Diversity of copper and gold deposits in the Eastern Europe Balkan, Carpathian and Rhodopean belts: tectonic, magmatic and geochronological investigations

SCOPES Project - Conference & Field Trip: Macedonia & Serbia

Organizers: A. von Quadt, T. Serafimovski, I. Peytcheva & V. Cvetkovic

May 29 - June 02, 2012 - Izgrev Hotel, Stip, Macedonia

Program, abstracts and field guide, edited by A. von Quadt & T. Serafimovski
(vonquadt@erdw.ethz.ch- todor.serafimovski@ugd.edu.mk)

ETH
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Content

Participant list of the workshop in Stip, May – June 2012

	First name	Name	Institution
1	Todor	Serafimovski	University Goce Delcev, Stip
2	Goran	Tasev	University Goce Delcev, Stip
3	Dobriela	Rogozareva	University Goce Delcev, Stip
4	Aneta	Donkova-Petrushova	University Goce Delcev, Stip
5	Lazar	Georgiev	University Goce Delcev, Stip
6	Violeta	Stefanova	University Goce Delcev, Stip
7	Albrecht	von Quadt	ETH Zurich
8	Stephan	Lehmann	ETH Zurich
9	Joshua	Barcikowski	ETH Zurich
10	Daniela	Gallhofer	ETH Zurich
11	Milorad	Antic	Uni Basel
12	Stefan	Schmid	ETH Zurich
13	Nino	Seghedi	Romanian Academy-Institute of Geodynamics
14	Irena	Peytcheva	BAS - Geological Institute
15	Peter	Marchev	BAS - Geological Institute
16	Valentin	Grozdev	BAS - Geological Institute
17	Stoyan	Georgiev	BAS - Geological Institute
18	Elitsa	Stefanova	BAS - Geological Institute
19	Petyo	Filipov	BAS - Geological Institute
20	Rossitsa	Vassileva	BAS - Geological Institute
21	Zlatko	Peltekovski	University Goce Delcev, Stip
22	Atanas	Hikov	BAS - Geological Institute
23	Valdica	Cvetkovic	University Belgrade, Faculty of Mining and Geology
24	Aleksandar	Pacevski	University Belgrade, Faculty of Mining and Geology
25	Kristina	Saric	University Belgrade, Faculty of Mining and Geology
26	Suzanna	Eric	University Belgrade, Faculty of Mining and Geology
27	Miodrag	Banjesevic	
28	Masa	Radivojevic	University Belgrade, Faculty of Mining and Geology
29	Aleksandar	Miskovic	University of British Columbia, Vancover
30	Craig	Hart	Department of Earth & Ocean Sciences
31	Bojan	Djordjevic	Avala Resources DOO
32	Sinisa	Glisic	Avala Resources DOO
33	Sibila	Borojevic Sostaric	University Zagreb
34	Dejan	Kozelj	South Danube Metals DOO Beograd
35	Stela	Anatasova	BAS
36	Bayram	Artun	Teck Cominco Limited
37	Daniela	Bombol	EurOmax Macedonia DOOEL Skopje
38	Mihaela-Elena	Cioaca	Geological Institute of Romania
39	Saygun	Keles	Teck Cominco Limited

40	Yassen	Khrischev	Empire Mining Corporation
41	Kemal	Kurcan	Teck Cominco Limited
42	Georgi	Magaranov	Mundoro Capital Inc
43	John	Menzies	Cmi Capital Limited
44	Marian	Munteanu	Geological Institute of Romania
45	Gligor	Saveski	Atlas Copco AB
46	Dechev	Teo	Mundoro Capital Inc
47	Vasil	Andreev	
48	Dorin	Dordea	PROSPECTIUNI SA
49	Veselin	Kovachev	University Sofia
50	Osman	Kurtulus	
51	Dimitar	Tsotsorkov	Asarel
52	Ahmet	Tukac	
53	Bahri	Yildiz	Stratex Madencilik San. Tic. Ltd. Şti
54	Trajca	Toncic	Mining and Metallurgical Company
55	Aleksandar	Pacevski	University Belgrade, Faculty of Mining and Geology
56	Nadka Bozhkova	Vasileva	Ellatzite Mine
57	Zheyazko Hristo	Yalamov	Ellatzite Mine
58	Aurelien	Rombaut	
59		Driver	

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May 29 - June 02, 2012

"Diversity of copper and gold deposits in the Eastern Europe Balkan, Carpathian and Rhodopean belts: tectonic, magmatic and geochronological investigations".

	Name	Title	Affiliation	
0	Albrecht von Quadt	Opening	ETH Zurich	8.15 - 8.30
	Regional Geology			
1	Stefan Schmid	Correlation of tectonic units from the Alps to Western Turkey	ETH Zurich	8.30 - 9.00
2	Ioan Seghedi	Miocene-Quaternary basalts from East Carpathian volcanic chain, Romania: a mineral chemistry and melt inclusion study	Institute of Geodynamics of Romanian Academy, Bucharest	9.00 - 9.30
3	Sibila Borojevic Sostaric	Oligocene shoshonitic rocks of the Rogozna Mts. (Central Balkan Peninsula): evidence of petrogenetic links to the formation of Pb-Zn-Ag ore deposits	Faculty of Mining Geology, Zagreb	9.30 - 9.45
4	Kristina Saric	New LA-ICP-MS U/Pb zircon data on various granitoids from the European side of the Tethyan Mesozoic suture	Faculty of Mining and Geology, Belgrade	9.45 - 10.00
	Regional Metallogeny			
5	Todor Serafimovski	Major Alpine ore districts at the territory of the Republic of Macedonia	University "Goce Delcev"-Stip	10.00 - 10.30
6	Daniela Gallhofer	Geodynamics, geochronology and Cu-Au hydrothermal ore provinces in the Banat region and Apuseni mountains	ETH Zurich, IGP	10.30 - 11.00
	Coffee break			**11.00 - 11.30**
7	Alexsandar Pacevski	Skarn mineralizations in the Bor ore district: new evidence from study of bornite-chalcopyrite-hematite paragenesis	Faculty of Mining and Geology, Belgrade	11.30 - 11.45
	Environmental Geology			
8	Lazar Gjorgiev	Technogenous deposits and their environmental impact around the Buchim Mine	University "Goce Delcev"-Stip	11.45 - 12.00
9	Aneta Donkova-Petrushova	Au-Ag tellurides and other mineral associations in the Ilovitza Cu-Au deposit	University "Goce Delcev"-Stip	12.00 - 12.15
10	Dobriela Rogožareva	Some typical hydrothermal alterations in the Ilovitza Cu-deposit	University "Goce Delcev"-Stip	12.15 - 12.30
	Lunch			**12.30 - 14.00**
	Deposit Studies			
11	Elitsa Stefanova	Ilovitsa porphyry Cu-Au deposit: sequence of vein formation and sulfide deposition	BAS, Geological Institute, Sofia	14.00 -14.15
12	Zlatko Peltekovski	Principle metallogenic features of the Sasa Pb-Zn deposit, Republic of Macedonia	University "Goce Delcev"-Stip	14.15 - 14.30
13	Goran Tasev	New data of fluid inclusions study of the Kadiica deposit, Republic of Macedonia	University "Goce Delcev"-Stip	14.30 - 14.45
14	Violeta Stefanova	Placer gold prospecting around the Tertiary occurrences in the Republic of Macedonia	University "Goce Delcev"-Stip	14.45 - 15.00
15	Rossitza Vassileva	Compositional characteristics of sulphide mineralization from the hydrothermal Madan Pb-Zn deposits: a LA-ICP-MS study	BAS, Geological Institute, Sofia	15.00 - 15.15

16	Atanas Hikov	Rare earth element mobility during advanced argillic alteration in Assarel porphyry copper deposit, Central Srednogorie, Bulgaria	Elatsite Mine	15.15 - 15.30
Magmatism				
16	Joshua Barcikowski	Magmatic evolution of the Buchim-Damjan-Borov Dol ore district - Petrology-geochemistry	ETH Zurich	15.30 - 15.45
17	Stephan Lehmann	Magmatic evolution of the Buchim-Damjan-Borov Dol ore district- Geochronology-source material	ETH Zurich	15.45 -16.00
	Coffee break			**16.00 - 16.30**
18	Milorad Antic	More than 500 Ma of magmatic and tectonic evolution of the Serbo-Macedonian Massif (south Serbia, southwest Bulgaria and east Macedonia)	University of Basel	16.30 - 16.45
19	Stela Atanasova	Magma Interaction Recorded in Amphiboles from Vitosha pluton, Western Srednogorie, Bulgaria"	BAS, Geological Institute, Sofia	16.45 - 17.00
20	Petyo Filipov	Preliminary Data on the Age and Geochemistry of Mesta Volcanic Complex and Central Pirin Pluton	BAS, Geological Institute, Sofia	17.00 - 17.15
21	Stoyan Georgiev	Transect trough the Cenozoic magmatism in WSW Bulgaria and Macedonia from Pirin Mountain to Kozhuf: temporal and isotope-geochemistry constraints	BAS, Geological Institute, Sofia	17.15 - 17.30
22	Valentin Grozdev	U-Pb zircon dating and zircon population analyses of the Paleogene magmatic rocks in Kyustendil and Kratovo area.	BAS, Geological Institute, Sofia	17.30 - 17.45

Transect through the Cenozoic magmatism in WSW Bulgaria and Macedonia from Pirin Mountain to Kozhuf: temporal and isotope geochemistry constraints

Stoyan Georgiev[1], Valentin Grozdev[1], Irena Peytcheva[12], Albrecht von Quadt[2], Peter Marchev[1], Todor Serafimovski[3], Goran Tasev[3]

[1]Geological Institute, Bulgarian Academy of Sciences, BG-1113 Sofia, Bulgaria; kantega@abv.bg
[2] Institute of Isotope Geochemistry and Mineral Resources, ETH-Zurich, 8092 Zurich
[3] Faculty of Natural and Technical Sciences, "Goce Delcev" University-Stip, Macedonia

Closing of Vardar Ocean at the Late Cretaceous to Early Cenozoic was followed by collision which caused thickening of the crust under the Morava-Rhodope zone (in Pirin region nowadays it is 49.5–48 km). We present new, preliminary Sr and Nd isotope data and U-Pb zircon ages for Cenozoic magmatic rocks along a NNE–SSW transect through WSW Bulgaria and SE Macedonia, characterized by highly variable crustal thickness. The study is based on U-Pb LA-ICP-MS zircon dating acquired in the Geological institute of BAS and zircon dating and whole-rock $^{87}Sr/^{86}Sr_{(i)}$ and $^{143}Nd/^{144}Nd_{(i)}$ ratios obtained in ETH–Zurich using Triton ID–TIMS.

The zircon ages support and contribute the idea for general rejuvenation of the Cenozoic magmatism from NNE to SSW. The oldest studied rocks (39.86±0.44 Ma) are the rhyolites of Visoka Elha that crop out to the north-easternmost part of the transect. Further SSW, the volcanic and subvolcanic rocks between the villages of Padesh and Kresna and the granitoides of North Pirin pluton represent a volcano-plutonic system with older plutonic rocks (35.2−34 Ma) and somewhat younger volcanic activity (33.75−31.64 Ma). Further south, the volcanic and subvolcanic rocks near to the villages of Razdol, Krastiltsi and Karnalovo are dated between 31.83−30.80 Ma and to the WSW the subvolcanic bodies and dykes near to Ilovitsa village are in the interval of 30−28 Ma. The volcanic rocks in Kratovo-Zletovo and Buchim–Borov dol areas in Macedonia, located to the WSW, show ages between 31−24.8 Ma and 23.74–23.52 Ma, respectively. The youngest are the south-easternmost situated trachydacites of Kozhuf − 5.64±0.025 Ma. The Kozhuh trachydacites, in Bulgarian territory, yielded age of 12.11±0.57 Ma and represent separate Neogene episode of extensional magmatism.

The magmatic rocks in the transect show considerable isotopic and age variations. The volcanic and subvolcanic rocks near to the villages of Padesh and Kresna, and the granitoides of the North Pirin pluton, which are underlain by the thickest crust (49.5–48 km), exhibit the most radiogenic $^{87}Sr/^{86}Sr_{(i)}$ (0.71413–0.71558) and least radiogenic $^{143}Nd/^{144}Nd_{(i)}$ (0.51220–0.51227) isotopic ratios. Additionally, their zircon populations contain a great number of xeno-grains and inherited cores. Razdol and Karnalovo volcanic and subvolcanic rocks in Bulgaria and, particularly, Ilovitsa, Buchim–Borov Dol and Kratovo–Zletovo volcanic areas in Macedonia, located on progressively thinner continental crust (39–34.5 km) have lower $^{87}Sr/^{86}Sr_{(i)}$ and higher $^{143}Nd/^{144}Nd_{(i)}$ ratios suggesting decreasing crustal input. The assimilation of crustal material decreases with the decreasing crustal thickness which reflects on the zircon populations that consist of propagating less number of inherited cores and xeno-grains. The clear correlation between Sr and Nd isotopes and crustal thickness, accompanied by changes in the acid/intermediate rock proportions and decreasing of inherited component suggests that they are most probably formed in post-collisional setting after the main crustal thickening in the area studied. The rhyolites of Visoka Elha have low $^{87}Sr/^{86}Sr_{(i)}$ (0.70557) ratio and large population of Cretaceous zircons, suggesting more primitive affinity and assimilation of Upper Cretaceous igneous rocks. The Miocene Kozhuh trachydacite also has low $^{87}Sr/^{86}Sr_i$ (0.70643) which is more likely due to fractionation of a mantle-derived magma with moderate crustal assimilation. The high $^{87}Sr/^{86}Sr_{(i)}$ (0.70904) in the trachydacite of Kozhuf volcano in respect to that of the volcanic rocks of Kratovo-Zletovo (0.70482–0.70835) and Bucim-Borov dol areas (0.7067–0.7073) is most probably related to the metasomatism of the melting substrate due to the magmatism in the Kratovo-Zletovo and Buchim-Borov dol areas.