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ILOVA GORA AND ČUŠPERK BAUXITE DEPOSITS

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ABSTRACT

Ilova Gora and Čušperk bauxite deposits comprise Gradišče, Mali vrh (552 m), Šopeh and Čušperk (SE Slovenia) occurrences. Bauxite bodies are interbedded approximately in the central part of the Malm carbonate succession in the form of more or less irregular pockets and lenses. They are of small extent, low Al_2O_3 contents, but high in silica and iron. Silica in the bauxites is mainly present in clay minerals. The X-ray analysis showed that the main bauxite mineral is boehmite and rarely gibbsite, which is commonly subordinate. The deposits vary considerably in composition and commonly range from bauxite to silty or sandy bauxitic clays. The bauxites are concordantly overlaid by the Clypeina *limestones, dolomitized limestones and latediagenetic dolomites.*

Key words: bauxite, mineral composition, Malm, Outer Dinarides, Slovenia

I DEPOSITI DI BAUXITE DI ILOVA GORA E ČUŠPERK

SINTESI

I depositi di bauxite di Ilova Gora e Čušperk comprendono i siti di Gradišče, Mali vrh (552 m), Šopeh e Čušperk (SE Slovenia). I blocchi di bauxite sono interstratificati nella parte centrale della successione carbonatica del Giurassico superiore, a formare lenti e tasche più o meno irregolari. Sono di piccola estensione, hanno bassi contenuti di Al_2O_3, ma alti contenuti di Fe_2O_3 e SiO_2. Nella bauxite il silicio è presente principalmente nei minerali argillosi. L'analisi a raggi X ha evidenziato che nella bauxite il minerale essenziale è la boemite e raramente la gibbsite, che comunemente è subordinata. La composizione dei depositi è mutevole, e varia dalla bauxite alle argille bauxitiche. Le bauxiti sono concordantemente ricoperte da calcari di Clypeina*, calcari dolomitizzati e dolomiti tardodiagenetiche.*

Parole chiave: bauxite, composizione minerale, Giurassico superiore, Dinaridi esterne, Slovenia

INTRODUCTION

The Ilova Gora and Čusperk bauxite district is a small area situated about 30 km to the southeast of Ljubljana in the Suha Krajina. The bauxites there are associated with consolidated carbonate rocks of Malm age.

The first discovery of bauxites in the Southern Slovenia was effectuated by Rizzato (Pleničar, 1955), who in 1935 explored several small bauxite deposits of relatively high-iron contents in the Nanos area. Later, Rizzato extended his search for ore bodies into the Hrušica area. In the above-mentioned areas, he dug out several pits and shallow trenches.

Lipold (1858) revealed the general geologic setting of these deposits. Tiringer (1954) gave a review of the up-to-date knowledge of the Slovene bauxite ore deposits. Pleničar (1953, 1955) described several oolitic bauxite and iron-ore deposits of Slovenia.

Intense and systematic detailed explorations of bauxites in Slovenia began actually in the year 1962. Lukacs & Kuhar (1964) presented the annual report on explorations of bauxites in Slovenia in the year 1963. The report involved general data and results of chemical, micropaleontological and X-ray analyses. These authors studied the Šmihel, Budganja vas, Ambrus, Ilova gora and some other Triassic, Jurassic and Cretaceous bauxite occurrences in Slovenia. Buser & Lukacs (1966, 1973) reported on systematic explorations of bauxite in Slovenia, describing eight bauxite stratigraphic horizons. According to them, the Malm bauxite occurs in the form of more or less irregular layer with maximal thickness of 2.5 metres. Šribar (1966) described the Jurassic sediments between Zagradec and Randol in the Suha Krajina area. On the basis of microfossils and the stratigraphic position, she divided the Jurassic succession into the Lower and Middle Liassic, Upper Liassic-Dogger, Lower Malm, and Upper Malm. Gregorič (1969) studied the origin of the red brown soil (terra rossa) lying on the Triassic dolomites in southern Slovenia. She suggested that the red brown soil had developed from insoluble residuum of the dolomites. According to her, the possibility of aeolian formation of the red brown soil in the area of Šmarje Sap near Ljubljana seems to be out of question.

In the Explanatory text for the Basic Geological Map of Slovenia 1:100 000 of the Map Sheet Ribnica, Buser (1974) described the Carnian and Jurassic bauxites. Jurassic bauxites lie upon the Lower Malm oolitic limestones and under the Upper Malm *Clypeina* limestones. The bauxites turned out to originate along the contact between the Lower and Upper Kimmeridgian in the form of a seam thinning laterally. However, the seams and lenses of the Malm bauxites are from several to 250 centimetres thick. Commonly, the bauxites are oolitic by structure, but under and over the oolitic ore there is usually nonoolitic bauxitic sediment. The Malmian bauxites at Laški Potok, St. Anna, on the Mala Gora, at Ambrus, Ilova Gora, Čušperk as well as the largest bauxite outcrops between Šmihel and Budganja Vas are not suitable for production of alumina owing to the too high silica contents (18–28%).

Buser (1979) investigated the geologic structure of the area on the Map Sheet Ribnica, dividing the Jurassic succession in the Lower and Middle Liassic, Upper Liassic and Dogger, the Lower Malm and the Upper Malm.

On the basis of collected micropaleontological data, Dozet (1990, 1996) subdivided the Jurassic and Lower Cretaceous into five cenozones and four subzones.

Strohmenger & Dozet (1991) studied the stratigraphy, facies developments and geochemistry of the Jurassic carbonate rocks in the Suha Krajina. The field and micropaleontological studies showed that at least the uppermost part of Dogger was not deposited there. Dozet (1993) detected the complete Lofer cyclothems in the Lower Liassic beds from the Slovene part of the Outer Dinarides. The main characteristic of the Krka limestones is the well-developed rhythmic sedimentation. Dozet *et al.* (1993) compared the Nanos bauxites with Late Jurassic bauxites from western Istria. They came to the conclusion that paleogeographic and tectonic conditions were rather similar. Dozet (1994a, 1994b) described in detail the Upper Triassic and Jurassic sedimentation in the Suha Krajina area as well as the Malm bauxites at Kočevska reka and Kočevje. Buser & Debeljak (1994/1995) as well as Debeljak & Buser (1997) studied the distribution of lithiotids in the Lower Jurassic beds of south Slovenia. The horizon with bivalves (lithiotid horizon) is attributed to Pliensbachian (Domerian).

Recently, the Jurassic stratigraphy and classification have been described by Strohmenger & Dozet (1991), Dozet (1995), Dozet & Šribar (1997) and Dozet (2000).

The objectives of this paper are, firstly, to describes the bauxite occurrences and geology in the western part of Suha Krajina and, secondly, to present and interpret the data of X-ray analysis.

The article for the first time presents and interprets the data of the Malmian bauxites in the southeastern Slovenia, on the basis of which a correlation of the Malmian bauxites in the whole Outer Dinarides will be made possible.

MATERIAL AND METHODS

Our work is based on the systematic regional geological mapping of the study area for the Geological Map of Slovenia on the scale of 1:50,000, on several detailed field surveys including stratimetric measuring and profiling, and on sedimentological and facies study of the Jurassic rocks in the area under consideration (Fig. 1).

Besides, our work is documented by numerous rock

samples, thin-sections and X-ray diffraction measuring. The bulk mineralogical compositions and clay fraction of samples were determined by X-ray diffraction (XRD) using a Philips diffractometer (PW 3710), goniometer PW 1820, with automatic divergence slit and curved monochromator, operating at 40 KV, 30 mA with CuK_{α} radiation and Ni filter. Scan step was 0.02^{o} with 0.400 s per step.

The stratigraphic relationships have been studied by means of micro- and macrofossils, and by lithologic correlations. The quantitative mineralogical composition of the bauxite samples were determined by X-ray diffraction.

The carbonate rocks are classified according to Folk's (1959) practical petrographic classification of limestones and Dunham's (1962) classification of carbonate rocks according to depositional texture. For the description and classification of the bauxites, the terminology proposed by Bardossy & Nicholas (1974) was used. The colour determinations of bauxite deposits and adjacent carbonate rocks are based on the Munsell Rock Colour Chart.

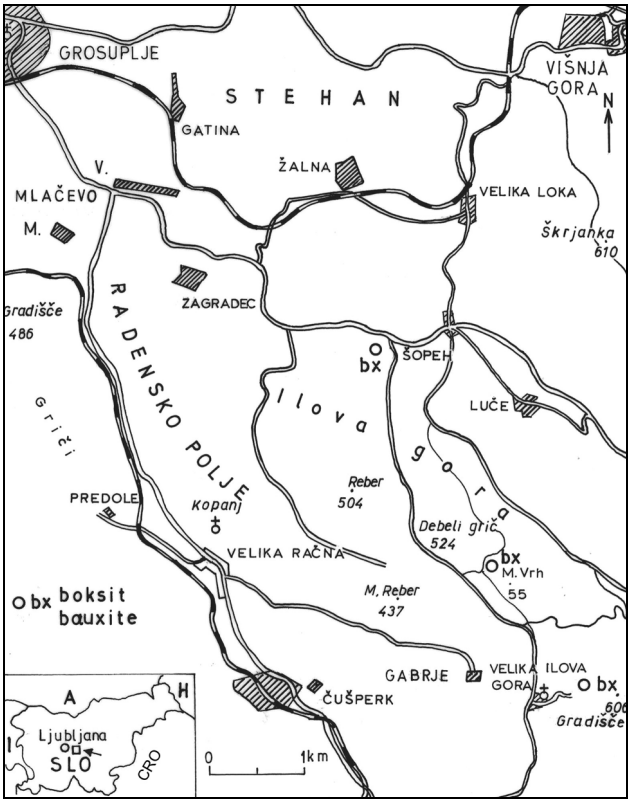

Fig. 1: Location sketch map of the bauxite occurrences in the Western Suha Krajina.
Sl. 1: Zemljepisna karta pojavov boksita v zahodni Suhi Krajini.

RESULTS AND DISCUSSION

General geology

From the geotectonical point of view, the investigated area belongs to the Dinarides, which are divided into the Inner and Outer Dinarides. The Inner Dinarides are built of deeper-water rocks, while the Outer Dinarides are composed of shallow-water sediments. The study area lies in the Outer Dinarides. The previous researchers mostly designated the study area as Dolenjski Kras, but Buser (1974) gave to this tectonic area a more suitable name: Dolenjsko-Notranjska Mesozoic Blocks, or Western Dolenjsko Mesozoic Blocks, to be more precise.

The unit of the Outer Dinarides was originally a relatively large and morphologically poorly differentiated area of predominantly shallow-water carbonate deposits ranging from subtidal to supratidal environments. Carbonate rocks were continuously deposited there from the Upper Triassic to the Lower Tertiary. The platform consisted of a very thick carbonate succession of an average thickness of about 4000 metres. Later, the Outer Dinarides underwent a differentiation due to the formation of the Slovene Basin, and the originally uniform area was dissected into two minor platforms, the Julian and the Dinaric ones (Buser, 1989).

Generally speaking, the syngenetic paleotectonic events have controlled the paleogeographic evolution of the surveyed area and the bauxite accumulation. The neotectonic processes, uplifting the region, brought about the present position of the bauxite outcrops.

Geology of the study area

The study area consists of the Upper Triassic and Jurassic carbonate rocks; limestones, dolomitized limestones, dolomites and carbonate breccias respectively. The listed sediments are shallow marine platform carbonates, formed in a restricted shelf, lagoon and subtidal to supratidal environments. The bauxites and bauxitic clays occur as thin lenses or pods in the topmost part of 450 to 500 metres thick Hočevje Oolitic Group (Dozet, 2000). The lower part of this group, composed of dark oolitic limestones, belongs to the Laze Formation, and the upper one, composed of greyish oolitic limestones, belongs to the Šentrumar Formation (Dozet, 2000).

The regional dip of the Triassic and Jurassic rocks is the southeast.

Bauxite and clay deposits

Bauxites in the Ilova Gora and Čušperk district occur as rather low-grade very small lenses or pockets in the topmost part of the Šentrumar Formation at or near the present land surface. The combination of low grade,

small size, iron-rich and silica-rich makes these deposits of no economic interest. The possibility of discovering new and larger deposits is considered to be unlikely.

Deposits in the district range in size from a few metres to as much as 100 metres and more in greatest areal dimension and from a half to 10 metres in thickness including both bauxite and kaoline. Bauxite occurs commonly in the central part of deposits and grades into kaoline downwards and to all sides. Since some deposits in the Ilova Gora and Čušperk areas are at or very close to the surface, some of the tops have been eroded in several cycles.

Bauxites are pale yellow to tan but may be often in part rusty to dark red and brown. Bauxites are cryptocrystalline, oolitic or pisolitic by texture and rather soft to pretty compact.

Description of the bauxite deposits

The Malm bearing bauxite contact of Ilova Gora lies parallel to the road Grosuplje-Krka towards Ilova Gora. The general direction of the ore-bearing contact is the north-south. In the area with considered outcrops, traces of old excavation have been preserved. The ore-bearing contact is about 15 kilometres long. The bauxite occurrences are found at three localities, namely: Gradišče, Mali Vrh, Šopeh. According to personal communication, the iron ore had still been dug before the year 1900.

The **Gradišče deposit** (Ilova Gora) consists of two smaller erosional nests on the Gradišče hill (552 m) a half kilometre southeast of the Velika Ilova Gora. The reddish brown oolitic bauxite was trapped in poorly developed karst paleorelief, built of light grey to medium light grey, medium-grained oosparitic, intraoosparitic and biolithitic limestones with hydrozoans, sponges, algae and foraminifers. A high percent of Fe_2O_3 (55%) is characteristic for this deposit.

Mali Vrh deposit extends in the west-east direction on the southern slope of the Mali Vrh (552 m) hill along the Lower Malm/Upper Malm contact in the form of several hundred metres long and 45 to 60 metres wide lens. The deposit is composed of four lithological types of bauxites: greyish olive pelitic bauxite, brick-red hematitized pelitic bauxite, yellowish orange cryptocrystalline bauxite and dark reddish brown oolitic bauxite. The thickness of the bauxite horizon is 3 to 5 metres.

Greyish olive bauxites predominate. The bauxites of the Mali Vrh deposit lie between underlying greyish oosparitic limestones with trocholinas, salpingoporellas, hydrozoans, sponges and overlying greyish black stratified *Clypeina* limestones.

The **Čušperk deposit** is represented by 180 metres long and 35 to 50 metres wide lens-like outcrop, lying about 500 metres to the south of Čušperk behind the Žitnik farm. This deposit is five to seven metres thick having an inexpressive paleorelief. The medium-grey, grey and dark grey oosparitic, oncosparitic, ooncosparitic, oointrasparitic and biolithitic limestones with hydrozoans, sponges, bryozoans and microfossils, *Trocholina elongata, Trocholina alpina, Salpingoporella annulata* are covered by the following lithological types of bauxites (from bottom to top): yellowish grey pelitic bauxite, lenses of yellowish orange to dark yellowish orange cryptocrystalline bauxite, lenses of greyish red bauxite, lenses of reddish orange bauxite, olive bauxite with numerous calcitic pseudooolites, greyish red oolitic bauxite, lenses of greyish red pelitic bauxite with bauxitic nodules (nodular bauxite). The greater part of the deposit is filled with the yellowish grey pelitic bauxite. In the upper part of the deposit, greyish red to reddish brown bauxites with pelitic or oolitic texture predominate. The nodular bauxite lies in the central part of the deposits. Fifty centimetres thick yellowish clay constitutes the final layer of the bauxite horizon in the Čušperk deposit. It is covered by the medium grey and medium light grey *Clypeina* biointrasparitic, biointrasparuditic and biomicritic limestone containing beside algae *Clypeina jurassica* the microfossils *Salpingoporella annulata*, Verneulinidae, and gastropods as well. Upwards in the carbonate succession follow medium grey and medium light grey biointrasparudites with the alga *Clypeina jurassica* and tintinninas proving the Upper Malm age of the overlying carbonate sediments.

The **Šopeh deposit** is situated at the Luče-Grosuplje and Ilova Gora-Šopeh cross-roads. It is represented by a roundish outcrop with a diameter about 150 to 200 metres. The footwall of the bauxite is built of the Lower Malm grey to moderate grey, medium-grained massive oosparitic limestone and dolomitized limestone. The deposit is composed of moderate yellowish orange fine-grained bauxite, yellowish grey to white fine oolitic bauxite with rare pisolites, pale red oolitic bauxite with rare pisolites, moderate red oolitic bauxite with rare pisolites, dark red bauxite, breccia-conglomerate consisting of 1 to 3 centimetres poorly-rounded dark red iron-bauxite fragments floating in a greyish orange groundmass and, finally, of pinkish oolitic bauxite composed of pale yellowish brown, orange, moderate reddish orange, light red, grey, greyish red and brick-red ooids.

Mineral composition

The mineral composition of the considered bauxites is not constant. The Al_2O_3 content is the highest in central parts of the considered ore deposits. On the other hand, moving upwards and downwards the ore contains more and more kaoline.

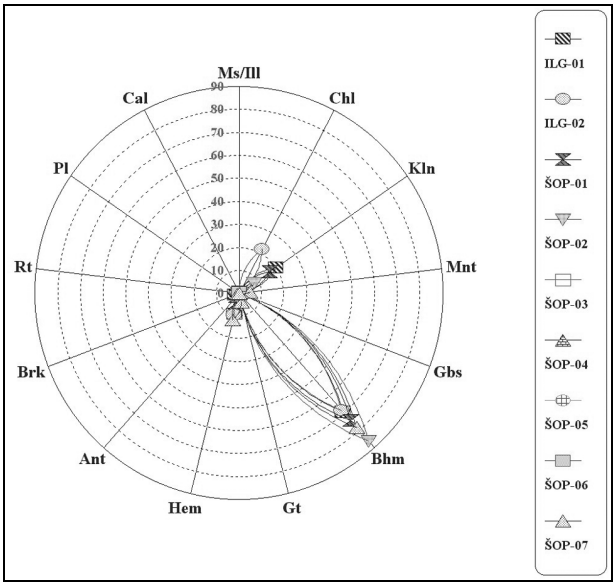

Fig. 2: The mineral composition of the bauxites from Ilova Gora and Šopeh in wt %. Legend: Ms/Ill – muscovite/illite; Chl – chlorite; Kln – kaolinite; Mnt – Ca-montmorillonite; Gbs – gibbsite; Bhm – boehmite; Gt – goethite; Hem – hematite; Ant – anatase; Brk – brookite; Rt – rutile; Pl – plagioclase; Ca – calcite.
Sl. 2: Minaralna sestava boksitov iz Ilove Gore in Šopeha podana v masnih %. Legenda: Ms/Ill – muskovit/illit; Chl – klorit; Kln – kaolinit; Mnt – Ca-montmorillonit; Gbs – gibbsit; Bhm – boehmit; Gt – goethit; Hem – hematit; Ant – anataz; Brk – brookit; Rt – rutil; Pl – plagioklaz; Ca – kalcit.

The mineral composition of the bauxites has been determined by X-ray powder diffraction analysis. In the Ilova Gora and Šopeh deposits, the main quantity of Al_2O_3 is bound to boehmite (Tab. 1, Fig. 2), while the Čušperk deposit, where bauxitic clays occurred, Al_2O_3 is bound to boehmite, muscovite-illite, chlorite and kaolinite (Tab. 2, Fig. 3). However, the Fe_2O_3 is in all occurrences bound to hematite and goethite, while the TiO_2 is associated with anatase, brookite and rutile. Common are goethite, kaolinite, hematite, micas and clay minerals, anatase, brookite and rutile.

Among transparent minerals of the heavy fraction, rare grains of rutile, titanite, zircon, tourmaline, epidote, amphibole, chlorite and muscovite occur. In the light fraction opaque grains prevail. Grains of quartz also occur. On the basis of hitherto established spectrum of heavy minerals it is very difficult to discuss their origin and rocks in their basement.

Tab. 1: The mineral composition of the bauxites from Ilova Gora and Šopeh in wt %. Legend: Ms/Ill – muscovite/illite; Chl – chlorite; Kln – kaolinite; Mnt – Ca-montmorillonite; Gbs – gibbsite; Bhm – boehmite; Gt – goethite; Hem – hematite; Ant – anatase; Brk – brookite; Rt – rutile; Pl – plagioclase; Ca – calcite.
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Locality	Ms/Ill	Chl	Kln	Mnt	Gbs	Bhm	Gt	Hem	Ant	Brk	Rt	Pl	Cal
ILG-01	0	0	20	0	0	69	0	9	0	2	0	0	0
ILG-02	0	22	0	0	0	68	0	10	0	1	0	0	0
ŠOP-01	0	0	16	0	0	74	4	4	2	0	0	0	0
ŠOP-02	0	0	8	0	0	86	4	0	2	0	0	0	0
ŠOP-03	0	0	17	0	0	79	2	0	2	0	0	0	0
ŠOP-04	0	20	0	0	0	69	4	5	2	0	0	0	0
ŠOP-05	0	0	15	7	0	69	0	8	1	0	0	0	0
ŠOP-06	0	0	12	3	2	76	5	0	0	2	0	0	0
ŠOP-07	0	0	0	5	0	78	4	12	0	1	0	0	0

Tab. 2: The mineral composition of the bauxitic clays from the Čušperk occurrences in wt %. (Legend: see Table 1)
Tab. 2: Mineralna sestava boksitne gline iz pojavov pri Čušperku v masnih %. (Legenda: glej Tabelo 1)

Location	Ms/Ill	Chl	Mln	Mnt	Gbs	Bhm	Gt	Hem	Ant	Brk	Rt	Pl	Cal
ČSP-02	29	25	0	0	8	18	6	0	0	0	2	0	12
ČSP-03	55	28	0	0	0	0	9	0	0	0	3	5	0
ČSP-04	21	22	13	0	0	26	3	8	0	0	3	4	0
ČSP-05	0	28	33	0	0	23	5	9	0	0	3	0	0
ČSP-06	0	18	19	0	0	12	2	0	0	0	0	1	48
ČSP-07	0	24	0	0	0	8	0	3	0	0	0	0	64
ČSP-08	31	26	0	0	0	27	0	8	0	0	0	0	7
ČSP-09	0	0	37	0	0	8	0	6	0	0	6	0	43
ČSP-09A	26	16	37	0	0	10	7	0	0	0	4	0	0

Origin of the bauxites

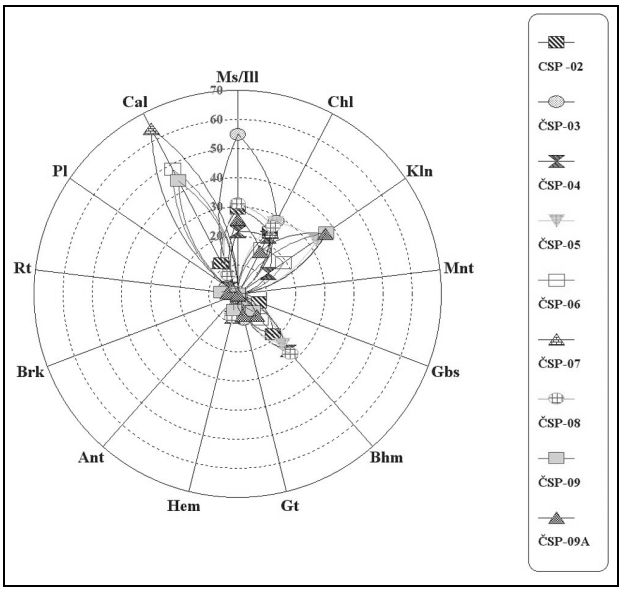

Fig. 3: The mineral composition of the bauxites from Čušperk in wt %. (Legend: see figure 2)
Sl. 3: Mineralna sestava boksitov iz Čušperka podana v masnih %(Legenda: glej sliko 2)

Regarding the way of occurrence and host rock, the Ilova Gora and Čušperk bauxites can be designated as "terra rossa" bauxites or karst bauxites. The main minerals are boehmite, goethite, hematite and kaolinite. The considered bauxites originated at the time of Late Kimmerian phase, which was relatively short. The movements forming a dry land were weak and of epeirogenetic type. This statement is confirmed by almost concordant relationship of the bauxites as well as underlying and overlying carbonate rocks. The Late Kimmerian epeirogenetic movements and weak fault tectonics created poorly developed, inexpressive paleorelief. On the carbonate surface weathering, karstification and denudation took place. Subsequently, the karstification was interrupted by bauxitization and accumulation of bauxite material of the "terra rossa" type into small depressions. According to Maksimović & Buser (1986), along two vertical profiles in the Logatec locality a strong enrichment of the mobile trace elements is exhibited (Be, Ni, Co, Cu, Zn, Y, La, Pb) towards the basement limestone, indicating that the bauxitization process took place *in situ* of the present position of the bauxites.

However, on the basis of all available data we can conclude that the source material originated from the insoluble residue of carbonate footwall rocks and allochthonous eolian material.

CONCLUSIONS

The Suha Krajina bauxite occurrences and deposits occur approximately in the middle part of the Malm stratigraphic sequence. Since the bauxites and bauxitic clays can be found only in the top of the Lower Kimmeridgian limestones, they are considered to be of the Middle Kimmeridgian age.

The bauxites in question lie between the underlying greyish oosparitic limestones with trocholinas, salpingoporellas, hydrozoans, sponges and the overlying dark *Clypeina* and *Tintinnina* carbonate rocks.

Our investigations of the Ilova Gora and Čušperk bauxite district confirm the early prospecting of Lukacs & Kuhar (1964) as well as Buser (1974). In general, the deposits are low-grade bauxites; they are small and the area of their occurrence is small. Bauxite and bauxitic clays occur in lenses and pockets. Our prospecting indicates that the individual deposits are small and erratic in distribution and mostly high in iron oxides and silica. Lateral gradations in composition of the bauxite ore within occurrences and deposits are common. Most of the material in the deposits is classified as grade C_1 bauxite.

ACKNOWLEDGEMENT

The authors wish to express their cordial thanks to the Ministry of High Education, Science and Technology of the Republic of Slovenia and to the Geological Survey of Slovenia for their financial support in the detailed and systematic regional research carried out in the western part of Suha Krajina.

LEŽIŠČA BOKSITOV NA OBMOČJU ILOVE GORE IN ČUŠPERKA

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POVZETEK

Opisujemo pojave in ležišča boksitov na območju Ilove gore in Čušperka, ki so nanizani v obliki leč, žepov in gnezd vzdolž rudonosnega kontakta spodnji kimmeridgij/zgornji kimmeridgij. Rudonosno območje Ilova gora-Čušperk obsega sledeče pojave oziroma ležišča boksitne rude: Gradišče, Mali vrh (552 m), Žitnik (Čušperk) in Šopeh, ki leže okoli 5 km jugovzhodno od Grosuplja.

Malmski rudonosni kontakt na območju Ilove gore leži vzporedno s cesto od odcepa ceste Grosuplje-Krka na Ilovo goro. Generalna smer kontakta je sever-jug. Na izdankih boksita Ilove gore so marsikje ohranjeni sledovi starega odkopavanja. Rudonosni kontakt je dolg 15 km. Boksitni pojavi so odkriti na treh lokacijah: Gradišče, Mali vrh (552 m) in Šopeh. Po ustnem izročilu so na območju Gradišča kopali železovo rudo vse do leta 1900. Kemična analiza vzorca rude iz tega območja je res pokazala visok odstotek železa (54,59%). Nekateri vzorci rude Ilove gore imajo za izkoriščanje razmeroma ugoden odstotek SiO_2. Rudno telo na lokaciji Žitnik na območju Čušperka ima obliko 180 m dolge in 35 m široke leče, ki je konkordantna s plastmi talnine in krovnine. V talnini močno prevladujejo sivkasti oosparitini, onkosparitni in oonkosparitni apnenci s foraminiferami, algami, hidrozoji in spongijami. Najpomembnejši fosili so Cladocoropsis mirabilis, Trocholina elongata, Trocholina alpina *in* Salpingoporella annulata*. V krovnini so temnosivi do sivkastočrni plastnati apnenci, dolomitizirani apnenci in dolomiti z algami, gastropodi, foraminiferami in tintininami. Za biostratigrafijo so poleg tintinin najpomembnejše alge* Clypeina jurassica*, ki so bile pri nas razširjene v zgornjem malmu.*

V nahajališčih Ilova gora in Šopeh je glavna količina Al_2O_3 vezana na boehmite, v nahajališču Čušperk, kjer nastopajo boksitne gline, pa je količina Al_2O_3 vezana na boehmit, muskovit-illit, klorit in kaolinit. Fe_2O_3 je v vseh nahajališčih vezan na hematit in goethit, TiO_2 pa je vezan na anataz, brookit in rutil.

Obravnavani boksiti pripadajo "terra rossa" tipu boksitov oziroma kraškim boksitom. Boksiti raziskanega ozemlja so nastali v času poznokimmerijske faze, ki je bila razmeroma kratka. Premikanja, ki so povzročila nastanek kopna, so bila šibka in epirogenetskega tipa. To potrjujeta neizraziti paleorelief in konkordantna lega rudnih teles ter plasti talnine in krovnine. Na površini spodnjemalmske karbonatne skladovnice je potekalo preperevanje, izluževanje, raztapljanje, zakrasevanje in denudacija.

Boksitni material se je nakopičil v številnih majhnih depresijah, potem je nastopila boksitizacija, ki je zaustavila zakrasevanje karbonatnih tal. Transport netopnega ostanka karbonatnih kamnin se je dogajal s spiranjem, s površinskimi in podzemeljskimi vodnimi tokovi ter s pomočjo vetra. Sestava boksitov se znatno spreminja zlasti v vertikalni smeri, tako da boksit prehaja v glinasti boksit in boksitno glino.

Boksitna ležišča Ilove gore in Čušperka imajo majhen gospodarski pomen, saj imajo majhen obseg, nizko vrednost Al_2O_3 ter razmeroma visoko vsebnost Fe_2O_3 in SiO_2. Večina boksitne rude na območju Ilove gore in Čušperka je klasificirana kot C_1 zaloge.

Ključne besede: boksit, mineralna sestava, malm, Zunanji Dinaridi, Slovenija

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