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PETROGRAPHIC CHARACTERISTICS OF THE NORTH-WESTERN PART OF KOSOVO

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Abstract: In the north – western part of Kosovo, the next lito stratigraphic units were separated: Palaeozoic (gneiss, mica schists, leucogneiss, amphibolite, quartzite), Jurassic (Serpentinised hazburgit, Schist serpentines with granitic intrusion, Basalts with dacite dykes, Dacite, Metamorphic sole (amphibolites), Supra ophiolite sedimentary mélange), Cretaceous (Valanginian basal conglomerates, Valanginian–Hauterivian silty – sandstone turbidity's, Barremian–Aptian basal conglomerates, Barremian–Aptian silty – marl turbidity's, Albian–Senomanian sandy – phillitic turbidites, Santonian sedimentary ophiolitic melange) Quaternary (alluvium, proluvium, slope wash, lower river terrace, higher river terrace, lacustrine, gravel and sand). The samples were taken from those rocks for chemical, geo-chemical and for the preparation of petrographic microscope properties. The analyses were completed at the certified laboratory of Geology-Mining Faculty (Polytechnic University of Tirana) – Geosciences Institute.

Keywords: *magmatism, metamorphism, microscope properties*

1. INTRODUCTION

The western Rhodope (Serbian–Kosovo–Macedonian massif) composite unit is made up of a variety of relatively high-grade metamorphic rocks, some of which are of Pan African age with a Variscian overprint (Dallmeyer et al., 1996; Krstić et al., 1996; Haydoutov et al., 1996; Karamata, 2006). The Serbian–Kosovo–Macedonian massif is generally believed to have formed the northerly, Eurasian margin of the Tethyan Ocean during Mesozoic–Early Cainozoic time. However, its setting during the Late Palaeozoic is controversial, in particular whether is experienced continental collision

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related to closure of a “Hercynian ocean” (e.g., Dercourt et al 2000), or remained an active margin into Mesozoic time with ongoing northward subduction (e.g., Stamphili & Mosar, 2000; 2001). Possible correlations with the Carpathian region are discussed by (Schmid et al., 2008). The term Vardar Zone was also established by Kossmat (Kossmat, 1924), named by the river Vardar. Based on differences in their Cretaceous sedimentation history (Mercier, 1968), subdivided the Vardar Zone into three NNW–SSE trending units (Almopias, Paikon and Peonias), where as the investigations of (Kockel, 1973) led to the present division of the Vardar Zone into the following five units (from W to E): The Almopias Unit; The Paikon Unit; the Guevguelije Unit; The Stip Axios Massif; The Circum Rhodope Belt (Fig. 1).

2. GEOLOGICAL SETTING AND FRAMEWORK

The study area is located in the North-Western part of Gjilan region and belongs to the Vardar Zone and Dardania zone (Serbian–Kosovo–Macedonian zone). Boundary of these geo tectonic units is marked by a fault, covered with Neogene sediments (Fig. 2).

The present structure of the Dinaric and the Hellenic is the result of a Mesozoic to Cainozoic orogeny, related to the ongoing convergence between the Apulian and European plates (Fig. 2). The present subdivision of the Dinaric-Hellenic into NNW–SSE trending zones (Fig. 2) is related to the structural geological and sedimentological investigations of (Aubouin J. et al., 1976) as well as (Jacobshagen V., 1986).

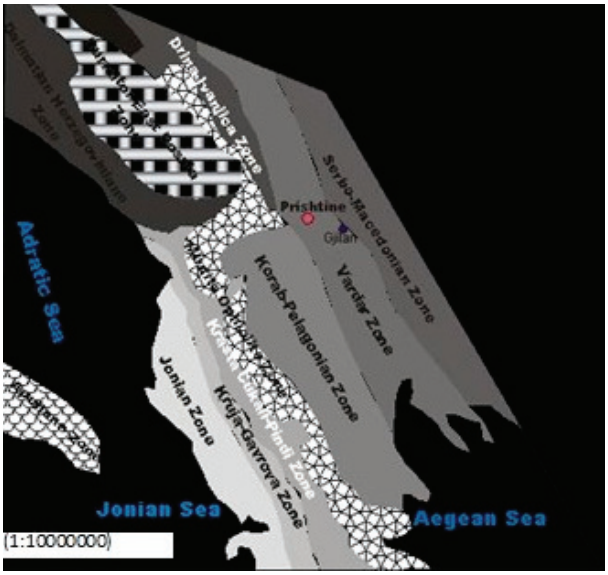

Fig. 1. Geological setting of Gjilani area in the per-Alpine Balkanic belts (1 : 10 000 000)

The Apulian platform forms the foreland of the Hellenic orogen, which is exposed on islands (e.g. Paxos) situated west of the Greek mainland. The Hellenic hinterland is represented by the crystalline of the Serbian–Kosovo–Macedonian and the Rhodope Massif (Fig. 1). The west vergent nappe system of the Hellenic orogeny comprises the following major tectonic units from W to E. (Fig. 1). The Vardar Zone (also referred to as Vardar-Axios Zone) represents the eastern Hellenic and Dinaric ophiolite belt and comprises MORB-type oceanic crust (Triassic to Jurassic) as well as Palaeozoic and Mesozoic sediments. The Serbian–Kosovo–Macedonian and the Rhodope massif are predominately composed of crystalline rocks and are regarded as a continental slope and rise during Jurassic and Cretaceous time.

According to (Jacobshagen. V 1986). The Alpine evolution of the Hellenic orogeny is dominated by four different orogenic cycles each of them is accompanied by folding, nappe transport and regional metamorphism.

Stratigraphic Units

Quaternary – represents mainly of: alluvium, slope wash, lower river terrace, higher river terrace, lacustrine, gravel and sand.

The Upper Oligocene Transgression – Onto the crystalline basement of Palaeozoic, with stratigraphic and structural inconsistencies, are placed limestones and dolomites of the upper Oligocene. Onto meta limestones of crystalline basement is developed the karstic phenomenon in the form of cavity filled with calcite mineral, which gives rocks a breccia's view.

Conglomerate – sandstone–clay–carbonate formation of meddle Miocene – This formation is placed onto the Palaeozoic crystalline basement of the Dardania unit and presents alternation of conglomerate, sandstone, limestone and claystone.

Granitic intrusion with large size is spread in the southwest of the region while some smaller sized intrusions are mainly distributed in the eastern part of the studied region. These rocks are tectonically transposed, thus presenting concordant and sub concordant bodies with metamorphic rocks structures where they are introduced. During intrusion penetration they have done migmatization (process) and recrystallization of the surrounding schists.

Granites are fine grain and contain less coloured minerals. Their colour is light grey. In the mineral composition are included: microcline, plagioclase (albite), quartz, muscovite, biotite, epidote, apatite, sagenite, leucocsene and metallic minerals. They have sub hedral texture.

Cretaceous (K) – Represents mainly of these lito stratigraphic units: Valanginian basal conglomerates (K_1^2); Valanginian – Hauterivian silty – sandstone turbidities ($K_1^{2,3}$); Barremian – Aptian basal conglomerates ($K_1^{4,5}$); Barremian – Aptian silty - marl

turbidities ($K_1^{4,5}$); Albian – Cenomanian sandy – phyletic turbidities (K_1^6–K_2^1); Santonian sedimentary ophiolite mélange (K_2^4).

The Supra ophiolite sedimentary mélange (J_3) – This melange starts in this part with a schistosity of clay matrix with rare sandy under layers. The blocks are mostly basalts of several meters to several tens of meters in size. There are also limestone blocks, metasandstones etc. Transferred to a matrix melange with over 90% of sandy-clay sediments, with the folds of inverted polarity, isoclinal folds and the badinage of sandy layers. Above is added sedimentary material until it reaches a typical sedimentation of turbidity's with met conglomerate – breccia's limestones (With 90% of limestone clasts cemented by limestone of the same gray colour, then followed with limestones with thin marly under layers, radiolarites, limestones with siliceous badinage. In breccia's limestone clasts are met the following species which dates from upper Jurassic: echinoderms, annelids, ostracods, Tubiphites. In layered limestones with siliceous are met the following species which dates from the upper Jurassic: Pelmicrite, echinoderms, Petites foraminifers circalittoraux.). Above the sediments take a real look of a flysch with limestone layers of Upper Jurassic up to 100 m thickness (Glams limestone). This limestone is combined with thin layers of clay and marls with highly schistosity.

The Palaeozoic crystalline basement (Pz) – Gneissic sequence starts from a series of gneiss and orthogenesis with the presence of tectonic banding without mapped, due to their limited size. These banding are represented by these types of rocks such as: biotite and biotite–muscovite gneiss, leptynolite, mica schists, leuco gneiss, amphibolite, quartzite. At the beginning, these rocks have represented pelagic sediments with under layers sin rift basic volcanism, accompanied with granite intrusion which then are metamorphosed in the Orth gneisses facies. The grade of metamorphism increases in the sense of the top to down, representing a epidote–amphibolite facies in the deep and green schist facies above.

Mica schists sequence is localized in the central and western part of region and it is built by mica schists with tectonic banding of limited scale of metamorphic rock types such as: green schists, amphibolite, gneisses, leptynolites and met limestones. According to (Moutrakis. D 1986) this sequence is named as Veles series with Palaeozoic age, as sub-unit of the Vardar zone. In this context, these authors considered this subunit as tectonically situated below the Neoproterozoic gneisses sequence of the Serbian –Kosovo-Macedonian mass. We think that the gneiss and mica schists sequence belong to Palaeozoic crystalline basement of tectonic unit of Dardania. These sequences are in continuity with each other, where the eastern and deeper part represents higher level of metamorphism compared with the mica schists sequence which is widespread in the center and west of explored area.

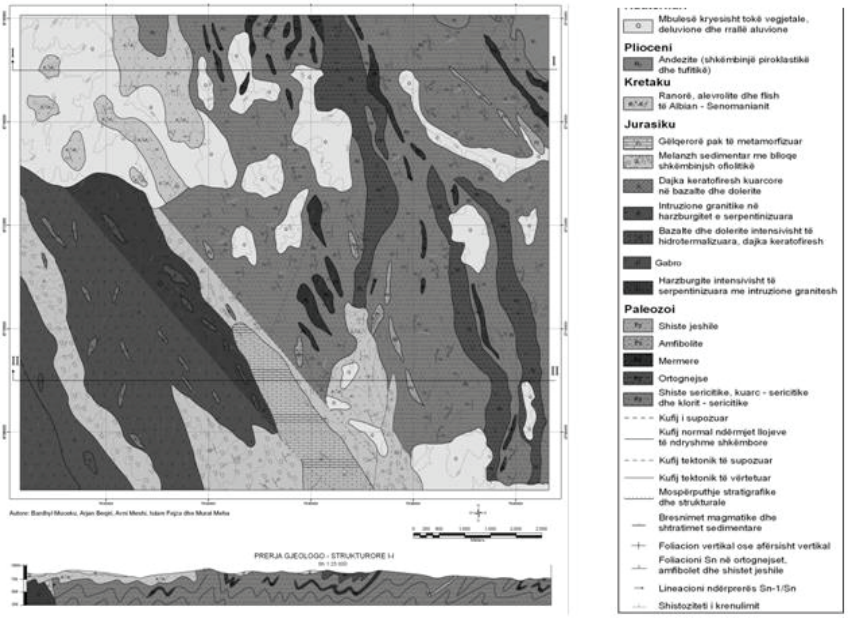

Fig. 2. Geological map and cross section in the north part of Gjilani Region, Kosovo

3. MINERAL PROPERTIES DESCRIPTION

1. Petrographic characteristics of the Paleozoic crystalline rocks we have divided into 2 groups:
   (1) schists,
   (2) magmatic rocks.

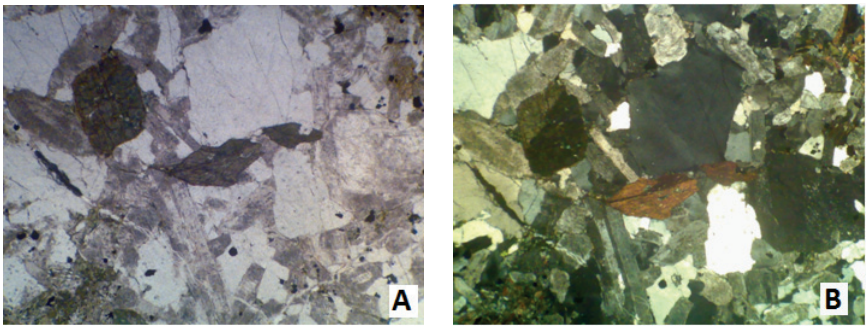

Fig. 3. Granodiorite with magmatic granular texture, that is mostly made of felsic minerals (quartz and feldspars) rather than mafic minerals (small amphibole and potassium feldspar). A – PPl, B – XPL. Field of view 30×

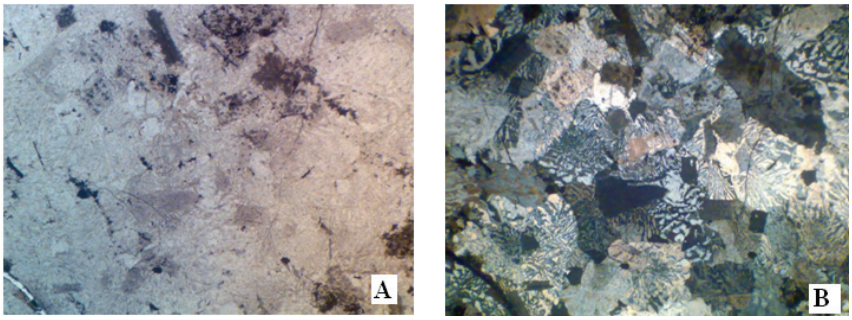

Fig. 4. Granite with granular texture. The rock is made up of:
quartz, plagioclase and potassium feldspar (orthoclase).
The particularity of this rock is that almost characterized by a myrmekite texture,
content very small dark colored minerals. A – PPl, B – XPL. Field of view 15×

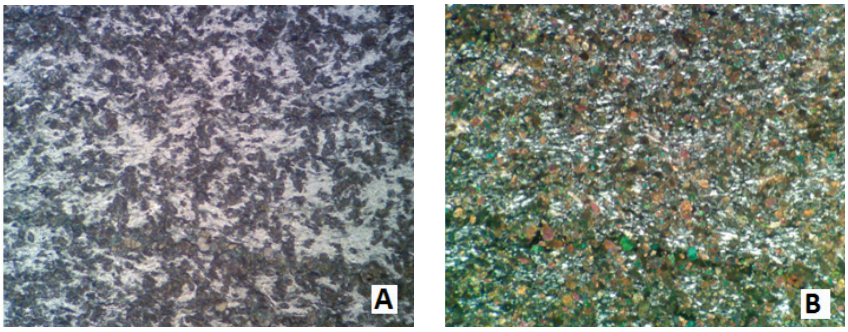

Fig. 5. Epidote schist. The rock is made up of:
quartz, many epidote, chlorite and small feldspar. Field of view 32×

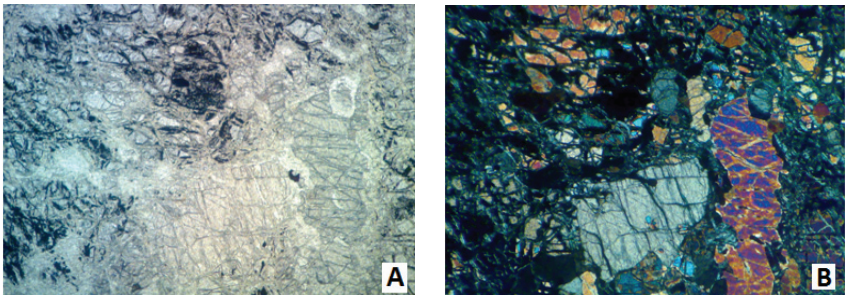

Fig. 6. Sepretinsed harzburgite. The rock is made up of:
olivine orthopyroxenes and clinopyroxenitic. A – PPl, B – XPL. Field of view 32×

4. CONCLUSION

Explored region represents an important point in the geology of Kosovo and beyond. In this region is the border between Vardar geological unit and Dardanian tectonic unit. Also in this region exposed the Vardar Ophiolites with its key representatives such as gabbro and dolerite complex parallel dykes. Interesting is the exposure of sedimentary mélange, mostly with basaltic blocks, that follow above with turbidity represented by alternation of pelagic Limestone/radiolarite/marl and closes with marl flysch.

Very interesting are the relationships between the ophiolites and Cretaceous formations in the east.

The north western part of Kosovo in the characteristics petrographic aspect consists of these rocks: Granodiorite, Granite, Gneiss, mica schist, amphibole, Sepretinsed harzburgite with the texture granular texture.

The analyses were completed at the certified laboratory of Geology-Mining Faculty (Polytechnic University of Tirana) – Geosciences Institute. These analyses were carried out for the research work in my doctoral studies in Geology-Mining Faculty (Polytechnic University of Tirana).

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