ABHANDLUNGEN DER GEOLOGISCHEN BUNDESANSTALT
Abh. Geol. B.-A. | ISSN 0378-0864 | ISBN 978-3-85316-058-9 | Band 65 | S. 11–18 | Wien, 10. 11. 2010
Fifty Years of Geological Cooperation between Austria, the Czech Republic and the Slovak Republic

50 Years of Geological Cooperation with the Czech Republic and the Slovak Republic – the Austrian Point of View

THOMAS HOFMANN*

5 Text-Figures, 1 Table

Cross-border cooperation
Geological correlation
Geological research
Geological maps
Iron Curtain
DANREG

Contents

50 Jahre geologischer Kooperation mit der Tschechischen und Slowakischen Republik – Die österreichische Perspektive

Zusammenfassung

Im Zuge des 1960 begründeten bilateralen, später trilateralen Kooperationsvertrages zwischen Österreich und der damaligen Tschechoslowakei auf dem Gebiet der Geologie konnten in den letzten 20 Jahren aus österreichischer Sicht große Fortschritte für die österreichischen Geowissenschaften erzielt werden. Zu nennen sind hier insbesondere die geologische Kartierung und die Grundlagenforschung. Ohne Mithilfe tschechischer und slowakischer GeologInnen hätten in beiden Bereichen viele wichtige Ergebnisse nicht erzielt werden können.

Abstract

Due to the bilateral and later trilateral cooperation act between Austria and former Czechoslovakia in the fields of geology, which dates back to 1960, from the Austrian point of view great advances were achieved within the last two decades. This concerns especially geological mapping and basic research. Without the help of Czech and Slovak geologists many scientific results in both fields would never have been achieved.

Introduction

The geological cooperation between Austria, the Czech and the Slovak Republic (former Czechoslovakia) goes back to 1960. On January 23rd, 1960 an "*Agreement between the Federal Government of Austria and the Government of Czechoslovakia Republic in the principles of cooperation in the field of geology between the Republic Austria and the Czechoslovakia Republic*" was signed (MINAŘÍKOVÁ & LOBITZER, 1990a, p. 8) between Austria and Czechoslovakia to stimulate and to regulate the exchange of geological information between both countries. The agreement covered all fields in geosciences; an additional agreement – which was signed the same day – concerned the exploration and exploitation of hydrocarbons in the border area. Based on this agreement annual meetings alternating between both countries were arranged to discuss geological questions. Plans for the following year

* THOMAS HOFMANN: Geologische Bundesanstalt, Neulinggasse 38, A 1030 Vienna. thomas.hofmann@geologie.ac.at

were worked out including a detailed program for the exchange of persons. Especially during the first three decades, when the Iron Curtain separated both countries, this exchange was the fundamental basis for geological cooperation and correlation. Based on this cooperation Austria supported Czechoslovakia in 1968, when the 23rd International Geological Congress (IGC) was held in Prague. Two excursions (32 C, 33 C) were organized by Austrian teams (Frasl et al., 1968; Grill et al., 1968), the excursion guides were published by the Geological Survey of Austria.

This contribution shows the Austrian point of view and focuses on the last 20 years of cooperation, the period from 1990 to 2010. Thus the results are outlined, especially in the fields of geological mapping and basic research (e.g. stratigraphy) which were achieved by the help of Czech and Slovak geoscientists.

Milestones in the Period 1990 to 2010

The first period (1960–1990) is documented in the festival volume "Thirty Years of Geological Cooperation between Austria and Czechoslovakia" edited by Dagmar Minaříková & Harald Lobitzer in 1990. This volume comprises 42 original papers and three informative reports in six thematic sections (Minaříková & Lobitzer, 1990b).

At the end of the 1980s and the beginning of the 1990s many states in Central and Eastern Europe (CEE) had a more or less turbulent change in the political regimes. The Iron Curtain separating Austria from Czechoslovakia since the end of World War II was cut through in December 1989 in an official act by the Austrian and the Czechoslovak Foreign Ministers in Laa an der Thaya, an old town in northern Lower Austria close to the border to Southern Moravia. Moreover, on January 1st, 1993, Czechoslovakia was divided into the Czech Republic and the Slovak Republic. The *"Agreement between the Federal Government of Austria and the Government of Czechoslovak Republic in the principles of cooperation in the field of geology between the Republic Austria and the Czechoslovak Republic"* was formally transformed into two identical agreements with the two countries with the same content as the previous one.

From Formal Bilateral Meetings to Multilateral Talks

The 34th meeting, which was held on July 30th, 1993, in Vienna was the first meeting of the new bilateral agreement with geoscientists of the Czech Republic, as well as the first meeting of the bilateral agreement with the Slovak Republic.

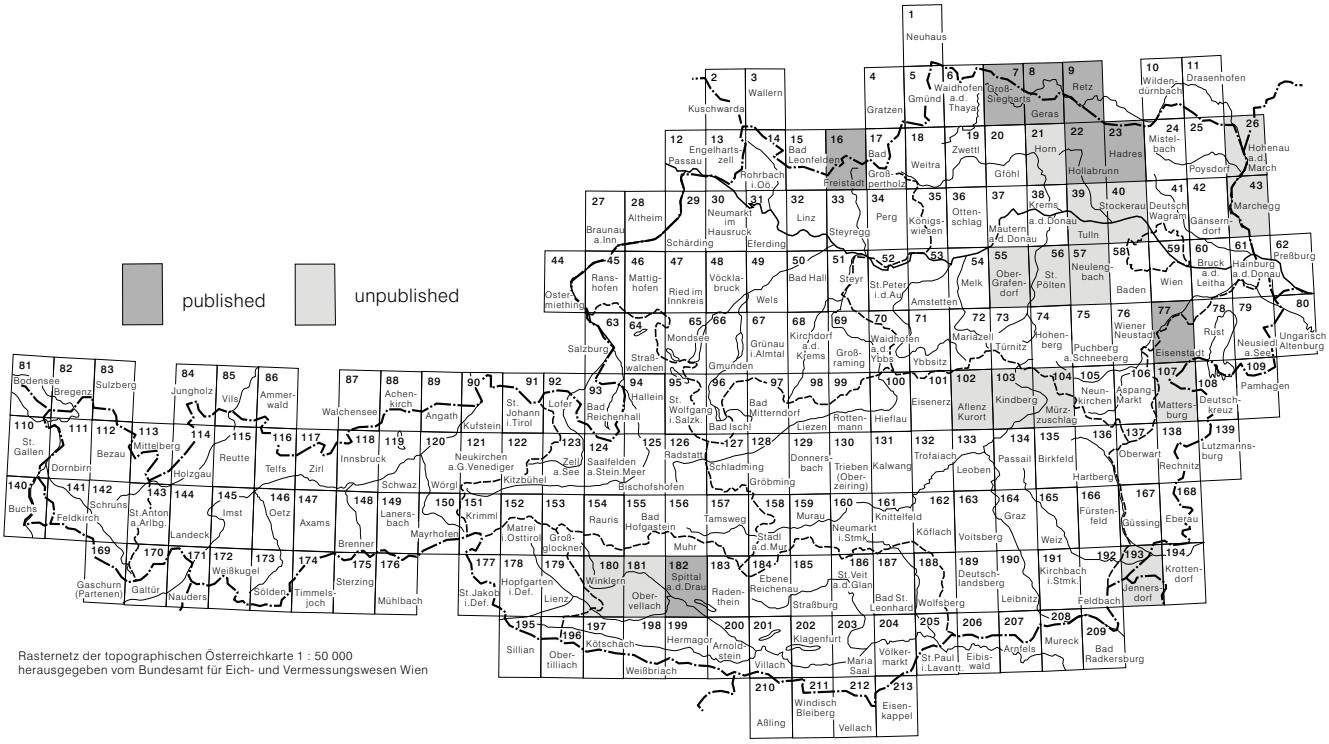
From then to the 45th meeting (2004) the directors met alternatively in one of the countries to discuss the working program, which has got two strong focuses: geological mapping and basic research on special topics. Meanwhile (1992) Czechoslovakia and Hungary became members in the Forum of WEGS (Western European Geological Surveys). This was initiated and strongly supported in 1990 by Traugott E. Gattinger (1930–2006), director (1983–1992) of the Geological Survey of Austria and member of WEGS. As a consequence of the entry of "eastern" countries into WEGS the Dutch and Austrian Directors suggested to rename WEGS into FOREGS (Forum of European Geological Surveys). This informal group ceased its activities in September 2005 and since then EuroGeoSurveys took over its tasks and responsibilities (EGS-Website, 2010).

In this period many more geoscientists from the Czech and Slovak Republic came to Austria to support Austrian geologists in their work with their know-how, than Austrians went abroad. The bilateral exchange became more and more a kind of a one way system. Harald Lobitzer was the central person in Austria managing all the exchange and cooperation between the Geological Survey of Austria and the Geological Surveys of the CEE-States like Czechia, Slovakia, Hungary and Slovenia.

It was the idea of Hans P. Schönlaub, director of the Survey from 1993 to 2007, to bring together the directors of the neighboring countries at one table for common discussions. On May 27th, 2005, one day after the official opening ceremony of the new building of the Geological Survey of Austria at Neulinggasse 38 the directors of the Geological Surveys of Czechia, Slovakia, Hungary and Slovenia met to share their experiences and to sign their bilateral agreements. In traditional counting it was the 46th meeting of the

Number of meeting / partners	Date	Location
47th / 14th Meeting A – CZ and A – SK	May 30th–31st, 2006	Prague (CZ)
Common meeting of the Geological Surveys of Austria, the Czech Republic, Slovakia, Slovenia, Hungary and Poland.		
48th / 15th meeting A – CZ and A – SK	June 5th– 6th, 2007	Krakow (PL)
Common meeting of the Geological Surveys of Austria, the Czech Republic, Slovakia, Slovenia, Hungary, Poland and Croatia.		
49th / 16th meeting A – CZ and A – SK	June 10th–11th, 2008	Banská Stiavnica (SK)
Common meeting of the Geological Surveys of Austria, the Czech Republic, Slovakia, Slovenia, Hungary, Poland and Croatia.		
50th / 17th meeting A – CZ and A – SK	May 21st–22nd, 2009	Krajnska Gora (SL)
Common meeting of the Geological Surveys of Austria, the Czech Republic, Slovakia, Slovenia, Hungary, Poland and Croatia.		
51st / 18th meeting A – CZ and A – SK	June 30th, 2010	Budapest (H)
Common meeting of the Geological Surveys of Austria, the Czech Republic, Slovakia, Slovenia, Hungary and Poland.		

Table 1:
Meetings of CEE Geological Surveys in the last five years.



Text-Fig. 1.
Scheme of maps 1:50.000 with contributions from Czech and Slovak geologists.

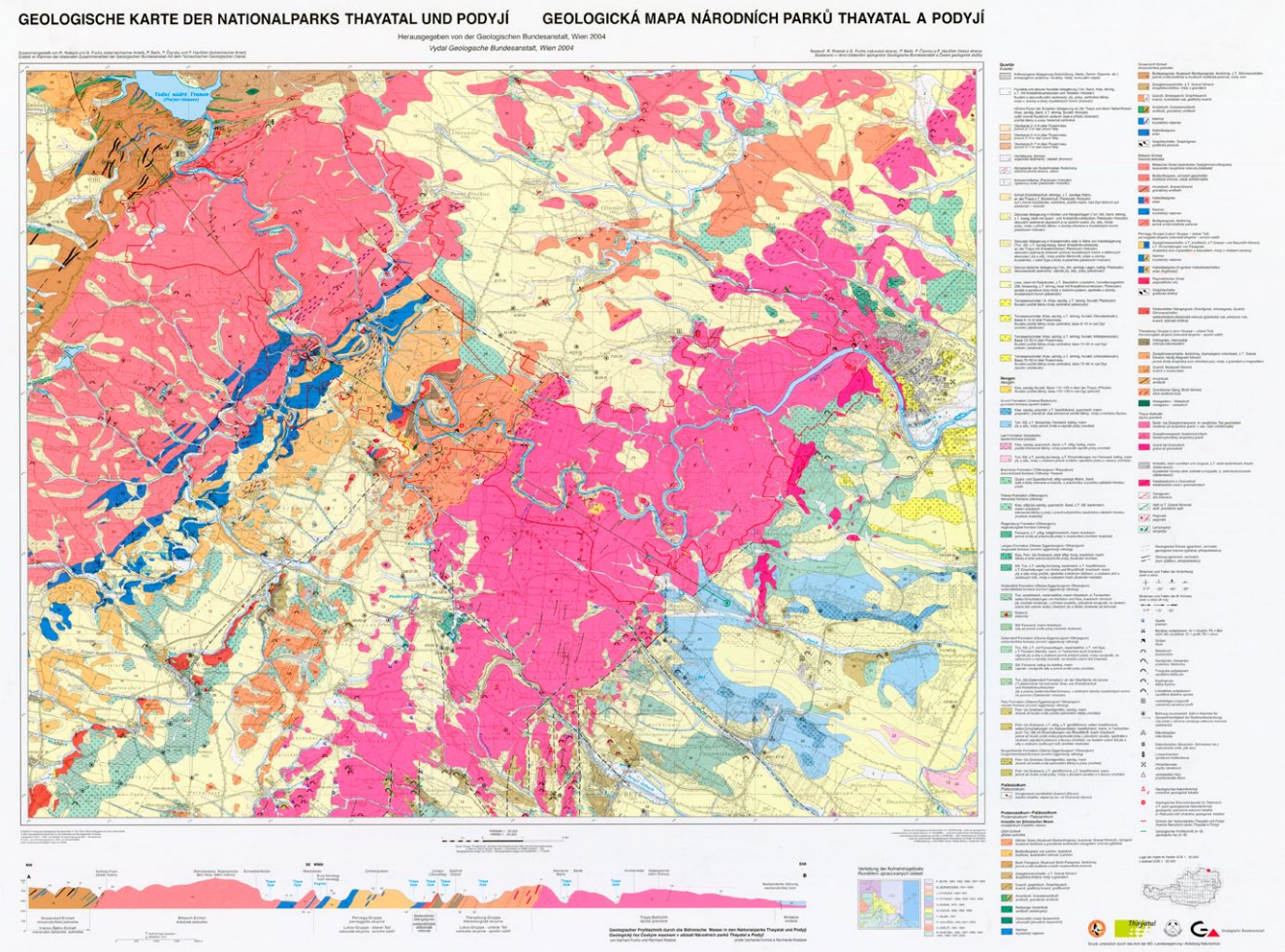
agreement with the former Czechoslovakia, i.e. the 14th meeting with the Czech Republic and the Slovak Republic.

Though the Directors of the Geological Surveys of Austria, the Czech Republic, Slovakia, Slovenia, Hungary, Poland and Croatia met in EuroGeoSurveys, they decided to keep the informal meetings once a year to share ideas and discuss common problems in "alpine" countries. This might also have been supported by the common history of the k.k. Geologische Reichsanstalt of the Austro-Hungarian Empire. In consideration of this rather regional point of view the Geological Survey of Austria (again) got a central position in CEE. EuroGeoSurveys turns out as a diverse group of 32 members ranging from Scandinavia to the Mediterranean covering the European point of view.

Geological Maps

Due to the fact, that geology ignores any political border, cross-border cooperation has always been one of the most important points especially in geological mapping. MATĚJOVSKÁ (1990) resumes: *"There exists a good cooperation between the Geological Survey in Prague and the Geologische Bundesanstalt in Vienna focused on mapping of areas along the Czechoslovak-Austrian state border."* Map sheet Groß-Siegharts (Nr. 7) within the Series "Geological Map of the Republic of Austria 1:50.000" is an important example because it has been completed during the time of the "Iron Curtain". The map covers in its northern part Czech area, which was mapped by Vladimir Jenček and Olga Matějovská. The Austrian part was mapped to a great extent by Otto Thiele who compiled and edited the map in 1987 (JENČEK et al., 1987). Further examples (Text-Fig. 1) of this very positive cross-border cooperation are the map sheets Geras (Nr. 8) by ROETZEL & FUCHS (2001), Retz (Nr. 9) by ROETZEL et al. (1999) and Hadres (Nr. 23) coordinated by ROETZEL (2007). Other map sheets lying south of the above mentioned cross-border sheets, like Hollabrunn (Nr. 22) by ROETZEL (1998) or Tulln (39) – the latter with ongoing mapping activities – could never have been realized without the massive help and support of mapping teams from the Czech Geological Survey. Examples like the above mentioned underline the importance of sharing knowledge in cross-border geological units like the Bohemian Massif, the Molassezone, the Vienna Basin or the Waschberg-Zdanice Unit. The experience was also shared to produce a series of four thematic geological maps of the Vienna Basin (1 : 200.000) including the Czech and Slovak regions of the basin. The corresponding explanatory notes (KRÖLL et al., 1993) are also a result of common research. The geological map of the Thayatal National Park (Text-Fig. 2) which also covers the area of the neighboring Podyji National Park is one more outstanding example of the bilateral cooperation. It is a bilingual product, titled as "Geologische Karte der Nationalparks Thayatal und Podyji 1 : 25.000 = Geologická mapa Národních parků Thayatal a Podyjí 1 : 25.000". Both languages are used equally even at the legend (for details see: ROETZEL et al., 2004).

In addition to cross-border maps a number of other Austrian map sheets benefited from the support of Czech and Slovak geologists. In the early 1990s Slovak geologists (KOVAC et al., 1992, 1993) contributed to map sheet Eisenstadt (77), published 1994 by PASCHER & BRIX. Some other Slovak geologists (BEZAK et al., 1993, 1994, 1995) mapped at map sheet Spittal an der Drau (182) in Carinthia, which was published in 2006 (PESTAL et al., 2006). On many other map sheets like Horn (21), Hohenau (26),



Text-Fig. 2.
The geological map of Thayatal National Park and Podyji National Park is an outstanding example of transboundary bilateral cooperation. Both languages are used equally for the title and the legend.

Mautern (37), Krems an der Donau (38), Stockerau (40), Marchegg (43), Obergrafendorf (55), St. Pölten (56), Neulengbach (57), Aflenz (102), Kindberg (103), Mürzzuschlag (104), Mattersburg (107), Winklern (180), Obervellach (181) and Jennersdorf (193) – most of them not yet published – some areas were worked out in detail (mostly mapping) by Czech and Slovak geoscientists. The reports of the mapping activities are regularly published in the "Jahrbuch der Geologischen Bundesanstalt" which can be found at the website (www.geologie.ac.at) as free download in PDF format. The manuscripts of all maps, published or not published yet, are stored in the archive of the Geological Survey of Austria.

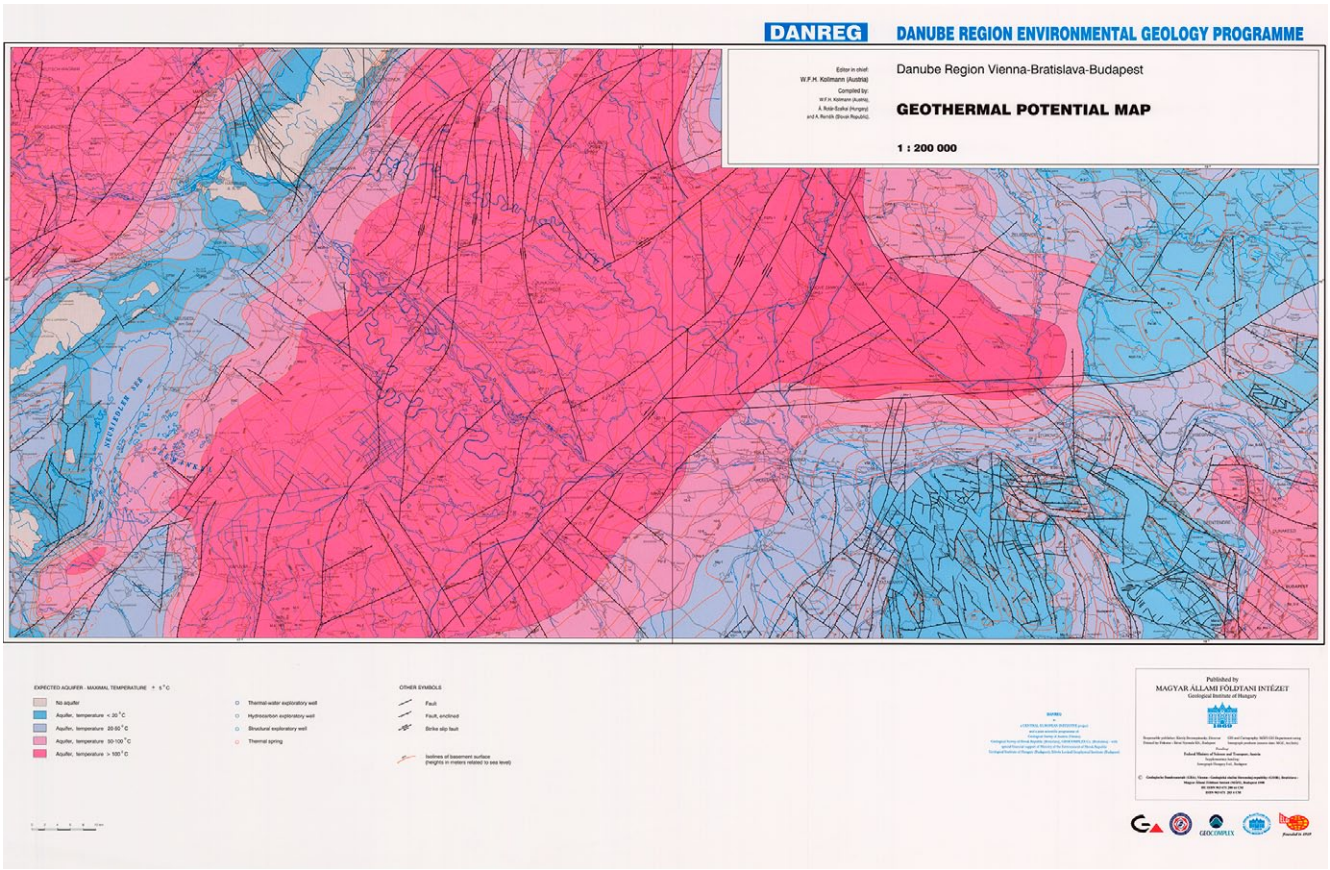
Basic Geological Research

In addition to mapping activities a lot of work has been made (and is still carried out) focusing on the fields of biostratigraphy, taxonomy, (micro)paleontology, micromorphology, microfacies, geophysics and petrology. Since the early 1980s Harald Lobitzer has been leading a working group of Czech, Slovak, Hungarian, and Austrian specialists in the Salzkammergut Region (Upper Austria, Styria) to work out details in the Mesozoic of the Northern Calcareous Alps, especially in the Gosau Group. The program is called "Studium mesozoischer Stratotypen/Studies of Mesozoic stratotypes".

Experts like Miloš Siblík (brachiopods), Lenka Hradecká (foraminifera), Jiří and Zlatko Kvaček (plant remains), Marcela Svobodová (pollen), Lilian Švábenická (nannofossils), Miloslav Rakús (cephalopoda), Jan Mello (cephalopoda), Slavomír Nehyba (sedimentology), Libuše Smolíková (micromorphology of loess), Miroslav Bubík (foraminifera), Karel Breiter (petrology), Ivan Gnojek (ground geophysics), Antonín Přichystal (ground geophysics), Zdeněk Vašíček (cephalopoda), Rostislav Brzobohatý (otoliths), Jiří Kovanda (molluscs), Anna Ondrejíčková (radiolarians), Bohumila Bezvodová (mineralogy, geochemistry), Ždeňka Řeháková (diatoms) and some others (only Czech and Slovak experts are listed here) largely contributed to solving a number of geoscientific questions. The results – so far a lot of published reports – are a fundamental basis for the explanatory notes of geological maps which are published after the issue of the maps, sometimes years later.

The DANREG Project

In 1989 Hungary and Slovakia started a bilateral project to prepare various geoscientific maps (with environmental focus) in the common Danube area, which was joined by Austria in 1990. Details are available at the Website of the Geological Institute of Hungary (MAFI Website, 2010):



Text-Fig. 3.
Geothermal potential map (1:200.000) published 1998 as part of the DANREG project.

"The main objective of the Danube Region Environmental Geological Program (DANREG) was to adjust the geological and geophysical data available in the cross-border region of the three partner countries (Slovakia, Austria and Hungary) in a harmonised framework with particular emphasis on the area along Danube river running across the three capitals. The project facilitated the harmonised interpretation of data providing thus considerable help to decision makers engaged in land management of the area. The Geological Institute of Hungary (MÁFI) and the Geological Survey of the Slovak Republic (Geologický ústav Dionýza Stúra [GÚDS]), later Geologická sluľba Slovenskej republiky (GSSR) and Státny geologický ústav Dionýza Stúra (SGÚDS) since 2000 signed a mutual agreement in 1989 aimed at compiling in co-operation the geological maps of the cross-border area along the Danube. In 1990 the Geological Survey of Austria (Geologische Bundesanstalt, GBA) also joined to the agreement. Geophysical surveying related to the program was executed by Geocomplex a.s (Bratislava), Eötvös Loránd Geophysical Institute of Hungary (Budapest), as well as the Vienna Meteorological and Geophysical Institute, the Vienna University and the OMV Aktiengesellschaft."

The DANREG Project was also appreciated by the CEI (Central European Initiative). The official closing ceremony of the DANREG Project was in Budapest from 26th to 30th of May 1997, some maps and the explanatory book (CSÁSZÁR, 2000) were printed later.

Thematic Maps Compiled by the DANREG Project

1 : 100.000 maps

Surface geological map
Map of the environmental geohazards

1 : 200.000 maps

Bouguer anomaly map
Engineering geological map
Geothermal potential map (Text-Fig. 3)
Hydrogeological map
Neotectonic map
Lithofacies & thickness map of the Pannonian
Lithofacies & thickness map of Pontian and the Pliocene
Map of the Pre-Tertiary basement
Map of genetic types & thickness of Quaternary sediments
Tectonic map
Geological cross-sections

1 : 500.000 maps

Stripped gravity anomaly map
Magnetic ΔT anomaly map
Gravity lineament map
Results of the magneto-telluric measurements
Contour map of the Pre-Tertiary basement
Contour map of the Pannonian basement
Thickness of the Quaternary sediments
Apparent resistivity map AB = 200 m

Czech and Slovak Correspondents of the Geological Survey of Austria

One possibility to express recognition for geological merits is to nominate a person for being "Korrespondent der Geologischen Bundesanstalt" (Correspondent of the Geological Survey of Austria). This tradition dates back to the k.k. Geologische Reichsanstalt (founded in 1849). Persons making donations or having contact with the survey were called "Korrespondent der k.k. Geologischen Reichsanstalt". Their names were listed in the "Jahrbuch der k.k. Geologischen Reichsanstalt" (Yearbook). After the collapse of the Austrian-Hungarian Empire in 1918 this tradition was interrupted. When Heinrich Küpper (1904–2000) was director of the Survey (1950–1969), he re-established the tradition of "Correspondents" to express gratitude to people for contributing in some way to the survey. The Correspondents are listed in the respective annual reports. The list of Czech and Slovak Correspondents shows a rather high number of geoscientists in the years 1999 and 2009 underlining that the Austrian Geological Survey is grateful to many persons supporting the work of the survey in the recent past.

125 Years of the Geological Survey of Austria
September 12th, 1975

Oto Fusan (Bratislava)
Josef Pravda (Prague)

Text-Fig. 4.
Zdeněk Stráník (Brno) left side, receives the title "Korrespondent der Geologischen Bundesanstalt" (Correspondent of the Geological Survey of Austria) from Director Peter Seifert (Photo: M. Brüggemann-Ledolter).

150 Years of the Mining Museum (Montanistisches Museum), the ancestor of the k.k. Geologische Reichsanstalt, November 15th, 1985

Jaroslav Vacek (Prague)
Jan Kuran (Bratislava)
Jan Gašparík (Bratislava)

150 Years of the Geological Survey of Austria
November 15th, 1999

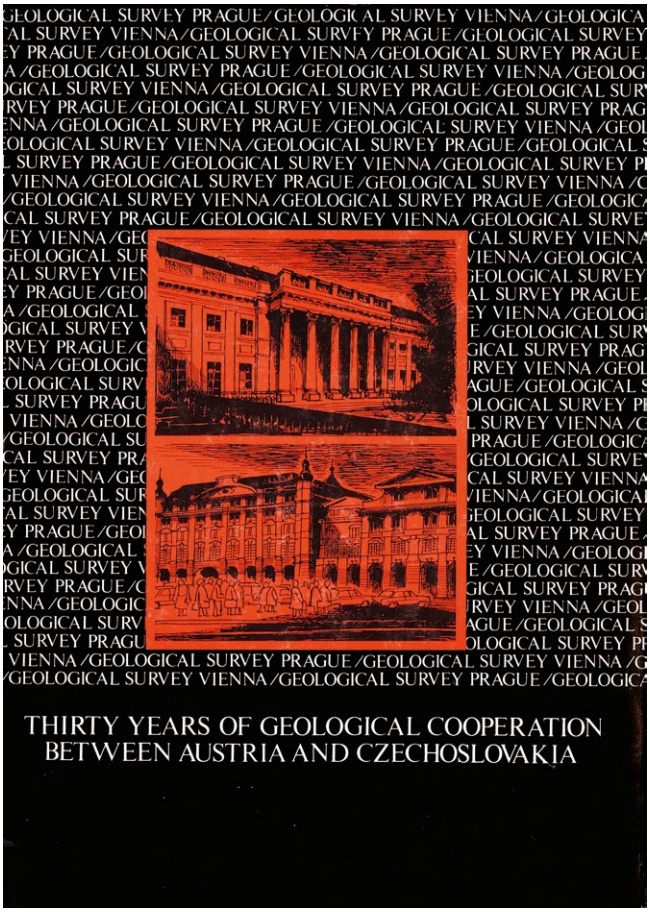
Lenka Hradecká (Prague)
Jan Mello (Bratislava)
Karel Pošmourný (Prague)
Miloš Siblík (Prague)
Lilian Švábenická (Prague)
Josef Vozár (Bratislava)
Eva Zacharova (Bratislava)

160 Years of the Geological Survey of Austria
November 17th, 2009

Ivan Cicha (Prague)
Zdeněk Stráník (Brno)
Marcela Svobodová (Prague)

Festival Volumes

The festival volume of 30 years of geological cooperation (Minaříková & Lobitzer, 1990) was initiated at a meeting in Mikulov on November 30th, 1988 and completed in 1990 (Text-Fig. 5). It was produced and printed in Prague,



Text-Fig. 5.
"Thirty Years of Geological Cooperation between Austria and Czechoslovakia". The festival volume was published by D. Minaříková from the Czechoslovakian Geological Survey and H. Lobitzer from the Austrian Geological Survey in 1990.

and issued at the beginning of 1991. In the foreword the Directors of both surveys, J. Vacek and T.E. Gattinger, expressed the benefits of cooperation and pointed out some future aspects: *"As examples, the increase in understanding of the geological features of the Bohemian Massif or the Tertiary basins may be quoted. The publication in hand is a expression not only of the studious work of the geoscientists of both countries and of the multiplicity of the treated subjects, but it especially reflects the sense and spirit of cooperation in good neighbourly relationship. It can be called an 'European Challenge' to preserve and promote this sense and spirit for further decades of fruitful common geological research."* (VACEK & GATTINGER, 1990).

On the occasion of the 150-years anniversary of the Geological Survey of Austria a festival volume was issued in the series of the Abhandlungen der Geologischen Bundesanstalt as volume **56**/1+2. The editors Harald LOBITZER (Wien) and Pavol GRECULA (Bratislava) issued volume **56**/1 (28 papers, 460 pages) for the celebration act on November 15th, 1999. Volume **56**/2 was published one year later (30 papers / 738 pages). Both were printed in Slovakia (Kosice). This volume (LOBITZER & JANDA, 2010) includes a total number of 14 papers dealing with various geological aspects from Austria, the Czech Republic and the Slovak Republic including also authors from Hungary.

Conclusion

Within the last 50 years the contributions of Czech and Slovak geoscientists for the geology of Austria became more and more important. Many examples from various disciplines in geosciences demonstrate that geology at large in Austria profited a lot from contributions of Czech and Slovak geoscientists. The Austrian-Czech-Slovak tradition of geological cooperation within the last fifty years (1960–2010) also has a greater dimension, showing that different political regimes cannot form a permanent obstacle for scientific work. Thus this example from CEE might encourage countries all over the world to work on common scientific themes, even if it seems impossible at first glance.

Acknowledgements

For selecting specific information from the "Jahresberichte der Geologischen Bundesanstalt" (1960–2009) the author is grateful to Brigitte Gansterer. For advice and critical reading thanks are due to Werner Janoschek and Reinhard Roetzel.

References

BEZAK, V., KOHUT, M., KOVACIK, M., MADARAS, J., MARKO, F., PLASIENKA, D. & PUTIS, M. (1993): Bericht 1992 über geologische Aufnahmen im Kristallin der Reißeck-Gruppe auf Blatt 182 Spittal an der Drau. – Jb. Geol. B.-A., **136**/3, 629–630, Wien.

BEZAK, V., BROSKA, I., KOVACIK, M., MADARAS, J., MARKO, F., PUTIS, M. & SIMAN, P. (1994): Bericht 1993 über geologische Aufnahmen im Kristallin der Reißeckgruppe auf Blatt 182 Spittal an der Drau. – Jb. Geol. B.-A., **137**/3, 523–524, Wien.

BEZAK, V., BARATH, I., BROSKA, I., JANAK, M., KOHUT, M., KOVACIK, M., LUKACIK, E., MARDARAS, J., MARKO, F., PLASIENKA, D., PUTIS, M. & SIMAN, P. (1995): Bericht 1994 über geologische Aufnahmen auf Blatt 182 Spittal an der Drau. – Jb. Geol. B.-A., **138**/3, 551–554, Wien.

CSÁSZÁR, G. (Ed.) (2000): Danube Region Environmental Geology Programme DANREG: Explanatory Notes. – Jb. Geol. B.-A., **142**/4, 413–607, ill., + 1 CD, Wien.

FRASL, G., SCHARBERT, H.G. & WIESENEDER, H. (1968): Crystalline Complexes in the Southern Parts of the Bohemian Massif and in the Eastern Alps: Guide to Excursion 32 C Austria. – Geol. B.-A., 42 p., ill., Wien.

GRILL, R., KAPOUNEK, J., KÜPPER, H., PAPP, A., PLÖCHINGER, B., PREY, S. & TOLLMANN, A. (1968): Neogene basins and sedimentary units of the eastern Alps near Vienna: Guide to excursion 33 C Austria. – Geol. B.-A., 75 p., ill., Wien.

JENCEK, V., MATĚJOVSKÁ, O. & THIELE, O. (Ed.) (1987): Groß-Siegharts. – Geologische Karte der Republik Österreich 1 : 50.000, Bl. 7, Geol. B.-A., Wien.

KOVAC, M., BARATH, I. & NEMCOK, M. (1992): Bericht 1991 über geologische Aufnahmen im Quartär und Tertiär im südöstlichen Teil des Wiener Beckens auf Blatt 77 Eisenstadt. – Jb. Geol. B.-A., **135**/3, 701–703, Wien.

KOVAC, M., BARATH, I., NEMCOK, H. & NEMCOK, M. (1993): Bericht 1992 über geologische Aufnahmen im Tertiär und Quartär auf Blatt 77 Eisenstadt. – Jb. Geol. B.-A., **136**/3, 584–586, Wien.

KRÖLL, A., GNOJEK, I., HEINZ, H., JIRICEK, R., MEURERS, B., SEIBERL, W., STEINHAUSER, P., WESSELY, G. & ZYCH, D. (1993): Erläuterungen zu den Karten über den Untergrund des Wiener Beckens und der angrenzenden Gebiete. – Geol. B.-A., 22 p., ill., 2 maps, Wien.

LOBITZER, H. & JANDA, C. (Eds.) (2010): Fifty Years of Geological Cooperation between Austria, the Czech Republic and the Slovak Republic – Abh. Geol. B.-A., **65**, Wien.

MATĚJOVSKÁ, O. (1990): Geological Maps from the Czechoslovak-Austrian Border. – In: MINAŘÍKOVÁ, D. & LOBITZER, H. (Eds.) (1990): Thirty Years of Geological Cooperation between Austria and Czechoslovakia, p. 279, Vydal Ustřední ústav geologický, Prague.

MINAŘÍKOVÁ, D. & LOBITZER, H. (Eds.) (1990): Thirty Years of Geological Cooperation between Austria and Czechoslovakia. – 280 p., ill., Vydal Ustřední ústav geologický, Prague.

MINAŘÍKOVÁ, D. & LOBITZER, H. (1990a): Editor's Introduction. – In: MINAŘÍKOVÁ, D. & LOBITZER, H. (Eds.) (1990): Thirty Years of Geological Cooperation between Austria and Czechoslovakia, 8–10, Vydal Ustřední ústav geologický, Prague.

MINAŘÍKOVÁ, D. & LOBITZER, H. (1990b): Editor's note. – In: MINAŘÍKOVÁ, D. & LOBITZER, H. (Eds.) (1990): Thirty Years of Geological Cooperation between Austria and Czechoslovakia, p. 10, Vydal Ustřední ústav geologický, Prague.

PASCHER, G. & BRIX, F. (Eds.), BARATH, I., BRIX, F., CHAHIDA, M.R., DELL'MOUR, K., IVANCICS, J., KOVAC, M., NEMCOK, M., PASCHER, G., PISTOTNIK, J., SCHMID, H., SOHS, F., TOLLMANN, A. & WIDDER, R.W. (1994): Eisenstadt. – Geologische Karte der Republik Österreich 1 : 50.000, Bl. 77, Geol. B.-A., Wien.

PESTAL, G., RATAJ, W., REITNER, J.M. & SCHUSTER, R. (Eds.) (2006): Spittal an der Drau. – Geologische Karte der Republik Österreich 1:50.000, Bl. 182, Geol. B.-A., Wien.

ROETZEL, R., FUCHS, G., BATIK, P. & CTYROKY, P. (Eds.), BATIK, P., CTYROKA, J., CTYROKY, P., DUDEK, A., FUCHS, G., HAVLICEK, P., MATEJOVSKA O., ROETZEL, R. & HOFMANN, T. (CONTR.) (1999): Retz. – Geologische Karte der Republik Österreich 1:50.000, Bl. 9, Geol. B.-A., Wien.

ROETZEL, R. (Ed.), BATIK, P., CICHA, I., HOLASEK, O., NOVÁK, Z., PALENSKÝ, P., ROETZEL, R., RUDOLSKÝ, J., RUZICKA, M., STRÁNIK, Z., SVABENICKÁ, L., VUJTA, M., HOFMANN, T. & HELLERSCHMIDT-ALBER, J. (1998): Hollabrunn. – Geologische Karte der Republik Österreich 1:50.000, Bl. 22, Geol. B.-A., Wien.

ROETZEL, R. & FUCHS, G. (Eds.), BATIK, P., BERNROIDER, M., DUDEK, A., FINGER, F., FUCHS, G., HAJEK, T., JENCEK, V., KREJCI, O., MATĚJOVSKÁ, O., NEHYBA, S. & ROETZEL, R. (2001): Geras. – Geologische Karte der Republik Österreich 1:50.000, Bl. 8, Geol. B.-A. Wien.

ROETZEL, R., FUCHS, G., BATIK, P., CTYROKY, P. & HAVLICEK, P. (2004): Geologische Karte der Nationalparks Thayatal und Podyji 1:25.000 = Geologicka mapa narodnich parku Thayatal a Podyji 1:25.000. – Geol. B.-A., Wien.

ROETZEL, R. (Ed.), CICHA, I., HAVLICEK, P., HOLÁSEK, O., NOVÁK, Z., PALENSKY, P., ROETZEL, R., RUDOLSKY, J. & STRÁNIK, Z. (2007): Hadres. – Geologische Karte der Republik Österreich 1:50.000, Bl. 23, Geol. B.-A., Wien.

VACEK, J. & GATTINGER, T. (1990): Foreword. – In: MINAŘÍKOVÁ, D. & LOBITZER, H. (Eds.) (1990): Thirty Years of Geological Cooperation between Austria and Czechoslovakia, 6–7, Vydal Ustřední ústav geologický, Prague.

EGS Website (2010): http://www.eurogeosurveys.eu/foregs.html# [2010.09.18]

MAFI Website (2010): http://www.mafi.hu/mafi/en/node/2496 [2010.09.18]

Jahresberichte der Geologischen Bundesanstalt (1960–2009).

Jahrbücher der Geologischen Bundesanstalt (1980–2010).

Received: 4. October 2010, Accepted: 6. October 2010