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A REVIEW OF THE C14 SERIES OF DATES FROM ĐERDAP

Abstract. – In this small contribution the author tried to arise an interest for radiocarbon dating in Serbia and especially in the region of Đerdap, which is important for many reasons. This article brought a list of all available C 14 dates for Đerdap, both from Serbian and Rumanian sites. For the first time the calibration of radiocarbon dates had been made using uniform method of calibration.

When now already world famous Lepenski Vir, was discovered in the sixties it echoed as a first rated scientific sensation. Since then, during that first campaign in the region of Đerdap, numerous sites have been excavated, astonishingly, with the complexity, abundance and the beauty of finds, both scientists and laymen. One after another new sites were discovered, containing archaeological material ranging from the early Mesolithic to the Medieval period. However, the greatest surprise was the discovery of Lepenski Vir culture, of interest for many scientific and popular studies.¹ The importance of this phenomenon has inspired archaeologists to make an inter-disciplinary approach to this problem. Today we have results of different sciences, including archaeology, physical and cultural anthropology, pedology, palinology, and physics.

Returning to this subject may appear obsolete, but the importance and complexity of Đerdap discovery can most certainly approve this article. In the middle of this century different dating techniques that emerged from laboratories initiated arguments among archaeologists, and some results of radiocarbon dating from Đerdap could, if left un-commented, bring up another round of disagreement. That was the main reason we decided to write this article with a distance of more

¹ D. Srejskić, *Lepenski vir*, Beograd 1968; D. Srejskić i Z. Letica, *Vlasac – mezolitsko naselje u Đerdapu*, Beograd 1978.

than 25 years, which could help confirm or perhaps definitely neglect certain dates.

Radiocarbon dating was conducted on samples from Lepenski Vir, Vlasac, Padina, Icoana, Ostrovul Corbului, Ostrovul Banului, Cuina Turcului and Alibeg. Results of this dating are scattered all over literature and were most frequently commented in their uncalibrated form, and when calibration actually took place, often happened that different dates calibrated using different calibration curves were used, thus obtaining methodologically incorrect conclusions.² Here, all C14 dates published will be gathered calibrated³ and commented on in the way suggested by H. T. Waterbolk:

C14 dates from Lepenski Vir

Lepenski Vir is certainly one of the most significant sites of the Central Balkan area. Not only for its sculptures of exquisite beauty, the first such in prehistoric archaeology, but also for the importance of its stratigraphy. This site eponymous for the Mesolithic culture of this region, today covered with waters of artificial lake, was situated 14 kilometers up stream from Donji Milanovac, under the cliffs of Korso hill. Lepenski Vir was discovered in 1960, and systematic excavations took place in 1965 under the supervision of D. Srejović. The periodization of this site covers three phases I – III (with subphases I a–e and III a–b). Dwelling horizons on this site contain evidences of transition from the Mesolithic to the Neolithic periods. The mobiliary characteristic for the Mesolithic period from the lower horizons is succeeded with the Starčevo type Neolithic pottery in the upper ones.

Radiocarbon dating was conducted on 12 samples in the laboratory in Berlin, and one sample dated in the laboratory in Zagreb.⁴

All these dates were obtained according to the old half-life which was estimated 55706±30 years. This series of dates was done in the beginning of dating of archaeological sites in this part of the world, and could not be compared to any other series of dates. But soon other samples, from other related sites from Đerdap were gathered and comment on them will be made subsequently.

C14 dates from Vlasac

This predominantly Mesolithic site is situated near the entrance to the Donji Milanovac Gorge, only 3 kilometers downwards from Lepenski Vir. In the year 1970, a wide range of excavations were undertaken by D. Srejović and

² H. T. Waterbolk, *Ten guidelines form interpretation of radiocarbon dates, 14C and Archaeology*, PACT 8, Strasbourg 1983; Н. Н. Тасић, *Можљивости коришћења различитих метода айсолућној датовања*, Археологија и природне науке, Београд 1992.

³ According to the Computer calibration program, Pearson & Stuiver, 1986.

⁴ H. Quita & G. Kohl, *Neue Radiokarbonaten zum Neolithikum und zur frühen Bronzezeit Südost-Europas und der Sowietunion*, Zfa, Berlin 1969; The sample for this analysis is roughly determined in phase L. V. I.

Red. br.	Sleji	Lab. N°	C14	Presek cal. krivulje	1σ	2σ	Verovatnoća	
							1σ BC	2σ BC
1	L.V. II	Bln-655	6560 ± 100 BP	6484 BC	6560-6380 BC	6640-6246 BC	6560-6370 100%	6640-6310 96%
2	L.V. II	Bln-654	6430 ± 100 BP	6535 BC	6430-6480 BC	6720-6340 BC	6640-6470 86%	6670-6350 96%
3	L.V. II	Bln-650	6420 ± 100 BP	6450 BC	6760-6620 BC	6669-6480 BC	6800-6620 91%	6880-6500 96%
4	L.V.I(7)	Bln-652	6420 ± 100 BP	6510 BC	6630-6480 BC	6714-6340 BC	6630-6470 96%	6714-6340 87%
5	L.V.Ie	Bln-676	6420 ± 100 BP	6690 BC	6750-6620 BC	6959-6480 BC	6800-6620 96%	6880-6500 97%
6	L.V.Ie	Bln-647	6445 ± 100 BP	6718, 6671, 6669 BC	6810-6630 BC	6960-6630 BC	6830-6620 100%	6960-6660 100%
7	L.V.IId	Bln-678	6400 ± 100 BP	6727 BC	6820-6630 BC	6970-6540 BC	6840-6630 100%	6960-6560 100%
8	L.V.IId	Bln-649	6400 ± 100 BP	6645 BC	6740-6675 BC	6964-6480 BC	6780-6560 100%	6850-6480 96%
9	L.V.IId	Bln-679	6400 ± 100 BP	6741 BC	6961-6640 BC	6980-6667 BC	6840-6640 94%	6980-6610 96%
10	L.V.IId	Bln-679	6400 ± 100 BP	6741 BC	6951-6640 BC	6980-6667 BC	6840-6640 94%	6980-6610 96%
11	L.V.Ib/c	Bln-653	7040 ± 100 BP	6999, 6990 BC	6033-6750 BC	6100-6660 BC	6990-6770 100%	6080-6710 88%
12	L.V.Ie	Bln-740a	7310 ± 100 BP	6122 BC	6223-6008 BC	6410-6070 BC	6230-6070 80%	6400-5980 100%
13	L.V.Ie	Bln-740b	7360 ± 100 BP	6174 BC	6377-6090 BC	6430-6088 BC	6260-6090 ⁵ 76%	6430-6070 94%
14	L.V.I (7)	Z-115	6200 ± 210 BP	6215 BC	6340-6901 BC	6530-6880 BC	6340-6930 85%	6540-6680 100%

Table 1.

Z. Letica.⁵ Occupational horizon showed four phases named Vlasac Ia-b, II and III. Above the stratum Vlasac III in the eastern sector of the site, the Early Neolithic stratum was found, with coarse ware, decorated occasionally with impresso ornament. The site is evidently closely related to Lepenski Vir.

Samples for a radiocarbon analysis were gathered from different cultural horizons, and were aimed at showing a complete image of the chronology of this settlement. These samples were sent to laboratories in Berlin, Zagreb and the La Jolla / Los Angeles University. There are 17 results from 15 samples. These results were calibrated and shown in the following table.

C14 dates from Padina

The site Padina was discovered during a ground survey of Đerdap in 1968. Excavations on this site confirmed the existence of a very rich cultural layer with abundant finds from different periods.⁶ This site is divided into sectors and internal

⁵ Д. Срејковић и З. Летича, *op. cit.*

⁶ В. Јовановић, *Chronological Frames of the Iron Gate Group of the Early Neolithic Period*, AI X, Beograd 1969.

Red. br.	Sloj	Lab. N ^o	C14	Presek cal. krivulje	1 σ	2 σ	Verovatnoća	
							1 σ BC	2 σ BC Δ
1	V.III	Bln-1954	7440 \pm 80 BP	6230 BC	6404-6175 BC	6400-6110 BC	6366-6312 44%	6425-6130 100%
2	V.II	Bln-1166	7575 \pm 80 BP	6379,6319,6248 BC	6423-6163 BC	6450-6130 BC	6399-6229 100%	6445-6165 100%
3	V.II	Bln-1052	7610 \pm 80 BP	6444 BC	6480-6417 BC	6591-6240 BC	6500-6387 81%	6597-6359 82%
4	V.II	Z-267	7559 \pm 93 BP	6427 BC	6471-6238 BC	6594-6170 BC	6470-6360 55%	6570-6170 99%
5	V.II	Bln-1189	7665 \pm 80 BP	6472 BC	6663-6510 BC	6671-6400 BC	6509-6438 60%	6676-6387 99%
6	V.II	Bln-1050	7935 \pm 60 BP	6787 BC	7036-6683 BC	7060-6800 BC	6828-6690 54%	7049-6672 96%
7	?	LJ-2047	7925 \pm 77 BP	6781 BC	7037-6676 BC	-	6827-6684 54%	7052-6605 100%
8	ranil V.II	LJ-2047a	7930 \pm 77 BP	6784 BC	7039-6677 BC	-	6828-6686 53%	7062-6609 100%
9	kraj V.Ib	Bln-1171	7830 \pm 100 BP	6675,6651,6648 BC	6800-6498 BC	7050-6440 BC	6810-6560 86%	6970-6470 93%
10	V.Ib	Bln-1170	7840 \pm 100 BP	6677 BC	6851-6504 BC	7050-6450 BC	6820-6560 86%	6970-6480 92%
11	V.Ib	Bln-1053	6865 \pm 100 BP	5730 BC	5820-5640 BC	5970-5640 BC	5840-5630 100%	5980-5560 100%
12	V.Ib	Bln-1014	6805 \pm 100 BP	5647 BC	5750-5579 BC	5955-5490 BC	5760-5560 100%	5980-5490 98%
13	V.Ib	Bln-1051	6950 \pm 100 BP	5743 BC	5952-5640 BC	5980-5571 BC	5850-5650 93%	5980-5610 98%
14	V.Ib	Bln-1051a	6790 \pm 100 BP	5643 BC	5740-5567 BC	5951-5490 BC	5750-5560 100%	5850-5480 97%
15	V.Ib	Z-262	7000 \pm 90 BP	5840 BC	5980-5740 BC	6080-5650 BC	5964-5787 100%	5999-5653 96%
16	V.?	Z-264	6335 \pm 92 BP	5311,5265,5245 BC	5360-5230 BC	5480-5067 BC	5367-5225 98%	5482-5197 93%
17	V.?	Z-268	6713 \pm 90 BP	5824 BC	5850-5500 BC	5750-5480 BC	5652-5495 100%	5777-5471 98%

Table 2.

peridoization goes as follows: Padina A – the Late Mesolithic of the Lower Danube Basin; Padina B – the Early Neolithic; Padina C – the Late Eneolithic, Padina D – the Early Iron age; Padina E – Roman period; Padina F – represented by one deposit of coins from the Medieval period (14th century). As we have results of Padina B, we shall draw attention to the Neolithic horizon from this site. The Neolithic settlement is extremely

well preserved. It is organized in rows of semi-subterranean houses, which sometimes show clear trapezoidal basis so characteristic for the Lepenski Vir culture. B. Jovanović has divided the Neolithic period of this site into three phases: Padina B1, B2 and B3 which should represent early phases of the Starčevo culture, and also the stratigraphic sequence.⁷ We have only three results of C14 dating from Padina:

Red. br.	Sloj	Lab. N ^o	C14	Presek cal. krivulje	1σ	2σ	Verovatnoća	
							1σ BC	2σ BC
1	B1	Gm-8229	6570±80BP	5485 BC	5555-5418 BC	5640-5330 BC	5568-5411 96%	5632-5339 100%
2	B2	Gm-8230	7100±80BP	5975 BC	6078-5845 BC	6110-5750 BC	5942-5873 33%	6099-5757 100%
3	B3	Gm-7981	7075±50 BP	5968 BC	6031-5844 BC	6080-5770 BC	5950-5870 95%	6009-5792 84%

Table 3.

Results shown in the Table 3. obviously do not correspond with the stratigraphic position of each sample. Although taken from a deeper horizon than other samples the result for Padina B1 is very low. As typological characteristics of pottery found in horizon B1 suggest chronological priority to horizons B2 and B3, it is probable that the result is wrong or misconnected with the archaeological context. It does not correspond to the results from other early Neolithic sites of the Central Balkans. Dates for Padina B2 and B3 are also rather low.

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We have fewer dates for sites on the Rumanian bank of the Danube. What makes even more difficult to draw conclusions from these dates, is the fact that the archaeological material from most of these sites has yet to be published. We must therefore rely on scant information on a relative-chronological relationship hinted here and there in literature. All we know about samples from Rumanian sites is that they are taken from charcoal from hearths, which is certainly not the best sample for C14 test.⁸

On the next table we gave the review of calibrated dates from the Rumanian site. These dates can be used as a rough information and a basis for comparison.

It is very important that we have dates for Icoana I-II. According to the relative-chronological charts these phases should be simultaneous with Vlasac

⁷ Б. Јовановић, *Падина – насеље мезолита и стипарије неолита*, Старинар 33-34, Београд 1982/83.

⁸ Paunescu Al., *Chronologia paleoliticului si mezoliticului din Romania in contextul paleoliticului central est si sud european*, SCIVA, tom. 35, 1984.

I-III. This is very important because there are few discrepant dates for Vlasac Ib. Dates from Ostrovul Banului can be compared with Padina B and Vlasac II.

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When interpreting the results of radiocarbon dates one must always have in mind a few rules, excellently developed in previously mentioned Waterbolk's "Ten guidelines...". The basic rule is that when working with small series, as in our case, one should be reserved in bringing out important judgments. One cannot say that Padina or Icoana are well dated sites with only three or four results of C14 analysis, not to mention Alibeg and Razvrata with only one date each. But, anyhow, one can make an attempt to check these dates, comparing them with other dates and with relative chronological charts made by archaeologists in their own "classical" manner.

The series of C14 dates from Vlasac shows a great deal of harmony between the calibrated C14 age and the position of samples. One must point out to a number of results marked from 11-15 which show a big discrepancy with other results and with their stratigraphical position. Results of these analyses are totally inaccurate. Samples taken from horizons that are with both stratigraphical position and archaeological material undoubtedly older, gave results about 1000 years younger than those taken from upper levels. In explanation of this confusion, authors of the dating quoted the position of the samples. They are said to have been under the influence of subterranean waters, thus acquiring additional amount of evidently younger radiocarbon. Calibration of these results that was given here was merely a mechanical act. If one would like to truly calibrate these faulty dates, the procedure would certainly be a much more complicated one, and would demand more relevant data for this particular case.

We shall be free to elaborate one idea for calibrating dates from Vlasac and Lepenski Vir, which also gave unexpectedly high results. This could explain furthermore the causes of this contamination of samples. As we said before, controversial samples were exposed to subterranean waters. If we wanted to calibrate them, we should know for how long these samples remained under water. This could be calculated with the help of geologists and by following the changes in geological layers of banks of the Danube in Đerdap. These layers are also datable. And if we succeed in dating this, it remains to be established the amount of younger radiocarbon in water. Once we know the amount of contamination, it is not difficult to make the correction on contaminated dates. This will most probably remain a mere speculation on the possibilities of calibration of dates. It is however cheaper and more efficient to send another set of samples to be dated, this time taking care of the sort of sample which we send. Samples should also be sent in more than one laboratory to avoid the possibility of a laboratory error.

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Gathered in this manner, calibrated and sorted, these results inevitably lead us to some conclusions. We should notify that in the process of interpreting the results extreme values have been cut off. Results obtained after the calibration are expressed in "historical age BC".

The chart 1 shows that dates from Vlasac Ib, Icoana Ia/Ib as well as those from Ostrovul Banului and Ostrovul Corbului range from 7000 to 6500 BC, which could point out to the beginning of the Mesolithic period in this region. This could move chronological chart for a few hundred years deeper into the past. D Srejović had dated Vlasac Ib in the period between 6615 and 6000 BC, with the note that those results were not calibrated.⁹

Dates for the Mesolithic period from Lepenski Vir would be of extreme importance, not only to determine the age of this culture, but also to fill the gap between the Early Mesolithic and Early Neolithic of this region. We shall here quote one result obtained by means of archaeomagnetic dating. For the aceramic (pre-pottery) stratum from Lepenski Vir it shows the age of 6300 BC, which corresponds well with the C14 scale from other dated sites.¹⁰

The date for Icoana II is far beyond the range of other contemporary sites so it cannot be taken into consideration when dealing with the end of the Mesolithic of Đerdap. There is also a contradiction in those dates from Ostrovul Corbului. The case is similar as with the Padina dates. Some of the results do not correspond to their stratigraphic sequence. Also standard error of 237 years for one result does not promise very accurate calibration.

The beginning of the Neolithic, represented with the series from Lepenski Vir III a/b and Padina, is not possible to determine, because of the fact that those series are probably wrong, and are the only dates available. We must therefore in determining the end of the Mesolithic give only *terminus post quem* for the beginning of the Neolithic. According to the dates in these series one should expect it to be in approximately 6200 BC.

In the end we must say that it is absolutely necessary to work more in this field and to gather as many samples as possible, because, with 47 results of C14 dating for the region of such importance for the European Mesolithic and Neolithic, it is not possible to come out with anything more than simple commentary of what has been done so far, without drawing any definite conclusions, which are of course expected when some new series of C14 dates appear.

⁹ D. Srejović, *The Neolithic of Serbia*, Beograd 1988, 10.

¹⁰ М. Ковачева и Д. Вельовић, *Археоманетнишки истрадуваниј на територији Н.Р. Булгарија и СФРЈ*, Археологија София 1982.

ЈЕДАН ОСВРТ НА СЕРИЈУ C14 ДАТУМА СА ЂЕРДАПА

Резиме

Када су шездесетих година археолози открили Лепенски Вир то је одјекнуло као првокласна научна сензација. Од тада је у првој кампањи заштитних ископавања на подручју Ђердапа истражено више локалитета који су богатством налаза и својом комплексношћу задивили и стручну и лаичку јавност. Са обе стране Дунава откривала су се налазишта разних периода, од мезолита до касног римског периода и средњег века. Ипак, оно што је највише задивило било је откриће културе Лепенског Вира и најраније фазе живота у овој, по много чему специфичној области. Култура Лепенског Вира је од тада била предмет већег броја научних студија. Значај овог културног феномена потакао је археологе да проблему који се пред њих тако изненада поставио приђу мултидисциплинарно, па тако данас располажемо резултатима који су плод рада стручњака разних области науке, од археолога, антрополога, седиментолога до оних који се баве датованем археолошког материјала физичко-хемијским методама.

Враћати се данас овој теми на први поглед делује можда и анахроно, али ма колико је до сада било написано о поменутих културним феноменима ни једно поновно враћање Ђердапској проблематици није сувишно. Ово тим више због специфичности конкретне археолошке области којом се овај рад бави. Управо датовање методом радиоугљеника донело је средином века највећа размимоилажења међу археолозима, а неки од резултата овог метода датовања, на пример део серије са Лепенског Вира и неки датуми са Власца II управо могу, уколико остану недовољно и на прави начин прокоментарисани, довести до нових заблуда и недоумица. Стога смо се и одлучили на овај осврт са дистанцом од већ преко двадесет пет година, која уз резултате датовања физичко-хемијским методама са других локалитета могу да учврсте или можда оборе раније претпоставке.

Датовање физичко-хемијским методама спроведено је на узорцима са локалитета Лепенски Вир, Власца, Падина, Icoana, Ostrovul Corbului, Ostrovul Banului, Ciupa Turcului и Alibeg. Резултати ових датовања расути су по литератури и коментарисани углавном некалибрирани, а када је то чиниено, дешавало се да се пореде датуми калибрирани на различите начине и на тај начин долазило до закључака који нису методолошки сасвим коректни. На овом месту покушаћемо да прикупимо све датуме добијене методом радиоактивног угљеника C14, извршимо калибрацију и прокоментаришемо на тај начин добијене резултате. На збирном графикону који овде прилажемо може се видети да се датуми са Власца Ib, Icoane Ia и Ib као и они са локалитета Ostrovul Banului и Ostrovul Corbului налазе у распону између 7000. и 6500. године што би могао да буде и интервал у којем бисмо пронашли почетак мезолита Ђердапске клисуре.

Такође су јасно издвојени спорни датуми са Лепенског Вира и Власца. Датум са Icoana II далеко излази изван оквира осталих датума тако да га не можемо узети у озбиљно разматрање када одређујемо крај мезолита на овом простору.

Ваљани датуми са Власца (у табели означени од 1 до 11) говоре да мезолитски период треба сместити између 7100. и 6100. године. Датуми са Icoane Ia и Ib се са незнатним одступањем уклапају у овакву шему. То се исто може рећи и за датуме за Ostrovul Banului, фаза III. Датуми са локалитета Ostrovul Corbului могу да се узму са извесном резервом. Ово због извесног несагласја између добијених старости и стратиграфског положаја узорка; сличан случај са резултатима са Падине, али и превелика стандардна грешка за датум из слоја II од 237 година, не обећавају нарочито поуздан резултат калибрације.

Почетак неолита овог подручја који представљају Лепенски Вир IIIa/b, Падина V3, Ciupa Turcului IIIc, нажалост не можемо одредити датумима са ових локалитета, обзиром на чињеницу да су датуми са Лепенског Вира и Падине највероватније нетачни, а са осталих локалитета није обављена ни једна проба радиоугљеника, те морамо да

određujući kraj mezolita damo samo *terminus post quem*. To bi prema raspoloživim datumima trebalo da bude period od ssa 6200. godine.

Треба на крају рећи да је сасвим неопходно даље радити на прикупљању узорака за датовање радиоугљеником, јер са 47 резултата C14 проба, за регион који је од оволиког значаја за европски мезолит и неолит, није могуће урадити ништа друго него дати само коментар онога што је урађено, а да се из тога не извлаче некакви коначни закључци, што би свакако било могуће када би постојале велике серије датума са свих локалитета у подручју Ђердапа.

Red. br.	Sloj	Lab. No.	C14	Presek oel. iznufje	1σ	2σ	Verovatnoća	
							1σ BC	2σ BC
1	ALIBEG/II	Bln-1193	7195 ± 100 BP	6079-6006 BC	6120-5978 BC	6221-5820 BC	6190-5980 100%	6230-6790 100%
2	ICOANA Ia	Bonn-2	8070 ± 130 BP	7055 BC	-	-	7020-6900 100%	7020-6970 97%
3	ICOANA Ib	Bonn-4	7880 ± 110 BP	6488 BC	6800-6420 BC	6700-6220 BC	6630-6360 97%	6730-6220 97%
4	ICOANA Ib	Bonn-3	8010 ± 120 BP	7036 BC	-	-	7080-6790 100%	7080-6820 100%
5	ICOANA II	Bonn-1	9830 ± 120 BP	4725 BC	4894-4545 BC	4988-4407 BC	4850-4580 94%	-
6	ICOANA III	Bln-1056	7445 ± 80 BP	6350, 6232 BC	6417-6173 BC	6450-6100 BC	6367-6271 90%	6439-6115 100%
7	RAVRATA II	Bln-1057	7990 ± 70 BP	6551, 6548, 6482 BC	6587-6443 BC	6680-6410 BC	6589-6445 90%	6680-6388 98%
8	Ostrovul Banului III	Bln-1079	7585 ± 100 BP	6430 BC	6480-6238 BC	6800-6170 BC	6480-6380 95%	6610-6170 100%
9	Ostrovul Banului III	Bln-1080	8040 ± 160 BP	7048 BC	-	-	7080-6780 98%	7080-6580 98%
10	Ostrovul Banului III	Bln-?	7440 ± 100 BP	6230 BC	6420-6150 BC	6470-6080 BC	6380-6180 100%	6480-6090 100%
11	Ostrovul Corbului	SMU-687	8089 ± 237 BP	7062 BC	-	-	-	-
12	Ostrovul Corbului	Bln-2135	7710 ± 80 BP	6555, 6536, 6491 BC	6610-6447 BC	6700-6410 BC	6611-6447 100%	6782-6388 98%
13	Ostrovul Corbului	Bln-2135a	7695 ± 80 BP	6532, 6545, 6484 BC	6603-6442 BC	6680-6400 BC	6603-6443 100%	6712-6382 97%
14	Ostrovul Corbului	SMU-686	7827 ± 237 BP	6674, 6654, 6640 BC	7050-6440 BC	-	6630-6470 75%	7080-6380 94%

Table 4.

Chart 1.

