more likely that *Sidneia* and *Radstockia* represent a group (?family) of Late Palaeozoic marattialeans that is different from both the Asterothecaceae and Marattiaceae. Far more likely candidates for primitive members of the Marattiaceae are *Qasimia* from the Late Permian of Saudi Arabia or even *Danaeites saraepontanus* Stur from the Westphalian of Saar-Lorraine. These have fronds and synangia that bear a much closer resemblance to the Marattiaceae, in contrast to *Sidneia* and *Radstockia*.

Grant Agency of the CR

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*)

The presence, occurrence and frequency of individual specimens and general composition of palynospectra in the North Bohemian Basin (NBB) are known from the earlier investigation linked with extensive coal prospection.
At present, the investigation has been focused on the group of *Arecaceae*, palm records, recognized as significant plant group for coal-forming vegetation. The palms are characterized by monosulcate and disulcate pollen. At some levels of the basin sections display more than 40 % of the total sum of pollen and spores.Their occurrence reflects the own basinal communities, forming both the thickets in the swampy forest and rim of the water banks in deltaic areas. Four main groups of palm pollen could be distinguished. They possess morphological counterparts at least in the three modern palm families and some of them, particularly *Calamoideae*, corroborate the assignment of spiny leaf remains of these liana palms. The modern palm pollen, especially of the respective family, were studied authentically in the material from the herbarium items from the North Africa, Malaysia and the United States. The small-sized fossil exines were often overlooked in the slides but it is evident they were world-wide distributed in the coal basins.

No. 205/00/1000. A multidisciplinary research of the Dětaň locality: (Tertiary of the Doupov Mts.): the integration of palaeontology and pedology (***R. Mikuláš, A. Žigová, E. Kadlecová,*** *O. Fejfar & J. Sakala, Charles University, Prague*)

The locality of Dětaň provides, in contrast to other occurrences in the southern margin of Doupov Mts. (e.g., Dvérce), geologic record mainly in subaerial context. The lowermost exposed beds, i.e., kaolinised arcoses and sandstones, were subjected to former exploitation. Overburden beds reach up to 50 m in thickness. At the top of the kaolinised arkoses, irregular lenses and lentiles of white quartzose sandstones to quartzites (up to 80 cm thick) are developed; they are followed by 1–2 m thick, non-lithified to weakly consolidated, non-laminated bed composed of sand mixed with basalt ash. The remaining 30–40 m of the profile are represented by tuff and tuffite beds usually several tens of centimetres thick. More that 90 individual beds were distinguished. The beds typically differ in colour (grey, brownish, reddish and violet nuances), grain size (compact matrix and several centimetres long crystals of smectite; beds composed of grains of equable size, e.g., 1–2 mm, and other varieties), lateral stability (lentiles, quickly nipping beds, con-

tinuous beds), presence of lamination, and in palaeontologic content. Lower 15–20 m of the volcaniclastic sequence is composed of non-laminated tuff beds gradually passing one to another. Some beds contain frequent angular lava shreds or, less frequently, lapilli. The tuff beds are overlain by laminated, locally cross-bedded tuffites; two stable, parallel-laminated, violet, sharply bounded beds are also present. Few tuff beds are also present in the upper part of the sequence. The volcaniclastic sequence was covered by a basalt lava flow, which is observed at the locality in debris only; large outcrops of the lava lie ca. 300 m to the W (the Vrbička Quarry).
Data on the age of the rock exposed at Dětaň are: (1) the age of biotite/smectite crystals from the tuffs was determined at 37.5 Ma by K/Ar dating method; however, because of the alterations of biotite, this indication may not be exact; (2) the age of the basaltic lava flow overlying the tuffs and tuffites was determined at 32.6±1.7 Ma by K/Ar method (bulk sample), and (3) based on relative palaeontological dating, the locality belongs to mammalian zone MP 21. These data point to the conclusion that the whole volcaniclastic series appeared in a relatively short time during the Lower Oligocene.There are no direct stratigraphic data for the quartzites, that are interpreted as a pre-Oligocene silcrete (its origin corresponds well with the presumed warm and humid climate). The ichnofabric of the silcrete (i.e., root and ?insect traces) documents the existence of vegetation and fauna. In the following period, contemporaneous with the mammal zone MP21, the limiting factor of vegetation development was a repeated fall of basaltic tuff. Because no tuff level provided a record of pedogenesis, intervals between the eruptions had to be very short (tens of years at maximum) and the vegetation was poor. Subsequently, the locality appeared in a flood plain of a water-course bringing the volcanic material; at that time, the ecosystems were at least twice destructed by pyroclastic flows, which left violet, sharply bounded beds. For a short time, swamp and lacustrine settings are also presumed. The ecosystem succession was disrupted by repeated lava flows.

No. 205/00/0118. Facies architecture of the turbidite system of Moravice Formation, Nízký Jeseník Culm Basin, based on sedimentology and ichnofacies analysis (*O. Bábek, J. Zapletal, Palacký University, Olomouc &* ***R. Mikuláš***)

Overall bioturbation of sediments of the Culm facies is much lower compared to the Mesozoic and Cenozoic flysch facies. Totally reworked intervals (up to 1 cm thick) occur sporadically on tops of turbidite sequences. Much more frequently, visual equivalents of "mottled zone" were observed at the two studied localities, which represent a transitional facies between “laminites” and greywacke bodies. Approximately one-half of the studied turbidite beds show a mottled level. *Planolites montanus* Ichnofabric and *Rhizocorallium* Ichnofabric are infrequent. Most of the laminites show no ichnofabric except cross sections of *Dictyodora,* which are typically observed on bedding planes only (not in vertical sections). The Culm facies appears, compared to the Mesozoic and Cenozoic flysch (i.e., Rhenodanubian or Carpathian flysch), to have formed in more dynamic settings with shorter and unequally distributed colonization windows and, moreover, with a low nutrient influx from the background sediment. This explains the prevalence of traces with complex feeding strategies comprising chemosymbiosis and gardening (*Chondrites, Dictyodora*). Their effect on the integrity of sediment (i.e., the amount of transported material) was weak.

No. 206/99/1321 Phylogeny of discoglossid frogs: Reconstruction based on developmental and palaeontological data. (***Z. Roček*** *& L. Sedláčková, Department of Zoology, Masaryk University, Brno*)

Discoglossid frogs are among the earliest representatives of these amphibians and, at the same time, they exist up to now (approximately 170 Ma). This is the reason why their palaeontological record can provide valuable information on the rate and other aspects of their morphological evolution.
The earliest discoglossid frogs were recorded from the Middle Jurassic (upper Bathonian) of Britain. As revealed by examination of the type material deposited in the Natural History Museum in London, they display all typical features of the family, in spite of their geological age. In contrast to original description it is probable that the sample includes more than one species (originally described as *Eodis-*

coglossus oxoniensis), a conclusion based on morphological features of the ilia. *Eodiscoglossus santonjae* from the Lower Cretaceous (upper Berriasian or lower Valanginian) of Spain, studied earlier in the collections of the Museo Nacional de Ciencias Naturales Madrid, is represented by articulated skeletons, which makes the comparison with disarticulated skeletal elements difficult. Nevertheless, it can be stated that both are very close to each other, closely resembling modern *Discoglossus*. Since Mesozoic discoglossids from North America are based on very limited material (*Enneabatrachus* on a single ilium, *Paradiscoglossus* on several humeri and one ilium), they were not included in this study. Discoglossids from the Cretaceous of Asia were subject of earlier author's studies.
At the beginning of the Paleogene, discoglossids disappeared for unknown reasons from North America and temporarily also from Asia. In Europe, which remained the main area of their distribution, they spit into two major lineages. The first is represented by small to medium-sized forms resembling both Mesozoic *Eodiscoglossus* and modern *Discoglossus*. They are represented by a single indeterminate discoglossid vertebra from the Middle Paleocene (late Danian) of Hainin, Belgium. They become more common in the Eocene (*Opisthocoellelus weigelti* from MP13 or MP14 of Geiseltal, Germany and hitherto undescribed form from the Lower Headon Beds (Upper Eocene, Ludian) of Britain. Oligocene members of this lineage include undescribed form from MP21 of Hoeleden, Belgium, *Opisthocoellelus hessi* from the Lower Oligocene (MP22) of Bechlejovice, Czech Republic, and *Discoglossus troscheli* from the latest Oligocene (MP30) of Rott near Bonn, Germany.
From these discoglossids, persisting from the Mesozoic over the K/T boundary and closely resembling contemporary *Discoglossus*, another lineage split off at the beginning of the Oligocene. It is represented by the genus *Latonia*, which culminated its evolution by hyperossified, robust foms occurring in the Late Oligocene and Early Miocene. This "*Latonia*" lineage was obviously more sensitive to climatic changes than the "*Discoglossus*" lineage, which is evidenced by the fact that it disappeared from central Europe in Late Pliocene and its last occurrences were recorded from the Early Pleistocene of central Italy (Pietrafitta). These occurrences no doubt represent vestigial distribution in Mediterranian region before extinction of the genus.
There is still open question concerning the origin of the modern genera *Discoglossus*, *Bombina*, *Alytes* (in Europe) and *Barbourula* (in extra-continental Asia). Two hypotheses exist: (1) all these genera may be descendents of "*Discoglossus*" lineage, or (2) *Discoglossus* may be a survivor derived from *Latonia* by hypoossification during Pleistocene climatic deterioration, and similar evolutionary mechanism may be supposed in *Bombina* and *Alytes,* which both can be derived from under-developed *Discoglossus*. The validity of the second hypothesis is supported by the fact that evolution within the genus *Bombina* is strongly affected by heterochrony (this part of study was co-authored by L. Sedláčková).

No.205/00/0944 Middle Liassic brachiopod fauna and the development of brachiopod assemblages in the Liassic of the Northern Calcareous Alps (***M. Siblík***)

The study in 2001 was focused on Kratzalpe in the Hagengebirge near Golling, and on the environs of Hallstatt. Kratzalpe was studied and described by Krafft in 1897 and has been known since due to rich Lower and especially Middle Liassic ammonite and brachiopod fauna. Grey crinoidal limestones of the Hierlatz-type were collected in 2001 on Tannhausberg near the path leading to Kratzalpe. They yielded the Sinemurian assemblage consisting mostly of zeilleriid brachiopods. The most common species were *Zeilleria stapia* (Oppel), *Zeilleria mutabilis* (Opp.), *Zeilleria ewaldi* (Opp.), *Lobothyris punctata* (Sow.), *Liospiriferina obtusa* (Opp.), *Liospiriferina alpina* (Opp.), *Calcirhynchia plicatissima* (Quenst.) and *Cuneirhynchia fraasi* (Opp.). The specific diversification of local brachiopod assemblage is relatively poor if compared to that of the classical locality of Hierlatz Limestone on Hierlatz near Hallstatt. The near locality Hieflalpe from where Krafft mentioned Hierlatz Limestone with similar rich brachiopod fauna was also visited in 2001 but the fossiliferous limestones were not ascertained. Red Pliensbachian micritic limestones of Kratzalpe area are famous thanks to their ammonite fauna, monographed by Rosenberg in 1909. Their best occurrences are to be found just on the Kratzalpe and on the NE bottom of the Kratzspitz (near the highway) and are characterized by big specimens of *Securithyris adnethensis* (Suess), *Apringia paolii* (Canav.) and *Bakonyithyris* cf. *pedemontana* (Parona).
In the Hallstatt area, several new localities were ascertained SW of Hallstatt in the environs of Mitter-

wand and Klausk̈ogerl. The Hallstatt Limestone yielded prevailingly terebratulids (*Lobothyris andleri* (Opp.)), zeilleriids, *Prionorhynchia polyptycha* (Opp.), *Calcirhynchia plicatissima* (Quenst.), *Cuneirhynchia retusifrons* (Opp.), *Liospiriferina obtusa* (Opp.) and *Liospiriferina alpina* (Opp.). Whole assemblages are of the upper Sinemurian age and differ from that of Hierlatz in relative minority of coarse-ribbed rhynchonellids.

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

Sporomorphs, foraminifers, dinoflagellate cysts and calcareous nannoplankton were recovered from the dark grey to black pelitic sequences of the Silesian unit (outer Western Carpathians) overlying the Tithonian–lower Berriasian Štramberk limestone body. The Lower Cretaceous rocks are preserved on the surface or penetrate into the karst cavities of the limestone and their age differ. Already during the study of first samples we could distinguish at least two associations of microfossils of different age. The youngest association is surprisingly of late Albian–early Cenomanian age and comes from the samples from the level eight of the Main Quarry. These results are based on nannofossils of *Prediscosphaera cretacea* – zone BC27/UC0c – lower part of early Cenomanian, nannofossils of late Albian age and on the base of palynomorphs (both angiosperm pollen, and dinoflagellate cysts) late Albian-early Cenomanian age. Of angiosperm pollen, very small reticulate tricolpate forms of *Tricolpites minutus, Retitricolpites prosimilis* are present. No angiosperm pollen were found in the Plaňava Formation of the Main quarry yet. Rich assemblage of dinoflagellate cysts with biostratigraphically important taxa – *Achomosphaera triangulata, Litosphaeridium siphoniphorum* and *Palaeohystrichophora infusorioides* was recorded, corresponding to *S. dispar* ammonite zone. According to older studies the sediments of the Plaňava Formation are Valanginian to Hauterivian or Barremian age.The second association of microfossils is of the Lower Cretaceous age.

”Warm-temperate“ Tethyan elements, i.e., nannofossil species *Cruciellipsis cuvillieri*, were also found in several samples. The presence of the nannofossil genus *Nannoconus* can indicate the “cold water“ of the Boreal province. The mixing of elements of both provinces at various stratigraphical levels can provide important information on the paleoclimatological and paleogeographical changes in the depositional area of the NW part of Tethys in the Lower Cretaceous.

2/VIII	5/VII	7/VII	9/VII	10/VI	12/VI	
x		•		x	x	*Achomosphaera neptunii* (Eisenack, 1958) Davey & Williams, 1966
x						*Achomosphaera triangulata* (Gerlach, 1961) Davey & Williams, 1969
			x			*Batioladinium jaegeri* (Alberti, 1961) Brideaux, 1975
x						*Callaiosphaeridium asymmetricum* (Deflandre & Courteville, 1939) Davey & Williams, 1966
				x		*Chlamydoporella* sp.
	•			x		*Circulodiinum brevispinosum* (Pocock, 1962) Jansonius, 1986
xx		•		x	xx	*Circulodinium distinctum* (Deflandre & Cookson, 1955) Jansonius, 1986
	•	•	x		xxx	*Circulodinium vermiculatum* Stover & Helby, 1987
x	•			x		*Cometodinium habibii* Monteil, 1991
x						*Cometodinium*? *whitei* (Deflandre & Courteville, 1939) Stover & Evitt, 1978
		•	xx	xx		*Cribroperidinium orthoceras* (Eisenack, 1958) Davey, 1969,
x	•	•	x	x	x	*Cymososphaeridium validum* Davey, 1982a
			x			*Dapsilidinium multispinosum* (Davey, 1974) Bujak et al., 1980
					x	*Dissiliodinium globulus* Drugg, 1978
	•		x			*Dinogymnium albertii* Sarjeant, 1966
x					x	*Endoscrinium* cf. *campanula* (Gocht, 1959) Vozzhennikova, 1967
x						*Exochosphaeridium* sp.
x						*Fromea amphora* Cookson & Eisenack, 1958
			x			*Gardodinium trabeculosum* (Gocht, 1959) Alberti, 1961
x						*Gonyaulacysta* cf. *cassidata* (Eisenack & Cookson, 1960) Sarjeant, 1966
			x	x	x	*Gonyaulacysta* sp.
xx			x			*Hystrichodinium pulchrum* Deflandre, 1935
			x		x	*Hystrichosphaerina schindewolfii* Alberti, 1961
xx	•	•	xx	xx	x	*Kiokansium unituberculatum* (Tasch, 1964) Stover & Evitt, 1978
xx					xxx	*Kiokansium* sp
x				x	x	*Kleithriasphaeridium eoinodes* (Eisenac, 1958a) Davey, 1974
			x	x		*Kleithriasphaeridium fasciatum* Davey & Williams, 1966
x						*Litosphaeridium siphoniphorum* (Cookson & Eisenack, 1958) Davey & Williams, 1966
					x	*Muderongia neocomica* Gocht, 1957
				x		*Muderongia macwhaei* Cookson & Eisenack, 1958
				x	x	*Muderongia pariata* Duxbury, 1983
	•					*Muderongia tabulata* (Raynaud, 1978) Monteil, 1991
				x		*Occisucysta* sp.
					x	*cf. Occisucysta tentoria* Duxbury, 1977
xx						*Odontochitina operculata* (O. Wetzel, 1933) Deflandre & Cookson, 1955
					x	*Oligosphaeridium* cf. *albertense* (Pocock, 1962) Davey & Williams, 1969
x				xx	x	*Oligosphaeridium*? *asterigerum* (Gocht, 1959) Davey & Williams, 1969
xx	•	•	xx	xx	xx	*Oligosphaeridium complex* (White, 1842) Davey & Williams, 1969
					x	*Oligosphaeridium dividuum* Williams, 1978
x						*Palaeohystrichophora infusorioides* Deflandre, 1935
x						*Prolixosphaeridium* sp.
			x		x	*Pseudoceratium pelliferum* Gocht, 1957
xx						*Pterodinium cingulatum* (O. Wetzel, 1933) Below, 1981
xxx			x		x	*Spiniferites ramosus* (Ehrenberg, 1838) Mantell, 1854
				x		*Spiniferites* sp.
				x		*Subtilisphaera* sp.
xx						*Surculosphaeridium* sp.
			x			*Systematophora cf. cretacea* Davey, 1979b
	?	•	xxxx	xxx	xxx	*Systematophora scoriacea* (Raynaud, 1978) Monteil, 1992b
					x	*Systematophora silybum* Davey, 1979
			x			*Systematophora* sp.
x						*Tanyosphaeridium* sp.
	•		x	x		*Wallodinium krutzschii* (Alberti, 1961) Habib, 1972

Distribution of dinoflagellate cysts in samples from the Main quarry, Štramberk (M. Svobodová)

x – less than 4%, xx – 4-15%, xxx –15-30%, xxxx – more than 30%

No. 206/00/0942 Permian acanthodians of the Czech Republic (***J. Zajíc***)

Acanthodes gracilis was originally described from the locality of Wolbromów (the old German name is Klein Neudorf) in Polish Silesia (North Sudetic Basin; Upper Anthracosia Shales). Specimens of the original fossil material (collection of F. Roemer) were measured and photographed (with the aid of digital camera) in the collections of the Department of Paleozoology of the Zoological Institute, University of Wroclaw, Poland. The fossil content, preservation of fossils, taphonomy, and character of sediments correspond to the Rudník Horizon (particularly to its development in the Košťálov area) of the Krkonoše Piedmont Basin. The facies development of the Upper Anthracosia Shales in the Intra-Sudetic Basin is, however, dissimilar. This situation could imply a direct connection of the North Sudetic Basin with the Krkonoše Piedmont Basin during the lower Autunian period. *Acanthodes gracilis* is in all probability the predominant (if not only) Permian acanthodian species of the Bohemian Massif area. Surrounding areas shows another Lower Permian acanthodian species. *Acanthodes bronni, A. boyi,* and *A. tholeyi* were described from the Saar**–**Nahe Basin (Germany), *A. bourbonensis* from the Massif Central (France). The new surprising acanthodian finds yields locality Kladoruby-Trávník, úzký pepřík (Boskovice Graben). New specimens were also find in the Rudník Horizon (Košťálov area) of the Krkonoše Piedmont Basin. The biometric measurements (17 ratios) of both older (e.g., specimens from the collection of the Regional Museum of Eastern Bohemia, Hradec Králové) and newly found specimens continued. Several successive ontogenetic phases were distinguished according to the development of the squamation, ratios, and length of the bodies.

No. 205/99/1322 Lower Silurian graptolite biostratigraphy and correlation of the northwestern Gondwana, biogeography and faunal links with the peri-Gondwanan Europe (***P. Štorch***)

Taxonomy and biostratigraphy of the graptoloid graptolites of the Tanezzuft Formation (Murzuq Basin and Al Qarqaf area) were studied with respect to their palaeoenvironmental and palaeobiogeographic distribution. *Coronograptus gregarius-Paraclimacograptus libycus*, "*Pribylograptus leptotheca*", *Lituigraptus convolutus*, and *Stimulograptus sedgwickii* assemblage zones and *Neolagarograptus tenuis* Subzone were recognized and correlated with standard zonal scheme and graptoloid successions in peri-Gondwanan Europe, Saudi Arabia and Morocco. Rhuddanian/Aeronian boundary can be tentatively placed at the base of the *gregarius-libycus* Zone, Telychian faunas were not found. Eleven of 22 species recorded herein belong to the mid-Aeronian *convolutus* Zone assemblage, which may be assigned to low-diversity graptolite faunas inhabiting unstable, occassionally turbulent and/or oxic environment. The more proximal, silty sandy deposits appeared the lesser diversity among abundant graptoloid rhabdosomes has been observed. Black-shale sequences of the peri-Gondwanan Europe exhibit the maximum diversity of the Silurian graptoloids in about this stratigraphical level (some 40–60 species). *P. libycus* suggests close biogeographical links to Aeronian graptolite faunas of Argentina, Brazil, and Jordan respectively. Generally low diversity of the Llandovery faunas and the occurrence of several species endemic to the northern and north-western Gondwana and peri-Gondwana further account for a distinct palaeoclimatic and palaeolatitudinal control on graptolite distribution. The *convolutus* Zone assemblage much resembles coeval fauna of Saudi Arabian Qusayba Shale. *Glyptograptus desioi* n.sp., from the *gregarius-libycus* Biozone has been described.

Series	Stage	Generalized graptolite zonation by SSS (Koren` et al. 1996)	Bohemian graptolite zonation (Štorch 1998,2001 MS)	Libyan graptolite zonation (this paper)	Ghadamis Basin	Al Qarqaf arc area	W Murzuq Basin	N Al Kufrah Basin
LLANDOVERY	Telychian	*insectus* -*lapworthi*	insectus	?				
			lapworthi					
		spiralis interval	*spiralis*					
		crenulata -*griestoniensis*	*tullbergi*	*flamandi* -*meridionalis*				
			griestoniensis					
		crispus -*turriculatus*	*crispus*					
			turriculatus	"*turriculatus-guerichi* interval"				
		guerichi	*linnaei*					
	Aeronian	*sedgwickii*	*sedgwickii*	*sedgwickii*				
			tenuis	*tenuis*				
		convolutus	*convolutus*	*convolutus*				
		argenteus	*leptotheca*	*"leptotheca"*				
			simulans					
		pectinatus-triangulatus	*pectinatus-triangulatus*	*gregarius* -*libycus*				
	Rhuddanian	*cyphus*	*cyphus*	*fezzanensis*				
		vesiculosus	*vesiculosus*	*vesiculosus / tariti-africanus*				
		acuminatus	*acuminatus* -*ascensus*	?				

Graptolite biostratigraphy and correlation of the Llandovery strata (Tanezzuft Formation) of Libya (P. Štorch). Framed interval and areas discussed in annotation.

No. 205/99/1315 Nearshore taphocoenoses across the Cenomanian-Turonian boundary (Bohemian Cretaceous Basin) (***J. Žítt, L. Peza*** *& B. Záruba B., National Museum, Prague*)

The study concentrated on nearshore and rocky-coast facies of the late Cenomanian - middle Turonian age (Bohemian Cretaceous Basin).
(1) Nearshore sandstone and limestone facies were studied using excavations of the gas-main in spring 2000, near Netřeba, Korycany, Veliká Ves, Předboj, Kojetice and Čakovičky, NNE of Prague. Detailed geological documentation and palaeontological-sedimentological studies enabled to newly interpret the limestone bodies in the classical area of Korycany and to contribute to the knowledge of depositional environments, including some early diagenetic phenomena (concretions) and age (new palynological and foraminiferal data) of all the studied strata (late Cenomanian–early Turonian) in the transsected region. Taphonomic studies encircled principal univalve (gastropods), bivalve (rudists, oysters, selected non-oyster species, brachiopods) and massive (corals) skeletons. New data were obtained on the cemented epibiont component of communities colonizing the gastropod and bivalve shells (especially their interior surfaces) of Korycany sections and of coarse lydite clasts of the Kojetice area (important finds of bivalves *Plicatula* and *Anomia*). Palaeoenvironmentally important ichnological studies in sandstones were also realized (Dřevčice).

(2) A wide range of problems was studied in selected sections of the rocky-coast depositional settings, concentrated on taphonomy of macrofauna and selected sedimentological and palaeoenvironmental phenomena (hardgrounds, condensed sedimentation). Regular echinoid, crinoid, asteroid, gastropod, rudist, oyster and brachiopod components of benthic communities were studied above all. The Kuchyňka near Brázdim, Předboj, Velim, Plaňany, and Zbyslav localities yielded particularly rich sets of completely new data not only on taphonomy, but also taxonomy of macrofauna (e.g., *Novasalenia* gen. n. from Předboj, Radim and Plaňany, *Aemula* from Zbyslav, *Metopaster* and many gastropods and rudists from Kuchyňka, *Pycnogyra* gen.n. and *Pycnodonte* from Plaňany, a.o.). The summary studies of phosphogenesis (Markovice, Kutná Hora–Karlov, Kutná Hora–Kaňk, Kutná Hora–Turkaňk, Radim and many other localities) have shown that phosphogenic episodes probably occurred in three stratigraphical levels (two in the late Cenomanian and one in early Turonian).

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

A goniasterid *Metopaster* cf. *thoracifer* Geinitz was found for the first time in the Bohemian Cretaceous Basin (upper Cenomanian, Kuchyňka near Brázdim). Rich assemblages of asteroid ossicles from deposits of the rocky-coast facies (lower Turonian, mainly the Velim-Václav, Zbyslav and Chrtníky sections) show predominance of different, so far indetermined goniasterid and asteriid species. Owing to the poor preservation in sandstones, determination of studied larger fragments of skeletons (*Nymphaster* sp.) has to be supported by studies of isolated ossicles and of the more complete specimens of related species abroad. Comparative studies of the Late Cretaceous asteroids of France and modern goniasterid, asteriid and goniopectinid species were performed in Le Havre, France. Better understanding of morpho-functional ossicle details was achieved this way. A computer catalogue of the studied asteroid skeletal elements aimed at their morpho-functional features is being prepared.

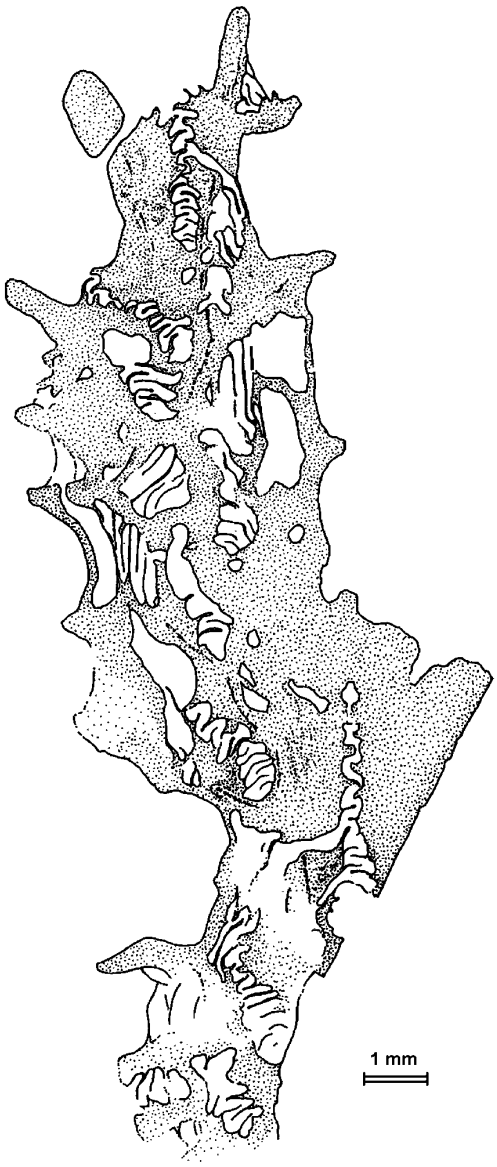
Grant Agency of the Academy of Sciences CR

No. A3013802 Mineralogy, geochemistry and paleomagnetism of Variscan diastrophic sediments in Bohemian Massif: provenance and paleotectonic interpretation (***P. Pruner, F. Patočka, J. Hladil,*** *O. Man, J. Štěpánková, M. Burian &* ***J. Kadlec****, in cooperation with J. Otava & L. Maštera, Czech Geological Institute, branch Brno*)

Subproject: Variscan diastrophic sedimentation in central part of the Barrandian area with regard to facies dynamics (***J. Hladil,*** *in cooperation with L. Strnad, Faculty of Science, Charles University, Prague*)

Thin-section studies of siltstones to very fine-grained sandstones in the Srbsko Formation (Barrandian area, Givetian) suggest that the deposition of carbonatic pelagic oozes continued after the termination of underlying limestone formations. There are only two significant differences: these pelagic carbonate particles were strongly dissolved, and this condensation was later accompanied by dilution of the carbonate material with siliciclastic material from orogenic sources. Majority of the Kačák-Shale laminites are strongly dissolved and silicified pelagic carbonates, which originated in times of "diastrophic sedimentary starvation". This change from several hundred meters deep sedimentation of normal calciturbidites to sedimentary bypass zone and CCD-related conditions implies relatively rapid pull in the abyssal depths. Such a change exceeds possible effects of climatic and eustatic oscillations of the Kačák Event. The red-coloured oozes (sedimentary background) in the lower part of the Roblín Member contain tiny dacryoconarid shells (an equivalent of the present red pteropod oozes), but also siliceous planktonic shells. The gradually increased orogenic shedding of the siliciclastic material was coming from an opposite side than the docking of a thin upper-crustal Barran-

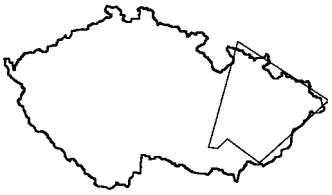
dian swell (with drowned islands and their deep-water outskirts on its top). The distal turbidites (siliciclastic diastrophic sediments) in the upper part of the Roblín Member have many shallowing-upwards features, both in clasts and sequences. This suggests formation of an accretionary prism, with possible stackings and extrusions of tectonically detached slices (early stages of orogenic deformation, Givetian–Frasnian).



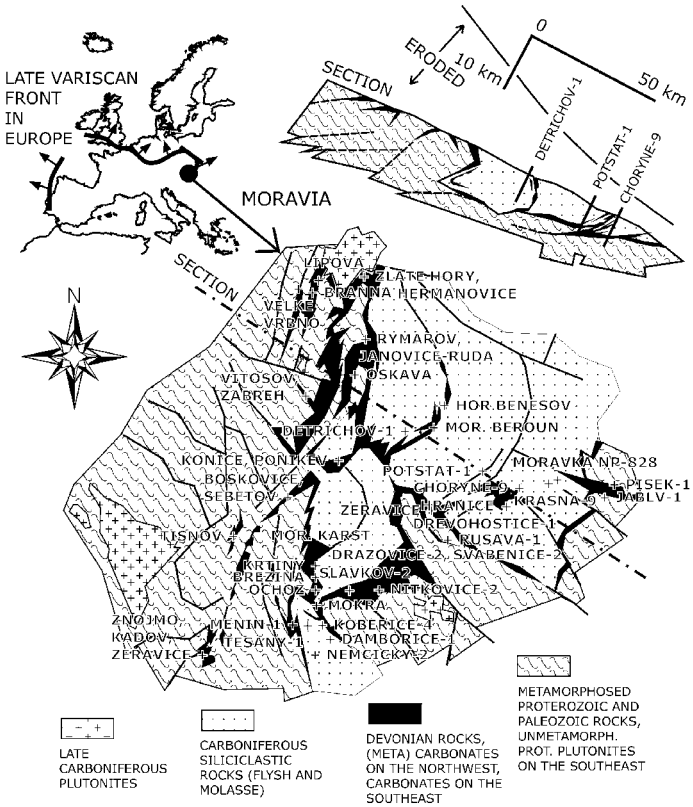
***Taouzia vulvaria* Plusquellec & Hladil, 2001.**

A longitudinal section of tabulate coral, which inhabited deep sea floor at the toe of Late Emsian (late Early Devonian) carbonate slopes in the Ibermaghian Domain. This species is one of the significant biogeographical markers which link the Barrandian area with the north-African basins (Tafilat in Morocco, for example). This coral illustrates paleogeographic origin of the docked Barrandian segment.

Subproject: Variscan burial diagenesis of the Devonian sedimentary formations, slight metamorphism and exhumation processes reflected in recrystallization of carbonates. (***J. Hladil,*** *in cooperation with E. Franců & J. Otava, Czech Geological Institute in Prague, branch Brno*)



Disjoined Devonian carbonate formations border many nappe and wedge units on the exterior of the Late Carboniferous Variscan Orogen of central Europe. Metamorphic gradient decreases sharply outwards, with disruptions by some nappes. Alterations of the Devonian carbonates range from amphibolite/greenschist facies to slight burial diagenesis, from inner to outer belts of nappes, respectively. The evolution of carbonate crystal fabrics (including ghosts and relic structures) correlates with thermal alteration of organic matter, illite crystallinity, the conodont alteration index and a leveling off of stable isotope amounts. Bioclasts, mainly the fragmented walls of tabulate corals (of genera *Thamnopora*, *Remesia*, *Alveolites*, *Scoliopora* and *Favosites*), were studied to determine their response to the maximum paleotemperature, lithostatic pressure and orientated strain forming the host rocks. Resistance of these fragments to alteration is almost as high as that of low-Mg calcite brachiopods or crinoid ossicles that have been rapidly depleted in magnesium. Specific conditions, such as the composition of sediment or early diagenesis of corals produce largely inter-woven paths of alteration, but regular changes can be understood through analysis of large quantities of material. Eight herein introduced typical crystal-fabric patterns provide standardized indicators of contrasting maximum burial conditions, as well as reflection of the exhumation processes.



A simplified map and section of the Moravo-Silesian area, where the Devonian rocks border the individual massifs of deformed crystalline rocks (west) and Visean Culm facies (south-east) (J. Hladil).

As the nappe and wedge shaped terrane segments were detached and transported in the Variscan deformation structure, this bordering by Devonian rocks has mostly secondary character of a separate layer with considerable tectonic incompatibility to formerly underlying and overlying rocks. Illustration to studies about burial history and slight metamorphosis during formation of late Variscan nappe piles.

No. A3013906 Early Palaeozoic extension in the Central European realm: sedimentary, volcanic, fossil and palaeomagnetic record of the Barrandian (Bohemian Massif) (***P. Štorch, F. Patočka, P. Pruner & J. Svobodová***)

A relatively simply folded and very low-grade metamorphosed Late Proterozoic basement of the Teplá-Barrandian terrane (Barrandian) is unconformably overlain by weakly deformed and unmetamorphosed sequences of Cambrian Příbram–Jince Basin and Early Ordovician up to Middle Devonian Prague Basin. The Early Palaeozoic volcano-sedimentary sequences of the Barrandian, up to several km in thickness, were accumulated on top of the Late Proterozoic basement after erosion subsequent to the Cadomian orogeny. Palaeomagnetic data of different ages from the Bohemian Massif demonstrate a continuously changing palaeomagnetic inclination and large-scale palaeorotations. Palaeolatitudes range from -58°S for the Early Cambrian Paseky Shale to -18°S for the Middle Devonian limestones. The geochemical data on siliciclastic sediments of both Cambrian and Lower Ordovician to Middle Devonian of the Barrandian provided significant implications on provenance and palaeotectonic setting of the rock origin. Middle Cambrian siliciclastic sediments deposited in the Příbram-Jince Basin of the Barrandian show low chondrite-normalized Ce_N/Yb_N ratios as well as low Th/Sc, La/Sc, Nb/Y and Hf/Y values; they were derived from intermediate to acid rocks of a Cadomian island arc based on oceanic lithosphere. Inversion of relief (Bohemian phase) interrupted the sedimentation and uplifted the Cambrian basin; the successory Prague Basin subsided nearby since the Tremadocian. Shallow-water siliciclastic sedimentation prevailed in the Ordovician and Early Silurian, and was replaced by the deposition of carbonate rocks beginning in the late Early Silurian. Above the Late Silurian and Early Devonian limestone suite a short-lived early Givetian accumulation of flysch-like siliciclastics (as an impingement of Variscan orogeny) completed the sedimentation. In the Early Ordovician to Early Silurian, and possibly also in the Middle Devonian, clastic sediments of the Prague Basin – characterized by significantly higher Ce_N/Yb_N, Th/Sc, La/Sc, La/Nb and Nb/Y values – were derived from progressively eroded continental island arc crust dominated by intermediate to acid igneous rocks. The supply of recycled sedimentary component was increasing through time as documented by Th/Nb, Hf/Ti and Hf *vs* La/Th relations. Synsedimentary basic volcanism contributed to some of the siliciclastics during the Ordovician and Silurian by enhanced Ti, Y and Sc concentrations as well as somewhat lower LREE/HREE fractination. The Early Palaeozoic siliciclastics of the Barrandian were deposited at intracontinental extensional tectonic setting, which may be related to the northern Gondwana large-scale rifting and development of the peri-Gondwanan fragments.

No. A3013902 Fructifications and spore populations of plant groups Lycopodiophyta, Equisetophyta and Polypodiophyta from the Carboniferous limnic basins of the Czech Republic (***J. Bek,*** *S. Opluštil, Faculty of Science, Charles University, Prague, J. Pšenička, West-Bohemian Museum in Pilsen, Z. Šimůnek, J. Drábková & M. Libertín, Czech Geological institute, Prague)*

Forty strobilar specimens of six *Lepidostrobus* species (*Lepidostrobus sternbergii* sp.nov., *L. nemejcii* sp.nov., *L. thomasii* sp.nov., *L. obovatus, L. ronnaensis* sp.nov., *L. stephanicus*) and their microspores from the Bohemian Late Palaeozoic continental basins were studied. The stratigraphical range of cones is Langsettian to Stephanian B. Descriptions of microspores are added to each species. Microspores isolated from six species of *Lepidostrobus* cones belong to seven dispersed species of the genus *Lycospora. Lepidostrobus crassus* was synonymised with *Lepidostrobus sternbergii* based on identical spore content and closely similar morphology and size of the type specimens of both species. *Lepidostrobus nemejcii*, *Lepidostrobus thomasii* and *Lepidostrobus ronnaensis* were erected as new species according to the cone morphology, spore content and parent plant affinity. Ecological constraints of all the species are discussed. Two groups of species prefering different habitats were distinguished. The first group consists of species which preferred clastic to mixed peat/clastic substrates and high water-table. Their parental plants grew either in clastic swamps along the lake margins or shallows or in planar mires

frequently disturbed during floodings by clastic input. This group involves most of the studied species and their parent plants. Differences between habitats of the species of this group are indicated but their precise specifications needs further investigation. The second group involves only *Lepidostrobus ronnaensis* and its parental plant *Lepidodendron ophiurus* (*sensu* Němejc 1947). It preferred peat substrate of planar eutrophic mires with only minor clastic disturbances.
Two species of *Noeggerathia* were described from the Kladno–Rakovník, Radnice and Plzeň Basins, the Radnice Member (Bolsovian) of the Bohemian Massif. The most complete fossil record is known for *Noeggerathia foliosa*. The finds of brachyblasts (fronds), small trunks and cones *Noeggerathiaeostrobus bohemicus* enabled to make a reconstruction of the whole plant. Cuticles, micro- and megaspores were studied. The genus *Noeggerathia* was emended. Only small fragments of brachyblasts (?fronds) of *N. intermedia* were found till now. The new combination of *Discinites* (al. *Noeggerathiostrobus*) *vicinalis* is proposed due to having a different microspore content to *Noeggerathia foliosa*. Only two longitudinally broken fragments of cones of *Discinites vicinalis* are known. Their preservation does not allow to determine the shape of the sporophylls, and two interpretations are possible. The new species of *Archaeonoeggerathia schatzlarensis* nov. sp. from the Žacléř Formation (Langsettian) in the Intrasudetic Basin was erected.

Grants of the Charles University, Prague

GAUK 227/200/B-GEO/PřF Reconstruction of the environmental changes and the late Variscian 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 Institute, Prague, S. Nehyba, Faculty of Science, Masaryk University, Brno, S. Štamberg, Regional Museum of Eastern Bohemia, Hradec Králové &* ***J. Zajíc****)*

Sections at the localities of Bačov, Obora, Kochov, Kladoruby–Trávník and Úzký Pepřík were measured and documented from the sedimentological, paleobotanic, palynological and zoopaleontological points of view. The faunal assemblage of the of the Kladoruby–Trávník, Úzký Pepřík (relatively rare actinopterygians *Paramblypterus* sp., amphibians, and acanthodians *Acanthodes gracilis*) suggests a possibly intermediate stratigraphic position between the stratigraphic levels of the Zbýšov and Bačov horizons. The Zbýšov Horizon corresponds to the Rudník Horizon of the Krkonoše Piedmont Basin (*Acanthodes gracilis* Biozone). The Bačov Horizon corresponds to the Kalná Horizon of the Krkonoše Piedmont Basin (*Xenacanthus decheni* Biozone). The intermediate-situated Kladoruby–Trávník and Úzký Pepřík locality (*Acanthodes gracilis* Biozone) could therefore correspond to the interval of the Upper Vrchlabí Formation–Lower Prosečné Formation. No stratigraphic significant fauna is known from that interval yet. A new redefinition (specification of the extent) of *Acanthodes gracilis* and *Xenacanthus decheni* biozones will be probably needed.

Grants of the state departments

Project of Administration of Landscpace Protected Areas No. M-7017: Geological and geomorphologic description of castellated rocks of the Český ráj area (***R. Mikuláš, V. Cílek & J. Adamovič***)

The "sandstone phoenomenon" of the humid temperate zone deserves its representative among the UNESCO – protected areas. The Český ráj (“Bohemian Paradise”) area shows a variety of geologic and geomorphologic features (geodiversity) joined with the sandstone phenomenon. Local authorities have declared their support of the idea of listing this area in the World Heritage areas of UNESCO. Two possible other alternatives – Bohemian-Saxonian sandstone area and Broumov Cliffs – are generally larger complexes of the undisturbed sandstone

landscape, but their geodiversity is lower.

Subproject: Gravity and orientated pressure as factors controlling “honeycomb weathering” of the Cretaceous castellated sandstones (northern Bohemia, Czech Republic) (***R. Mikuláš*** *)*

A thorough, “sophisticated” geometry of honeycomb surfaces suggests that not only processes forming the pits but also some “construction plan” has to be involved. Lateral sides of rock arches often bear honeycombs having axes parallel to the curve of the arch vault thus copying a presumed pressure vector (lines of force). Most of the pits are spindle-shaped or cellular but some are arcuate with rudimentary oblique bottoms. Cellular honeycombs are characteristically developed on vaults of spherical or parabolic rock shelters and abri. These show similar parameters as the previous group but their axes are usually close to the projection of vertical line onto the wall. Therefore, it is difficult to assess whether the vector of gravity or the vector of pressure is responsible. Surfaces of fallen blocks bear pits of double or triple shape: (1) symmetrical arcuate ones with flat bottoms; (2) symmetrical arcuate ones with oblique bottoms and oblique axes; the obliqueness, however, is presumably caused by the rock fall and not by the irregular growth, and (3) “reconstructed” honeycombs, usually larger than the two previous types; their upper parts are inclined and somewhat asymmetrical, bottoms are flat. Some blocks bear only the “reconstructed” honeycombs. The examples show that the bottom is “re-built” more rapidly than the vault, and, consequently, bottoms of arcuate honeycombs are the place of the maximum loss of the sandstone. The fact that a rock crust usually does not harden horizontal or sub-horizontal surfaces, may be one of the reasons. Cross-bedded sandstones (or blocks of horizontally bedded sandstones fallen and tilted a long time ago) have flat, horizontally orientated bottoms of the pits regardless of the inclined structure of the rock. Therefore, there is a strong “angular unconformity” between the pit bottoms and bedding of the rock. Because the honeycombs are often constituted on softer inclined beds of sandstone and occur in more-or-less regular intervals, their flat bottoms may form a regular “staircase”.

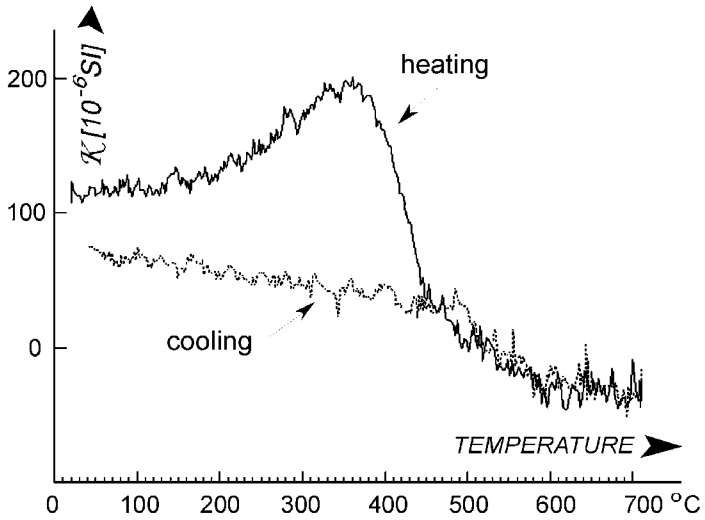
Industrial grants

Bohemian-Moravian Cement Co. (Lime and Cement Works of Mokrá Co.) Project No. 7004: Physical stratigraphy of Paleozoic and Quaternary rocks in Mokrá quarries (***J. Hladil & J. Kadlec***)

Subproject: Physical stratigraphy of Paleozoic limestones in Mokrá quarries (***J. Hladil, L. Slavík,*** *in cooperation with M. Chadima, Agico, Ltd., M. Geršl, Dept. of Geology, Masaryk University, Brno*)

Thermomagnetic curves of condensed weathering products on a physical-stratigraphy marker 20 m below the termination of the Macocha Formation (reef-bank limestones of Frasnian age) were fitted to patterns known for the haemo-ilmenite mixtures. These magnetosusceptibility carriers form lamellae several micrometers thick and several tens of micrometers wide, which occur in weathered grains of magnetites/titanomagnetites with ilmenite. This ultra-fine microscopic clastic admixture corresponds to generally increased contents of TiO_2 (up to 1.5 %, rock in boundary seam), which is dispersed and substituted also in structures of tiny particles of weathered clastic micas, illite and goethite-mixtures. This suggests that atmospheric dust and diluted aqueous suspensions contained also significant amount of material from the (?)basic igneous rocks. The weathered iron-bearing micas and ilmenite-related microremains are responsible for bulk magnetosusceptibility in the horizon close to the cycle boundary. It forms a narrow but strong spike on the magnetosusceptibility-stratigraphy curves. The hardground and protosol fabrics are developed on the emergent basement rocks and corresponds to gamma-ray spectrometrically detected Th-spike, which is of high magnitude but very narrow. The good identification of the "marker on minus 20 m below the top of the Macocha Formation" has a great importance for the determination of the F-F stratigraphical lacunae, which occur in the uppermost part of the Mokrá reef banks (different in separate

quarried segments).



This thermomagnetic curve suggests presence of haemo-ilmenite mixtures in weathered protosol material at the major cycle boundary which occurs within the Upper Frasnian. As observed using the SEM and XRD methods, these haemo-ilmenite grains are scattered in other weathering products dominated by goethite, weathered micas and illite, these all with slightly but significantly increased TiO2 contents (0.5 to 1.5 %). The magnetic evidence of this magnetosusceptibility carrier corresponds to spot compositions analysed by microprobe. Illustration to studies on physical stratigraphy with application for practical correlations in quarries (J. Hladil).

Severočeské doly Ltd.: North Bohemian open mines, mine Bílina: special microscopic analyses of sedimentary sequences (***M. Konzalová***)

Study of morphologically identifiable microcomponents derived from the coal-forming vegetation and relevant microbiotas continued. New data were obtained in plant and organic fragments as well as in plant taxonomy linked with the exinitic components, fungous remains, resins and xylitic splinters. The isolated and botanically identifiable plant particles were evaluated also in the palaeoecological implications and studied in relation to the coal petrological analysis, applied to the same samples. The results point to the compatibility of both methods mainly as concerns the predominant microcomponents. Variations were observed in the frequency of several groups, e.g., in the appearance of epidermal or suberin remains, which show different distribution in the same samples. The discrepancy in the occurrence of both plant tissue elements can be well explained by the methods of investigation, different concentration in palynological slides and in the chips of coal observed in polished sections. Both methods, micropalaeontological and micropetrological, can be positively employed.
The assignment of isolated plant particles showed plant derivation of several petrological coal components, for example terrigenous and aquatic ferns (Polypodiaceae, Salviniaceae-Azollaceae), making the detrital and exinitic microcomponents at some levels. Another example are Fungi, which were recognized in more detail in slides. Hyphae, unicellular and multicellular fungal remains and highly variable spores could be differentiated besides fungal sclerotia. Also the epiphytic fungi of the family Microthyriaceae were newly and repeatedly recorded in the coal seam, at different growth stages. Similarly, more details were observed on pollen and xylitic chips reflecting wooded swamps in the basin.

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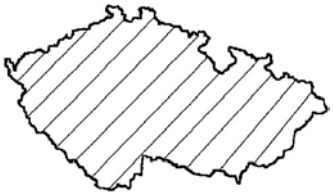
10. Department of Exogenic Geology and Geochemistry

Foreign Grants and Joint Projects

5th Framework Research Programme of the European Commission: BIOCLIM - Modelling sequential biosphere systems under climate change for radioactive waste disposal, Proposal No: FIS5-1999-00134, Contract No: FIKW-CT-2000-00024. *Project coordinator M. Calvez – ANDRA (Agence nacionale por la Gestion des Dechets Radioactifs, Spain), Coordinator for CR: A. Laciok: Nuclear Research Institute, Řež u Prahy.*

Subproject: The influence of long-term climatic oscillations and environmental changes on the safety of nuclear waste repositories. Case study: Czech Republic (Central Europe) in Y±million year perspective *(**V. Cílek**)*



The unified approach of EU countries towards deep nuclear-waste repositories is established on the knowledge of past 1 million year environmental and climate history and for the scenarios of further 1 million year future for individual sites. The safety of nuclear waste repositories depends on several interconnected environmental and geological factors. The most important factors are: (1) climate forcing; (2) fracturing and micro-fracturing of the sealing medium due to tectonic stress, neotectonic or neovolcanic activity and glacioeustatic balance; (3) fluid circulation in rock massif under different hydrological regimes, and (4) recrystallisation or degradation of the sealing medium and technical support of the repository involving materials such as concrete, technical glass, clay minerals especially montmorillonite and depending on internal and external conditions of the repository. This confidential report is focused mostly on the paleoclimatic and paleoenvironmental analysis of the last 1 million years and the territory of the Czech Republic.

Project of the UNESCO: Encyclopedia of Life Support Systems**.** "The Earth System: History and natural Variability" *(Honorary theme editor **V. Cílek**)*
The EOLSS encyclopedia is proposed as the biggest environmental encyclopedia ever published. It consists of about 200 themes, each containing some 50-100 articles (each about 15-25 computer pages long) by altogether several thousands of authors. V. Cílek was nominated the editor of the opening theme dealing with Earth sciences (some 60 articles by 50 authors). The opening essay was published in hard cover Forerunner volume "Our fragile world", the articles are processed by academic editor to be published in electronic form. The project should be completed and inaugurated during 2002.

Grant Agency of the CR

No. 205/99/1307 Biogeographic significance of freezing rock screes of central Europe *(M. Zacharda, Institute of Landscape ecology AS CR, České Budějovice, co-investigator **V. Cílek**).*

More than 20 sites of ice screes have been found in the area of České středohoří in northern Bohemia. Very cold slope wind descends during the winter season through free fissures among the stones or boulders, which leads to the formation of ice when meltwater or precipitation enter the cooled zone some 1–3 m under the surface. The ice was reported to stay at many sites till May-July. Some glacial relicts, which are otherwise living north of the polar circle were recently discovered in the mostly neovolcanic screes. We presume subsequent but intermittent scree formation during the Holocene and especially during the Late Glacial. However, the scree formation is diminished during the Pleniglacial and Holocene climatic optimum because the rock massif is either frozen or covered by vegetation. The total thickness of some some scree fields is 10–20 m or more but the free zone is usually only 1–3 m thick. The scree fields display slow, gradual episodes of creep and slope movements. The scree ter-

races may develop when the screes are moving over uneven bedrock relief. The other important features are "scree waves", which can be observed as the consequence of slope movements in the lower parts of active scree fields. The scree fields of former glacial cycles were destroyed by solifluctional processes to form large, flat and forested "scree plateaus" where transported boulders or screes can be found more than 1 km from the original outcrops.

Grant Agency of the Academy of Sciences CR

No. A3013005 Holocene evolution of the soil cover of the protected landscape areas of the Czech Republic (***A.Žigová, V. Cílek, V. Ložek,*** *V. Šrein & M. Šťastný, Institute of Rock Structure and Mechanics AS CR, Prague*)

The soil survey and results of various analyses are indicated by the differences of pedogenesis of Cambisols and other soil types in the protected areas.
Protected Landscape Area of the Blanský les: The most common soil type is Cambisol. Accompanying soil type is Leptosol. The differences of soil-forming processes of Cambisols are result of local relief and climate conditions and different type of parental materials.
Protected Landscape Area of the Bohemian Karst: The structure of soil types is more varied than of the neighbouring agricultural soils. Evolution of soil cover has a polygenetic character. The oldest stage of pedogenesis is represented by terra fusca. Leptosols, Cambisols, Luvisols correspond to Holocene stage of pedogenesis.
Protected Landscape Area of Křivoklátsko: Holocene stage of pedogenesis is predominant in this territory. Cambisols, Leptosols and Planosols are the most characteristic soil types for this region.

Grants of the state departments

Project No. 0039 Geomon *(Ministry of the Environment, principal investigator D. Fottová, Czech Geological Institute, Prague, responsible person in the GLI* ***P. Skřivan****)*

The most remarkable result of the monitoring of bulk precipitation, beech- and spruce throughfall and surface discharge of the Lesní potok stream in the water year 2001 concerns the deposition flux of Pb. Majority of the element in the atmosphere is derived from the vehicular emission sources. In spite of the sales prohibition of leaded gasoline since January 1, 2001, both the concentration of Pb in bulk precipitation, as well as its deposition flux, do not show appropriately strong decrease. In fact, the Pb deposition flux has decreased form 1,280 $mg.m^{-2}.yr^{-1}$ in 2000 to 480 $mg.m^{-2}.yr^{-1}$ in 2001. Explanation of this finding follows from the characteristics of the Pb-vehicular aerosol, which is formed, according to the literature, by very small solid particles with relatively high residence time (1 to 4 weeks) in the atmosphere. Sources of the remaining atmospheric lead over central Bohemia then may be derived from more remote emission sources.

Industrial grants

Velkolom Čertovy schody Quarries Co. No. 7002 Assessment of natural value of the mining area of Giant Quarry of "Čertovy schody" in Koněprusy region (***V. Cílek***, ***P. Bosák, A. Žigová, J. Hlaváč, E. Kadlecová,*** *contributions: M. Anděra and col., National Museum, Department of zoology, Prague, F. Fér, J. Möllerová, J. Viewegh, Czech Agricultural University, Department of Forestry, Prague)*

In 1999–2001, the basic geological/geomorphological, faunistic and forestry research was performed in the eastern part of the Velkolom Čertovy schody including the territory of the proposed nature reserve Na voskopě. Mammals (Mammalia), birds (Aves), reptiles (Reptilia), amphibians (Amphibia), molluscs (Mollusca), spiders (Arachnida) and carabid beetles (Carabidae) were selected as model groups for faunistic research. During the study, altogether 302 species were found including 70 species of vertebrates (mammals - 17, birds - 46, reptiles - 4, amphibians - 2) and 232 ones of invertebrates (molluscs - 27, spiders - 139, carabid beetles - 53, other families of beetles - 10, fleas - 3). The geological research was focused on the study of karst phenomena, soils and Holocene landscape development. Forestry research consisted of mapping of the most valuable parts of the mining area.

Evaluating the distribution of the observed species at the locality of the primary open steppe habitats can be regarded as the most valuable. In any case this part should not be included into the area of planned mining. The biological and geological evidence points to the same objects – open steppes and adjoining belt of karst plateau where future excavation should be radically limited. The stability of the local amphibian populations depends on the only temporal and very small water body. This pool should be an object of special attention and future protection.

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

Systematic monitoring of the chemistry of atmospheric deposition was carried out at selected localities in the Velkolom Čertovy schody Quarry (loc. KJ41 to KJ5) and its vicinity (loc. KJK – Kosov, KJB – town of Beroun) since November 1996. Collected samples of the bulk precipitation and throughfall are currently analysed for more than 20 major, minor and trace elements and anions. The whole studied area is evidently affected by the enhanced quantity of dust originating from the operation of the quarry. This is shown by higher deposition fluxes of Ca, Mg, Sr and HCO_3^- and higher pH-values of the precipitation compared to the reference rural area of Kostelec nad Černými lesy. Nevertheless, fluxes of some of the studied toxic trace elements in the close vicinity of the quarry are comparable or even lower (in case of Pb) than those in the reference rural area. On the other hand, fluxes of the predominantly vehicular lead are higher in urban areas (loc. KJB) with high traffic. Fluxes of the typical trace elements originating in the fly ash of Czech coal burning power plants (especially As) have been gradually decreasing due to the recent purification of their combustion products. Mutual correlation analysis of daily deposition fluxes of the individual elements/ions, carried out on the data obtained from the individual monitored localities, has specified several typical groups of elements with conjoint sources in the atmosphere: emissions of large coal-burning boilers, local soil- and rock dust, oceanic spray. In case of the locality KJK, strong mutual correlation values for Al, Fe, Mn, As, Be, Cd, Pb, Sr and Zn indicate relatively uniform chemistry of the bulk deposition and therefore the existence of a single relatively important emission source of these elements. Results of the research will be summarized in the annual report prepared for the client.

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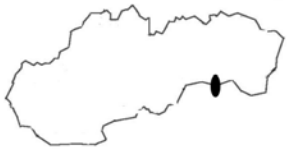
11. Department of Paleomagnetism

Foreign Grants and Joint Projects

Hungarian Scientific Research Fund (OTKA), Grant No. T 035004
Study of the Quaternary development of the Gömör-Torna Karst and palaeomagnetic research of sediments from the Baradla Cave (***P. Bosák, J. Kadlec, M. Chadima, P. Pruner*** *& J. Móga, Geography Department, Eötvös Loránd University, Budapest, Hungary*)



The Baradla Cave represents a continuation of the Domica Cave (Slovakia). Both caves are included in the Caves of Slovak and Aggtelek Karst of the World Heritage List of UNESCO. Paleomagnetic and magnetostratigraphic research in the Baradla Cave followed a similar study from the Domica Cave. Altogether five sections of cave fluvial sediments with a thickness of over 6 m were studied. They were composed mostly of clays and silts representing flood facies, and overlying coarse-grained sands and gravels of river-bed facies. Intercalation of speleothems and flowstones were present, too. All studied sections contain only normal-polarized sediments, i.e., younger than the Brunhes/Matuayma boundary (0.78 Ma), documenting the youngest history of cave development.

Czech–Italian Joint Programme. Agreement of scientific co-operation between the Museo Civico di Storia Natural, Trieste and the Institute of Geology, AS CR
Paleomagnetic analysis of cores from caves in the Trieste region, Italy (***P. Pruner, P. Bosák, D. Venhodová, O. Man****, R. Calligaris & A. Tremul, Museo Civico di Storia Natural, Trieste, Italy*)

Borehole S 1 was drilled in the Pocala Cave (Grotta Pocala) near the village of Aurisina (the site has been known as an important archaeological site). Borehole S 3 was drilled in the Borgo Grotta Gigante near Opicina. Both boreholes were situated in unroofed parts of caves. Magnetostratigraphic pictures obtained from the boreholes are fully correlable with each other in both the arrangement of normal and reverse polarized magnetozones and in the character of the moduli of remanent magnetization and of magnetic susceptibility. Mean values reflect also the major lithological boundaries in both boreholes, i.e., the lithological change in transported material into the caves and/or some major climatic change. The dominant parts of both sections are represented by normal magnetozones. One well-documented reverse polarized zone was documented and also short reverse excursions of magnetic field. The correlation of the obtained arrangements of normal and reverse polarized magnetozones can indicate the Black event within the Brunhes chron (117.1±1.2 to 111.8±1.0 ka BP). This fact is in a good agreement with obtained paleontological finds. The results must be proved by U-series dating of speleothem beds in boreholes.

Czech–Slovak Joint Programme. Agreement of scientific co-operation between the Administration of Slovak Caves, Liptovský Mikuláš and the Institute of Geology, AS CR
Subproject 1: Paleomagnetism and magnetostratigraphy of cave sediments in selected caves of Slovakia, part 3 (***P. Pruner, J. Kadlec, P. Bosák, O. Man, D. Venhodová*** *& P. Bella, Administration of Slovak Caves, Liptovský Mikuláš, Slovakia*)

Paleomagnetic and magnetostratigraphic investigation in selected Slovak caves followed previous stages of research of 1999–2000. It contributed substantially to the dating of speleogenetic process and evolutionary stages of development of cave systems in Slovakia. In the *Belianská Cave* (Belianské Tatry, North Slovakia), two profiles of fine-grained clastic

sediments were sampled. Both profiles contained normal and reverse polarised magnetozones, indicating the age higher than 0.78 Ma. Some subzones can be correlated with magnetostratigraphic division in previous sections.
Three profiles were studied in the *Stratenská Cave System* (Slovak Ore Mountains, Central-eastern Slovakia). One profile yielded only normal polarisation. Two profiles contained complex alternation of normal and reverse magnetozones, indicating the age higher than 0.78 Ma. One of the two profiles is clearly older than 1.77 Ma. Geometry of the magnetozones can be compared with the Gauss Chron (i.e., 3.04–3.33 Ma) confirming previous interpretation of the age of main level No. IV of the cave to 1.8–3.6 Ma.

Subproject 2: Belianská Cave: origin and evolution (***P. Bosák, P. Pruner, J. Kadlec****, J. Głazek, Institute of Geology, Adam Mickiewicz University, Poznań, Poland, H. Hercman, Institute of Geological Sciences PAN, Warsaw, Poland, S. Pavlarčík, Administration of the Tatranský National Park, Tatranská Lomnica, Slovakia & P. Bella, Administration of Slovak Caves, Liptovský Mikuláš, Slovakia*)

The Belianská Cave is situated in the eastern High Tatra Mts. (Belianské Tatry) in northern Slovakia. The cave is developed at about 1,000 m a.s.l. in the form of a steeply inclined tube-like passage with some smaller parallel branches and subhorizontal levels following the bedding of Mesozoic limestones. The cave contains numerous speleogens indicating corrosion in stagnant or slowly flowing waters. The cave contains also several relatively thick sections in fine-grained cave sediments. Paleomagnetic and magnetostratigraphic research indicated a substantial age of sedimentary fill, clearly older than 1.77 Ma. The arrangement of magnetozones can be compared with the Gauss or even Gilbert chrons. The primary origin of the cave can be easily explained by corrosion of ascending thermal waters enriched in hydrogen sulphide from deep sources. The deep groundwater circulation was connected with the southern marginal normal fault of the High Tatra Mts., asociated with numerous springs of thermal waters in the present. Along the fault, deep waters were pushed by heat lift within tectonised rocks of the hanging-wall of the normal fault. It can be expected that in the time of cave origin, the limestones were buried beneath strata of the so-called Central Carpathian Paleogene (Eocene-Oligocene), which have been eroded since then. The original thermal cave was later substantially remodelled and enlarged by aggressive cold waters entering the cave from thawing of snow and glaciers, flooding the cave numerous times during the Quaternary.

Czech–French Joint Programme "BARRANDE" (Ministry of Education, Youth and Sports CR)
No. 2001-032-1: Plate-tectonic movements and paleoclimatological changes recorded in Lower Paleozoic rocks of peri-Gondwanan Europe (*investigators:* ***P. Pruner*** *and T. Aifa, contributions:* ***P. Štorch*** *and J.P. Lefort, Universite de Rennes, France)*

The principal aim of the Project is to elaborate a complex approach to the investigation of Early Palaeozoic climatic changes in the territory of present Europe considering plate-tectonic movements and palaeogeographic changes. Plate-tectonic interpretation of palaeomagnetic data, which indicate drift and rotations of respective terranes of peri-Gondwanan Europe will be compared with relevant palaeontological, sedimentological and, later, sequence-stratigraphic data on palaeogeographic and palaeoclimatic evolution of the territory. For this purpose, suitable rocks of the Lower Palaeozoic will be collected, preferably from the Barrandian area, central Bohemia, and these will be subjected to petromagnetic and palaeomagnetic investigations with the aim to determine palaeogeographical latitudes of the respective formations. At the same time, palaeontological and sedimentological indicators of the climatic changes will be evaluated and the results obtained will be interpreted in a complex way both by the French and Czech research teams. Similar palaeoclimatological problems, as they exist for the Barrrandian area, have been encountered for other peri-Gondwanan terranes, e.g., for Armorica. Consequently, results of studies of

palaeoclimatic changes and the methodological procedures employed during the investigations are of paramaount interest both for the French and Czech sides. We have finished laboratory procedures on the Ordovician and the Silurian rocks from the French localities of Crozon Penisculla (Formation Postolonnec), Rosan Formation, Ploermel, Saint Malo de Phily for testing their applicability to palaeomagnetic investigations. Separation of the respective remanent magnetisation components was carried out by using the multi-component analysis of J. L. Kirschvink. Numerous samples from the set of samples show typical three-component magnetic remanence, according to blocking temperatures. Phase or mineralogical changes of magnetically active (mostly Fe-oxides) minerals frequently occur during the laboratory thermal tests, especially at low temperature intervals.

Czech–Polish agreement on cooperation in Science and technology
Reflection of climate changes and human impact in the alluvia of the Elbe and Vistula rivers (comparative study) (*T. Kalicki, A. Budek, Polish Academy of Science, Institute of Geography &* ***J. Kadlec, E. Růžičková***)

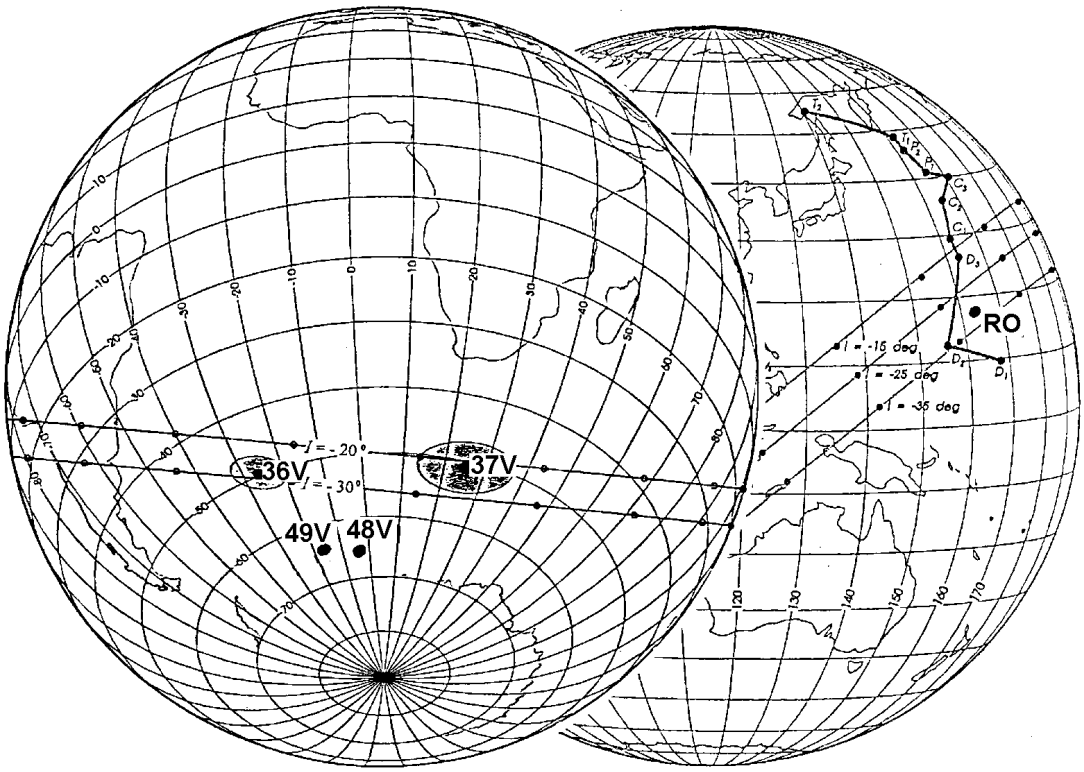
Joint research project is focused on comparison of Late Pleistocene fluvial processes in the Vistula and Labe river basins. Samples from flood plain deposits and soil horizons were collected for micromorphological and geochemical analyses in the Labe River basin (Ostrá, Sandberg, Hradišťko). These analyses will be conducted in Poland during the year 2002 with the aim to reconstruct periods of Holocene fluvial erosion or stability. Samples of tree trunks preserved in fluvial sands were collected and prepared to radiocarbon and dendrochronological datings conducted at Charles University in Prague and at Mendel University in Brno.

Grant Agency of the CR

No. 205/99/0594 Paleomagnetic studies and paleogeographic interpretation of the Barrandian Lower Paleozoic with respect to the Bohemian Massif and peri-Gondwanan Europe (***P. Pruner, M. Krs, D. Venhodová, O. Man, P. Štorch & V. Suchý***)

The project was focused on unresolved problems in palaeomagnetism and palaoegeographic interpretation of the Lower Palaeozoic of the Barrandian terrane, with the aim to contribute to palaeogeographic and plate-tectonic reconstruction of the peri-Gondwanan Europe. Paleomagnetic data from the Variscan and pre-Variscan formations of the Bohemian Massif were tectonically interpreted and palaeogeographically evaluated with respect to the European palaeomagnetic results. The study provided the calculation of palaeomagnetic and virtual pole positions to the Lower and Middle Silurian of Armorica and for the Ordovician to Devonian of the Barrandian. Palaeogeographic affinity of newly inferred virtual pole positions to pole positions for the Ordovician and Silurian was tested on a theoretical model simulating the rotation-controlled distribution of pole positions. The values of palaeolatitudes correspond with the regions northeast of the Trans-European Suture Zone (the stable East European Craton). The peri-polar latitudes derived by some authors are in good agreement with the cold climate indicators for the Ordovician (Late Ordovician glaciation of N Africa) but, in case of the paleogeographic affinity of the Barrandian to Armorica, they imply an anomalously rapid drift of Armorica and Gondwana as well. In the Bohemian Massif, horizontal paleotectonic rotations were well documented for the individual bloks of Silurian and Ordovician rocks. They reach several tens of degrees, but the total palaeorotation relative to the Permian reaches up to 200° in extreme cases for the Devonian rocks, of mostly clockwise sense. We also documented very similar values of palaeomagnetic inclinations for both investigated areas, which show palaeolatitude values of -27° for the Barrandien and -24° for the Armorican Massif. The study of the tectonics and palaeogeography of Ordovician to Devonian formations of the Barrandian area, which is considered a

peri-Gondwanan terrane with affinities to Armorica, may serve a case history for the study of a terrane incorporated into a stable lithospheric plate. Here, the Barrandian terrane became a part of the European Plate as a component of the emerging Pangea supercontinent in the final phase of the Variscan Orogeny.



Barrandian Area – Middle Ordovician to Middle Silurian virtual pole positions.
Left side: 36V - Karlštejn, Kosov Quarry, Early to Middle Silurian, black shale; 37V - Hlásná Třebáň, Levín, Early Silurian, limestone and claystone; 48V – Žebrák - Točník, Middle Ordovician, silicite; 49V - Praha Libeň, Černá skála, Middle Ordovician, black shale. **Armorician Massif.** Right side: RO – France, Crozon, Rosan form., Asghilian, limestones.Thin lines indicate distribution of pole positions due to paleotectonic rotation. Full small circles denote pole positions due to paleorotation at the paleomagnetic declination step of ΔD = 20°. APWP for a stable Europe during the period of Middle Triassic (T2) to the Early Devonian (D1) is presented by a thick line
(according to M. Krs and P. Pruner, 1995).

Grant Agency of the Academy of Sciences CR

No. A301-3-802 Mineralogy, geochemistry and paleomagnetism of Variscan diastrophic sediments in the Bohemian Massif: provenance and paleotectonic interpretation (***P. Pruner, F. Patočka, J. Hladil, O. Man, D. Venhodová, J. Slepičková, M. Burian, J. Kadlec, P. Štorch,*** *J. Otava & L. Maštera, Czech Geological Institute, Brno)*

The Moravo-Silesian Zone (MSZ) rims the Bohemian Massif, in the eastern branch of the Variscan Belt of Europe. The Variscan diastrophic sediments of the MSZ (Culm facies, Devonian?–Early Carboniferous) are considered to be equivalent of the Rhenohercynian Zone. The detached segments of the MSZ were thrust over the Neoproterozoic

basement. The palaeomagnetically evidenced clockwise rotation of these detached segments by 100 to 190 degree occurred relative to cratons on the NE. A strong Late Carboniferous shear zone contributed to a conspicuously narrow shape of the Variscan thrust belt in this area. The geochemical data on the MSZ siliciclastic sediments, mostly greywackes/arkoses to greywackes/lithic sandstones, provided significant implications on provenance and palaeotectonic setting of the rock origin. The westernmost basin fills are mostly of early Visean age with as old as Givetian(?) basal part. The siliciclastics were derived from young continental island arc showing also some features of oceanic island arc. The arc was situated on an old passive continental margin (of the Brunovistulian microplate?). A wide variety of basic to acid (meta)igneous rocks contributed to the siliciclastics. The ages of the folded and detached segments (formations) diminish towards the E. The middle to late Visean basin fills were sedimented in a setting of maturing CIA with scarcely preserved features of OIA. Mostly acidic arc involving a wide spectrum of rocks of granitic (rhyolitic-dacitic) geochemistry was a source of the siliciclastics. Somewhat more condensed spectrum of the same rock types characterized a tectonic setting of mature CIA (evolving to active continental margin) where a subsequent (late Visean) sequences of the MSZ sedimentary fills were accumulated. The youngest siliciclastics of the latest Visean to early Namurian(?) age were deposited in a CIA to ACM setting, and were provided by a homogeneous acidic arc source. A narrow spectrum of rocks geochemically equivalent to acid magmatites produced uniformity of the sediments. The succession from CIA(±OIA) to CIA to ACM sources recorded in geochemical composition of the MSZ diastrophic siliciclastics seems to correspond to a series of events from the early to culminating stages of orogenic collision, and subsequent uplift and exhumation of tectonic slices. The source development may reflect the docking of the Tepla-Barrandian microplate on the Brunovistulicum during the final accretion of the Bohemian Massif terrane mosaic.

Variscan diastrophic sediments (DS) of the Moravo-Silesian Zone are mostly greywackes, sandstones and siltstones, with subordinate beds of conglomerates and shales (Culm facies). These thick and tectonically multiplied strata-sets were deformed into wedges and nappes, with scattered slices of crystalline and Devonian rocks on the margins (a mosaic of terrane segments). The main DS volumes were deposited during the Visean to Visean/Namurian A, but the oldest DS formation on the Northwest is in close contact with the Givetian trilobite shale and can be also Devonian(?). The time-span between the oldest and youngest DS is ca. 50-60 Ma. The palaeomagnetic studies in separate segments (formations) of the DS were concentrated on the separation of primary magnetisation components, with special emphasis on the directions, which correspond to synsedimentary and early diagenetic history of the rocks. The shales from the oldest DS segment on the Northwest (Mohelnice Fm., at Slavoňov) yield mean directions of remanent magnetism with D = 143 and I = -26 degree. The virtual-pole position is close to pole positions of the pre-flysh Late Devonian in Moravian Karst (e.g., at Křtiny). The clockwise tectonic rotation, if compared with the Devonian "stable" Europe NE of TESZ, is approx. 100 degr., i.e., 120^{o} against the cratonic Permian cover. However, the tectonic-rotation values for the main Visean Culm group of formations are even higher than at Slavoňov (difference ca. +70^{o}). This next side-developed group of formations consists of the Andělská Hora Fm., Protivanov Fm., and Rozstáni Fm., where the relevant mean directions D/I are 210 / -13; 218 / -22; and 216 / -14, respectively. These clockwise tectonic rotations of evidently Visean DS are higher than above. The primary remanent-magnetisation components, all on greywackes, shales and siltstones, differ form the early Carboniferous on the "stable Europe" about 170–190^{o} clockwise, i.e., approx. 180–200^{o} against the cratonic Permian cover. These data clearly separate the oldest DS segment on the Northwest and, practically, co-indicate its different age. The stepwise evolution of the clockwise tectonic rotation was irregular, with a great gap between the oldest DS and the late Visean group of the DS formations. Within the latter group, the declination values are closely grouped (similar deformation history), but the different values of inclination suggest different pre-deformation positions of the basins. The youngest Myslejovice Fm. on the SE was remagnetised with typical Carboniferous/Permian directions.

No. A 8002406 Start of the human activities in the Doubrava River flood plain (*I. Pavlů, Institute of Archaeology ASCR &* ***J. Kadlec***)

Research was focused on two sections in flood deposits exposed in Žehušice and Záboří. Mineral magnetic properties (total magnetic susceptibility, dependence of the magnetic suscetibility on changing temperatures) of fine sediments were studied in detail to detect periods of stability or flood events. Subrecent soil horizons capping both sections reveal the highest MS values due to the origin of magnetite during modern pedogenic processes or pollution by modern air contaminants.

Industrial grants

Bohemian-Moravian Cement Co. (Lime and Cement Works of Mokrá Co.) No. 7003 Project: Study of the Cenozoic sediments in the caves in the southern part of Moravian Karst (***J. Kadlec***)

Anisotropy of magnetic susceptibility was measured in Pleistocene fluvial cave silts deposited in the Ochozská Cave. The results allow to reconstruct paleoflow directions of underground streams to the S in the Labyrint and to the N in the Zkamenělá řeka passage. Seismic measurements and resistivity sounding conducted in the Hostěnické Valley yielded information about the depth and morphology of this half-blind karst valley drained by the Ochozská Cave. Cenozoic surface and subsurface drainage pattern of the S segment of the Moravian Karst was reconstructed based on the obtained geophysical data.

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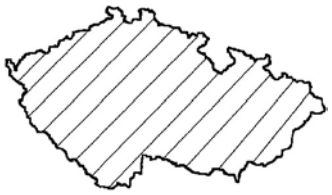
12. Programme of Advancements in Scientific Research in Key Directions

(12a) 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 (*co-ordinator A. Špičák, Institute of Geophysics, Academy of Sciences, Prague*)

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



The project "Dynamics of the evolution of continental lithosphere" is a continuation of a particular theme "Paleozoic evolution of terranes of the Bohemian Massif within the history of the European Variscides", which was being solved in the Institute of Geology AS CR as a part of the project Key Areas in Science 5 "Geophysical processes and structure of the Earth" in 1996-2000. Research activities within the current Project 03 were aimed at the understanding of general features and relations in processes of continental lithosphere evolution.

The paleomagnetic studies from the boundary between the Bohemian Massif and the Western Carpatians comprised the areas of Drahanská vrchovina Highland and the Moravian Carst. The data obtained were tested using the model of paleorotation simulation of “Stable European Continent”. Devonian rocks show paleotectonic rotation by 110–160^{o}, comparable with known paleorotations of marlstones of the Moravo-Silesian Zone. The secondary component of remanent magnetization was deduced from data obtained from the Lower Carbonian rocks and is supposed to be induced by the remagnetization during Lower Permian–Upper Carboniferous in temperature of 300 ^{o}C.

In connection with these results, the gamma-ray spectrometric method was used to investigate the samples of Lower Paleozoic rocks of Barrandian. The comparison of radioactive elements (K, Th, U) concentrations detected on the biostratigraphic profiles allow to derive possibile tendencies in comparison of eustatic changes in the sea level and these concentrations. Gamma-ray spectrometry can be thus used as an additional tool in stratigraphy.

Varying but mostly island-arc upper crustal environments have been derived from the geochemistry and isotope compositions of (meta)carbonates in the Krkonoše–Jizera metamorphic units. In comparison with this part of Sudetic area, all the data from the Barrandian suggest close contact with northern Gondwana.

Some progress was achieved also in chemostratigraphy, where the strontium-isotope chemostratigraphy confirmed the middle/upper Pragian emergence of the Koneprusy Reef (with non-sedimentation and erosion). Although the Barrandian Early Paleozoic sequences yield a reliable geochemical evidence about the continental extension to oceanic sea-floor spreading, the latest Barrandian sediments (siliciclastics of the Srbsko Formation) correspond to sources on dissected island arc. A strongly dissolved pelagic-ooze material embedded in this diastrophic siliciclastic sediment indicates abyssal ocean depths (relating to docking and formation of accretionary prism, thrust faults and nappes).

The traditional paleontological research showed also results useful for geodynamic interpretations, e.g., the palynological studies of microfossils from the borehole Měnín-1 confirmed the larger extent of the marine sedimentary cover of the Brunovistulicum. The palynomorphs community corresponds to the idea of connection between the Brunovistulicum and the Baltica terranes during Lower Cambrian. The micropalentological research of the Železné hory Mts. metasediments was presented in a regional monograph.

In the central part of the Moldanubicum, attention was given to the geochronology and structural evolution of granulites and to the general principles of metamorphic reactions and inference of the P-T conditions of different stages of metamorphism.

The ongoing study of the lithological and the lithostratigraphic development of the W Bohemian Saxothuringicum in the Cheb area and of the Svatava Crystalline Complex treats problems at the boundary between the Teplá-Barrandian Block and Saxothuringicum. For this zone, lithogeochemical data were completed and materials for computer evaluation were collected to provide correlation with the adjacent W Bohemian segment of the Neoproterozoic of the Teplá–Barrandian Block.

SELECTED INDIVIDUAL RESULTS:

Geochronological study of rocks from granulite facies terranes *(**M. Svojtka**)*

Isotopical, petrological and structural data from the HP–HT granulites and a syn-tectonic granite in the southern Bohemian Massif were used for the reconstruction of the history of the granulite facies terranes in the southern Moldanubian Zone. Two major deformation phases, D_1 and D_2, resulted in the formation of two intersecting planar fabrics: a steeply disposed foliation S_1 and flat-lying structures S_2. While the former has formed in a compressional setting, the latter originated during the extension. The combination of previously published garnet Sm–Nd, zircon and monazite U–Pb data and Ar–Ar amphibole, biotite and muscovite cooling ages from the granulites with the new Rb–Sr whole rock–biotite ages and U–Pb (Pb–Pb) zircon data allowed to time-constrain both phases of deformation. The older deformation phase D_1 corresponds to the HP–HT stage of the granulite development (~354 Ma) that was followed by decompression and deformation D_2 associated with the MP(LP) –HT metamorphism dated at 345–338 Ma. The final stages of deformation D_2 were associated with the formation of low-angle structures whose minimum age is constrained by the intrusions of syn-tectonic two-mica granites at ca. 318 Ma (U–Pb zircon). The progressive cooling of rocks through ca. 250 °C at 300–290 Ma corresponds to the transition from the largely ductile deformation to field of brittle deformation. The estimate of cooling rates is based on modelling of diffusion profiles in garnets, the estimate of the P–T conditions of equilibration of different mineral assemblages and on the apatite fission track data that reflect the low-temperature history of the granulites.
The initial stages of exhumation are characterized by high cooling rates of ca. 24 °C/Ma. After the D_2 deformational phase the rate of cooling slowed down with an exponential decrease of temperature in time. The cooling rate of 19 °C/Ma (338 Ma–319 Ma) progressively decreased to 4 °C/Ma (319 Ma–314 Ma) and 0.5 °C/Ma (220 Ma to Recent). The exhumation of granulites from depths of ca. 70 km (~20 kbar) to 20 km (~6 kbar) can be modelled as an extrusion of a softened root of the Variscan orogen.

Late Cadomian plutons exhumed from different structural levels: crustal tilting due to Carboniferous elevator-style tectonics (Bohemian Massif) (*C. Bues, W. Dörr, Institut für Geowissenschaften und Lithosphärenforschung, Universität Giessen **J. Fiala, Z. Vejnar** & G. Zulauf, Institut für Geologie und Mineralogie, Universität Erlangen – Nürnberg*)

The SW Teplá–Barrandian unit is characterized by large amounts of Cambrian intrusions that cut through Cadomian crystalline basement. When moving from NE to SW within the igneous complex of the Stod–Kdyně–Neukirchen area, the plutons show significant changes in composition, melt emplacement level, isotopic cooling ages, and tectonometamorphic overprint. Granite, granodiorite, and quartz diorite of the NE part intruded at shallow crustal levels (< ca. 7 km depth). Isotopic cooling ages of hornblende and mica suggest that these felsic to intermediate plutons remained at shallow crustal levels (T < ca. 350 °C) since the Cambrian. When moving further SW, gabbro and diorite prevail that intruded or have been metamorphosed at considerably deeper crustal levels (> ca. 20 km). This holds for the Cambrian plutons, that prevail in this area, and for the Teufelsberg (Čertův kámen) diorite, which forms an unusual intrusion dated at 361±4 Ma using U–Pb on zircon. Apart from metamorphic reactions, the deformation fabrics of the constituent minerals and the isotopic cooling ages of hornblende and mica suggest a strong Variscan impact on the intermediate to basic plutons. Still further SW, the Cambrian igneous complex and the Teufelsberg (Čertův kámen) diorite are cut by the steeply NE dipping Hoher–Bogen shear zone (HBSZ), which forms the boundary against the adjacent Moldanubian unit. The HBSZ is characterized by top-to-the-NE normal movements, which started probably already in Upper Devonian times and were particularly active during the Lower Carboniferous. We present a geodynamic model that explains the striking lateral gradients in pluton composition and emplacement level by northeastward crustal tilting, differential uplift and exhumation,

the latter being related to crustal-scale long-lasting movements along the HBSZ as a consequence of Lower Carboniferous orogenic collapse and associated elevator-style tectonics within the overthickened crust of the Bohemian Massif.

High-Mg and low-Ti mafic metavolcanic rocks from the Neoproterozoic sequence of Sedlčany-Krásná Hora (SKI) metamorphic "Islet", Central Bohemian Pluton (***P. Vítková*** *& V. Kachlík, Charles University, Faculty of Science, Prague)*

The metabasites of the Sedlčany–Krásná Hora metamorphic "Islet" (SKI), Central Bohemian Pluton, are a part of the Neoproterozoic Svrchnice Formation. They form bodies elongated parallel to the dominant NE-SW metamorphic foliation. Petrographic features (porphyritic fabric, sharp contact with the surrounding metasediments) show that most of the metabasites represent shallow intrusive bodies (dykes and sills) rather than effusive basalts. Based on their chemistry, the SKI metabasites can be divided into two chemical and petrological defined groups: P and F (for porphyritic and fine-grained). The present mineral assemblage of both groups usually includes actinolite, magnesiohornblende, clinopyroxene rich in MgO, plagioclase and chlorite. Epidote, quartz and opaque minerals can be also presented but in accessory amounts. Some magmatic minerals are preserved (pyroxene and amphibole). The secondary paragenesis, related to a greenschist- or lower amphibolite-facies metamorphism, includes chlorite pseudomorphs after olivine, uralitized pyroxenes and amphiboles, sericitized plagioclases and crystals of actinolite after pyroxenes.
The effect of alteration can be observed in the MORB and chondrite-normalized multielement charts that sometimes display a wider scatter for the most mobile elements, such as K, Ba, Rb and Sr. In contrast, the HFSE and REE are generally more coherent, reflecting their relative immobility in these volcanic rocks. Geochemistry based on the "immobile" elements suggests that SK metabasites of both groups are siliceous high-Mg and low-Ti basalts and tholeiitic basalts or basaltic andesites. Differences between the two above-mentioned groups of metabasites cannot be explained by fractional crystallization from one parental magma source. Nd-isotope data from representatives of metabasites and metaboninites show evidence of having been derived from a heterogeneous depleted mantle source that was influenced to a different degree by adding a subduction-zone component.
Distribution of major and trace elements of the metabasites, LILE enrichment and depletion in HFSE, REE, K, Ti, Nb rank these rocks among the tholeiitic suite comparable with modern island arc. Very low REE contents with relatively flat chondrite-normalized patterns are consistent with the assignment of these rocks to the island-arc tholeiitic series. Two samples of metabasites from the P-group correspond to geochemically primitive Mg-rich boninitic rocks derived from more depleted MORB-like mantle.

Paleomagnetic investigations aimed at the contact regions of the Bohemian Massif and the Western Carpathians (***M. Krs, O. Man, P. Pruner & D. Venhodová***)

The results of palaeomagnetic investigations of Phanerozoic rocks of the Bohemian Massif and rocks from the Western Carpathians provide a basic overview of aspects of global tectonic interpretations and correlation of palaeolatitudinal drift in both the Alpine and Hercynian mobile belts. Palaeomagnetic data were inferred for rocks from two belts whose deformations differ in space and time, however, comparison of the results allows a better interpretation of principal palaeotectonic deformations in both mobile belts. For an easier correlation, the values of palaeolatitudes and palaeodeclinations calculated from palaeomagnetic pole positions were extrapolated to a single reference point for each of the two territories. The comparison of palaeomagnetic data suggests a similarity in palaeodeclination values due to the Variscan Orogeny in the Bohemian Massif and the Alpine Orogeny in the WCA. Palaeotectonic, predominantly counter-clockwise rotations were recorded in the territory of the WCA, whereas the Bohemian Massif is dominated by clockwise rotations. Rotations of individual blocks induce large scatters of palaeomagnetic pole positions even

though they may affect only small units. In contrast, changes in pole positions due to drift of larger units are generally smaller although the translations involved are appreciable.

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(12b) K3046108 Project No. 08: Climatic and human impact on development of natural environment (*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 (***J. Kadlec, I. Dobešová, M. Filipi, O. Kvídová, O. Man, L. Minařík, P. Pruner, E. Růžičková, A. Žigová***)

The climatic controls of river processes are reconstructed in the Labe River basin. Sedimentary structures, lithology and the age of Holocene fluvial sediments were studied in the Stará Boleslav, Lysá, Hradišťko and Ostrá with the aim to determine periods of increased flood activity. The obtained data were complemented by results of micromorphological analyses of soil horizons intercalated into flood deposits. Samples of tree trunks preserved in these sediments were collected and prepared for radiocarbon and dendrochronological datings. A stalagmite from the Amatérská Cave was sampled for detailed TIMS datings and stable isotope reconstruction climatic variations at the Pleistocene/Holocene boundary.

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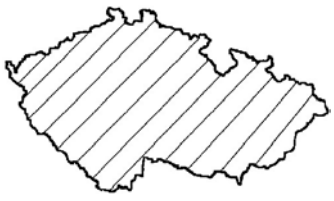
(12c) K6005114 Project No. 14: Biodiversity and the function of ecological systems *(Project coordinator: F. Krahulec, Institute of Botany AS CR)*

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



The project is aimed at the understanding of co-evolution of geological and biological environment in selected geological periods. The emphasis is laid on environmental crises, especially in the Lower Palaeozoic and in the Quaternary. One particular example concerns the study of prolonged dry periods in a 17 m thick tufa body at Svatý Jan pod Skalou in the Bohemian Karst (the research was performed within cooperation with the Czech Geological Institute).

Tufa formation at this site started at about 9,500 BP, on a flat fluvial gravel terrace of Late Glacial/Early Holocene age. Deposition of lithologically uniform, pure hard porous tufa continued until about 6,500 BP. From that time onwards, more unstable climate with several dry periods and erosion events produced a lithologically varied complex of loose tufa alternating with embedded soils and scree beds. Termination of the tufa deposition occurred at about 2,500 BP and was followed by partial erosion connected with relocation of the spring below the tufa body. Holocene climatic changes were recorded in lithology, assemblages of molluscan shells and in oscillations of oxygen and carbon stable isotope ratios in carbonate. The observed patterns are in a good agreement with the evolution of calcareous tufa deposits all over central Europe.

SELECTED INDIVIDUAL RESULTS:

Lower Devonian conodont biostratigraphy of the Prague Basin (***L. Slavík***)

Based on the results obtained from extensive biostratigraphic investigations of 10 Barrandian sections, applicability of the present standard global conodont zonation of the Pragian is impossible in this classic area for the Pragian due to rare and relatively random occurrences of zone-diagnostic taxa and their haphazard stratigraphic ranges. Because of this, an alternative proposal was suggested for the Prague Basin, one that may be utilised in some of Barrandian-related areas with similar facies development and low abundandce of forms of *Eognathodus sulcatus* (e.g., Morroco, Carnic Alps). The newly suggested three-fold zonation involves *steinachensis*, *serratus* and *celtibericus* Zones for the lower, middle and upper Pragian. Being not a phylogenetic zonal succession, this proposal is not ideal but, due to the scarcity of biostratigraphically useful species in the Barrandian sections, more suitable stratigraphic markers could not be found. The best indicator for lower boundary of the Pragian is the first occurrence of *Latericriodus steinachensis* (Al-Rawi) eta morph Klapper & Johnson; it is more frequent and its stratigraphic position is more accurate than that of *Eognathodus sulcatus eosulcatus* Murphy. Representatives of *Polygnathus* Hinde are scarce and rather random in the Barrandian sections, possibly reflecting the character of sedimentation in the upper parts of the Praha Formation. Likewise, the base of the Emsian is is more readily identified by the first occurrences of *Latericriodus bilatericrescens gracilis* Bultynck. This taxon is the oldest form of the *Latericriodus bilatericrescens* (Ziegler) group. Similar composition of conodont assemblages and stratigraphic ranges of individual taxa occur in the sequences of the Moroccan Meseta and the Carnic Alps.

Alternative conodont zonation of the Pragian proposed for the Prague Basin compared with standard zonal scale **(L. Slavík, 2001).**

stage	division	Standard zonal scale	Alternative proposal for the Prague Basin (Barrandian)
Emsian	lowermost part (basal)	dehiscens/kitabicus	gracilis/dehiscens
Pragian	Upper	pireneae	celtibericus
	Middle	kindlei	serratus
	Lower	sulcatus	steinachensis

Malacostratigraphic investigation of the Quaternary: importance for palaeoenvironmental and stratigraphical analyses (***J. Hlaváč***)

Subproject: Malacozoology and stratigraphy of Postglacial period in the Koněprusy area (***J. Hlaváč***)

Using malacostratigraphic investigation with correlation of sedimentological features provided results from two sections on the northern slopes in the Koněprusy area. Calcareous tufa deposit (1) close to Havlíčkův mlýn yielded results similar to most tufa deposits known from the Bohemian Karst. The tufa was deposited by a small spring situated near the boundary of Silurian limestones and shales with dykes of diabase. Changes in sedimentological features and palaeomalacological content made possible to subdivide the beds in the section to Boreal, Atlantic, Epiatlantic, Subboreal and Subatlantic periods. The section in the northern slope of Voskop Hill unveiled 2 m Middle(?)–Young Holocene sediments not so rich in palaeomalacological content.

Subproject: Reconstruction of Holocene palaeoenvironment in limestone area of the Javoříčko Karst (***J. Hlaváč***)

The evaluation of sections in the cave entrance deposits and foot-rock's sediments shows several main results, based on correlation with sedimentary dynamics. The Last Glacial-Holocene boundary separates two different periods in the evolution of palaeoenvironment. The Middle Holocene period is characterised by fully developed woodland habitats represented by quick expansion of sensitive woodland molluscan species, such as *Bulgarica cana, Cochlodina orthostoma* or *Orcula dolium*. This period is characterized by very humid climate and deposition of powdery calcium carbonate sinter in the cave entrances and abri. The high number of *Vallonia*, *Pupilla*, *Truncatellina* species recorded in lower beds close to Last Glacial-Holocene boundary (approximately at the depth of 3 m within the whole studied area) reflects the occurrence of open habitats. Their total substitution with closed forest is documented in the Middle Holocene but later, in Late Holocene, a slight re-expansion of open or semi-open habitats is detected again. Carpathians elements were documented in faunal coenoses due to close connection with Western Carpathians. Also the intersection of elements with the Alpine distribution is documented from the start of Young Holocene period.

Subproject: Crystalline limestones in the Šumava foothills and their recent malacocoenoses - importance for reconstruction of Postglacial environment (***J. Hlaváč***)

Natural habitats in the territory of crystalline limestones between Sušice and Horažďovice towns in the Šumava foothills have highly developed variability of malacocoenoses reflected as very rich in number of species. Habitats consist of fresh mixed debris forest, little sunlit rocks, rocky steppes etc. Some new records of sensible species, e.g., *Ruthenica filograna*, *Sphyradium doliolum*, *Merdigera obscura* or freshwater snail *Gyraulus acronicus* subsp. *stelmachaetius*, are very surprising and will contribute to their zoogeographical distribution in the Czech Republic. Results of a detailed analysis of Recent living molluscs will be compared with neighbouring areas with different substrates.

Subproject: Oligotrophic woodland habitats and their molluscan indicators (***J. Hlaváč***)

Recent malacocoenoses of coniferous woodland areas were investigated in the western and southern parts of the Bohemian Massif. The studied areas built by oligotrophic vegetation cover, such as *Picea*- and *Pinus*-woodlands with herbaceous level dominated by herbs, e.g., *Festuca ovina, Deschampsia flexuosa, Carex brizoides, Vaccinium myrtillus, Calluna vulgaris*, were represented by silicate bedrock (granite, gneiss). Due to the low content of calcium carbonate in the rock, the soils developed on these rocks do not enable the development of rich and sensitive woodland malacocoenoses typical for natural deciduous forests on silicate or basic bedrock. Coniferous woodlands are represented by molluscan species, not so ecologically ambitious. Most malacocoenoses are represented mostly by slugs and shell-snails. Especially one dwarf snail species, *Columella aspera* with 3 mm long shell, is a typical inhabitant of coniferous woodlands and is absent from areas with deciduous woodlands. The snail *Columella aspera* is also absent in the areas with limestone bedrock. The pH measurement of the soils proved that *Columella aspera* lives in soils with pH-range of 3.5–5.5. In general, these conditions are

extreme for the development of malacocoenoses and majority of woodland species are absent. In spite of this result, the snail *Columella aspera* is a typical indicator for oligotrophic woodland areas on silicate bedrock.

Subproject: Revision of the occurrence of the superfamily *Sciurodea* (***E. Kadlecová***)

The occurrences of the Sciuridae in the Tertiary of the Bohemian Massif agree with the distribution of Sciuridae in the Tertiary of central and western Europe. A prominent uniformity in the composition of Sciuridae fauna can be observed particularly among Czech, German, Austrian and Slovak sites. The unformity in the composition of tree, ground and flying squirrel is high for each stratigraphical zone. The remains of giant squirrel (*Sciurus giganteus* Freudenberg, 1941) and remains of an aplodontid (*Paracitellus eminens* Dehm, 1950) were found in the Lower Miocene (mammal biozone MN3) of the Bohemian Massif.

Subproject: Monitoring of mammalian assemblages at Czech and Moravian localities (***E. Kadlecová***)

A rich assemblage of small mammals and amphibians was found in karstic filling in a limestone quarry at Vitošov near Olomouc. The mammalian asseblage contains particularly Microchiroptera and Gliridae (*Muscardinus* sp., *Glis sackdillingensis* Heller, 1936). The biostratigraphical position of the fauna was determined by the presence of a significant mammalian form *Mimomys pliocaenicus* to the Pliocene, Villanyian stage, Biozone MN17.

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13. Organization of conferences and scientific meetings

Conferences and Symposia organized in 2001

9th Coal Geology Conference, Prague, 25.-29. 6.2001. **R. Mikuláš** – preparation of an excursion.

6th International Congress of Vertebrate Morphology, Jena, July 21-26 2001. Symposium: Nasal Region in Tetrapods.
Organizers and convenors W. Maier (University of Tübingen), **Z. Roček** and L. Witmer (University of Athens). Web presentation - http://icvm-6.zoo.uni-jena.de/ScientificProgram.html.

6th World Congress of Herpetology, Colombo, Sri Lanka, December 2001. **Z. Roček** - Member of the Executive Committee and of the Scientific Programme Committee.

Conferences and Symposia under preparation

International Symposium HIBSCH 2002, Teplá – Ústí nad Labem – Mariánské Lázně (Ohře–Eger Rift Region, Czech Republic) 3-8 June 2002. Organized by the Institute of Geology AS CR, Prague, Czech Geological Institute, Prague, Faculty of Science, Prague and other 6 institutions (incl. that from Germany and Austria); Organizing Committee: **J. Ulrych, V. Cajz, J. Adamovič,** Č. Nekovařík (Czech Geological Institute, Prague), E. Jelínek (Faculty of Science, Charles University, Prague) and others. We register 60 scientists as potential participants, who responded to preliminary conference announcement. The Organizing Committee addressed 4 scientists as invited lecturers.
Web Site presentation: http://www.gli.cas.cz/hibsch, http://www.natur.cuni.cz/hibsch2002

International Conference: Sandstones – ecology, environment, protection*. Organising comitee: H. Hartel (České Švýcarsko National Park), T. Herben (Charles University),* ***V. Cílek*** *(Institute of Geology AS CR). 2002. Krásná Lípa,14-20 September 2002.*

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14. Publication activity of the Institute of Geology

At the end of 2001, the Institute of Geology co-published the book: **Vladimír Panoš**: ***Karstological and Speleological Terminology. Explanatory Vocabulary with equivalents in Slovak and official languages of the International Union of Speleology (English, French, Italian, German, Russian, Spanish)***. The book with 352 pages was published in Knižné centrum, Žilina, Slovakia in co-edition with the Administration of Slovak Caves, Liptovský Mikuláš, Slovakia.

In 2001, the Institute of Geology published one issue of **GeoLines** – extended conference abstracts. 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.

2001
GeoLines 13 (2001)
Proceedings of the International mineralogical-petrological symposium (held at Magurka SK, August 29-31, 2000) and 6th Meeting of the Czech Tectonic Studies Group (held at Donovaly SK, Nízké Tatry, May 3-6, 2001). Edited by J. Kadlec & M. Svojtka.

THE INTERNATIONAL MINERALOGICAL–PETROLOGICAL SYMPOSIUM – MAGURKA 2000

Branislav ***BAHNA*** *and Martin* ***CHOVAN*****:** Low-Sulfidation Type of Epithermal Au-Ag Mineralization Near Pukanec (Central Slovakia Neogene Volcanic Fields)
Karel ***BREITER****, Jiří K.* ***NOVÁK*** *and Marta* ***CHLUPÁČOVÁ:*** Chemical Evolution of Volcanic Rocks in the Altenberg - Teplice Caldera (Eastern Krušné Hory Mts., Czech Republic, Germany)
Š. ***FERENC*** *and Igor* ***ROJKOVIČ***: Copper Mineralization in the Permian Basalts of the Hronicum Unit, Slovakia
Jaroslav ***PRŠEK*** *and Martin* ***CHOVAN*****:** Hydrothermal Carbonate and Sulphide Mineralization in the Late Paleozoic Phyllites (Bacúch, Nízke Tatry Mts.)

Igor ***ROJKOVIČ*****:** Early Paleozoic Manganese Ores in the Gemericum Superunit, Western Carpathians, Slovakia

6th MEETING OF THE CZECH TECTONIC STUDIES GROUP – DONOVALY, NÍZKÉ TATRY

Pawel ***ALEKSANDROWSKI*** *and Stanislaw* ***MAZUR*****:** Dextral Shear Zone between Nove Mesto Unit and the Core of Orlica-Snieznik Massif (the Sudetes) – a Variscan Terrane Boundary?
Ondřej ***BÁBEK****, Jan* ***ZAPLETAL****, Radek* ***MIKULÁŠ*** *and Tomáš* ***LEHOTSKÝ***: Controls on Development of Asymmetric Fining-Upward Megacycles in a Generally Fine-Grained Turbidite System of the Moravice Formation, Moravian-Silesian Culm Basin
Jiří ***BABŮREK*****:** Basic and Ultrabasic Rocks at the Bohemicum/Moldanubicum Boundary Along the Central Bohemian Fault
Ivan ***BARÁTH****, Ivan* ***HLAVATÝ****, Branislav* ***ŠÁLY*** *and Michal* ***KOVÁČ*****:** Evolution of Miocene Depositional Systems in the Northern Vienna Basin
Dawid ***BIAŁEK*****:** Mineralogy and Thermobarometry of the Jawornickie Granitoids, Rychlebske Hory
Martin ***BLAŽÍČEK****, Ondrej* ***LEXA*** *and Karel* ***SCHULMANN***: Development of Fracture Networks in the Melechov Massif and their Analysis
Kristýna ***BURIÁNKOVÁ*** *and Jan* ***KOŠLER***: Metamorphic Evolution of the High Himalaya in the Makalu Region – Constraints from P-T Modelling and in-situ Th-U-Pb Monazite Dating
Ivan ***DOLEŽAL*****:** Documentation of Geological and Archaelogical Features Using the Lacquer-Film Method
Zdeněk ***DOLNÍČEK*** *and Marek* ***SLOBODNÍK***: The Neoidic Fluorite Mineralization in the Brno Massif: Interaction between Fluid and Rock
Shah Wali ***FARYAD****, Péter* ***ÁRKAI*** *and Kadosa* ***BALOGH*****:** Accretionary Type Metamorphism in the Meliata Unit (Western Carpathians, Slovakia)
Shah Wali ***FARYAD*****:** Fluid Compositions in High-grade Rocks: An Example from the Lapis Lazuli Deposits at Sare Sang, Afghanistan
Shah Wali ***FARYAD*** *and Georg* ***HOINKES*****:** Metamorphism Along a South-North Cross-section in the Middle Austroalpine Units East of Tauern Windows (Easter Alps, Austria)
Tomáš ***FISCHER****, Josef* ***HORÁLEK****, Alena* ***BOUŠKOVÁ*** *and Zuzana* ***HUDOVÁ*****:** West Bohemian Seismic Swarm 2000: First results
Helena ***GILÍKOVÁ****, Slavomír* ***NEHYBA*** *and Jiří* ***OTAVA*****:** Sedimentology of Redeposited Conglomerates: Sections at Large Quarries of the Drahany Culm Basin
Ivan ***GNOJEK*** *and František* ***HUBATKA*****:** Magnetic Basement Complexes in the Outside of the West Carpathians and of the Eastern Alps
Radomír ***GRYGAR****, Jiří* ***PTÁČEK****, Petr* ***KONÍČEK*** *and Petr* ***WELSER***: The Influnce of Carpathian Nappes on Tectonic Structures of the Czech Part of Upper Silesian Coal Basin
Radomír ***GRYGAR*** *and Jan* ***JELÍNEK*****:** Alpine Rejuvenation of Epi-Hercynian Foreland – the Complex Morphostructural and Tectonic Analysis (Moravosilesian Region, Bohemian Massif)
František V. ***HOLUB*****:** Ultrapotassic Intrusions of the Bohemian Massif: Insights into the Variscan Subcontinental Lithospheric Mantle?
František ***HROUDA****, Dušan* ***PLAŠIENKA*** *and Dagmar* ***GREGOROVÁ***: Neogene Deformations of the Core Mountains of the Central Western Carpathians as Indicated by Magnetic Anisotropy
František ***HROUDA****, Jaroslav* ***AICHLER****, Marta* ***CHLUPÁČOVÁ*** *and Martin* ***CHADIMA***: The Magnetic Fabric in the Žulová Pluton and its Tectonic Implications
František ***HROUDA****, Marián* ***PUTIŠ*** *and Ján* ***MADARÁS*****:** A Model for the Mechanism of the Alpine Overprint of Magnetic Fabric in the Late Variscan Vepor Pluton Granitic Rocks, Western Carpathians
František ***HUBATKA****, Oldřich* ***KREJČÍ*** *and Jiří* ***SEDLÁK***: Gravity Images of the Bohemian Massif and the West Carpathians Contact Zone
Peter ***IVAN*** *and Ján* ***MELLO***: Tectonic Subunits in the Bôrka Nappe (Inner Western Carpathians): Their Lithostratigraphy and Original Position in the Structure of the Ancient Meliata Ocean Basin
Peter ***IVAN*** *and Rastislav* ***DEMKO***: Calc-alkaline Basic Volcanic Rocks in the Cretaceous Conglomerates of the Klape Unit (Pieniny Klippen Belt): the Problem of the Source Region and its Geodynamic Setting
Marian ***JANÁK****, Igor* ***PETRÍK*** *and Ulrike* ***POLLER***: Disequilibrium Melting in Early Devonian (406 Ma) Orthogneisses from the Western Tatra Mts.

Juraj ***JANOČKO*****:** Turbiditic Sedimentary Fill of the Central-Carpathian Paleogene Basin
Vojtěch ***JANOUŠEK****, Jindřich* ***HLADIL****, Jiří* ***FRÝDA****, Ladislav* ***SLAVÍK*** *and Jakub* ***ŠMÍD***: Strontium Chemostratigraphy of Carbonate Sediments – Pilot Study of Silurian and Devonian Brachiopods from the Prague Basin
Mirosław ***JASTRZĘBSKI*****:** The Pb-Zn Deposits Connected with the Rejuvenation of the Staré Město – Kletno – Marcinków Fault Zone
Josef ***JEŽEK****, František* ***HROUDA*** *and Karel* ***SCHULMANN***: Numerical Modeling of Magnetic Susceptibility of Rocks Deformed in Transpression Regime
Josef ***JEŽEK****, Ondrej* ***LEXA*** *and Karel* ***SCHULMANN*****:** A Thin Viscous Sheet Model for Weak Zone Deformation
Václav ***KACHLÍK****, Vojtěch* ***JANOUŠEK****, Radek* ***HEŘMÁNEK*** *and Petra* ***VÍTKOVÁ***: Whole-Rock Geochemistry and Nd Isotopic Composition of Metavolcanics from the Netvořice – Neveklov and Sedlčany – Krásná Hora Islets: their Petrogenesis and Implications for Geodynamic Processes at the Teplá-Barrandian – Moldanubian Boundary
Václav ***KACHLÍK*** *and Vojtěch* ***JANOUŠEK*****:** Cambrian in the Netvořice–Neveklov Metamorphic Islet (roof of the Central Bohemian Pluton)
Václav ***KACHLÍK*** *and František* ***PATOČKA*****:** Late Devonian to Early Carboniferous Bimodal Volcanic Rocks of the Ještěd Range Unit (W Sudetes): Constraints on the Development of the Variscan Orogenic Wedge
Jakub ***KANTA*** *and David* ***ULIČNÝ***: The Role of Palaeotopography and Tectonics in the Stratigraphy of Fluvial Through Shallow-Marine Deposits of the Peruc –Korycany Formation (Cenomanian) in the SE Part of the Bohemian Cretaceous Basin
Milan ***KOHÚT***: The Gneissic Complex of the Staré Hory Mts. – Its Hercynian and Alpine History
Milan ***KOHÚT****, Ulrike* ***POLLER*** *and Wolfgang* ***TODT*****:** From Collision through Delamination to Post-Orogenic Uplift: Three Stages of the Hercynian Granite Magmatism in the Veľká Fatra Mts. (Slovakia)
Vlastimil ***KONEČNÝ*** *and Jaroslav* ***LEXA***: Evolution of the Horst-Graben Structure in the Central Slovakia Volcanic Field
Jiří ***KONOPÁSEK*** *and Bedřich* ***MLČOCH*****:** Phase Changes in Medium-Temperature Metagranites – An Example of the St. Catherina Dome and its Continuation below the North Bohemian Basin (Krušné hory Mts., Boheman Massif)
Jana ***KOTKOVÁ****, Milan* ***NOVÁK****, Jaromír* ***LEICHMANN*** *and Stanislav* ***HOUZAR***: Nature and Provenance of Exotic Rock Types from Lower Carboniferous Conglomerates (Eastern Bohemian Massif)
Michal ***KOVÁČ*****:** Subsidence History and Tectonic Control During the Development of the Western Carpathian Neogene Basins
Michal ***KOVÁČ*****:** Miocene 3rd Order Cycles Reflected in Basins of the Western Carpathians
Lenka ***KREJZLÍKOVÁ****, Karel* ***SCHULMANN****, Jean-Marc* ***LARDEAUX****, Pavla* ***ŠTÍPSKÁ****, Ondrej* ***LEXA*** *and Véronique* ***GARDIEN***: Metamorphic Zonality of the Jeseník Amphibolite Massif and its Influence on Deformation of Amphibolites during Folding
Ryszard ***KRYZA*** *and Mentor* ***MURTEZI*****:** Zircons from the Czarnów Schists, East Karkonosze Complex, Sudetes, SW Poland: Morphology and Geochemistry
Leszek ***KUROWSKI*****:** Fluvial Sedimentation of the Słupiec Formation (middle Lower Permian) in the Nowa Ruda Area (Intra-Sudetic Basin, Sudetes, SW Poland)
Jiří ***LAURIN*** *and David* ***ULIČNÝ***: Sequence Stratigraphic Relationships of Rhythmically Bedded Hemipelagic Deposits and Coarse-grained Deltas in an Epicontinental Setting; Example from the Turonian of the Bohemian Cretaceous Basin
Jiří ***LAURIN*** *and Bradley B.* ***SAGEMAN***: Depositional and Relative Sea Level History of the Cenomanian/Turonian Interval, Dakota and Straight Cliffs Formations of the Western Interior Basin, Southwestern Utah
Ondrej ***LEXA****, Karel* ***SCHULMANN*** *and Josef* ***JEŽEK***: New Approach to Interpretation of Superposed Cleavage Patterns in Weak Rocks: Result of Independent Movements of Rigid Basement Promontories on an Example of the Gemer Unit
Karel ***MARTÍNEK*** *and David* ***ULIČNÝ*****:** Depositional Processes in a Low-Sinuosity Fluvial System: Facies and Depositional Geometries of the Permian Havlovice Member, Krkonoše Piedmont Basin
A. ***MATEJČEK****, R.* ***ONDRÁŠIK*** *and Š.* ***HOLEŠA*****:** Tectonic Structures in the Tunnel Višňové in the Lúčanská Malá Fatra Mts., Slovakia

Stanisław ***MAZUR*****:** Multi-Stage Variscan Evolution of the Central Sudetes – Structural Evidence from the Kłodzko Metamorphic Unit
Rostislav ***MELICHAR*** *and Yuriy D.* ***SHKOVIRA***: Case Study of the Cone-in-cone Structure Based on Czech and Crimean Samples
Rastislav ***MILOVSKÝ****, Vratislav* ***HURAI*** *and Dušan* ***PLAŠIENKA***: Is there any Mechanical Paradox in Thin-Skinned Thrusting? A Case Study from the Muráň Nappe (Central Western Carpathians)
Bedřich ***MLČOCH*** *and Jana* ***KOTKOVÁ*****:** Interpretation of the Fault Network of the Western Bohemian Region Based on the Digital Model of the Relief DMR2 and Gravimetric Maps
Bedřich ***MLČOCH*** *and Jana* ***KOTKOVÁ:*** Interpretation of the Fault Network of the Western Bohemian Region Based on the Digital Model of the Relief DMR2 and Gravimetric Maps
Monika ***NĚMEČKOVÁ****, David* ***BURIÁNEK*** *and Milan* ***NOVÁK***: Cordierite-Bearing Rocks and their Relation to the PT Evolution of Rocks in the N Parts of the Zábřeh and Polička Crystalline Complexes
Teresa OBERC-DZIEDZIC*, Krystyna* ***KLIMAS****, Ryszard* ***KRYZA*** *and Mark* ***FANNING:*** SHRIMP Zircon Geochronology of the Neoproterozoic Strzelin Gneiss: Evidence for the Moravo-Silesian Zone Affinity of the Strzelin Massif, Fore-Sudetic Block, SW Poland
Mário ***OLŠAVSKÝ*****:** Evidence of Volcanism in the Middle Triassic Reifling Limestones of the Hronikum Unit
Martin ***ONDREJKA*** *and Pavel* ***UHER***: Composition and Origin of Triassic Potassium-rich Rhyolites of the Silicicum Superunit, Western Carpathians, Central Slovakia
Igor ***PETRÍK*** *and Marian* ***JANÁK:*** Pseudotachylyte from the High Tatras: Petrology and Kinetics of Crystallisation
Dušan ***PLAŠIENKA:*** Structural Geometry of the Krížna Unit in the Donovaly Area: Inferences for the Emplacement Mechanisms of Thin-Skinned Cover Nappes
Dušan ***PLAŠIENKA:*** Mesozoic Structural Evolution of the Central Western Carpathians
Michal ***RAJCHL*** *and David* ***ULIČNÝ:*** Response of a Fluvial Depositional System to Unequal Compaction of Underlying Peat (Neogene, Most Basin, Czech Republic)
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Markéta ***ROMANOVÁ*** *and Pavla* ***ŠTÍPSKÁ:*** Tectonometamorphic Evolution of the Stronie Series near Javorník
Karel ***SCHULMANN****, František* ***HORUDA****, Ondrej* ***LEXA****, František* ***MLEJNECKÝ****, Stanislav* ***ULRICH*** *and Jiří* ***KONOPÁSEK:*** Mid-Crustal Emplacement of the Třebíč Durbachite: A Result of Interplay between Compressional and Wrench Tectonics due to Block Rotations
Marek ***SLOBODNÍK*** *and Zdeněk* ***DOLNÍČEK***: Hydrothermal Mineralization Beneath the Upper Silesian Basin, Czech Republic: the Record of a Possible Tectonic Driving Fluid Flow
Ján ***SOTÁK*****:** Paleoenvironmental Changes in the Western Carpathian Basins across Eocene-Oligocene Boundary: Onset of TA4 Euxinity and Catastrophic Eutrofication
Ladislav ***STRNAD*** *and Jindřich* ***HLADIL***: Geochemistry and Composition of the Middle Devonian Srbsko Formation in Barrandian Area, Bohemian Massif: a Trench or Fore-Arc Strike-Slip Basin Fill with Material from Volcanic Arc of Continental Margin?
Jakub ***ŠMÍD****, Karel* ***SCHULMANN*** *and František* ***HROUDA***: Preliminary Data on the AMS Fabric in Salt Domes from the SW Part of Zagros Mts., Iran
Aleš ***ŠPIČÁK****, Václav* ***HANUŠ*** *and Jiří* ***VANĚK***: Seismic Activity around and under Krakatau Volcano, Sunda Arc: Constraints to the Source Region of Island Arc Volcanics
Lenka ***ŠPIČÁKOVÁ*** *and David* ***ULIČNÝ***: Palaeotopography and Base-Level Change as Controls on Fluvial Architecture: Horoušany-Brník Palaeovalley Evolution (Cenomanian, Bohemian Cretaceous Basin)
Veronika ***ŠTĚDRÁ****, Václav* ***KACHLÍK*** *and Quentin C.* ***CROWLEY***: Sources, Emplacement Environments, and Metamorphic Evolution of Metagabbros in the Mariánské Lázně Complex and Teplá Crystalline Unit (NW Bohemian Massif)
Pavla ***ŠTÍPSKÁ****, Karel* ***SCHULMANN*** *and Jiří* ***KONOPÁSEK***: Mechanical Collapse of Vertically Extruded Orogenic Root System: SW Moldanubian Zone

*Lucie **TAJČMANOVÁ**, Jiří **KONOPÁSEK** and Karel **SCHULMANN***: Metamorphic and Structural Evolution of the Moldanubian Lower Crust – an Example of the Strážek Moldanubicum

*Pavel **UHER**, Pavol **MALACHOVSKÝ**, Ivan **DIANIŠKA** and Michal **KUBIŠ***: Rare-Element Nb–Ta–W Mineralization of the Tin-Bearing. Spiš-Gemer Granites, Eastern Slovakia

*David **ULIČNÝ***: Depositional Systems and Sequence Stratigraphy of Coarse-Grained Deltas in a Shallow-Marine, Strike-Slip Setting: the Bohemian Cretaceous Basin, Czech Republic

*David **ULIČNÝ** and Jiří **LAURIN***: Well-log based Correlation of Turonian–lower Coniacian Depositional Systems in the Western Part of the Bohemian Cretaceous Basin: New Basis for Reconstructing the Basin History

*Rastislav **VOJTKO***: Kinematics and Succession of the Neoalpine Fault Structures of the Tisovec Karst and its Surroundings

*Jozef **VOZÁR***: Remarks to Main Tectonic Fenomena along the Northern Part of the Seismic Transect 2T

*Patrycja **WÓJCIK-TABOL***: Cenomanian/Turonian Boundary in the Pieniny Klippen Belt- Sedimentological Studies

*Bogdan **ZOGALA**, Ryszard **DUBIEL**, Halina **GORSZCZYNSKA** and Radoslawa **TOMASZEWSKA***: Geoelectrical Investigations in Slovakian Tatra Mountains

*Vladimír **ŽÁČEK**, Zdeněk **DVOŘÁK** and Roman **SKÁLA***: Unusual Mineral Assemblage Associated with the Fossil Fire of the Coal Seam at Želénky, North Bohemian Brown Coal Basin, Czech Republic

*Jiří **ŽÁK**, Karel **SCHULMANN** and František **HROUDA***: Syn-Tectonic Emplacement of Island-Arc Calc-Alkaline Magmas during Oblique Transpression: SE Margin of the Teplá-Barrandian Zone (Bohemian Massif)

6th MEETING OF THE CZECH TECTONIC STUDIES GROUP – DONOVALY, NÍZKÉ TATRY: EXCURSION GUIDE

*Juraj **JANOČKO** and Stanislav **JACKO** Jr.:* Turbidite Deposit Systems of the Central-Carpathian Paleogene Basin

*Marian **JANÁK**, Dušan **PLAŠIENKA** and Igor **PETRÍK***: Excursion to the Tatra Mountains, Central Western Carpathians: Tectonometamorphic Records of Variscan and Alpine Orogeny

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

15a) Papers published in 2001

* publications in journals with impact factor (IF value according to list from 2000)

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15c) Lectures and poster presentations

Adamovič J., Melka K. & Ulrych J.: Fe-oxyhydroxide cementation in Cretaceous sandstones, Northern Bohemia: relation to young volcanic activity. Lecture. *Anniversary Meeting Österreichische Mineralogische Gesellschaft 1901-2001 MINPET 2001, 24.-26. September 2001, Vienna.*

Bek J. & Opluštil S.: Palaeoecology and palynology of the Radnice Member, Kladno-Rakovnik Basin, central Bohemian (Bolsovian). Lecture. *First Meeting of the C.I.M.P. Spores and Pollen Subcommission National University of Ireland, Cork, Ireland, 2nd to 7th September, 2001*, 12.

Bek J. & Pšenička J.: *Senftenbergia plumosa* and its spores from the Kladno and Pilsen basins. Lecture. *Česko-slovenský paleontologický seminář. Přírodovědecká fakulta UK, Praha*

Bek J. & Šimůnek Z.: Spores of Carboniferous and Permian *Discinites*. Lecture. *Česko-slovenský palaeontologický seminář. Přírodovědecká fakulta UK, Praha*

Bek J.: *Discinites* spores: an example of unusual variation. Lecture. *First Meeting of the C.I.M.P. Spores and Pollen Subcommission National University of Ireland, Cork, Ireland, 2nd to 7th September, 2001,* 11.

Bosák P.: Hydrothermal karst of the Barrandian. Lecture. *Instytut Geologii, Uniwersytet im. Adama Mickiewicza, Poznań, Polska*, 11.6.2001.

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Budil P., Chlupáč I., Kraft P., **Mikuláš R.** & Chvátal P.: Multidisciplinární výzkum lokality Červený vrch (šárecké souvrství Barrandienu). Lecture. *Paleontologický seminář, PřFUK Praha, 2.5.2001.*

Cílek V.: The economy of landscape space. Invited lecture. *Krajina domova. MŽP a Komora architektů. 22.2. Průhonice*.

Cílek V.: Civilisations and natural catastrophes. Public lecture. *Botanical garden, 21.11. Praha*.

Cílek V.: Ironstones of CR. Lecture. *Seminar "Ferrugineous sandstones".14.9. Houska*.

Cílek V.: Landscape and space. Invited lecture. *Ecological seminar. 13.11. Olomouc.*

Cílek V.: Landscape development. Invited lecture. *Monastery – strategic planning. 18.2.* Bechyně.

Cílek V.: Phenomenon of Czech landscape. "Plant your forest workshop". Invited lecture. *Academy of Fine Arts, 9.4., Praha.*

Cílek V.: Praha: relief, history and development. Excursion and lecture. *De Paul University. Chicago, USA, Abroad studies in Europe. 7.12. Praha.*

Cílek V.: Tetín and its Quaternary development. Public lecture. *Tetín.*

Cílek V.: The carbonate metabolism and problems of prolonged droughts in Holocene. Invited lecture. *Quaternary seminar. 24.5. Institute of archaelogy AS CR. Praha*.

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Cílek V.: The microprobe analysis and the protection of historical monuments. Lecture. *Microprobe workshop. Institute of Geology ASCR. 20.3. Praha*.

Cílek V.: The thieves of landscape. Invited lecture. *Seminar Landscape forming programmes. VI. 28.11. Příbram.*

Cílek V.: Town and its environment. Case study. Invited lecture. *Praha, Raleigh. University of North Carolina, USA. Academic advisory meeting. USA.*

Fejfar O., **Kadlecová E.**, Nedomová J.: Review of Tertiary faunas of Bohemian Masif. Lecture. *Palaeontological seminar, Faculty of Science, Charles University, December 4, 2001, Praha.*

Filippi M. & Vašíček M.: Morphology and mineralogy of salt karst in southern Iran. Lecture. *Geologický seminář. Ústav struktury a mechaniky hornin AV ČR. 19.6. 2001*, Praha.

Filippi M.: Přbuz site: arsenic migration. Lecture. *Mineralogicko-ložiskový seminář. Přírodovědecká Fakulta UK, 27.11. 2001, Praha.*

Filippi M.: The weathering of an arsenopyrite concentrate. Soils pH changes. Lecture. *Mineralogicko-ložiskový seminář. Přírodovědecká Fakulta UK, 3. 4. 2001, Praha.*

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Hladil J. & **Pruner P.**: Anatomy of the Kacak-related magnetosuscebtibility zones (Devonian) based on carbonate deposits at medium rate of sedimentation. Lecture. *26th General Assermbly European Geophysical Society, 25-30 March 2001, Nice, France.*

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Hladil J.: Amphiporids / Their initial growth stages / Stems and coatings, why and when? Lecture. *2. zasedání Stálého českého a slovenského paleontologického semináře. 18. - 19. 6. 2001. PřF UK Praha.*

Hladil J.: What happened to the limestones on the Bahamian banks close above and below sea level. Invited Lecture. *Co-operative Seminary of Advanced Carbonate Tasks. Dept. of Geology, Masaryk University, Brno & Czech Geological Survey, branch Brno, 18-19 April 2001.*

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Kadlec J.: Kvartér – období člověka. *Lecture. Cyklus seminářů na Filosof. fak. UK - Ústav pro pravěk a ranou dobu dějinnou, May 3, 2001. Praha.*

Kadlec J.: Ponor Valleys in the Moravian Karst (Czech Republic). Reconstruction of Surface and Subsurface Drainage. *Lecture. 9th International Karstological School, June 26, 2001, Postojna. Slovenia.*

Kadlecová E.: Occurrence of families Sciuridae and Aplodontidae (Rodentia, Mammalia) in Tertiary of Bohemia and Moravia. *Poster. Stálý Český a Slovenský Paleontologický seminář, June 18-19, 2001*, Praha.

Kohout T., Kletetschka G., Wasilewski P.: Influence of terrestrial weathering on the magnetic record of a LL chondrite. *Poster. American Geophysical Union, 2001 Fall Meeting, 10-14 December 2001, San Francisco, California.*

Konzalová M. (2001): Coal seam as the plant archive of ancient peat, mires and swamps. *Poster. 9th Coal Geology Conference, Charles University, Faculty of Science, Czech Geol. Survey, Institute of Geology of the Academy of Sci. of the Czech Republic, June 25-29, 2001, Prague.*

Konzalová M. (2001): Selected Miocene plant genera juxtaposed to the Pliocene and Quaternary records, a statistical approach. *Poster. Int. Conf. EEDEN/NECLIME Joint Workshop, Charles University, Faculty of Science, September 15-18, 2001, Prague.*

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Mach K., Opluštil S., **Konzalová M.** & Sýkorová I.: Petrological, floristic and sedimentary - geological evidence of relative water level changes within the peat-mire – lake system in the North Bohemian Basin. *Lecture. Seminar of the sedimentary geology, Charles University, Faculty of Science, May 16, 2001, Prague.*

Man O.: Euler decolvolution: new rationale behind the method, new way of the presentation of results. *Lecture. 26th General Assermbly European Geophysical Society, 25-30 March 2001. Nice, France.*

Méon H., Guignard G., Pacltová B. & **Svobodová M.**: Biodiversity and "crisis" in angiosperm pollen of the Normapolles: an example from Central and South-Western Europe. *Poster. Paléobiodiversité, Crise, Paléoenvironnement, Séance spécialisée de la Société Geologique de France, 6-7 décembre, 2001, Paris.*

Mihevc A., Sket B., **Pruner P.** & **Bosák P.**: Fossil remains of a cave tube worm (Polychaeta: Serpulidae) in an ancient cave in Slovenia. Session 3, 009: 151. *Lecture. 13th International Congress of Speleology, 4th Speleological Congress of Latin America and the Caribbean, 26th Brazilian Congress of Speleology. July, 15-22, 2001. Brasilia, Brazil.*

Mikuláš R. & Mertlík J.: Periodické, sférické a krápníkovité precipitační formy karbonátů v pískovcích – částečná analogie s tvary železitých impregnací. *Lecture. Terénní seminář Železivce, Houska 14.-16.9.2001; GIÚ AVČR a CHKO Kokořínsko.*

Mikuláš R. & Mertlík J.: Proželeznění dřevitých zbytků v pískovcích České křídové pánve. *Lecture. Terénní seminář Železivce, Houska 14.-16.9.2001; GIÚ AVČR a CHKO Kokořínsko.*

Mikuláš R., Dvořák Z. & Mach K.: Ichnostavba jílových sedimentů Severočeské hnědouhelné pánve v okolí Bíliny. *Lecture. 2. zasedání Stálého českého a slovenského paleontologického semináře 19-19.6.2001, Praha.*

Mikuláš R.: Ichnofosilie. *Lecture. Course of sedimentary geology, April 5 2001 ,Faculty of Science, Charles University, Prague.*

Mikuláš R.: Prostorová a genetická souvislost proželeznění a prokřemenění pískovců v CHKO Kokořínsko. *Lecture. Terénní seminář Železivce, Houska 14.-16.9.2001; GIÚ AVČR a CHKO Kokořínsko.*

Pruner P. & **Bosák P.**: Palaeomagnetic and magnetostratigraphic research of cave sedimets: theoretical approach, and examples from Slovenia and Slovakia. Session 122: 86. *Lecture. 13th International Congress of Speleology, 4th Speleological Congress of Latin America and the Caribbean, 26th Brazilian Congress of Speleology. July, 15-22, 2001. Brasilia, Brazil.*

Pruner P. & **Bosák P.**: Paleomagnetic analysis of two cores from caves in the Trieste region, Italy. *Lecture. 7th Cave Bear Symposium, October 5-7, 2001, 5. 10. 2001, Trieste-Opicina, Italy.*

Pruner P., Bosák P., Kadlec J. & **Venhodová D.**: Paleomagnetický výzkum sedimentárních vyplní vybraných jeskyní na Slovensku. *Lecture. Výskum, využívanie a ochrana jaskýň. 3, Vedecká konferencia s medzinárodnou účastóu, November 14-16, 2001, Stará Lesná, 14.11. 2001. Slovakia.*

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Pruner P.: High-resolution magnetostratigraphy across the J/K boundary strata in the Tethyan realm. *Lecture. Institute of Geology and Geophysics, Chinese Academy of Sciences, September, 13, 2001, Beijing, China.*

Slavík L.: An alternative proposal for Pragian conodont zonal scale in the Prague Basin (Barrandian area, Czech Republic). *Lecture. Siberian IGCP 410/421 Joint meeting, August 3-22 2001. Novosibirsk.*

Slavík L.: Problematika hranice lochkov/prag v pražské pánvi. *Lecture. 2. zasedání Stálého českého a slovenského paleontologického semináře. 18. - 19. 6. 2001. PřF UK Praha.*

Šroubek P., **Kadlec J.** & Diehl J.F.: Last five centuries climatic record preserved in flood deposits of the Spirálka Cave (Moravian Karst, Czech Republic). *Lecture. Conference Fluvial response to rapid climatic changes & The impact of tectonics on fluvial systems, March 9-12, Haarlem, Netherlands.*

Šroubek P., **Kadlec J.** & Diehl J.F.: Vývoj nivy Bílé vody (Drahanská vrchovina) během posledních

1000 let. Lecture. *Seminář Niva IV., October 10, 2001, Brno.*

Strnad L. & **Hladil J.**: Geochemistry and composition of the Middle Devonian Srbsko Formation in Barrandian Area, Bohemian Massif - A trench or fore-arc strike-slip basin fill with material from volcanic arc of continental margin? Poster. *Workshop of the Czech Group for the Tectonic Studies (international conference), 3-6 May 2001. Donovaly, Slovakia*.

Svobodová M. & Pacltová B.: Palynologická charakteristika paleoekologických změn, které probíhají během cenomanské transgrese. Lecture. *2. Zasedání stálého českého a slovenského paleontologického semináře, 18.6. 2001, Přírodovědecká fakulta UK, Praha.*

Svojtka M. (2001): Polyphase evolution of zircons from HP-HT granulites. Lecture. *Geological seminars at Kyoto University, December 4, 2001. Kyoto.*

Svojtka M. (2001): Temperature–time path for the granulites in the southern Moldanubian Zone, Bohemian Massif. Lecture. *Geological seminars in the Kyoto University, May 8, 2001, Kyoto.*

Ulrych J., Svobodová J., Novák J. & Balogh K.: Middle to Late Miocene alkaline volcanic series in W Bohemia: geochemistry and mineralogy. Lecture. *Anniversary Meeting Österreichische Mineralogische Gesellschaft 1901-2001 MINPET 2001, 24.-26. September 2001, Vienna.*

Vařilová Z.: Geology of the Bohemian Switzerland National Park. Poster. *Mezinárodní konference SWAPNET 2001, 7.-11.5. 2001, Prachovské skály, ČR.*

Vavrdová M. (2001*)*:Baltické typy akritarch z kambrických klastik na jižní Moravě. Lecture. *2. zasedání Stálého českého a slovenského paleontologického semináře. 18. - 19. 6. 2001. PřF UK Praha.*

Zajíc J. (2001): Akantodi ze sbírek Natural History Museum v Londýně. Lecture. *2. zasedání Stálého českého a slovenského paleontologického semináře. 18. - 19. 6. 2001. PřF UK Praha.*

Zajíc J. (2001): Nové nálezy xenakantidů ze spodního permu sudetské oblasti a redefinice biozóny *Xenacanthus decheni.* Lecture. *2. zasedání Stálého českého a slovenského paleontologického semináře. 18. - 19. 6. 2001. PřF UK Praha.*

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Žítt J.: Nové nálezy přisedlých epifaun v české křídové pánvi. Lecture. *2. zasedání Stálého českého a slovenského paleontologického semináře. 18. - 19. 6. 2001. PřF UK Praha.*

Žítt J., Hradecká L. & **Svobodová M.**: Late Cenomanian - Early Turonian hardgrounds and nearshore depositional environments (Bohemian Cretaceous Basin). Poster. *Colloquium sur le Cénomanien, 18-24 octobre, 2001, Rouen.*

15d) Unpublished reports

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Bosák P., Kadlec J. & **Chadima M.** (2001): *Palaeomagnetic analysis of sediments from the Baradla Cave, Aggtelek National Park, Hungary.* - MS, Geol. úst. Akad. Věd Čes. rep.: 1-8. Praha.

Cajz V. (2001): *Geologické vyjádření ke studii "Tunel Kubačka, studie alternativního vedení trasy D8".* – MS, MŽP ČR: 1-8. Praha.

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16. 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)
Rotary magnetometers JR-4 (1976, 1981)
Rotary magnetometers JR-5A (1993, 1998)
Astatic magnetometer LAM-24 (<1980)
Astatic magnetometer LAM-22 (<1980)
Magnetometrs ROCOMA (1992, 1993)
Inductors ROCOMA to MAVACS (1999, 1999)
MINOSECAR cutting machines (1992,1993)
KLY 2 (1992)
Demagnetizer KC (1992)
Kappameter KT5 (1992)

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 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)

8. Microscopic laboratory (head Mgr. Michal Filippi)
System for picture analysis: Steromicroscope NIKON SM2-U with adapters and CCD camera JVC TK 1381 (1998)
Polarization microscope ORTHOPLAN Photometr. 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)

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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17. Financial Report

(in thousands Czech Crowns)

A. INCOMES	
1. From the annual budget of the Academy of Sciences CR	20,017
2. From the Grant Agency of the Acad. Sci. (accepted research projects)	2,002
3. From the Grant Agency CR (accepted research projects)	1,192
4. From the internal research projects of the Acad. Sci.	3,583
5. From other state sources (Ministry of Environment, etc.)	410
6. Applied research	1,291
7. Investments (for laboratory facilities)	13,084
8. Investments (for buildings)	500
TOTAL INCOMES	**42,079**

B. EXPENSES	
1. Scientific staff - wages, medical insurance	12,163
2. Research and scientific activites	6,730
3. Administration and technical staff - admin.expenses,wages,medical insurance	3,522
4. General expenses (postage shipping, maintenance of buildings, energies, transport, office supplies, miscellaneous, etc)	5,194
5. Library (subscriptions etc.)	536
6 Editorial activites (Geolines, Annual Report)	350
7 Investments (for laboratory facilities)	13,084
8 Investments (for buildings)	500
TOTAL EXPENSES	**42,079**