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**Zbornik apstrakata  
XVIII Kongres geologa Srbije**



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**GEOLOGIJA REŠAVA PROBLEME  
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# **XVIII Kongres geologa Srbije: Zbornik apstrakata**

(Nacionalni kongres sa međunarodnim učešćem)

# **XVIII Serbian Geological Congress: Book of abstracts**

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## TEKTONOTERMALNA I EKSHUMACIONA ISTORIJA METAMORFNIH STENA ĐUNISKOG VISA, CENTRALNOG DELA SRPSKO- MAKEDONSKE MASE, SRBIJA

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**Ključne reči: tektonotermalna istorija, ekshumacija, eklogit, gnajs, PT trajektorija.**

Prikazani su preliminarni rezultati istraživanja metamorfnih bazičnih stena u eklogitskoj faciji iz rojeva dajkova smeštenih uglavnom u paragnejsima Đuniskog visa (centralna Srbija) koji su glavni litološki član metamorfnih stena Srpsko-makedonske mase. Proučavana su dva reprezentativna uzorka, iz dajka (Djun 13/1 eklogit) i okolnih gnajseva (dvoliskunski gnajs Djun 13/13) radi praćenja stepena i vrste metamorfizma kako bi se utvrdila PT trajektorija sa posebnim osvrtom na retrogradnu istoriju. Tipična, dominantna stena u kojoj se javljaju rojevi dajkova su gnajsevi izgrađeni od unduloznog kvarca, orijentisanih liski fengitičnog muskovita (7,1-6,5 Si afu), biotita bogatog Fe (Fe/Fe+Mg = 45-57), plagioklasa (Ab<sub>68-81</sub>An<sub>19-32</sub>Or<sub>1-3</sub>), granata (Py<sub>7-14</sub>Alm<sub>58-70</sub>Grs<sub>8-25</sub>Sp<sub>0-12</sub>) sa "ravnim" odnosom sadržaja Mg i Fe uz povećanje Ca od jezgra ka obodu uz istovremeno smanjenje sa Mn. Od sporednih minerala prisutni su apatit, dravitski turmalin i retki cerijum-alanit. Tipični eklogit (uzorak Djun 13/1) je porfiroblastične strukture sa krupnim (do par mm.) porfiroblastima granata sastava (Py<sub>20-28</sub>Alm<sub>43-52</sub>Grs<sub>22-32</sub>Sp<sub>0-2,5</sub>) okruženim sa pritkastim omfacitima (Jd 50-62 mol%), zatim disten, kvarc, akcesorni klinocoisit (ca 1 wt% FeO), fengitski liskun (7,2-5,3 Si afu), apatit, rutil i retki ilmenit, sulfidi, cirkon. Zrna granata pojkilitski uklapaju kvarc, klinocoisit, omfacit, disten i rutil. To su gusto grupisane inkluzije u centralnim delovima zrna dok su spoljni delovi siromašni ili bez inkluzija. Karakteristika ovog minerala je i da su veliki porfiroblasti deformisani sa brojnim pukotinama koje su obično ispunjene kvarcom, Al-bogatim amfibolom (oko 17-19 tež.% Al<sub>2</sub>O<sub>3</sub>), albitskim plagioklasom, belim liskunom. Pomenimo da u gnajsevima nisu "jasno" uočene retrogradne promene kao u pomenutim eklogitima. One ukazuju na složenu istoriju ekshumacije koja se manifestuje u ekstenzivnim reakcionim teksturama i paragenezama. Modalno različiti simplektiti dominiraju u mineralogiji matriksa sa podređenim kelefitskim Al-bogatim amfibolom (oko 20-22 tež.% Al<sub>2</sub>O<sub>3</sub>) koji diskontinualno obavija granat. Izdvojena su tri modalno različita tipa simplektita: a) vermikularni diopsid siromašan jadeitom (Jd <32 mol%), b) vermikularni diopsid siromašan jadeitom (Jd <32 mol%) i pargasitskom Al-siromašnom hornblendom (9-17 tež.% Al<sub>2</sub>O<sub>3</sub>), c) vermikularni alumo-spinel, u plagioklasnom matriksu (Ab<sub>100-49</sub>An<sub>51-0</sub>). Izračunati efektivni ukupni sastavi za uzorak eklogita Djun 13/1 i spinel+plagioklas simplektit su modelovani u NC(K)FMASSTO sistemu za H<sub>2</sub>O zasićene i nezasićene (0,041 mol% H<sub>2</sub>O odgovarajuće za metamorfni maksimum) koristeći Perple\_X (Connolly, 2005) i HP62 termodinamičku bazu podataka. U oba modelirana sistema, položaj metamorfnog maksimuma (granat + omfacit + fengit + disten + rutil ± kvarc) nije odstupao, dajući oko 610 °C i oko 26-27 kbar-a, blizu univarijantne granice kvarc-koesita. Široko divarijantno polje simplektita spinel+plagioklas je ograničano na niže pritiske, 4-12 kbara, i više temperature, od 750-1150 °C, što ukazuje na pojavu tektonotermalnog impulsa u kasnoj fazi retrogradne putanje tokom ekshumacije. Ekstenzivne retrogradne reakcije i asocijacije minerala i izračunati visoki PT uslovi ukazuju na relativno brzu istoriju ekshumacije metamorfnih stena Srpsko-makedonske mase.

## TECTONOTHERMAL AND EXHUMATION HISTORY OF ĐUNIS HIGHLAND OF THE CENTRAL PART OF THE LOWER METAMORPHIC CORE COMPLEX UNIT (SERBO-MACEDONIAN MASSIF, SERBIA)

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**Key words:** tectonothermal history, exumation, eclogite, gneiss, PT path.

Here we report the preliminary results of studying the basaltic rocks equilibrated in eclogite facies from a swarm dyke intruded in the country rocks of Djunis Highland (central Serbia) of amphibolite facies metasedimentary origin which present the building blocks of the exhumed Lower Metamorphic Core Complex Unit of Serbo-Macedonian Massif. Two representative samples, from the swarm dyke (Djun 13/1 eclogite) and surrounding host gneisses (Djun 13/13 two-mica garnet gneiss), were studied in order to track changes in the continental crust and establish the metamorphic PT path with attention to retrograde history. A typical swarm dykes hosted country rock is leucocratic and granoblastic gneiss containing undulose quartz, locally glomeroblastic reflected in randomly oriented phengitic white mica (7.1-6.5 Si a.f.u.) and Fe-rich biotite (Fe/Fe+Mg = 45-57), plagioclase (Ab<sub>68-81</sub>An<sub>19-32</sub>Or<sub>1-3</sub>), apatite inclusions in garnet and very rare cerium-allanite, dravitic tourmaline, with rare (<1 vol%) atoll garnets and partly resorbed idioblastic porphyroblasts (Py<sub>7-14</sub>Alm<sub>58-70</sub>GrS<sub>8-25</sub>Sp<sub>80-12</sub>) containing (quartz, mica, rutile, ilmenite) inclusions mainly concentrated in core parts. Large garnet porphyroblasts record nearly flat Mg-Fe compositional pattern with conspicuous core-to-rim increase in Ca coupled with decrease in Mn. A typical swarm dyke eclogite (basaltic eclogite Djun 13/1) has porphyroblastic texture defined by subidioblastic to nearly round-shaped poikilitic garnet porphyroblasts (Py<sub>20-28</sub>Alm<sub>43-52</sub>GrS<sub>22-32</sub>Sp<sub>80-2.5</sub>) surrounded with lath-shaped matrix omphacite (Jd 50-62 mol%), kyanite, quartz, and accessory clinozoisite (ca 1 wt% FeO), phengitic mica (7.2-5.3 Si a.f.u.), apatite, rutile and rare ilmenite, sulfide, zircon. Poikilitic garnet contains quartz-clinozoisite-omphacite-kyanite-rutile densely clustered inclusions in core parts with inclusion-poor to inclusion-free outer parts typically in small porphyroblasts; large porphyroblasts experienced extensive deformation reflected in numerous fissures commonly filled with quartz, Al-rich amphibole (ca 17-19 wt.% Al<sub>2</sub>O<sub>3</sub>), albitic plagioclase, white mica. Lacking retrograde textures and assemblages in host gneisses moved our focus on metabasites (basaltic eclogite Djun 13/1), clearly subjected to retrogression, as they revealed more complex exhumation history reflected in extensive disequilibrium reaction textures and products. Various modally distinct symplectites dominate in matrix mineralogy with subordinate kelephitic Al-rich amphibole (ca 20-22 wt.% Al<sub>2</sub>O<sub>3</sub>) discontinuous overgrowth enveloping garnet. Three modally distinct types of symplectites were singled out: a) vermicular jadeite-poor diopside (Jd <32 mol%), b) vermicular jadeite-poor diopside (Jd <32 mol%) and pargasitic Al-poor amphibole (9-17 wt.% Al<sub>2</sub>O<sub>3</sub>), c) vermicular alumo-spinel, all in K-free plagioclase (Ab<sub>100-49</sub>An<sub>51-0</sub>) matrix. The recalculated effective bulk compositions for Djun 13-1 eclogite and spinel+plagioclase symplectite were modeled in NC(K)FMASSTO systems for H<sub>2</sub>O saturated and unsaturated (0.041 mol% H<sub>2</sub>O appropriate for metamorphic peak assemblage) conditions using the Perple\_X (Connolly, 2005) and HP62 thermodynamic database. In both modeled systems a locus of metamorphic peak assemblage (garnet + omphacite + phengite + kyanite + rutile ± quartz) was not affected yielding ca 610 °C and ca 26-27 kbar close to quartz-coesite univariant boundary. Spinel+plagioclase symplectite wide divariant field is constrained in lower 4-12 kbar and higher 750-1150 °C PT conditions indicating tectonothermal impulse in late stage exhumation trajectory. The extensive preserved reaction products and inferred deep burial in presumably thickened continental crust suggest relatively rapid exhumation history of the central part of lower core complex of Serbo-Macedonian Massif.

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