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Investigations of Characteristic Assoociation of Lithofacies, Numerical Hierarchy of Bounding Surfaces, Geometry of Sedimentary Bodies, Architectural Elements, And Typical Sequences of Lower Triassic Braided Rivers of Clastites Kladnica Formation (SW Serbia)

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Abstract: The Clastites Kladnica Formation was investigated and defined in thirty nine measured sections in right bank of Kladnica river, Studena river and Lug Creek, on the road Ivanjica-Sjenica (SW Serbia). Selected nineteen representative sections and their details are described, discused and interpreted. The results are given in paper as a text, tables and figure attachments. All structural and textural characteristics of sedimentary rocks where researched and interpreted with measured dimensions of sedimentary bodies. Particularly where investigated internal and external stratification, two and threedimensional geometry of sedimentary bodies, characteristic associations of lithofacies, numerical hierarchy of bounding surfaces and analysis of architectural elements of fluvial sedimentary bodies. According to the all investigated characteristics and their analysis the typical sequences and created interpretation of their mechanism of transport and deposition and environments of sedimentation are defined. As the results of all mentioned detailed investigation are four mains topics. The first and second are determinations of typical sequences of channel facies of gravely andsandy predominated braided rivers. The third is designation of very well exposed typical sequences of various bar facies of sand predominated braided rivers. The fourth is confirmation of typical sequence of overbank facies. Also is created a graphic modelof gravely and sandy predominated braided river sedimentation environments and their facies.

Keywords: Clastites Kladnica Formation,braided rivers deposits, Lower Triassic,channels, bars, overbank, SW Serbia.

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I. INTRODUCTION

Investigated area belong to the South Western part of Serbia (Fig. 1-1). In geotectonic setting of Serbia [1] it is belong to Drina-Ivanjica Element which is composed of two blocks. In the north-west is a Drina block and in south is Ivanjica block. To the west this element is bounding with Ophiolite Belt and Eastbosnian-Durmitor Zone and to the east with Vardar Zone.

The Ivanjica block is composed of Paleozoic metamorphic rocks and overlying Continental Red Beds, olistoplakes of Triassic carbonate platform and various rocks of Jurassic Ophiolite Melange [2], [3].

In published maps of OGK Yugoslavia 1:000 000 the investigated Continental Red Beds are marked as following chronostratigraphic units: P; P,T; $^{3}P_{3}$-T_{1}; T_{1};T^{1}_{1} and $^{1}T_{1}$. Mentoined sediments are overlies everywhere discordantly across Paleozoic rocks and lies below Triassic carbonate formations in normal and tectonic contact.

Age was determined on the basis of superposition, and a small amount of palinomorphs (*Alisporites* sp.*, Verrucorsisporites* sp., cf. *Taeniasporites labdakus Klaus, Klausipollenites* cf. *chandbergeri, Araucariacites* sp., *Platisacus* sp.*, Cysadopites* sp., cf. *Aratrisporites saturni* th., *Pinuspollenites* sp.),and was pointed to Lower Triassic.

The Clastites Kladnica Formation was defined during the mapping of Geological Map of Serbia 1:50 000 in Western Serbia[4], [5]and during the investigations for magistar thesis and doctor disertation of paper author [6], [7], [8], (Fig. 1-2).

The Clastites Kladnica Formation overlying discordantly on the Paleozoic semimetamorphic and metamorphic rocks and below the Triassic preplatform and platform carbonate formationsin, predominantly decolmanecontact, and below formations of Ophiolite Melange (Fig.1-2).

The formation is defined in 39 measured sections in right bank of Kladnica river, Studena river and Lug Creek (Fig. 1-3). All columns are measured in sections of excaveted outcrops-profiles of new builded regional road Ivanjica-Sjenica (SW Serbia).

In paper are given the results of investigation of 19 representative columns of measured sections and discusion of their details using the methods of fluvial sedimentology[9], [10], [11].

II. METHODS

All methods presented and applied in this paper are possible to divide as a descriptive and interpretative. Also they are interactive and very oftenis it difficult to find the border between them.

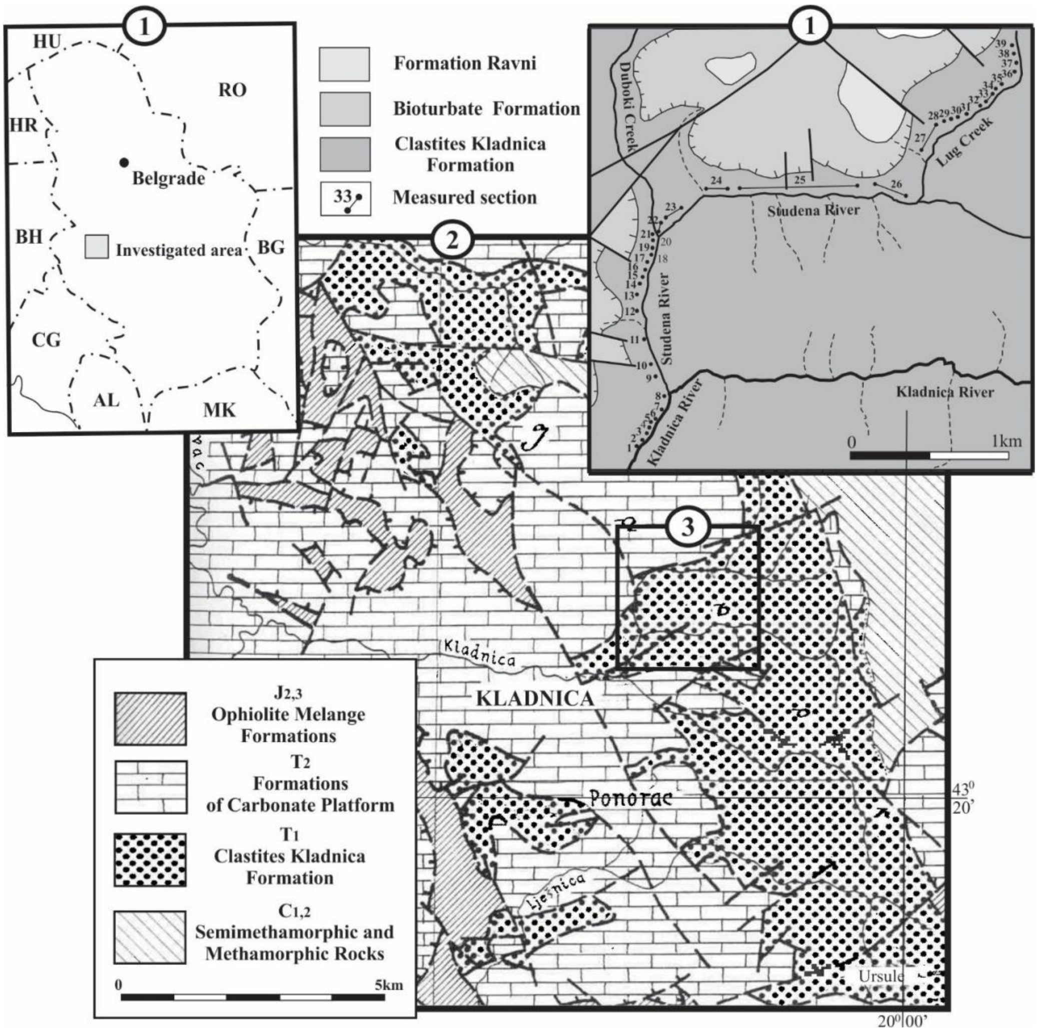

Fig 1.1-1 Location map.
1-2 Shematic geological map of investigated area.
1-3 Detail of shematic geological map and position of measured sections

On Table 1 are given the legend of all used abbreviations, codes, or acronims for all basic characteristic of rocks and some their interpretations. The next structural and textural characteristics of sediments where researched: lithology, sorting, roundness, grain size, relation of clast and matrix, dimension of sedimentary bodies, stratification and other important internal end external characteristic of rocks in generaly, sets, cosets, and other higher ranks of macroforms and their two and three dimensional geometry of sedimentary bodies.

Beside standard descriptive methodology of investigation of clastic sedimentary rocks are applied particular, specific descriptive - interpretative methodology: lithofacial analysis and synthesis (investigation of vertical and lateral migration and interpretation of association of lithofacies), characteristic association of lithofacies, numerical hierarchy of bounding surfaces, typical seqences for paricular genetic sedimentary seqences and analysis of architectural elements of fluvial sedimentary bodies.

This specific methodology are produce and specific terminology which is applied in this work (Table from 1 to 5). The lithofacial analysis [12], [13], [14], [15], [16], [17], as a descriptive-interpretative method with specific terminology and acronyms are presented separately of modelling method using the characteristic association of lithofacies and lithofacial assemblage for comparison of conclusions and for interpretation (Table 2).

Table 1 Legend of Used Abbreviations, Codes or Acronims and their interpretation

MPPhPha	MARK OF PROFILE, PHOTO OR PHOTOASSAMBLAGE in Table 4	MMf, s, g	MARK OF MACROFORM, SINGLE OR GROUP in Table 4

LITOLOGY Table II			
ClSil	Clayey Siltstone	MgS	Medium grained Sandstone
Sil	Siltstone	CgS	Coarse grained Sandstone
SSil	Sandy Siltstone	VcgS	Very coarse grained Sandstone
SilS	Silty Sandstone	SC	Sandy Conglomerate
S	Sandstone	CS	Conglomeratic Sandstone
VfgS	Very fine grained Sandstone	C	Conglomerate
FgS	Fine grained Sandstone	B	Breccia

S	SORTING in Table 4	R	ROUNDING in Table 4
vgS	Very good Sorting	vgR	Very good Rounding
gS	Good Sorting	gR	Good Rounding
mS	Medium Sorting	mR	Medium Rounding
bS	Bad Sorting	bR	Bad Rounding, subangular grains
vbS	Very bad Sorting	vbR	Very bad Rounding, angular grains

GS,mm, r, a	GRAIN SIZE IN mm, RANGE, AVERAGE in Table 4	C:M%	RELATIONS CLAST:MATRIX % in Table 4

Dsb, m, w	DIMENSION OF SEDIMENTARY BODY, METERS, WIDTH in Table 4

Dsb, m, t	DIMENSION OF SEDIMENTARY BODY, METERS, THICKNESS in Table 4

TEXTURES AND STRUCTURES in Table 4			
mb	Masive bedding	rb	Ripple bedding
thb	Thick bedding	rl	Ripple lamination
tnb	Thinbedding	i	Imbrication
hb	Horisontal bedding	ngb	Normal graded bedding
hl	Horisontal lamination	igb	Inverse graded bedding
tpcb	Tabular planar cross bedding	cgb	Composite gradded bedding
tpcl	Tabular planar cross lamination	es	Erosional surface
tacb	Tabular asimptotic cross bedding	ech	Erosional channel
tacl	Tabular asimptotic cross lamination	tmf	Traces of mud flow
tcb	Trough cross bedding	l	Lag
tcl	Trough cross laminations	m	Micaceous

GSB, 2d	TWODIMENSIONAL GEOMETRY OF SEDIMENTARY BODIES in Table 4	GSB, 3d	TREEDIMENSIONAL GEOMETRY OF SEDIMENTARY BODIES in Table 4
re	Rectangle	s	Sheet
tri	Triangle	w	Wedge
tra	Trapezoide	se	Segment
pl	Planar lens	c	Cone
cl	Convex lens	ch	Channel
l	Lens	ri	Ribbon

CAL	CHARACTERISTIC	NChBS	NUMERICAL CHIERARHY OF

	ASSOCIATION OF LITHOFACIES in Table 5		BOUNDING SURFACES in Table 5

AEA, s, g, p	ARCHITECTURAL ELEMENT ANALYSIS, SOLITARY, GROUP, PART in Table 5

IMD	INTERPRETATION OF MECHANISM OF DEPOSITION in Table 4	IMT	INTERPRETATION OF MECHANISM OF TRANSPORT in Table 4
A	Aggradation	**bl**	**B**ed **l**oad
LA	Lateral accretion	**sl**	**S**uspended **l**oad
P	Downstream cccretion - progradation	**mf**	**M**ass **f**low
IPFDS	**INTERPRETATIO NOF PART OF FLUVIAL SEDIMENTARY ENVIRONMENT in Table 5 (textually)**	**df**	**D**ebris **f**low
		gf	**G**ravity **f**low

The study of geometry of fluvial sedimentary bodies is one of the most important point of investigation in fluvial sedimentology (Fig. 2). Here are presented the most common shapes of alluvial bodies in 2-d and 3-d measured parameters of dimension of this sedimentary bodies[16],[18].

Analysis oh hierarchy of bounding surfaces are presented with the typical lateral extend and typical thickness (Table 3-1) [19], [20], [21], [22], [23], [24], [25], [26], [27].

The analysis of architectural elements of sedimentary bodies as a method for investigation of alluvial deposits [20], [24],are applied in interpretation sense. The specific terminology and acronyms of this method are presented with explanation (Table 3-2).

The typical sequences of particular fluvial sedimentary environments are defined according to all factors, specially according to characteristic associations of lithofacies and architectural elements.

Table 2 Lithofacies and structures in paleoalluvial deposits (modified, after[13],[14])

LITHO FACIES CODE	LITHOFACIES DESCRIPTION	SEDIMENT STRUCTURES
Gms	Gravel, massive, matrix supported.	None
Gm	Gravel, massive or crude bedding.	Horizontal stratification, imbrication.
Gt	Gravel, stratified.	Trough cross stratification.
Gp	Gravel, stratified.	Planar cross stratification.
St	Sand, medium to very coarse grained, can be and gravely.	Planar or grouped trough cross bedding.
Sp	Sand, medium to very coarse grained, can be and gravely	Single or grouped planar cross bedding.
Sr	Sand, very fine to coarse grained.	Ripple marks of all type
Sh	Sand, very fine to coarse grained.	Horizontal lamination, parting lineation or flow lineation.
Sl	Sand, fine grained.	Smal angle (< than 10^{o}) of cross bedding.
Se	Sand, erosional scours with intraclasts.	Crude cross bedding.
Ss	Sand, fine to coarse grained, can be and gravely.	Broad, shallow flooding, including and “eta” cross bedding.
Sse,She,Spe	Sand	Same as a Ss, Sh and Sp.
Fl	Sand, silt, clay silt, mud.	Fine lamination, very small ripples.
Fcs	Silt, clay silt, mud.	Laminated to massive.
Fct	Clay silt, mud.	Massive , dessication cracks.
Fr	Silt, clay silt, mud.	Plants roots.
C	Coal, carbonaceous mud.	Plants, mud films.
P	Carbonate	Pedogenic features.

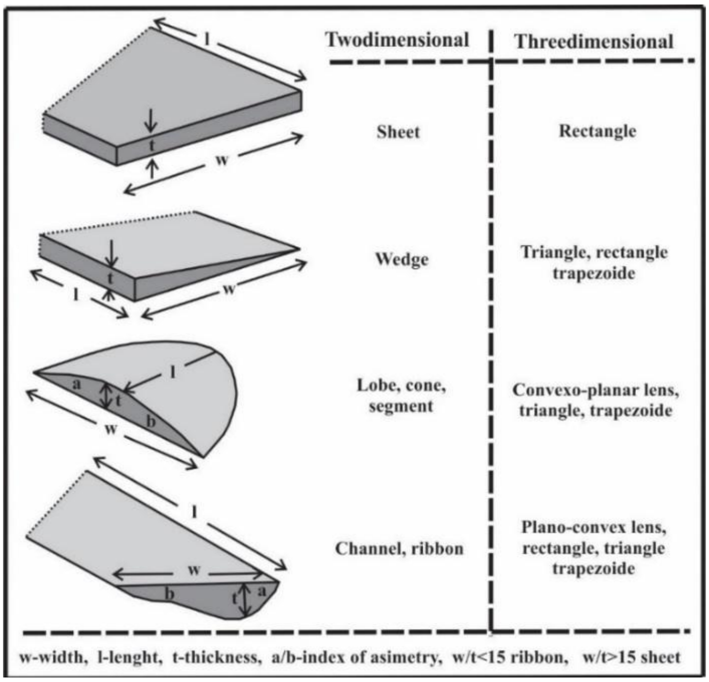

Fig. 2. The most frequent geometric shapes of sedimentary bodies in twodimensional and threedimensional sections with terminology and parameters that are measured for quantitative descriptions (modified, after [13])

Table 3-1 Chierachy of bounding surfaces in depositional units (modified, after [22],)

Table 3-2 Lithofacies in architecrural elements (modified, after, [24]; modified after [20])

①

RANK ORDER	DEPOSITIONAL UNIT	TIPICAL LAT. EXTEND (m)	TYPICAL THICK. (m)
1	Bed-form set	10^0 -10^1	0.2-0.5
2	Bed–form coset	10^1 - 10^2	1-5
3	Macroform increment, seasonal deposits	10^1 - 10^2	1-15
4	Macroform, minor channel	10^1 - 10^2	1-15
5	Main channel, major flood unit	10^2 - 10^3	1-15
6	Channel belt, paleo-valey, highest-order sequence, endr of Fm	10^2 - 10^4	20-200 or more

②

ELEMENT	SYMBOL	LITHOFACIES ASSEBLAGE
Channel.	CH	Any combination.
Gravel bars and bedforms.	GB	Gm,Gp,Gt
Sandy bedforms.	SB	St,Sp,Sh,Sl,Sr,Se,Ss
Downstream accretion macroforms	DA	St,Sp,Sh,Sl,Sr, Se,Ss
Lateral accretion macroforms.	LA	St,Sp,Sh,Sl,Sr,Se,Ss, Gm,Gt, Gp
Sediment gravity flow.	SG	Gm,Gms,Sm
Laminated sand sheets.	LS	Sh,Sl, minor St,Sp,Sr.
Overbank fines.	OF	Fm,Fl,P,Fr
Interfluvial dunes.	ID	Spe,She,Sre

III. RESULTS

The interpretational data given in Table 4 are conclusions about characteristic assotiation of lithofacies, numerical hierarhy of bounding surfaces and definition architectural elements. According to these conclusions mechanism of transport and depositionare interpreted.

The final conclusions are interpretation of the part of fluvial sedimentary environments (Table 5). The four parts of braidded rivers sedimentary environments are detected:

1. Channel sequences of gravely predominated part of braided rivers deposits
2. Channel facies of sandy predominated part of braided rivers deposits
3. Bar facies of sandy predominated part of braided rivers deposits
4. Overbank facies as a deposits of distal part of alluvial plain

The measured sections and their detail marked as a F-KK-1, F-KK-2, F-KK-3 and F-KK-8 are interpreted as a **channel sequences of gravely predominated part of braided rivers deposits** in upper medial part of alluvial plain (Table 5 and Fig 3-1, 3-2).

On this sections and their details are interpreted architectural elements of channel type are with external bounding surfaces of 3rd order. The conglomerates have gravels up to 35mm in size. Internal stratifications are lightly cross planar tabular, through and horizontal. It is characteristic a lateral migration of G lithofacies: Gm-GP, Gm-Gt and Gms-Gm. The section shape are trapezoidal and irregular lens which are indicate the channel geometric forms and channel ribbons. Architectural elements are interpreted as a products of agradational fills of small proximal channels.

On Fig. 3 are exposed one part of section 2 and one detail. On the left side (Fig. 3-1) is exposed four sequences of conglomeratic rocks as a product of aggradational sedimentation. The conglomeratic seqences are deposed in small channels of braided rivers.

On right side (Fif. 3-2) is exposed detail of 3-1. It is a part of conglomeratic sequence with light inverse gradation and light imbrication. Bed load transport. Partially progradational and dominantly aggradational deposition in small channels. Between bounding surfaces 2rd and 3rd order are detected channel lag deposits.

The measured sections and their detail marked asF-KK-6A, F-KK-6B, F-KK-33A, F-KK-33B, F-KK-33C (Table 5, Fig. 4) are recognized**channel facies of sandy predominated part of braided rivers deposits.** The typical sequence of very well exposed and superimposed channel facies of sandy predominated braided rivers are defined. The typical sequence of 4m is represent of this profile (dimension of 15x10m) and of many others in this locality. All macroforms are defined by bounding surfaces of 3rd order and all of them are same channel type. The sandy bedforms (SB) are internal architectural elements of channel facies. The beginning of first macroform is covered. The rocks are pink reddish sandstone mostly horizontally bedded and laminated.They laterally transit into cross tabular planar bedding and lamination. Characteristic association of lithofacies are Sh, Sp, Se.

This part of macroform is interpreted as a internal sandy bedforms type.The last, sandy phase of deposition is interpreted as a big channel. The red color pigment is hematite which is sin depositional and sin diegenetic [28]. The overlying macroforms have BS of 2rd order between conglomeratic and sandy part of sequence and sandy and fine-grained part if exist. Well exposed cross and horizontal bedding and lamination in sandy part of macroforms and horizontal lamination in fine-grained part. Characteristic association of lithofacies is Gm-Gp (Gt), Sp-St,Sh, Fl. Geometry of AE is typical channel forms: sections of convex-planar lens which indicate channel ribbons.

Table 4 Basic characteristic of rocks of Clastites Kladnica Formation

MMPh Pha	**MM f, s, g,**	**Litholog y**	**S**	**R**	**GS,m m r, a**	**C:M %**	**Dsb m,w**	**Ds b m,t**	**Textures Structures**	**GSB 2d**	**GSB 3d**
F-KK-1	1g	C,CS,SC, VcgS-MgS	bS, vbS	mR, gR	0,5-35 6	40:60 60:40	5-15	<2	mb, tpcb,tcb, es, ngb,i	pl,cl, p,tz	ch,ris, w, se
F-KK-2	1s	C,CS,SC, VcgS-MgS	bS, vbS	mR, gR	0,5-20 5	50:50	-	-	mb,tbcb,ig, i	-	-
F-KK-3	1s	C,SC,CS, VcgS	vbS	sR, mR	0,3-30 2,5	40:60	-	-	mb,tbcb,ng b,i	-	-
F-KK-8	1s	C,SC,CS, VcgS	vbS	sR, mR	0,5-20 0,7	40:60	-	-	ms,i	-	-
F-KK-6A	1g	C-Sil	mS, vbS	mR, gR	0,01-10 0,5	-	20-50	<3	tpcb-l,tacb-l, hb,tcb-l,es,i, ngb,ech	re,tri, tra,pl, cl	w,se,c , ch,ri
F-KK-6B	1g	C-Sil	mS, vbS	mR, gR	0,01-10 0,5	-	20-50	<3	tpcb-l,tacb-l, hb-l,tcb-l, es,i,ngb,ech	re,tri, tra,pl, cl	w,se,c , ch,ri
F-KK-33A	1s	VcgS-FgS	mS, gS	mR, gR	0,1-5 0,5	-	>30	<3	tpb-l,tcb-l, hb-l,es	re,tri, tra,l	s,w,se ,c
F-KK-33B	1g	C,SC,CS, CS-VcgS, FgS,Sil,S Sil	mS, vbS	mR, vgR	0,01-2 0,7	-	>50	<3	ms,tpcb-l,hb-l, tcb-l,i,ech, es,ngb	re,tri, tra,pl, cl	s,w,se , c,ch,ri
F-KK-33C	1g	C,CS,SC, VcgS-	vbS	mR, gR	0,1-25 0,5	-	>10	>2	ms,hb-l,es, tbb-l,i,ngb	tri,tra, re	ch,w

		Ssil, Sil									
F-KK-30	1s	MgS,FgS , CS,VcgS	mS, gS	mR, gR	0,1-2 0,5	-	>20	>10	tpcb-l,hb-l,es	re,tri, tra,l	s,w,c
F-KK-32A	1s	C-Sil	mS, vgS	mR, vgR	0,01-3 0,1	20:80	>15	<5	ms,hb-l,ngb, tpcb-l	re,tri, tra	c,ch,ri
F-KK-32B	1s	C,SK-FgS, Ssil,Sil	mS, vgS	mR, vgR	0,01-5 0,3	-	-	-	tpb-l,es,hb-l	re,tri, tra	se,c,ch,ri
F-KK-32C	1s	C,SC,CS, VcgS-MgS	mS, vbS	mR, gR	0,5-4 0,2	15:85	-	-	ms,tpb-l,ngb	-	-
F-KK-25A	1g	CS,SC, VcgS, MgS, FgS,VfgS , SSil	mS, bS	mR, vgR	0,05-15 0,7	-	>50	<10	tpcb-l,tacb-l, tcb-l,hb-l,es	tri,tra, re,l	s,w,se ,c
F-KK-25B	1g	CS,SC, VcgS, MgS, FgS,VfgS , SSil	mS, bS	mR, vgR	0,05-15 0,7	-	>50	<10	tpcb-l,tacb-l, tcb-l,hb-l,es	tri,tra, re,l	s,w,se ,c
F-KK-25C	1s	CS,VcgS, SC,MgS, FgS,VfgS , SSil	mS, bS	mR, vgR	0,01-10 0,5	-	-	-	tpcb-l,tacb-l, tcb-l,hb-l,es	-	-
F-KK-26A	1s	FgS,VfgS , S-Sil, Sil, ClSil	vgS	vgR	0,01-1 0,05	-	>10	<0,1	hl,tpkl	re	s
F-KK-26B	1g	FgS,VfgS , S-Sil, Sil, ClSil	vgS	vgR	0,01-1 0,05	-	>10	<0,1	hl,tpkl	re	s
F-KK-36	1g	FgS,VfgS , SSil,Sil, ClSil	mS, vgS	mR, vgR	0,01-0,5 0,05	-	>10	<3	hb-l,tpcb-l, Tcb-l,ngb,ls	-	-

On Fig 4-1. is very vell exposed channel facies of sandy predominated braided rivers and one detail (Fig. 4-2) which is discused and all methods of fluvial sedimentology is appllied.

In measured sections and their details marked as a F-KK-30, F-KK-32A, F-KK-32B, F-KK-32C, F-KK-25A, F-KK-25B, F-KK-25C are defined **bar sequences of sandy predominated braided rivers.** The typical sequence are macroforms (architectural elements) divided by bounding surfaces of 3rd order. Bounding surfaces of 2rd order are between internal macroforms formed of composite sets and cosets (BS of 1rd order) of very well exposed tabular planar and asymptotic and cross through lamination. Sets are composed mostly of coarse grained to medium grained pink reddish sandstones and fine grained sandstones.

Table 5 Interpretations of basic characteristic of Clastites Kladnica Formation

MMPhPha Table I	CAL Table IV	NChBS Table V	AAE Table			IMT	IMD	PART OF FLUVIAL SEDIMENTARY ENVIRONMENT
			s	g	p			
F-KK-1 **F-KK-2** **F-KK-3** **F-KK-8**	Gma,Gm (Gp,Gt) Gms,Gm	3,4 -	CH -	- -	CH GB	mf,bl mf,bl	A A	**Channel facies of gravely predominated part of braided rivers deposits.** **Upper medial part of alluvial plain.**
F-KK-6A **F-KK-6B** **F-KK-33A** **F-KK-33B** **F-KK-33C**	Gm,Gp,Gt, Sh,Sp,Se,Sr Gm,Sp,St,Sh, Sp,St,Sr,Se,Fl Sp,St,Sr,Se,Fl	1,2,3, 1,2,3, 2,3,	CH CH CH	- CH CH	- CH CH	bl,sl bl,sl bl,sl	A(LA) A(LA) A(LA)	**Channel facies of sandy predominated part of braided rivers deposits.** **Medial part of alluvial plain.** **Lower medial part of aluvial plain.**
F-KK-30 **F-KK-32A** **F-KK-32B** **F-KK-32C** **F-KK-25A** **F-KK-25B** **F-KK-25C**	Sh,Sp,Sh Gm,(Gp),Sh Sp,(St,Fl) Sp,St,Sh,Se,Sr	1,2,3 1,2,3 1,2,3,	- - LA- DA	- CH -	SB - LA- DA	sl bl,sl sl	LA-A A(LA) LA- DA	**Bar facies of sandy predominated part of braided rivers deposits.** **Medial part of alluvialn plain.**
F-KK-26A **F-KK-26B** **F-KK-36**	Gm,(Gp),Sh,Sp, Sp,Sh,St,Sr,Sl	1,2,3, 2,3,	LA OF		LA -	bl-sl sl	- LA	**Overbank facies deposits of distal part of alluvial plain.**

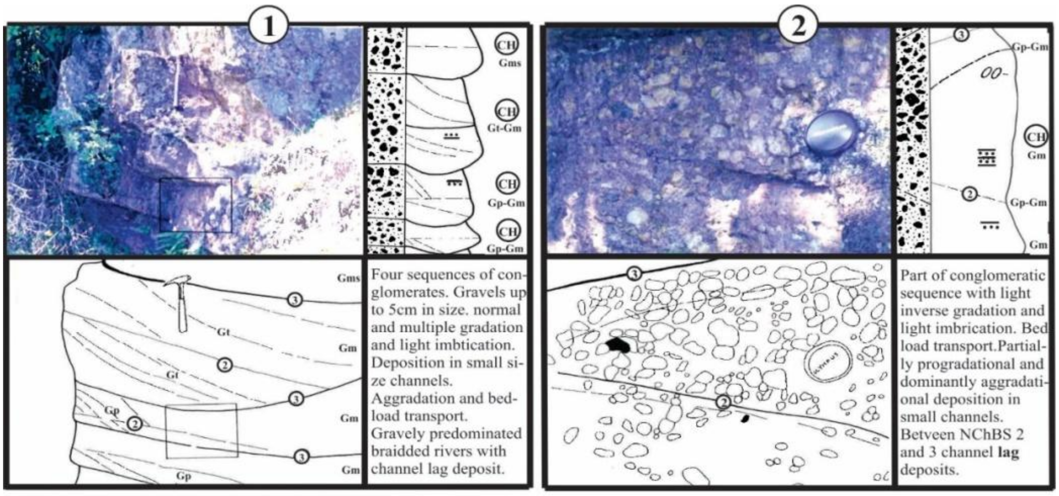

Fig. 3. Two details of measured sections 2
3-1 Channel facies of gravely predominated part of braided rivers deposits.
3-2 Detail with channel lag deposits

On Fig 4-1. is very vell exposed channel facies of sandy predominated braided rivers and one detail (Fig. 4-2) which is discused and all methods of fluvial sedimentology is appllied.

In measured sections and their details marked as a F-KK-30, F-KK-32A, F-KK-32B, F-KK-32C, F-KK-25A, F-KK-25B, F-KK-25C are defined **bar sequences of sandy predominated braided rivers.** The typical sequence are macroforms (architectural elements) divided by bounding surfaces of 3rd order. Bounding surfaces of 2rd order are between internal macroforms formed of composite sets and cosets (BS of 1-2rd order) of very well exposed tabular planar and asymptotic and cross through lamination. Sets are composed mostly of coarse grained to medium grained pink reddish sandstones and fine grained sandstones.

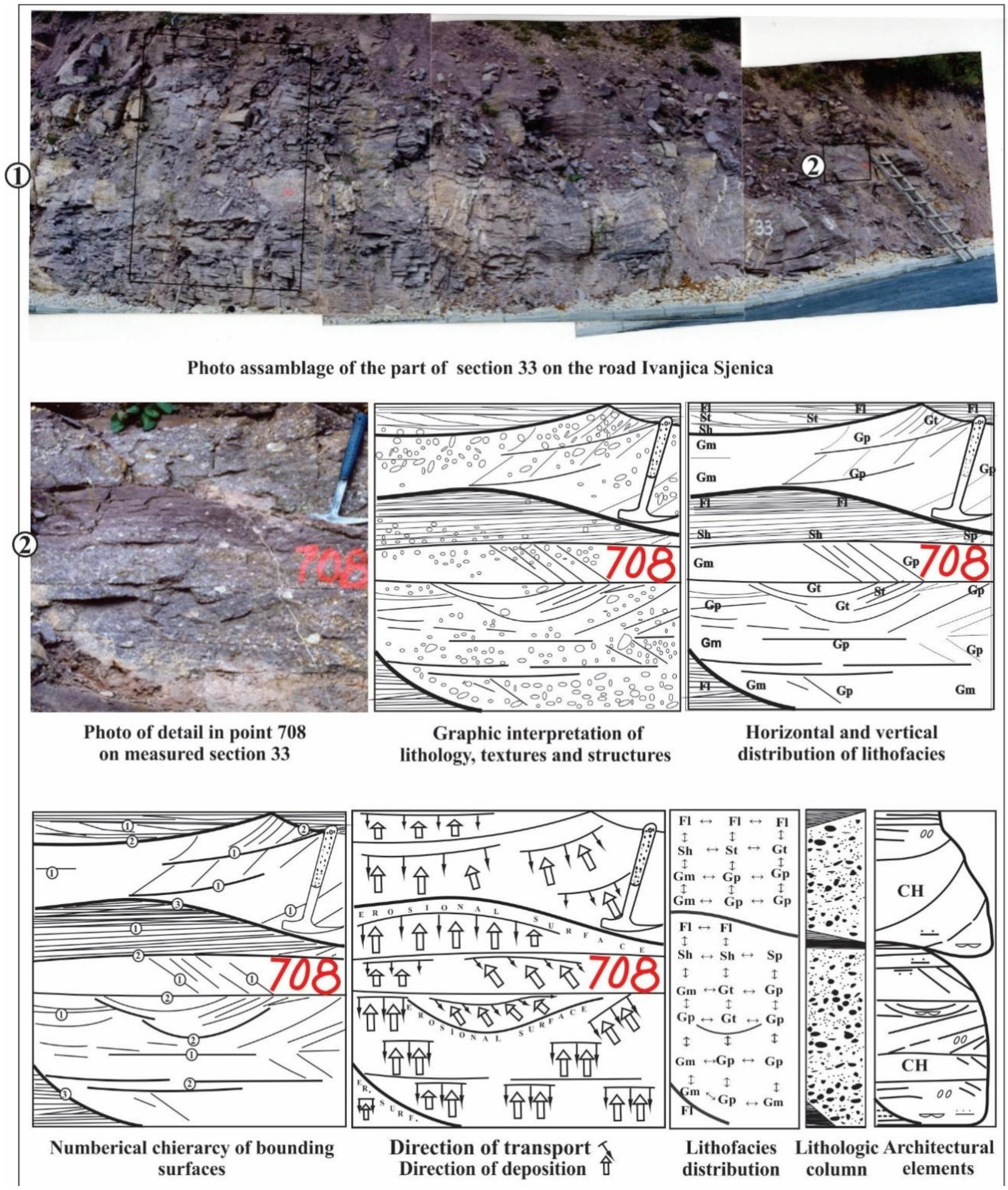

Fig. 4-1. View of one part of measured section 33.
4-2. Fluvial sedimentological dicusion of detail on point 708, of sandy predominated chanel facies of braided rivers deposits

Conglomerate sets and siltstone sets are rare. Solitary grains of gravel are frequent.Characteristic association of lithofacies is Sp, St, Sh, (Gm), Se, Sl, Fl. All lateral migration of S lithofacies are possible in any combination. 2-dimensional section of sediments bodies are trapezoids, lens, triangle and other irregular forms which are indicate wedge, lobe and cone 3-dimensional forms. AE are interpreted as a LA-DA type deposits which are product of lateral accretion and downstream accretion.

On Fig. 5-1. are a view of several meters of one part of very well exposed bar sequences of sandy predominated braided rivers deposits in measured section 25 and one small detail is dicussed (Fig. 5-2).

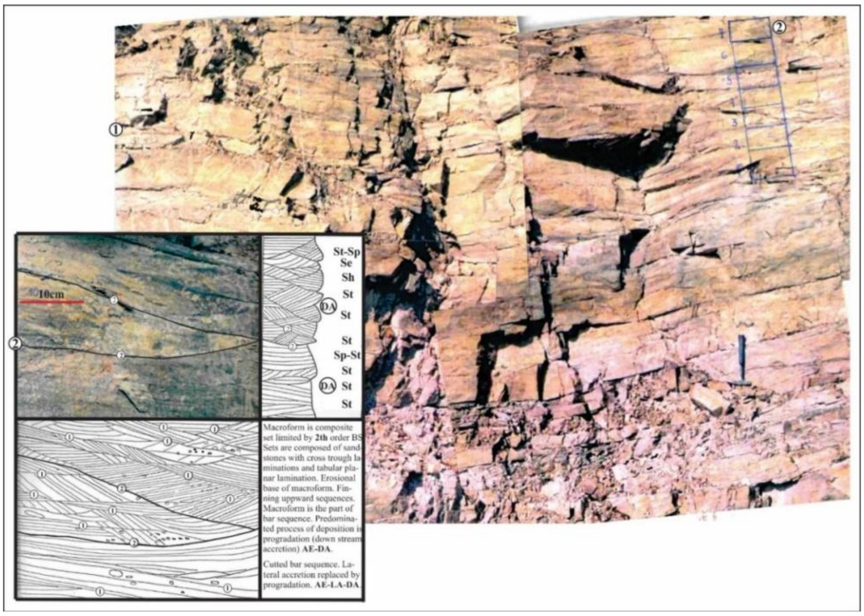

Fig. **5-1.**View of one part of measured section 25.
5-2. Dicussion of one small detail of bar facies of sandy predominated braided rivers deposits

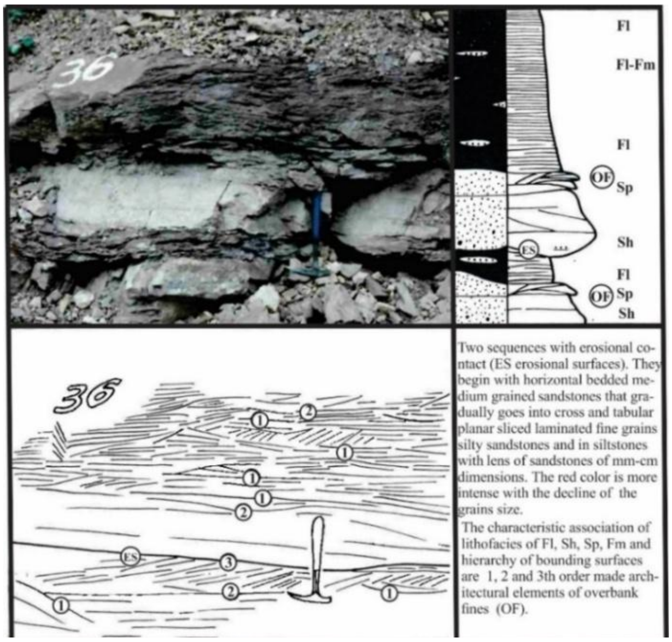

Fig. 6. Detail of measured section 36.
Two well developed sequences of overbank fines - architectural elements AE-OF

On the measured sections marked as a F-KK-26A, F-KK-26B, F-KK-36 are recognised the typical sequence of **overbank facies deposits** of distal part of alluvial plain. They are defined as a architectural elements of overbank fines (OF) type with characteristic association of lithofacies Fl, Fm and Sh and hierarchy of bounding surfaces of 2rd and 3rd order. This is product of periodical gradational filling of overbank space. In fig. 6 is presented well exposed deposits of overbank sedimentations.

IV. CONCLUSIONS

The braided rivers deposits of Clastites Cladnica Formation are overlied discordantly the Lower and Middle Carboniferous semimetamorphic and metamorphic rocks and below the Triassic preplatform and platform carbonate formations in tectonic, predominantly decolmane, contact, or below formations of Ophiolite Melange.

The Clastites Kladnica Formation was investigated and defined in 39 measured sections in right bank of Kladnica river, Studena river and Lug Creek. All columns are on regional road Ivanjica-Sjenica.

The 19 representative sections and their details are described, discused and interpreted and results are given as a text, tables and figure attachments.

The all structural and textural characteristics of sediments where researched. The two and threedimensional geometry of sedimentary bodies, characteristic associations of lithofacies, numerical hierarchy of bounding surfaces and analysis of architectural elements of fluvial sedimentary bodies are defined.

According to the all investigated characteristics and their analysis are interpreted typical sequences and interpretation of their mechanism of transport and deposition and interpretation of environments of sedimentation are created.

It is determinated typical sequence of gravely and sandy predominated braided rivers of channel facies and bar facies and typical sequence of overbank facies (Fig. 7).

It is created a model of gravely and sand predominated braided river sedimentation environments and their facies (Fig. 8).

In **gravel predominated channel** facies architectural elements of channel type have characteristic association of lithofacies of Gms, Gm, (Gp, Gt,). The hierarchy of bounding characteristic association of lithofacies of Gms, Gm and they are product of dominantly aggradational bed filling.

Sand predominated channel facies are characterized with architectural elements of channel type (internal architectural elements of sandy bedforms type) and characteristic association of lithofacies Gm, Gp, Sh, St, Sr, Se and Fl and hierarchy of bounding surfaces of 1rd, 2rd, 3rd order. The deposits are formed by aggradational bed filling as a dominant mechanism of deposition which are frequently changed to the lateral accretion and, rarely, progradational bed filling.

In very well developed **bar facies** are noted the architectural elements of lateral accretion macroforms – downstream accretion macroforms with characteristic association of lithofacies Sp, St, Sh, Se Sr and hierarchy of bounding surfaces of 1rd, 2rd, and 3rd order. The deposition mechanism are predominantly suspensional and lateral accretion are frequently changed with downstream accretion.

With aggradational bed filling are formed, in overbank space, the architectural elements of **overbank fines** with characteristic association of lithofacies Fl, Sh, Sp, Fm and in which are hierarchy of bounding surfaces of 2rd, and 3rd order.

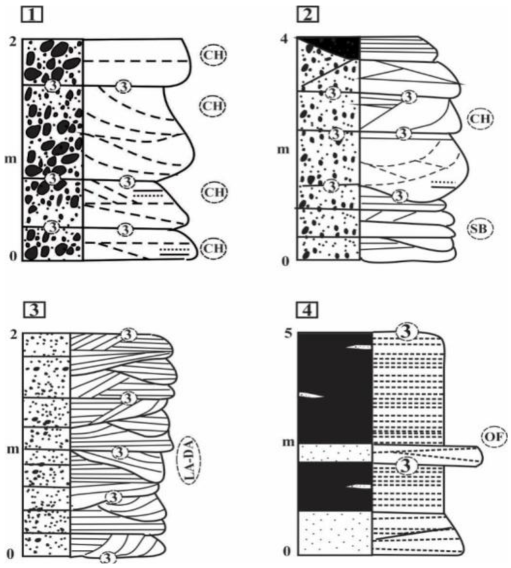

Fig. 7. Typical sequences of braided river deposits of Clastite Kladnica Formation
7-1. Gravely predominated channel facies
7-2. Sand predominated channel facies
7-3. Sandy predominated bar facies
7-4. Overbank facies

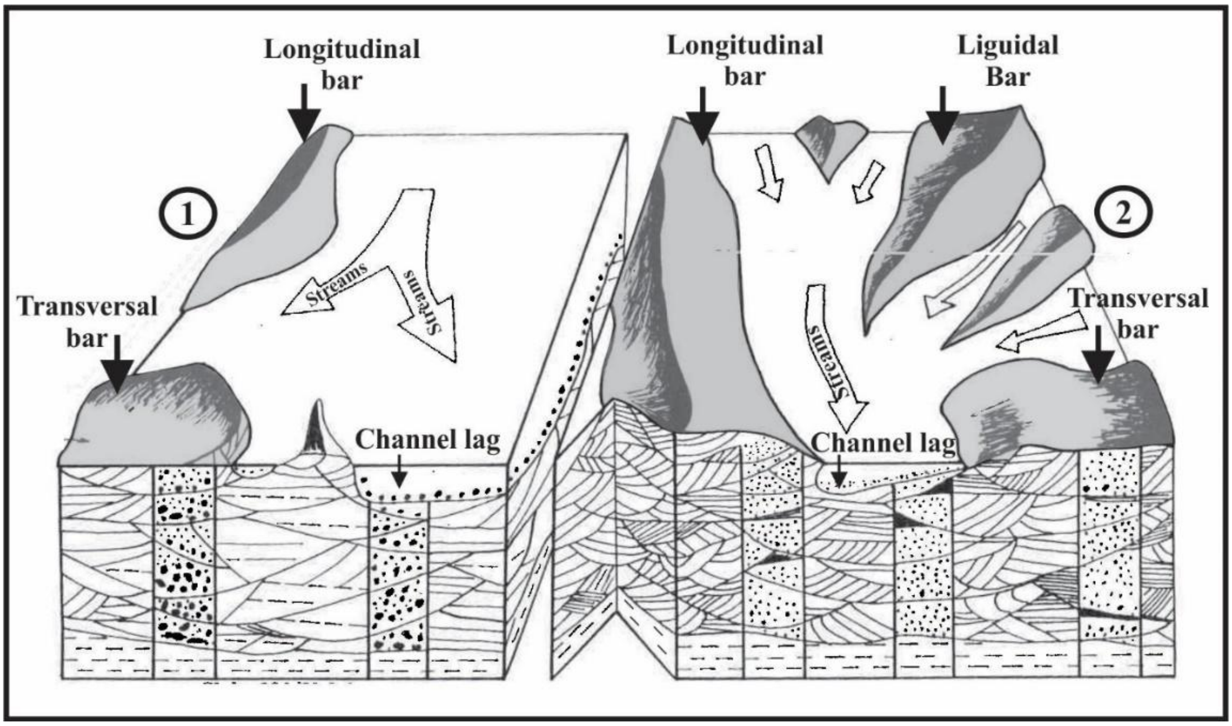

Fig. 8. Simplified shematic models of two types of braided river depositin
8-1. Model of gravely predominated braided river deposits
8-2. Model of sandy predominated braided river deposits

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