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# Extended and Revised Archaeomagnetic Database and Secular Variation Curves from Bulgaria for the Last Eight Millennia

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## ABSTRACT

The efforts of geophysicists to describe geomagnetic field behaviour in the past lead to creation of different geomagnetic field models. On the other hand, the established regional palaeosecular variations of geomagnetic elements are increasingly used for dating purposes in archaeology. Both of these goals can be achieved if sufficient amounts of long archaeomagnetic data sets exist for different geographical regions. The accumulation of archaeomagnetic determinations began at the middle of the last century, parallel with the progressive development of experimental methodology and acceptance criteria. The presence of great number of old determinations requires their critical assessment. The important question about the

reliability of the associated dating intervals should be also re-assessed. All this requires the continuous refinement and extension of the accumulated databases. This paper presents the last synthesis of Bulgarian archaeomagnetic database and the local palaeosecular variation curves obtained using a statistical treatment based on Bayesian approach (RenCurve software). The rock-magnetic characteristics of the newly included, non-published results are summarized.

**Key words: archaeomagnetism, database, southeastern Europe, reference curves**

## **1. Introduction**

Archaeological baked clay structures and volcanic rocks are the most valuable source of data bearing information about the past behaviour of full geomagnetic vector. On the basis of this kind of data, treated with Bayesian (Lanos, 2004; Lanos et al., 2005; Lanos et al., in preparation) or bivariate (Le Goff et al., 2002) statistics, enable secular variation curves (SVCs) to be built for a given territory. These curves should be created from sufficiently precise archaeomagnetic determinations obtained from well dated materials preferably by independent methods. In such cases, SVCs can be used in archaeology for dating purposes (Kovacheva et al., 2004; Lanos, 2004; Herve et al., 2011). The global and regional geomagnetic field modeling (Korte et al., 2009; Korte and Constable, 2011; Pavón-Carrasco et al., 2009) is the most important key for elucidating the geomagnetic field origin and fluid motions in the Earth's interior. These complicated geophysical problems can be solved on the basis of reliable data sets of archaeomagnetic and palaeomagnetic (volcanic and sedimentary environments) determinations of geomagnetic field elements. Each database

compilation is a long, continuous process and periodical updates, revision or re-examinations are required. The accumulation of the Bulgarian data set started in 1967 and several updates have been published (Kovacheva, 1992; Kovacheva, 1997; Kovacheva et al., 2009a). In previous compilations archaeomagnetic determination from all studied collections in Sofia Palaeomagnetic laboratory (Bulgarian, Serbian, Greek, etc) were included. Now the data from non-Bulgarian archaeological sites are excluded and those obtained after 2009 (28 different features) are added. Furthermore, in the present compilation, the dating intervals for some sites were corrected according to the new  $^{14}\text{C}$  dates that are becoming available or last archeological conceptions. The aim of this paper is to communicate the enlarged and revised after 2009 local data set and the obtained from it local reference curves for the three geomagnetic field elements during the last 8000 years.

## **2. General description of the extended database**

The basic feature of Bulgarian archaeomagnetic data set is that it summarizes the simultaneous determination of the geomagnetic field direction (D, I) and intensity (F) – both parameters being obtained from the same material. It covers almost the entire prehistoric and historic periods. The methodology applied in the Sofia Palaeomagnetic laboratory was gradually improved and optimized over the years. Detailed information about sampling technique, experimental protocols, selection and quality criteria can be found in Kovacheva and Toshkov (1994), Kovacheva et al. (1998), Kovacheva et al. (2009a), Kostadinova-Avramova et al. (2014). The archaeomagnetic determination correspond to the feature`s mean values as “the feature is a volume of material that can be considered to have been magnetized at the same time” (Tarling,

1983). In some cases (mainly for the historic periods) “feature” coincides with the studied site, but in other (e.g. for the prehistoric periods), several “features” corresponding to different layers are related to the same archaeological site. The feature’s average values for the direction are calculated following the hierarchical approach (Lanos et al., 2005).

The used  $^{14}\text{C}$  dates (generally series of  $^{14}\text{C}$  dates) were taken mainly from Görsdorf and Bojadžiev (1996). Most of these were obtained by the conventional method and OxCal 4.0 software was used for their calibration. The recently received  $^{14}\text{C}$  dates for some prehistoric archaeological sites by the AMS method were compared with those obtained by the conventional method. The both methods give consistent results (Boyadzhiev, in press). The problems concerning  $^{14}\text{C}$  dates related to Eneolithic period are described in Boyadzhiev (1995) and Kostadinova-Avramova et al. (2014). When there are no  $^{14}\text{C}$ , the archaeological assumption about the dating interval is based on stratigraphic constraints, e.g., the accumulation rate of layer and the cultural features found in it. Often, in addition to the existing  $^{14}\text{C}$  dates, the mentioned archaeological evidences and the type of material (annual or perennial) used for  $^{14}\text{C}$  dating were taken into account, which has led to better constraint of the dating intervals.

*Please, insert the Table here*

The archaeomagnetic data and all supporting information are given in a Table. For clarity the same format is kept as the Table linked to Kovacheva et al., 2009a. The differences are listed below:

- 28 newly included Bulgarian sites (given in bold).

- All the data obtained from non-Bulgarian sites (Serbian, Greek, etc) but studied in Sofia laboratory were excluded. Thus the column “Country” becomes unnecessary and it is discarded. The Serbian data were used previously for the construction of first local SVCs in Kovacheva and Toshkov, 1994 and Kovacheva et al., 1998.
- Another discarded column is “STEP” connected with the level of the thermal or alternating field cleaning. The normalized palaeointensity (PI) results corresponding to the site dipole field (PI\_PIDIP) were also excluded.
- A new column for “K” was added. This column represents the grouping factor according to the Fisher (1953) statistics.
- When no data were available, the sign “\*” was used in the Table.
- The results of inclination (I) of many sites represented only by brick materials were re-evaluated (e.g. Labnos 107, 108, 141) and some were discarded (e.g. these of Labnos 202, 230, 271) keeping only the intensity results.
- At the end there were 32 reference sites for which a new evaluation of the directional results (I and D) or only of the PI result had been performed (e.g. Labnos 36, 113, 156, 227, 311). The directional results for Labno 85 were discarded. This site has been studied at least 40 years ago and a doubt existed for the reliability of the results obtained on the basis of very limited number of independently oriented samples.

- Labno 97 (Kovacheva et al., 2009a) was entirely discarded because of its dubious results. Now the same Labno 97 was given to the results of one unused so far sector from the multilevel Bronze tell at Dyadovo.
- Two Labnos 10 and 294 from Kovacheva et al. (2009a), representing averaged results from successive layers in the sites Samovodene and Koprivetz, correspondingly were changed. They were both separated following the stratigraphy and the advices of archaeologists. Thus three new reference points: Labnos 354, 355 and 358 were obtained.
- For the prehistoric past the newly obtained  $^{14}\text{C}$  dates were taken (e.g. Labnos 247, 261, 272). It should be noticed that for the sites dated on the basis of  $^{14}\text{C}$  only, the dating intervals are now given exactly on the 95.4% probability level. This interval is often very large but is required for the subsequent mathematical applications. In some cases taking these large intervals, their midpoints are not always consistent with the stratigraphy (e.g. Labnos 306; 307; 295) Dating intervals of some prehistoric sites (layers) without  $^{14}\text{C}$  were changed according to the last archaeological conceptions related to the stratigraphic constraints and cultural features (e.g. Labnos 50, 281, 295).
- For the prehistoric past the column showing the stratigraphic constraints is added (SC). Older/current Labno is after the «older» and before the «younger»/younger (e.g. 35/51/52) for Labno 51. The information in this column clarifies the above mention problem when considering only the midpoints.

- Besides the problems in prehistory, the dates of several Middle age sites were changed after new consultations with the archaeologists (e.g. Labnos 120, 159, 195, 314).

### **3. General magnetic characteristics of the unpublished sites, included after 2009**

The new sites included in the last version of Bulgarian database are 28. The archaeomagnetic results from 11 of them are published (corresponding references are given in the last column of the Table – the first reference corresponds to that of Geomagia 50.v3 (in preparation) and the second one corresponds to the original (detailed) publication). The main properties of the other 17 unpublished reference points are summarized in this section.

For all studied materials different types of magnetic cleaning were performed. Viscous cleaning was done for all specimens coming from the gathered hand samples. The viscosity coefficient  $S_v$  (%) was calculated for each specimen according to the relation  $S_v = \{NRM_0 - NRM_{st}\} / NRM_0 \times 100\%$ , where  $NRM_0$  is the initially measured remanence and  $NRM_{st}$  is the stable component measured after the zero field storage. For the most of the studied collections acceptable ( $\leq 8\%$ ) values for  $S_v$  were obtained (Fig. 1a). The exceptions are three collections (Labnos 353; 356 and 366). For these, the  $S_v$  values vary over a wide range and often exceed 8% (Fig 1b). For PI determinations only specimens with  $S_v$  less than 6% were used. There are two possible explanations for the observed high  $S_v$  values: 1) the insufficient heating in the antiquity and 2) the presence of significant amount of unstable superparamagnetic (SP) grains. The determined  $K_{FD}$  (%) for the studied materials are often more than 6% (Fig 1c). This indicates that magnetic grains with SP sizes are very common for baked clay materials



(Jordanova et al., 2001). Insufficient heating in the antiquity also is not an uncommon affecting factor - for example Labnos 368 and Labno 369 are two kilns from a recently studied archaeological site Pliska which shows high  $S_v$  and high  $K_{FD}$  values (Kostadinova-Avramova et al., in press). On the other hand the Arai plots and magnetic susceptibilities measured after each heating step (Fig 6c) indicate that both structures have been heated in the past to temperatures around 430-460°C. Therefore, in this case combination of factors 1) and 2) are probably responsible for the observed high  $S_v$  values.

*Please, insert Fig. 1 here*

Magnetic cleaning with alternating field (AF) or temperature (Fig. 2) were applied for some selected specimens (from one to four per sample depending on the number of cut specimens). The final directional results were obtained only from the results after both AF and thermal cleanings.

*Please, insert Fig. 2 here*

Information about the domain state of the magnetic particles was obtained using the Lowrie and Fuller test (Lowrie and Fuller, 1971). The fact that the magnetite type minerals are dominant for the studied materials makes this test applicable. The test failed completely for all studied specimens related to Labno 366 where the highest amount of hematite was identified (Fig 3a). Therefore, for this site, no conclusion about the domain state of magnetic particles could be drawn. For the other sites the Lowrie and Fuller test determined that the magnetic grains had SD-like, BM or mixed behaviour of magnetic particles (Fig. 3b, c, d; Dunlop, 1983).

*Please, insert Fig. 3 here*

The identification of magnetic mineralogy was based on  $T_b$  and  $T_c$  determined from three-axis isothermal remanence thermal demagnetization – 3IRM test (Lowrie, 1990) and thermomagnetic analyses respectively. The results showed a predominant presence of magnetite type magnetic minerals (titanomagnetite and/or magnetite) for all studied materials (Fig. 4). In some cases a stable in respect to temperature maghemite was also observed (Fig 4). High coercivity minerals were rather rare for the studied collections. Hematite is supposed for Labnos 349; 365 and 366 (Fig. 4b, c, f).

*Please, insert Fig. 4 here*

The SIRM test (Kovacheva and Jordanova, 2001; Jordanova, et al., 2003) and thermomagnetic analyses generally showed stable mineralogy of the materials during heating (Fig 4d, e, f and Fig. 5a, b). This fact makes the material especially suitable for the obtaining good PI estimations. Strong mineralogical transformations (Fig. 5c) were detected only for very few individual cases (one or two specimens per collection for Labnos 351; 356; 357; 365 and 366) and usually the corresponding materials came from the external parts of the structures where probably the burning temperatures have been lower.

*Please, insert Fig. 5 here*

The PI experiment usually showed good internal consistency between the results and the number of failed experiments was generally less than 20% (Table – columns NOPI, NPI; Fig 6a,b, c). There are two exceptions - Labnos 356 and 367 (sites Malenovo and Nessebar). The material from these two sites, in spite their stable

mineralogy during heating, appears not appropriate for PI evaluation (Fig. 6d). On this basis no PI results were given for both of these sites.

*Please, insert Fig. 6 here*

For three of the newly studied features (Labnos 362; 363 and 370) it was not possible to determine the direction of the ancient geomagnetic field: Labno 362 and 370 - small number of collected pieces, characterized by a large dispersion; Labno 363 – the collection represented well burnt clay pieces found in a pit at a chaotically changed position.

#### **4. Discussion of the raw data**

The main difficulty in archaeomagnetic studies aiming to describe the palaeosecular variations of the geomagnetic field elements is the reliable distribution of the experimental results on the absolute scale of time (Fig. 7). This distribution depends entirely on the obtained information for dating interval of the studied structures. The last 2000 years are historically well known for the Western Europe and SVCs are obtained for France (Gallet et al., 2002) and Germany (Schnepp and Lanos, 2005). In contrast in South Europe and Asia Minor the prehistoric discoveries are very reach. The important feature of Bulgarian prehistory is the presence of multilevel settlements in which the stratigraphic chronology helps a lot the searched chronology (Kovacheva, 1995; Kostadinova-Avramova et al., 2014). Multiple revisions helped the refinement of the input data.

*Please, insert Fig. 7 here*

Fig. 7 shows the unchanged raw data (I, D and F), published in Kovacheva et al., 2009a (full circles), the revised and corrected data (empty squares) and the included after 2009 new points (crosses). The principle goal of the work was to improve the quality of the data revising many of them and to increase their number as far as possible. The revised points describe better the general trend for the three geomagnetic field elements. The new results are close to the previously published (crosses in comparison with full circles).

The main drawbacks of Bulgarian database are: (a) the lack of systematic corrections for any anisotropy effect on the directional and PI results and (b) the absence of any correction for cooling rate effects on the palaeointensity. These two factors should mostly affect results from bricks and pottery. In the Bulgarian data set pottery are not included. The archaeomagnetic studies in Sofia laboratory from the beginning have been always directed to determination of full geomagnetic vector from the same material. Thus pottery has been excluded as suitable material. The one exception is Labno76 – the samples were taken from the bottom of the found *in situ* pithoi. The brick collections were generally studied at the beginning of the archaeomagnetic studies in Bulgaria and are from the AD time period. The laboratory field during the PI evaluation (Coe version, 1967 of Thellier and Thellier, 1959) was directed along the z axis of the sample coordinate system. The difference 90-INC is the angular deviation of the laboratory field from the carried NRM vector. As described in Kovacheva et al., (2009b) and as well known from the literature (Odah et al., 2001), this deviation is one of the main factors for the effect of the magnetic anisotropy during the PI evaluation. For example, on a subset of 44 brick specimens the

anisotropy effect on the PI evaluations has been studied using the TRM anisotropy tensor (18) or the ARM anisotropy tensor (26). In 40 specimens the anisotropy correction was between -4% and +6% with maximum frequency being between 0% and 2%. There were four cases with a higher anisotropy effect – the highest effect being 11% in one case (Fig. 8a).

*Please, insert Fig. 8 here*

The other deficiency of the database is the lack of cooling rate correction. Most of archaeomagnetic data were retrieved before 2004 and are based on 24 or 20 mm cubes that were left to cool in furnaces without a fan. The cooling time varied from two to five hours depending on the temperature. As far as the multiple data come from the often thin prehistoric ovens or floor plasters which have cooled in open air, the cooling rate effect should not be so important. However, the problem remains for the bricks in the database.

Speaking about the PI determinations and the reliability of the existing data, many authors support the idea for accepting the PI determination if the standard deviation of the average site value is no more than 5  $\mu\text{T}$  (Donadini et al., 2009). The chosen threshold connected with PI values about 50  $\mu\text{T}$  should be quite convenient as representing ~10% of the calculated average values for the corresponding sites. At the same time if the averaged palaeointensity values are between 30-35  $\mu\text{T}$ , the standard deviation of 5  $\mu\text{T}$  would represent between 17 to 14% of the mean value. Such results would be considered as very reliable data, despite having poor internal consistency. In contrast, for considerably higher average PI values (~70  $\mu\text{T}$  or more) the threshold of 5  $\mu\text{T}$  would make many good evaluations as not acceptable. In our opinion, the threshold

given to PI should be a percentage of the calculated site's average value, saying 10%. Such a threshold has a similar drawback if very low palaeointensity values (less than 15 $\mu$ T) are in question. Such low intensity values are not encountered in the archaeological past and even in the entire Holocene. Following this idea we show (Fig. 8b) the distribution of PI results included in the revised data set as a function of standard deviation (STD) presented as a percentage of the mean site results. Obviously a very small part of the included PI determinations have dispersion higher than 10% of the PI site's average.

## **5. Bulgarian SVCs of the three geomagnetic field elements for the last 8000 years and discussion.**

The main goal of each local data set is the elaboration of the local palaeosecular variations of the geomagnetic field elements in the archaeological past. The here presented extended and revised Bulgarian database is used to provide the searched secular variations over the last 8000 years. They are given in Fig. 9 (Lanos 2004, pp. 43-78; Lanos et al. in preparation).

*Please, insert Fig. 9 here*

The evident larger error bands immediately mark the time periods where not sufficient materials were found and studied (Fig. 7), due mainly to the lack of discovered sites. This problem is discussed in Kovacheva et al., 2009a. The most important gap is the so called Transition period after the end of Late Eneolithic - between 3850-3750 BC and the beginning of the Bronze Age about 3200-3100/2900-3000 BC (Fig. 7; Fig. 9). The archaeological problem about the impossibility to accept such a discontinuity in the prehistoric development made some authors to support the

idea for probable palaeo-climatic reason (Todorova, 1995). Middle and Late Bronze Age (around 2000 BC) is also insufficiently represented due to the small number of discovered sites. All these difficulties are just an example of how the archaeomagnetic studies depend on the existing archaeological problems. The revealed extreme palaeointensity value about 6<sup>th</sup>-5<sup>th</sup> century BC is in good coincidence with the similar values obtained from Greek and Western Turkey materials (De Marco et al., 2008) and also with the data from Western Europe (Herve et al., 2013). The last 500 years BC are related to the existence of the rich Thracian culture in Bulgaria with much more precise archaeological dating. Thus, the observed cloud of contradictive results (Fig. 7) which determines large error bands (Fig. 9) is somehow unacceptable. The most problematic period in the palaeointensity determination is the saw type variation in the first five centuries AD. The future filling up of the present data set is of great importance for refinement of the secular variation curves and for the Earth's magnetic field modeling.

## **6. Conclusions**

As a result of this study the following conclusions can be drawn:

1. Each local database requires a constant maintenance, filling up and revisions.
2. Obviously the newly obtained archaeomagnetic data are close to the previously published. The later in combination with the revised points describe better the general trend of the three geomagnetic field elements.
3. The Bayesian evaluation of the local secular variation curves of the geomagnetic elements over the last 8000 years are valuable contribution to the knowledge of past

geomagnetic field behaviour in our lands. The obtained full geomagnetic vectors from the same materials are the best basis for the geomagnetic field modeling.

4. The accepted, as a global feature maximal PI value about 10<sup>th</sup> century is not revealed in by our data in spite the proved important changes of geomagnetic field during the last millennia BC.

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## Appendix

The abbreviations of the columns used in the Table are as follows:

**LNO=LABNO** – Identification laboratory number of the studied collection; **LAT** – Geographical latitude of the site location; **LONG** – Geographical longitude of the site location; **PLACE** – Name of the nearest town or village to the site location; Kap. Andreevo – Kapitan Andreevo; mon. – monastery; Gol. – Golyamo; G. Kremena – Gorna Kremena; **SITE\_HORIZ** – Name of the archaeological site. Some information available as the number of the corresponding horizon, square indication and associated culture (e.g. KI – Karanovo I, KII-etc are Neolithic and Eneolithic culture related to Bulgarian relative chronology); L. – Late; E. – Early; M. – Middle; EB – Early Bronze; Eneol. – Eneolithic; LE – Late Eneolithic; ME – Middle Eneolithic; EE – Early Eneolithic; TP – Transition period; LN – Late Neolithic; c. – century; ch. – church; cer. – ceramic; St. – Saint; sq – square; Med. – Medieval; Bogor. – Bogoroditza; mat. – material; dwell. – dwelling; West. – Western; Chr. – Christian; amphith. – amphitheater; hor. – horizon; dwrđ or upwrđ – the horizons in multilevel prehistoric

settlements are counted downward or upward respectively; Multil. – multilevel; Trans. – transition; per. – period, lev. – level; beg. – beginning; Supp. – supposed; cult. – culture; equipm. – equipment; settl. – settlement; sect. – sector; **MAT=MATERIAL** – Type of the used material or structure sampled: BR – brick as displaced material; bBR – burnt brick in the kiln construction; BC – baked clay; BS – burnt soil; P – pottery; KL – kiln; HR – hearth or oven – thinner clay floor plaster (generally for the prehistoric sites); bST – burnt stone; BF – burnt floor; T – tile; **LAGE= LOWAGE** – Oldest limit of the dating interval in years (negative values for the time before Christ – BC); **HAGE=HIAGE** – Youngest limit of the dating interval in years (negative values for the time before Christ – BC); **DTP=DTPOINT** – The center of the dating interval – Midpoint; **SC** – Stratigraphic constraints; **DM=DEMAG** – The magnetic cleaning used for the directional data (T – thermal, AF – with alternating field, TA – thermal and alternating field); **NDIR** – Number of the results used for the final directional determination; **DEC** – The value of mean declination obtained for a studied feature given in degree; **INC** – The value of mean inclination obtained for a studied feature given in degree;  **$\alpha_{95\%}$ =ALFA95%** - Semi angle of the confidence cone according to Fisher (1953), when both DEC and INC data are available; **K** – The precision parameter K (grouping factor) according to the Fisher statistics (1953) when both DEC and INCL are available. In the case of bricks, providing only INC, K is calculated by the relation:  $K=(1/S)^2*(180/\pi)^2$  (Lanos et al., 2005); **NOPI** – Number of specimens subjected to the palaeointensity determination (PI) experiment; **NPI** – Number of the results accepted according to the Sofia Palaeomagnetic laboratory quality criteria and used for the final mean PI determination;  **$\sigma$ =STDPI** – The obtained standard deviation from the weighted

statistics. In the case of single results, the standard error of the best fitted line is given;

**AN\_cor** - When anisotropy correction for PI was studied the type of the remanence used is noted (ARM – Anhysteretic Remanent Magnetization; IRM - Isothermal Remanent Magnetization; TRM – Thermo Remanent Magnetization); **TYPE** - Classical Thellier and Thellier (1959) method was used from the beginning of archaeomagnetic studies in Bulgaria until 2004. After the Coe (1967) modification is applied. Taking into account that the acceptance criteria were modified and optimized during the years, different abbreviations are used for TYPE: THDL – the oldest results when PI was estimated according to the stability of direction and linearity of Arai plot; THkD – to the previous criteria the magnetic stability behaviour during heating was added; THpT – latest results – to the previous criteria pTRM tests were also included. When it appear twice, the results of classical Thellier` method with pTRM tests were checked up with the Coe` version. When two types are noted additional check-up experiments were performed to control those obtained by older methods. The results obtained by the two methods are averaged on the basis of internal consistency, which was proved in the most cases; **FLDNUMBER** – Samples field numbers used for the studied feature;

**DATING** – The independent dating method used for each feature. When <sup>14</sup>C is given in brackets (mainly for the Eneolithic period) the obtained <sup>14</sup>C dates are not taken into account due to the contradictions with vertical stratigraphy and archaeological evidences (Boyadziev, 1995). AD – Anno Domini; archaeol. – archaeological; begin. – beginning; c. – century; strat. – stratigraphy; synchron. – synchronization; rel. – relative; **REF=REFERENCE** – The first numbers given in this column correspond to the

numbers in the Geomagia 50.v3 – in preparation - (<http://geomagia.ucsd.edu>). When the second number is 502 through it the original publications can be seen.

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#### TABLE AND FIGURE CAPTION

Table. The state of Bulgarian database related to 2014 (the detailed description of the columns is given in the Appendix). The results of sites obtained between 2009 and 2014 are given in bold. The corrected results of the presented in Kovacheva et al. (2009a) features are given in italic. All remained data are in regular font.

**Fig. 1.** Distribution of viscosity coefficient for representative features a) with mostly acceptable  $S_v(\%)$  values, b) with  $S_v$  values often higher than 8% and c) distributions of  $K_{FD}(\%)$  values for three representative newly studied features.

**Fig. 2.** Representative examples of a) AF demagnetization and b) thermal demagnetization of the carried remanence.

**Fig. 3.** Representative examples of Lowrie and Fuller test showing a) the presence of high coercivity magnetic mineral (i.e. failed experiment), b) single domain (SD), c) bimodal (BM) and d) mixed behaviour of magnetic grains.

**Fig. 4.** Representative examples of a), b) and c) stepwise thermal demagnetization of three components IRM (3IRM test) and d), e), f) high temperature behaviour of magnetic susceptibility – heating and cooling curves.

**Fig. 5.** Representative examples of SIRM test – a), b) insignificant and c) strong mineralogical changes during heating. SIRM (2T) is the isothermal remanent magnetization induced at each temperature step; SIRM<sub>left</sub> is the remained part of the induced SIRM (2T) by the thermal demagnetization at the corresponding step; 3IRM curve is the thermal demagnetization of the module of three-axes single induced isothermal remanence (on the sister specimen),  $K/K_{20}$  – normalized to the initial value magnetic susceptibility measured after each temperature step.

**Fig. 6.** Representative examples of a), b), c) successful and d) failed PI determination experiments.

**Fig. 7.** The raw data of extended and revised database. Different symbols are given to the new data, revised ones and unchanged data from Kovacheva et al., 2009.

**Fig. 8.** a) Distribution of anisotropy correction on PI values from an extract of 44 brick (BR) samples and b) Distribution of all PI results as a function of standard deviation expressed as a percentage of the mean PI per site.

**Fig. 9** Bulgarian SVCs of the three geomagnetic field elements based on Bayesian approach (Lanos et al., in preparation).

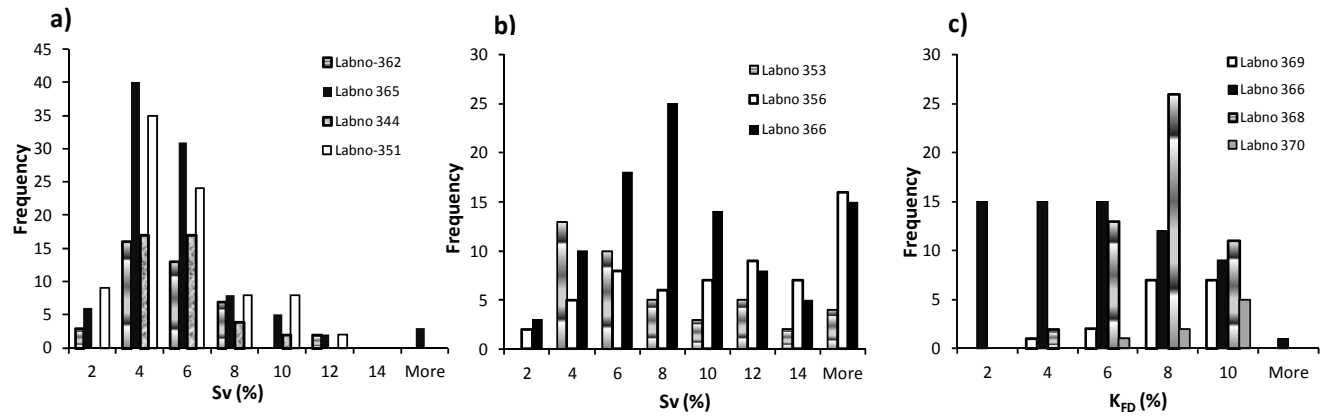


Fig. 1

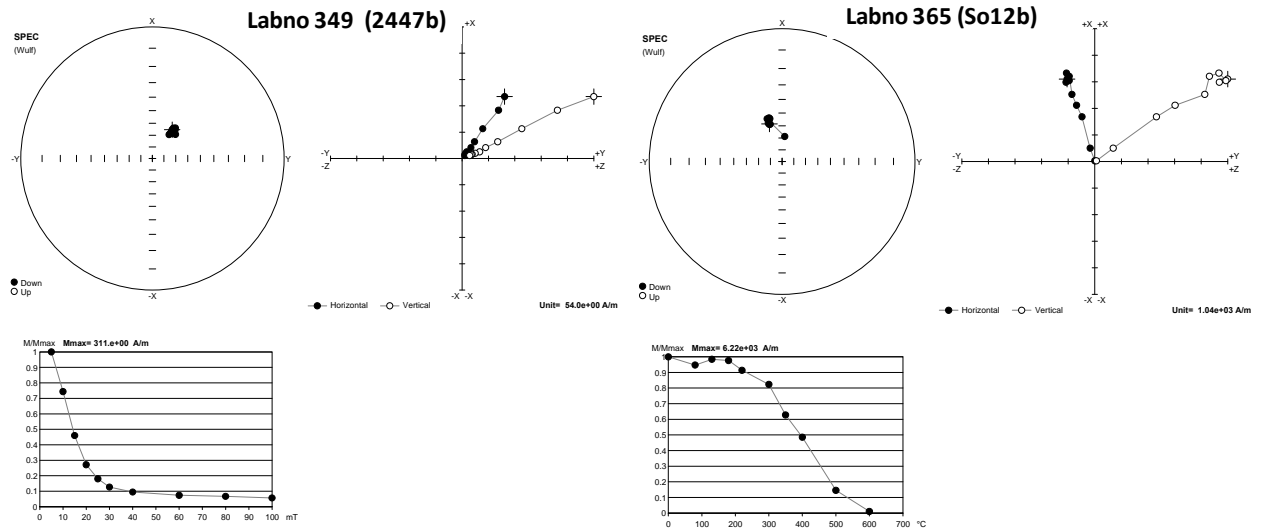


Fig. 2

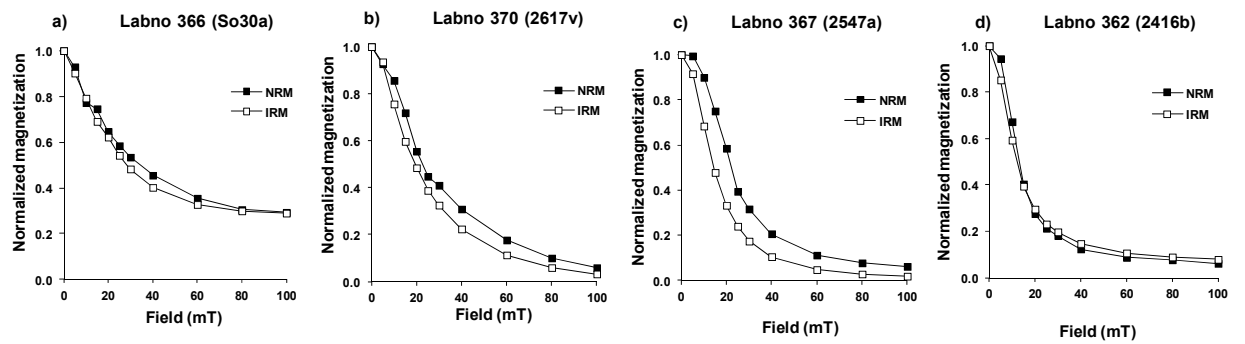


Fig. 3

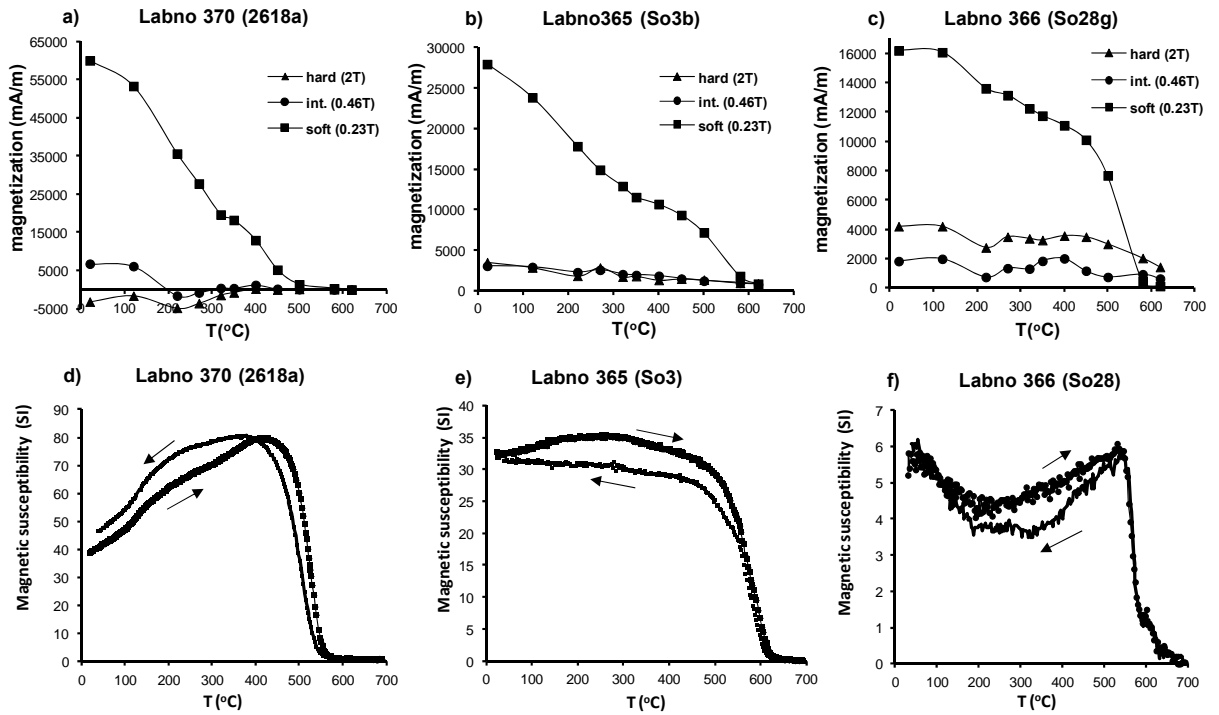


Fig. 4

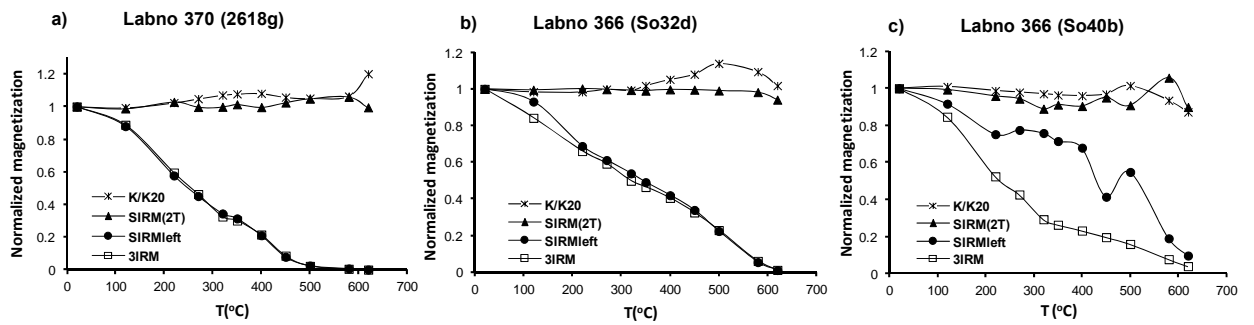


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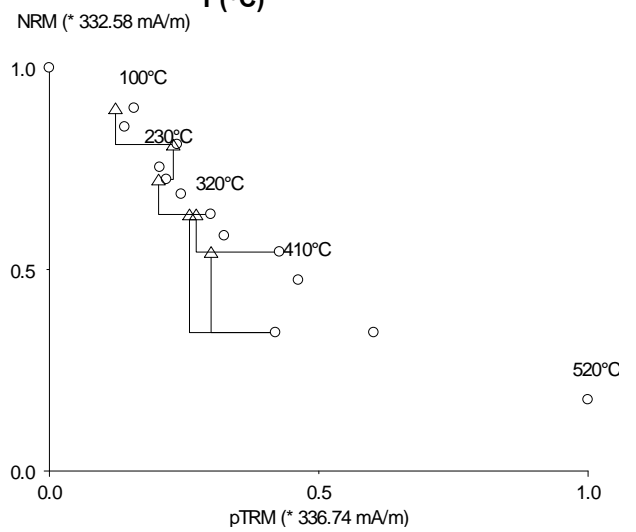
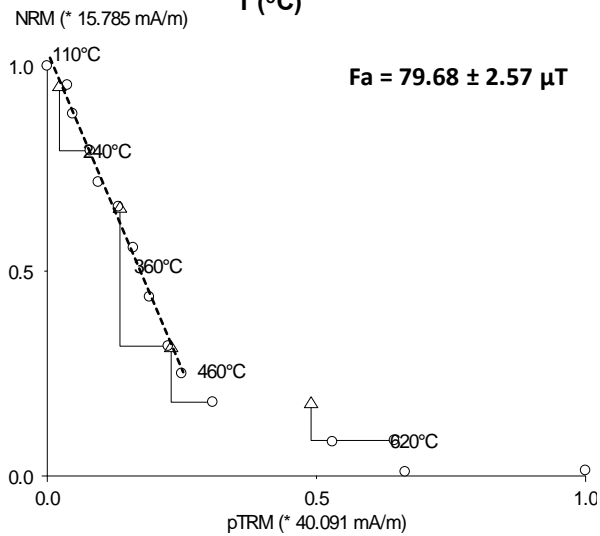
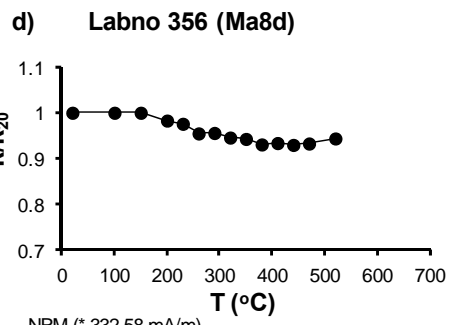
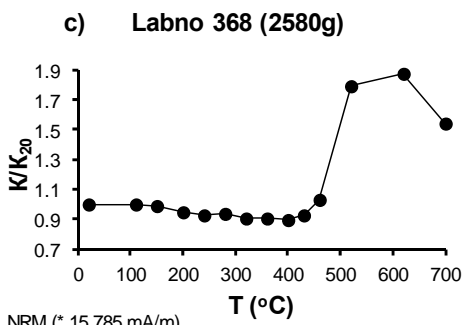
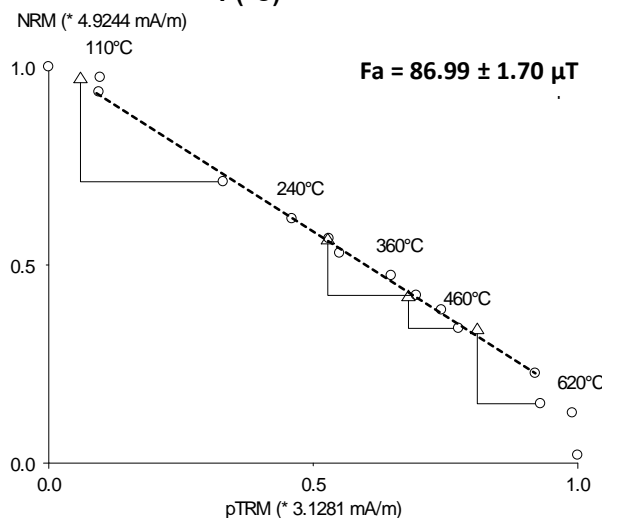
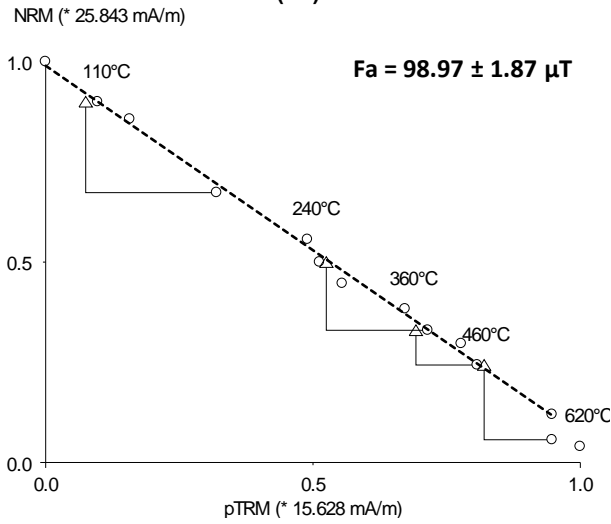
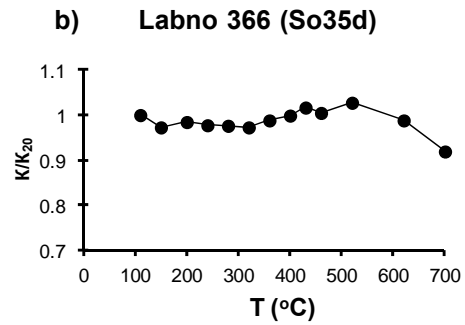
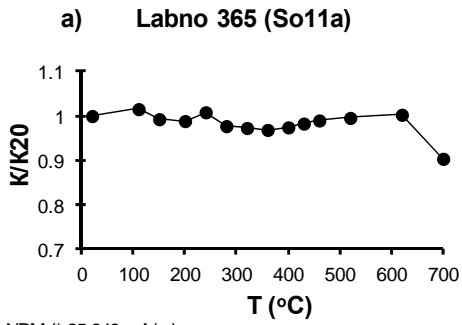


Fig. 6

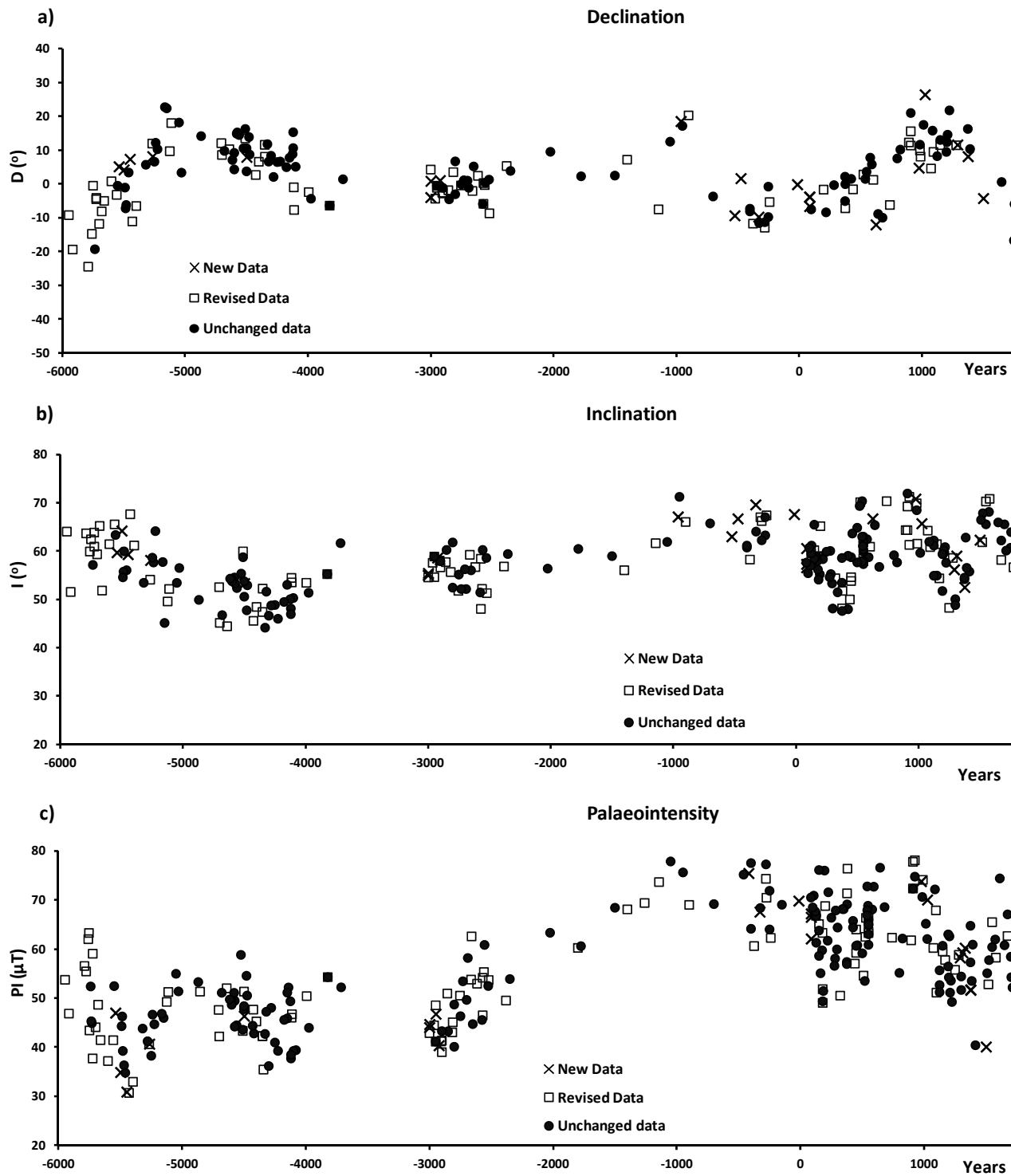


Fig. 7

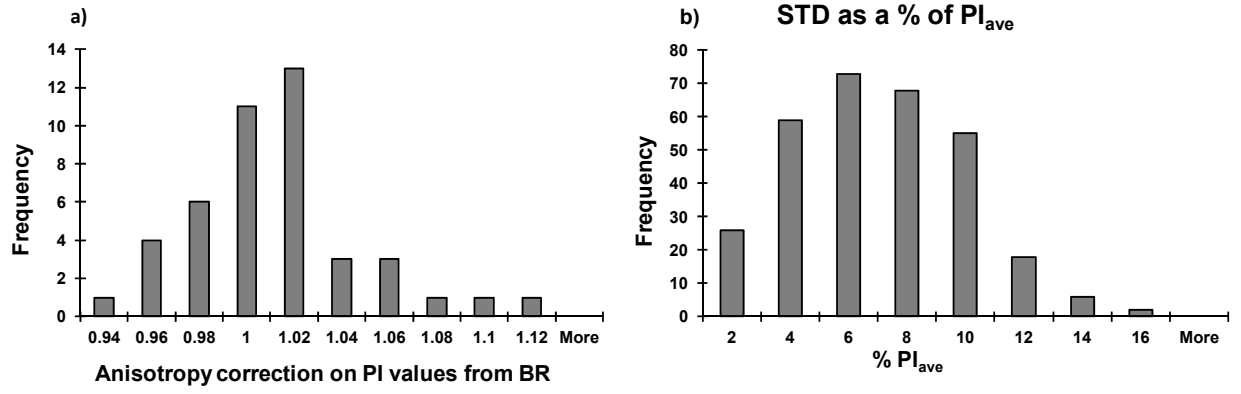


Fig. 8



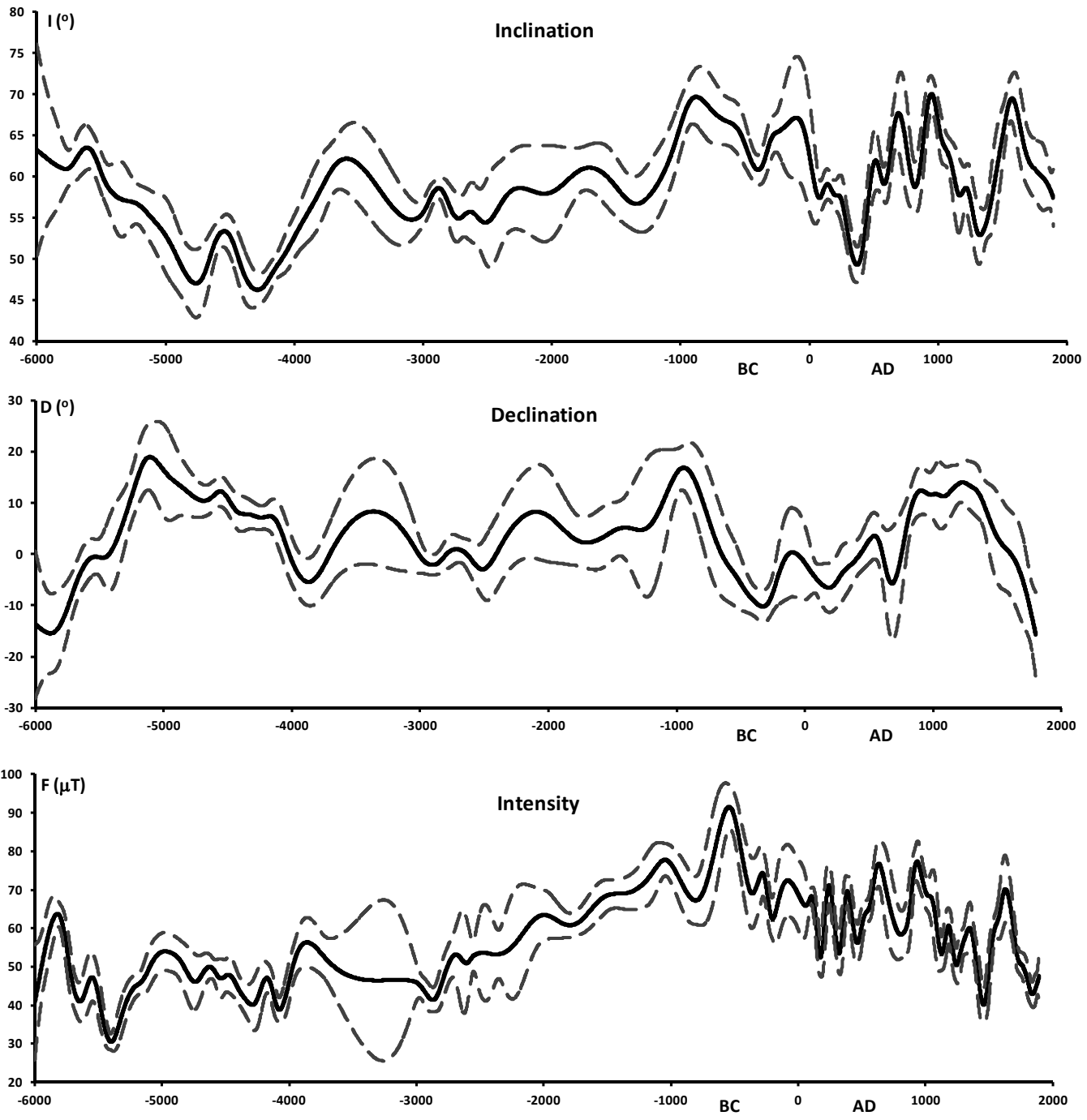


Fig. 9

LNO	LAT	LONG	PLACE	SITE_HORIZ	MAT	LAGE	HAGE	DTP	SC	DM	NDIR	DEC	INC	α <sub>95</sub>	K	NOPI	NPI	PI	σ	AN_cor	TYPE	FLDNUMBER	DATING	REF
239	42.20	27.80	Tzarevo	The old church	BR	1894	1894	1894		T	5	*	53.00	6.71	73	4	4	43.76	1.44	*	THDL	146-150	documents	197
238	43.10	25.70	Veliko_Tarnovo	Preobrajenski monaster	BR	1893	1893	1893		T	5	*	58.70	3.35	293	5	5	47.29	3.26	*	THDL	589-595	documents	197
<b>352</b>	<b>43.10</b>	<b>25.70</b>	<b>Veliko_Tarnovo</b>	<b>Bricks with inscription of the date</b>	<b>BR</b>	<b>1888</b>	<b>1888</b>	<b>1888</b>		<b>TA</b>	<b>2</b>	<b>*</b>	<b>57.20</b>	<b>4.03</b>	<b>202</b>	<b>2</b>	<b>2</b>	<b>44.54</b>	<b>0.06</b>	<b>ARM</b>	<b>THpT</b>	<b>2365-2366</b>	<b>inscription</b>	<b>239, 519</b>
237	43.10	25.70	Veliko_Tarnovo	Fireplace in a Turkish dwelling	KL	1886	1886	1886		*	*	*	*	*	*	4	4	51.61	1.61	*	THDL	B170-B174	historical	197
236	43.20	27.90	Varna	Turkish building	BR	1874	1874	1874		T	3	*	59.70	1.56	1350	3	3	41.00	3.94	*	THDL	306-308	documents	197
235	43.10	25.70	Veliko_Tarnovo	Church Saint "Konstantin and Elena"	BR	1873	1873	1873		T	12	*	57.87	5.04	129	5	5	47.29	1.16	*	THDL	576-588	inscription	197
234	43.10	25.70	Veliko_Tarnovo	Samovodski market	BR	1868	1868	1868		*	*	*	*	*	*	5	5	45.25	4.39	*	THDL	1111-1123	inscription	502
322	43.10	25.70	Veliko_Tarnovo	Turkish mosque turned to Christian ch.	BR	1800	1878	1839		*	*	*	*	*	*	20	17	42.13	2.45	ARM	THpT	2329-2364	supposed archaeol.date	239,519
226	41.50	23.40	Melnik	Fireplace - Kordupulova house	BR	1800	1850	1825		*	*	*	*	*	*	3	3	42.17	0.28	*	THDL	1715-1725	historical	197
229	41.47	25.65	Krumovgrad	Mosque	BR	1809	1809	1809		T	3	*	61.03	3.52	265	4	3	46.50	0.38	*	THDL	1291-1294	inscription	197
230	41.50	25.30	Djebel	Mosque	BR	1780	1780	1780		*	*	*	*	*	*	7	4	45.54	2.12	*	THDL	1284-1290	documents	239,502
227	43.00	25.50	Trojan	Furnace for daily ceramics	KL	1750	1800	1775		T	3	343.60	56.60	5.40	525	7	7	52.15	3.09	*	THDL/THpT	1340-1346	archaeological	239,502
228	43.10	25.70	Veliko_Tarnovo	Tzarevetz-Turkish kiln for daily cer.	KL	1750	1760	1755		T	4	354.06	63.89	3.37	745	6	5	50.07	3.09	*	THDL/THpT	1300-1304	archaeological	502
220	43.30	24.60	Pleven district	Bivolare-Medieval kiln	KL	1700	1800	1750		T	9	343.29	60.65	3.80	182	3	3	52.24	1.91	*	THDL	1739-1748	archaeological	502
224	43.85	26.00	Russe	Bey's house	BR	1700	1730	1715		T	12	*	60.06	5.20	122	4	4	52.14	1.09	*	THDL	1666-1679	historical	197
225	42.70	23.30	Sofia	Tombs No3 & No9 - "St.Späss"	BR	1690	1720	1705		*	*	*	*	*	*	9	6	54.24	4.73	*	THDL	1381-1395	archaeological	197
231	42.00	24.30	Peshtera	Clock tower	BR	1701	1701	1701		T	7	*	65.50	5.03	130	6	6	58.41	2.47	*	THDL/THpT	B251-B257	historical	197
223	42.70	23.30	Sofia	Serdica-East door-Turkish dwelling	BR	1650	1700	1675		T	10	*	62.16	4.67	151	5	5	67.04	5.92	*	THDL	682-694	historical	197
187	41.80	24.80	Assenovgrad	Bachkowski monastir-Dining room	BR	1650	1700	1675		T	4	*	58.12	4.98	133	4	4	62.64	4.09	*	THDL	621-627	archaeological	239,502
258	42.70	23.30	Sofia	Serdica-oven No1 - the Isljam period	BC	1550	1750	1650		TA	5	0.60	65.90	2.10	1285	5	2	60.75	5.45	ARM	THpT	2272-2278	archaeol.-ceramic's feature	175
222	43.10	25.70	Veliko_Tarnovo	Church "Saint Georges"	BR	1612	1612	1612		*	*	*	*	*	*	5	5	74.37	3.92	*	THDL	1322-1330	documents	502
217	42.27	23.10	Dupnitsa	Mosque	BR	1540	1620	1580		T	7	*	70.78	1.81	1003	5	5	58.23	4.93	*	THDL	1361-1368	archaeological	239,502
215	42.70	23.30	Sofia	The old church - site "St.Späss"	BR	1550	1600	1575		T	5	*	68.08	4.81	142	6	5	61.93	3.62	*	THkD	1396-1400	archaeological	502
214	43.50	26.50	Razgrad	Teke Demir Baba	BR	1500	1600	1550		T	10	*	69.46	4.47	164	4	4	60.78	1.84	*	THDL	R'1-R'15	historical (chronicle)	239,502
213	42.45	26.00	Grafitovo	Kademli Baba Teke	BR	1540	1560	1550		T	7	*	70.24	4.67	151	6	6	65.45	4.60	*	THDL/THpT	1246-1259	archaeological	239,502
219	43.20	27.45	Provadia	Choban mosque	BR	1500	1600	1550		T	9	*	65.51	2.95	378	7	6	60.38	2.63	*	THDL	280-292	archaeological	502
212	41.93	25.90	Harmanli	Kervan saraj	BR	1500	1550	1525		T	17	*	67.80	4.12	194	5	5	57.72	1.70	*	THDL	1267-1283	historical	197
216	43.43	28.30	Kavarna	Turkish baths	BR	1510	1530	1520		T	7	*	61.81	5.11	126	5	4	52.78	4.53	*	THDL	349-357	archaeological	239,502
208	42.70	23.30	Sofia	Church "Saint Petka Samardjijska"	BR	1490	1530	1510		TA	22	*	66.43	5.98	92	10	10	55.05	3.45	*	THkD	2003-2037	archaeological	502
<b>364</b>	<b>41.80</b>	<b>23.50</b>	<b>Bansko</b>	<b>Sanctuary in Medieval site</b>	<b>BC</b>	<b>1450</b>	<b>1550</b>	<b>1500</b>		<b>TA</b>	<b>10</b>	<b>355.80</b>	<b>62.30</b>	<b>6.20</b>	<b>61</b>	<b>6</b>	<b>4</b>	<b>40.09</b>	<b>2.74</b>	<b>*</b>	<b>THpT</b>	<b>2102-2114</b>	<b>archaeological</b>	<b>239</b>
209	43.10	25.70	Veliko_Tarnovo	Church "Saint Peter and Pavel"	BR	1330	1500	1415		T	6	*	55.72	2.06	774	4	4	40.38	1.25	*	THDL	569-574	documents	197
203	43.10	25.70	Veliko_Tarnovo	Tzarevetz - the fire - Turk's invasion	BC	1393	1393	1393		T	8	10.36	56.49	3.70	217	11	9	60.88	5.76	*	THDL	141-3/168-173/1460-7/1582	historical documents	502
201	41.93	25.50	Haskovo	The old mosque	BR	1385	1385	1385		T	5	*	62.76	2.28	632	6	4	53.48	1.46	*	THpT	57-61	documents	502
<b>370</b>	<b>42.23</b>	<b>27.78</b>	<b>Kiten</b>	<b>Urdoviza Fortress-Med.ceramic furnace</b>	<b>KL</b>	<b>1347</b>	<b>1403</b>	<b>1375</b>		<b>TA</b>	<b>*</b>	<b>*</b>	<b>*</b>	<b>*</b>	<b>*</b>	<b>8</b>	<b>7</b>	<b>51.73</b>	<b>1.52</b>	<b>*</b>	<b>THpT</b>	<b>2614-2620</b>	<b>coins</b>	<b>239</b>
<b>361</b>	<b>42.23</b>	<b>27.78</b>	<b>Kiten</b>	<b>Urdoviza Fortress-Med.ceramic furnace</b>	<b>BC</b>	<b>1347</b>	<b>1403</b>	<b>1375</b>		<b>TA</b>	<b>10</b>	<b>8.20</b>	<b>52.50</b>	<b>1.70</b>	<b>789</b>	<b>17</b>	<b>15</b>	<b>51.64</b>	<b>1.70</b>	<b>*</b>	<b>THpT</b>	<b>2525-2546</b>	<b>coins</b>	<b>239</b>
207	43.10	25.70	Veliko_Tarnovo	Church "40 Saint Martyrs"	BR	1350	1400	1375		T	9	*	54.13	4.23	184	5	5	57.27	2.02	*	THDL	1331-1339	documents	197
198	42.30	26.00	Dyadovo	Medieval layer on top of Bronze Age tell	BC	1350	1400	1375		TA	10	16.30	54.47	1.80	715	4	4	64.72	3.71	*	THDL	1750-1762	archaeological	197
<b>363</b>	<b>41.50</b>	<b>25.30</b>	<b>Momchilgrad</b>	<b>Sedlare-Pit in Medieval necropolis</b>	<b>BC</b>	<b>1280</b>	<b>1380</b>	<b>1330</b>		<b>*</b>	<b>*</b>	<b>*</b>	<b>*</b>	<b>*</b>	<b>*</b>	<b>8</b>	<b>7</b>	<b>60.22</b>	<b>3.96</b>	<b>*</b>	<b>THpT</b>	<b>1943-1958</b>	<b>archaeological</b>	<b>239</b>
<b>349</b>	<b>44.10</b>	<b>27.28</b>	<b>Silistra</b>	<b>Drustur-Medieval furnace No4</b>	<b>BC</b>	<b>1270</b>	<b>1350</b>	<b>1310</b>		<b>TA</b>	<b>2</b>	<b>*</b>	<b>59.00</b>	<b>1.56</b>	<b>1350</b>	<b>6</b>	<b>5</b>	<b>59.28</b>	<b>4.10</b>	<b>*</b>	<b>THpT</b>	<b>2444-2448</b>	<b>archaeological</b>	<b>239</b>
205	43.20	27.90	Varna	Medieval church	BR	1280	1320	1300		T	5	*	50.00	5.15	124	4	3	54.39	1.56	*	THDL	341-348	archaeological	197

185	41.50	23.40	Melnik	Boyar house	BR	1280	1320	1300	T	9	*	48.79	4.68	150	8	7	51.64	4.97	*	THDL	1680-1697	archaeological	502
<b>344</b>	<b>44.10</b>	<b>27.28</b>	<b>Silistra</b>	<b>Drustur-Medieval furnace No3</b>	<b>BC</b>	<b>1260</b>	<b>1320</b>	<b>1290</b>	<b>TA</b>	<b>10</b>	<b>11.67</b>	<b>56.16</b>	<b>3.05</b>	<b>252</b>	<b>11</b>	<b>9</b>	<b>58.24</b>	<b>2.81</b>	*	<b>THpT</b>	<b>2422-2437</b>	<b>coin;stratigraphy</b>	<b>239</b>
159	44.10	27.28	Silistra	Drustur-Medieval furnace	BC	1250	1310	1280	TA	8	11.47	58.54	4.96	126	17	15	58.80	2.50	ARM	THpT	2380-2403	archaeological	239,502
204	43.80	25.60	Cherven	Medieval fortress	BR	1200	1300	1250	T	10	*	48.21	5.32	116	5	5	55.74	4.04	*	THDL	1049-1066	archaeological	239,502
319	43.10	25.70	Veliko_Tarnovo	Medieval kiln for metal production	BC	1200	1250	1225	TA	6	21.79	57.55	3.73	324	8	7	49.20	1.12	*	THpT	2318-2328	archaeological	370
199	43.10	25.70	Veliko_Tarnovo	King Ivan Assen tomb-"St.40 Martyrs" ch.	BR	1203	1230	1217	T	9	*	60.79	3.48	271	4	4	53.53	4.75	*	THDL	558-568	documents, coins	502
312	41.80	26.10	Lubimetz	Orta Burun-sq.E9-10+kiln No1+oven-C7	KL	1180	1240	1210	TA	23	14.60	59.71	2.00	224	15	13	51.10	4.10	TRM;IRM	THpT/THpT	2173-2206	coins-end12-begin.13c.AD	502
196	42.20	24.20	Kovachevo	Destructions after an ancient fire	BC	1180	1230	1205	T	4	12.39	60.07	6.32	212	11	6	62.57	2.66	*	THDL	1203-1228	coins	502
248	43.10	25.70	Veliko_Tarnovo	Med. kilns:metal&domestic production	BC	1150	1250	1200	TA	6	9.50	59.30	3.30	546	7	6	54.19	3.37	*	THpT	2438-2443	archaeological (ceramic)	370
194	41.50	23.40	Melnik	Despot Slav fortress - Saint Nikola place	BR	1180	1210	1195	T	24	*	51.70	5.40	113	7	4	62.97	4.87	*	THDL	1560-1573//1698-1699	archaeological	502
144	42.00	24.80	Assenovgrad	Medieval church "Saint Jana"	BR	1180	1210	1195	T	4	*	59.35	5.12	125	6	2	56.43	3.41	*	THpT	628-631	archaeological	502
195	42.20	24.30	Pazardjik	Tzepina fortress-water reservoirs	BR	1120	1220	1170	T	22	*	54.32	5.17	123	7	6	57.75	5.33	*	THDL	971-998//50//51	archaeological	239,502
188	42.50	26.00	Assenovets	Medieval settlement-Markova water mill	KL	1100	1200	1150	T	7	13.04	54.89	3.90	238	5	5	60.64	3.90	*	THDL	1587-1595	archaeological	197
311	41.80	26.10	Ljubimetz	Orta burun-kiln No2	KL	1100	1200	1150	TA	6	11.50	61.40	6.60	104	5	3	59.49	2.81	TRM	THpT	2157-2172	coins	239,502
192	42.00	24.80	Assenovgrad	The fortress-church "St.Bogor.Petrichka"	BR	1100	1150	1125	T	5	*	62.16	2.01	813	3	3	52.64	5.63	*	THDL	614-619	historical	197
191	43.12	25.70	Veliko_Tarnovo	Church "Saint Dimitar"	BR	1100	1150	1125	T	16	*	54.86	5.24	120	7	7	55.64	3.06	*	THDL	1305-1320	historical	197
313	42.10	26.10	Iskritza	Kiln used to the middle of 12 century	KL	1100	1150	1125	T	6	8.25	61.11	6.66	104	5	5	51.19	2.20	TRM;IRM	THpT	2208-2216	archaeological	197
271	42.10	24.20	Patalenitza	The church	BR	1050	1150	1100	*	*	*	*	*	*	6	6	51.10	4.70	*	THDL	1726-1738	archaeological	239,502
197	42.60	23.00	Pernik	Krakra fortress-burnt soil of ancient fire	BC	1080	1110	1095	T	7	9.50	60.80	3.70	264	11	5	67.86	2.92	*	THDL/THpT	1347-1360	archaeological	239,502
210	42.10	25.43	Chirpan	Zlatna livada-Medieval domestic oven	BC	1025	1150	1088	TA	10	15.80	61.90	1.10	1832	9	5	72.13	3.49	*	THpT	2367-2379	archaeological	369
183	43.20	26.60	Veliki_Preslav	Patlejna ceramic center	KL	1050	1100	1075	T	3	4.60	64.20	2.00	3916	3	1	60.20	2.21	*	THDL	892-894//896	archaeological	239,502
<b>369</b>	<b>43.37</b>	<b>27.12</b>	<b>Pliska</b>	<b>Palace complex-kiln 2,sq.XX-321</b>	<b>KL</b>	<b>1000</b>	<b>1050</b>	<b>1025</b>	<b>TA</b>	<b>3</b>	<b>26.50</b>	<b>65.70</b>	<b>2.70</b>	<b>2156</b>	<b>6</b>	<b>6</b>	<b>70.03</b>	<b>1.33</b>	*	<b>THpT</b>	<b>2574;2576;2595;2598;2599</b>	<b>archaeological</b>	<b>552</b>
255	41.80	24.80	Assenovgrad	Bachkovski_monastir-Ossuary	BR	1000	1050	1025	*	*	*	*	*	*	1	1	62.02	1.94	*	THkD	620	archaeological	197
186	41.42	23.20	Petrich	The remains of an ancient fire	BS	1014	1014	1014	T	5	17.51	59.59	5.48	196	5	5	65.14	3.82	*	THDL	1543-1559	historical	502
184	43.37	27.10	Pliska	The king's estate-prefurnium; furnace	KL	950	1030	990	T	7	8.10	61.50	5.20	137	9	6	74.08	5.09	*	THDL	634-639/1628-1645	archaeological	239,502
180	43.40	28.20	Balchik	Protobulgarian dwellings	HR	950	1020	985	T	4	9.92	69.86	3.60	628	2	1	80.11	8.00	*	THDL	1771-1784	archaeological	239,502
182	43.70	28.50	Durankulak	The field - kiln's floor plasters	KL	970	1000	985	T	17	11.64	68.43	2.00	317	11	7	70.59	3.58	TRM;IRM	THkD/THpT	1763-1766//1785-1802	archaeological	502
<b>368</b>	<b>43.37</b>	<b>27.12</b>	<b>Pliska</b>	<b>Palace complex-kiln 1,sq.XX-363</b>	<b>KL</b>	<b>950</b>	<b>1000</b>	<b>975</b>	<b>TA</b>	<b>12</b>	<b>4.80</b>	<b>70.80</b>	<b>2.30</b>	<b>358</b>	<b>6</b>	<b>6</b>	<b>73.80</b>	<b>3.04</b>	*	<b>THpT</b>	<b>2573; 2575;2577-2592</b>	<b>archaeological</b>	<b>552</b>
178	43.20	26.82	Veliki_Preslav	The inner fortress wall	BR	900	950	925	T	4	*	61.25	4.50	162	4	4	78.06	7.54	*	THDL	742-748	archaeological	239,502
175	44.10	26.80	Garvan	Slav settlement	HR	900	950	925	*	*	*	*	*	*	7	2	74.73	9.22	*	THDL	108-113	archaeological	502
174	43.20	26.82	Veliki_Preslav	The monastery estate in the inner town	BR	900	950	925	T	7	*	71.21	2.53	513	10	9	84.03	9.24	*	THDL/THpT	896-910	archaeological	239,502
173	43.20	26.80	Vinitza	Ceramic center of the king's estate	KL	900	920	910	T	6	15.60	69.20	3.50	376	7	7	77.75	2.48	TRM;IRM	THDL/THpT	98-107	historical	239,502
177	43.20	26.82	Veliki_Preslav	Ceramic center on the road to Patlejna	KL	900	920	910	T	4	21.02	71.89	6.52	200	3	3	72.30	3.09	TRM;IRM	THDL/THpT	93-97	archaeological	502
176	43.20	27.90	Varna	Early Bulgarian dwelling	HR	880	940	910	T	13	11.40	64.30	3.80	117	8	5	72.32	4.05	*	THDL	1435-1459	historical	239,502
179	43.70	28.60	Durankulak	The island-Medieval horizon-kiln's floor	KL	870	920	895	T	8	12.30	64.30	7.00	64	5	4	61.76	0.42	*	THpT	B521-B531	archaeological	239,502
181	43.20	27.60	Kipra	Slavonic ceramic center	KL	800	850	825	TA	13	10.19	57.62	2.39	301	10	9	62.12	5.62	*	THDL	1803-1818	archaeological	502
343	41.70	26.30	Kap. Andreevo	Early Medieval settlement	KL	780	820	800	TA	57	7.57	59.11	1.75	117	21	9	55.12	6.62	*	THpT	2449-2524	coins Yustinian VI	502
314	43.40	28.30	Topola	Kilns under the roof of iron construction	KL	680	800	740	TA	6	353.80	70.30	4.80	196	6	6	62.29	3.53	TRM;IRM	THpT	2217-2226	archaeological	239,502
170	43.50	23.20	Montana	Rego Montanensium-kiln floor&burnt soil	KL	600	760	680	TA	5	350.03	56.69	4.12	346	4	3	68.52	3.95	*	THDL	1506-1516	archaeological	197
172	43.10	25.70	Veliko_Tarnovo	Tzarevets - burnt soils after the fire	BS	641	647	644	T	31	351.14	65.33	2.10	143	15	15	76.55	5.56	TRM;IRM	THDL/THpT	135-139//640-666//1574-1581	coins&inscription	502
<b>367</b>	<b>42.60</b>	<b>27.70</b>	<b>Nessebar</b>	<b>Early Byzantine furnace-the floor</b>	<b>KL</b>	<b>575</b>	<b>675</b>	<b>625</b>	<b>TA</b>	<b>4</b>	<b>348.00</b>	<b>66.70</b>	<b>2.50</b>	<b>1406</b>	*	*	*	*	*	*	<b>2547;2552;2557;2559</b>	<b>archaeological</b>	<b>239</b>

157	43.60	25.60	Krivina	Jatrus-sqs X-T9; X-B; IX-O-Avar's invasion	BC	590	620	605	T	16	1.24	60.87	3.30	123	11	11	83.21	7.86	*	THDL	827-831//854-874	archaeological	239,502	
296	42.70	23.30	Sofia	Serdica-pottery oven No2 of L.Roman Age	BC	571	615	593	TA	18	5.80	58.70	1.90	324	11	8	72.68	2.90	ARM	THpT	2279-2304	coins-Emperor Yustin II	175	
167	43.30	27.60	Sherba	Remains of a Late Roman kiln	KL	560	600	580	T	5	7.80	62.42	4.23	328	4	4	68.04	3.90	TRM;IRM	THpT	83-87	archaeological	197	
149	43.20	27.90	Varna	The Basilica at Djanavar tepe	BR	500	600	550	T	4	*	57.88	2.66	464	6	5	65.99	5.58	TRM;IRM	THDL/THpT	302-305	archaeological	502	
166	42.70	27.70	Nessebar	Roman town's wall	BR	540	560	550	T	5	*	62.96	5.22	121	7	5	60.84	4.00	TRM;IRM	THDL/THpT	376-381	seal Yustinian	502	
171	42.90	25.40	Drjanovski_mon.	Late Roman tower in Borunja district	BR	500	600	550	T	11	*	57.87	3.40	284	6	4	66.45	6.97	*	THDL/THpT	1124-1138	archaeological	239,502	
161	42.40	25.70	Hrishtene	Early Christian Basilica	BR	500	600	550	T	11	*	57.27	4.21	185	6	6	65.22	6.58	TRM;IRM	THDL/THpT	B207-B218	archaeological	502	
163	42.68	26.33	Novo_selo	Well preserved furnace for bricks baking	KL	500	600	550	T	7	3.63	59.84	3.90	234	5	5	63.01	4.75	TRM;IRM	THDL/THpT	548-557	archaeological	502	
165	42.76	23.30	Bojana	Late Roman Buildings	BR	520	580	550	T	9	*	58.49	2.70	451	9	9	63.56	5.01	*	THDL	962-970	archaeological	239,502	
155	43.40	28.40	Kaliakra	Re-used L.Roman mat.in Medieval ch.	BR	500	600	550	T	15	*	61.89	3.56	259	12	9	64.86	6.15	*	THDL	358-367//79-82	archaeological	502	
168	43.20	27.70	Beloslav	Material from Dobrea chuka district	BR	500	600	550	T	5	*	61.76	4.38	171	3	3	63.23	3.46	*	THkD	240-246	archaeological	239,502	
160	43.20	27.45	Provadija	Re-used bricks in Ovechgrad fortress	BR	500	600	550	T	5	*	60.28	6.74	72	4	3	64.96	2.91	*	THDL	293-301	archaeological	502	
150	42.70	23.30	Sofia	Serdica-South triangular tower;East door	BR	527	565	546	T	22	*	60.99	5.37	114	9	8	68.80	5.68	*	THDL	398-414//477-489//678-681	coins Yustinian	197	
162	43.20	23.90	Gol_Belene	Late Roman basilica	BR	480	600	540	T	14	*	62.94	3.27	307	6	6	72.74	1.60	*	THkD/THpT	1230-1245	archaeological	502	
256	44.00	22.50	Perilovetz	Late Roman fortress Bovonia	BR	520	560	540	T	2	*	70.30	1.41	1653	3	3	67.89	3.15	*	THkD	777-778	archaeological	197	
244	42.30	22.65	Kustendil	Early Medieval sanctuary in Goranovtzi	KL	500	580	540	T	10	1.50	57.80	3.50	188	6	6	66.86	4.87	*	THDL	1933-1942	archaeological	502	
202	42.50	24.30	Strelcha	Re-used Roman bricks in Med. Fortress	BR	500	560	530	*	*	*	*	*	*	7	6	66.33	4.71	*	THDL/THpT	1596-1609	archaeological	239,502	
156	43.50	27.10	Vojvoda	Roman Estate-burnt wall made by bricks	bBR	500	550	525	T	6	2.80	70.10	5.90	94	5	5	62.47	1.34	*	THDL	911-914//928-931	archaeological	239,502	
143	43.70	24.90	Nikopol	Christian church in a Roman domination	BR	440	600	520	T	7	*	69.30	2.91	388	3	3	53.48	1.16	*	THDL	802-809	archaeological	502	
233	43.10	24.70	Lovech	Med. church-re-used Late Roman bricks	BR	400	620	510	*	*	*	*	*	*	8	8	54.56	4.22	*	THDL	1139-1150	archaeological	239,502	
151	43.70	22.70	Macresh	Roman Basilica-unique abse	BR	450	550	500	TA	5	*	57.62	1.35	1803	5	4	59.11	2.66	*	THpT	771-776	archaeological	197	
66	43.30	27.80	Varna_district	Early Byzantine fortress "Muhalijsko tepe"	BR	450	550	500	T	5	*	64.80	3.34	295	*	*	*	*	*	*	*	313-319	archaeological	197
158	43.20	27.80	Kisheshlika	Late antique fortress and settlement	BR	400	520	460	T	11	*	63.60	3.98	207	3	3	60.76	2.01	TRM;IRM	THpT	268-279	archaeological	502	
145	43.50	26.50	Razgrad	Roman town Abritus-fortress's East wall	BR	400	500	450	TA	5	*	54.56	5.40	113	2	2	63.96	0.67	*	THDL	1068-1076	archaeological	239,502	
164	42.70	27.70	Nessebar	Western wall of the Roman town	BR	400	500	450	T	3	*	53.77	3.50	268	4	4	59.21	2.57	TRM;IRM	THDL/THpT	68-70	archaeological	239,502	
146	42.70	27.70	Nessebar	Roman public house	BR	400	500	450	TA	14	*	58.70	4.90	137	7	7	60.63	2.37	TRM;IRM	THDL/THpT	B175-B182//71-72	archaeological	502	
142	42.50	23.10	Kralevo_dol	Roman villa	KL	400	480	440	TA	10	358.43	49.94	2.60	326	7	6	57.01	5.35	*	THpT	1151-1162	archaeological	239,502	
126	43.50	23.20	Kalimanitza	Roman cer.center-Rego Montanensium	KL	380	470	425	TA	28	1.52	58.99	2.02	183	10	9	65.71	4.14	*	THDL	1372-1380//1517-1542	archaeological	502	
154	42.20	24.30	Pazardjik	Tzepina fortress-E.Bizantine ch.+dwell.	T	400	450	425	T	10	*	47.92	3.98	207	6	4	64.38	4.58	*	THkD	1003-1008//1016-1023//48//49	archaeological	502	
120	42.20	24.80	Plovdiv	Philippopol-a road after an ancient fire	BS	320	440	380	T	4	*	51.73	2.08	760	2	2	76.36	5.94	*	THDL	B242-B250	archaeological	239,502	
134	41.50	26.10	Ivajlovgrad	Roman villa Armira - the fire, hypocaust	KL	376	378	377	T	5	352.82	48.09	5.40	201	5	5	71.33	2.40	*	THDL	161-6//382-97//1401-03//1428	archaeological	239,502	
128	43.20	25.30	Hotnitsa	Roman ceramic center	KL	376	378	377	T	12	359.97	47.56	4.20	103	6	5	69.08	5.57	*	THDL	144//182-183//653-662	archaeological	197	
136	42.50	25.70	Stara_Zagora	Roman site Chataalka-kiln's floor of bricks	bBR	350	400	375	T	5	354.95	53.42	6.10	88	7	7	57.35	2.92	*	THDL	200-211	archaeological	502	
121	43.10	25.70	Butovo	Roman furnaces	KL	370	380	375	T	14	2.17	58.53	4.70	70	15	14	56.92	4.86	*	THDL	126-130//176//878-890	archaeological	197	
135	41.70	25.70	Dolno_Botevo	Roman reservoir	BR	300	400	350	*	*	*	*	*	*	7	7	68.11	1.03	*	THDL	54-56//1260-1266	archaeological	502	
130	42.70	23.30	Sofia	Serdica-E.Christian chuch "St. Georgue"	BR	300	380	340	T	12	*	51.43	5.62	104	6	5	68.13	6.30	*	THDL	415-423//709-714	archaeological	197	
141	42.70	23.30	Sofia	Serdica-East door-tower 2;West. column	BR	310	360	335	T	11	*	49.93	6.24	84	8	8	53.71	4.18	*	THDL	667-677//695-699	archaeological	239,502	
140	43.50	27.10	Vojvoda	Late Roman fortress	BR	306	337	322	T	10	*	54.33	6.90	69	8	8	50.49	3.68	*	THDL	915-927//1646	seal Dules	239,502	
132	42.70	23.30	Sofia	Roman estate-farm buildings of Serdica	BR	250	350	300	T	4	*	48.07	6.58	76	5	5	64.36	2.27	*	THDL	44-47	archaeological	197	
129	42.50	24.70	Hissarja	Diokletianopol-town gate and wall	BR	280	310	295	T	25	*	53.27	3.88	218	26	15	59.91	2.29	ARM	THDL/THpT	596-611//2305-2317	archaeological	502	
123	43.60	25.35	Svishtov	Roman town Nove - furnaces	KL	270	300	285	T	9	359.67	55.20	5.20	122	7	7	67.84	1.55	*	THDL	115-123	archaeological	197	

127	43.50	26.50	Razgrad	Roman town Abritus	BR	260	300	280	T	20	*	60.00	4.47	164	5	5	58.04	1.11	*	THDL	1077-1097	archaeological	197
125	43.10	25.70	Butovo	Roman construction&necropolis	BR	250	300	275	T	5	*	54.56	1.32	1886	4	4	56.56	2.91	*	THDL	124-125//174-175	archaeological	502
131	43.70	24.50	Gigen	Roman town Escues-a building; a bath	BR	200	300	250	T	18	*	59.84	5.27	118	7	7	66.36	5.46	*	THDL	752-770	archaeological	502
117	43.60	25.35	Svishtov	Roman town Nove - bricks	BR	200	300	250	T	2	*	50.20	0.28	41873	4	3	60.27	1.16	*	THDL	35-37	archaeological	197
122	43.20	26.50	Targoviste	Burnt stones in the ritual ovens	bST	200	250	225	*	*	*	*	*	*	2	2	71.55	0.96	*	THDL	1838-1846	archaeological	197
112	43.20	25.30	Pavlikeni	Furnaces-big Roman ceramic center	KL	200	240	220	T	49	351.62	58.30	1.90	111	23	23	61.69	5.40	*	THDL	1099-110//B158-69//1182-94	archaeological	197
113	42.50	26.50	Jambol	Kabile - furnace	KL	150	250	200	T	7	358.34	65.13	4.79	143	7	6	68.74	3.82	*	THDL	B331-B343	archaeological	239,502
116	42.50	25.70	Stara_Zagora	Augusta Trajana-Roman public houses	BR	170	220	195	T	29	*	55.16	5.65	103	10	9	75.97	5.85	*	THDL	184-188//1024-1048	archaeological	197
153	43.20	27.60	Devnja	Marcianopol-E.Chr.Basilica:re-used mat.	BR	170	200	185	T	8	*	54.05	5.88	95	1	1	51.43	3.00	*	THDL	333-340	archaeological	502
111	43.20	25.50	Nikjup	Nikopolis ad Istrum	BR	170	190	180	T	11	*	58.72	4.31	177	6	6	51.80	3.53	*	THDL	132-134//1468-1478	coins	239,502
148	43.00	27.80	Bjala	Erite-Roman road station-re-used mat.	BR	140	220	180	T	8	*	58.42	1.94	873	4	4	49.01	4.82	*	THDL	257-267	archaeological	239,502
115	43.20	27.60	Devnja	Marcianopol-gladiatorial's fight amphith.	BR	160	200	180	T	6	*	56.12	2.06	774	5	5	49.34	1.92	*	THDL	327-332	archaeological	553
110	42.70	23.30	Sofia	Serdica - the monetary house	BR	176	180	178	T	17	*	58.94	4.00	205	9	6	63.27	3.69	*	THDL	1819-1837	coins	239,502
104	43.20	27.90	Varna	The Roman thermes	BR	150	200	175	T	4	*	57.93	3.66	245	6	6	59.72	2.43	*	THDL	73-76	coins	553
109	42.50	25.70	Stara_Zagora	Augusta Trajana-the mineral baths	BR	162	163	163	T	21	*	58.78	4.81	142	5	5	55.05	4.94	*	THDL	715-724//B190-B206	inscription	197
124	42.50	23.10	Krlev_dol	Roman villa	BR	120	200	160	T	13	*	58.77	4.71	148	6	6	80.11	4.60	*	THDL	1163-1180	archaeological	239,502
106	43.60	25.60	Krivina	Jatrus-2d c.bricks in 3d c.building-sq.9F	BR	100	200	150	T	21	*	65.43	5.45	111	12	11	58.58	3.51	*	THDL	933-852	archaeological	197
103	41.90	25.60	Haskovo	The Roman mineral baths	BR	100	200	150	*	*	*	*	*	*	2	2	63.75	2.46	*	THDL	52-53	archaeological	197
108	42.30	22.65	Kjustendil	Pautalia-the fortress wall and the citadel	BR	100	200	150	TA	18	*	60.14	4.41	169	14	11	65.08	3.95	*	THDL/ThpT	953-961	archaeological	239,502
240	42.90	23.00	Gaber	Antique building	BR	50	250	150	T	15	*	58.40	4.88	138	6	5	76.08	4.98	*	THDL	725-741	archaeological	197
105	43.20	25.00	Kalvaka	The tomb	BS	117	138	128	T	4	*	61.10	4.92	136	3	3	66.82	4.68	*	THDL	177-181	coins	197
284	43.80	22.80	Vartop	Jidkovetz-triangular brick	BR	117	138	128	*	*	*	*	*	*	3	3	61.27	2.66	*	THDL	38	inscription Hadrien	197
107	42.20	24.80	Plovdiv	Roman Philipopol - the Forum	BR	100	150	125	T	9	*	59.53	4.47	164	3	3	66.76	4.64	*	THDL	B225-B241	archaeological	239,502
102	43.60	27.70	Dobrogled	The East Roman fortress	BR	100	150	125	T	8	*	59.49	5.48	109	1	1	66.75	1.95	*	THkD	247-256	archaeological	502
114	41.50	26.10	Ivajlovgrad	Roman villa Armira	BR	100	140	120	T	24	*	56.92	5.13	125	22	16	67.61	3.96	*	THDL	388-394//1414-1427	archaeological	197
101	43.70	24.90	Nikopol	The Roman fortress - East part	BR	98	117	108	T	12	*	60.62	5.82	97	4	4	70.86	2.99	*	THkD	810-821	coins	197
99	42.50	25.90	Karanovo	Settlement-the furnace and the grave	BC	81	117	99	T	5	352.50	55.38	6.10	159	8	7	68.45	0.48	*	THDL	1610-1627	coins-Domician and Trajan	502
346	43.64	25.59	Krivina	Lime workshop of Legio I Italica	BC	70	100	85	TA	10	353.44	60.56	2.54	364	6	6	66.51	2.80	*	ThpT	Lv1-Lv10	coins-end of 1st c.AD	509
347	43.64	25.59	Krivina	Lime workshop of Legio I Italica	KL	70	100	85	TA	8	356.20	56.60	2.72	426	9	7	62.10	3.80	*	ThpT	Lv11-Lv23	coins-end of 1st c.AD	509
348	43.64	25.59	Krivina	Lime workshop of Legio I Italica	KL	70	100	85	TA	23	356.26	57.29	1.93	246	20	18	67.20	4.50	*	ThpT	Lv35-Lv59	coins-end of 1st c.AD	509
98	42.70	23.30	Sofia	Roman town.Serdica-the aquadukt	BR	50	120	85	T	5	*	57.58	4.43	167	2	2	70.48	5.16	*	THDL	403-407	archaeological	197
345	43.64	25.59	Krivina	Roman pottery kiln	BC	-60	30	-15	TA	5	359.90	67.60	5.60	191	9	9	69.82	3.50	*	ThpT	Lv24-Lv32	archaeological;stratigraphy	509
96	42.50	27.50	Burgas	Mandrensko ezero - Tursis	BC	-200	-100	-150	*	*	*	*	*	*	3	2	69.01	0.43	*	THDL	1654-1662	archaeological	197
253	43.72	26.71	Isperih	Teke Demir Baba-Thracian sanctuary	BC	-280	-200	-240	T	32	354.66	67.36	1.58	259	28	26	62.25	5.12	*	THkD/ThpT	1879-96//1918-26//1988-2002	archaeological	239,502
274	43.72	26.71	Isperih	Thracian site at Water supply station	BC	-260	-240	-250	TA	21	350.23	63.22	1.84	298	26	23	71.85	3.91	TRM;IRM	ThpT	2038-2065//2115-40	coins; inscriptions; seals	502
56	43.70	26.75	Isperih	Sborjanovo-hill28+fireplace-hill30(GSM)	BC	-300	-200	-250	TA	44	359.23	66.98	0.96	499	22	16	63.98	2.77	TRM;IRM	ThpT	DG22-DG58//DG3-DG21	archaeological	502
279	43.10	25.70	Veliko_Tarnovo	Thracian oven-the floor	BC	-350	-200	-275	*	*	*	*	*	*	12	12	70.44	2.95	*	ThpT	VT1-VT8	archaeological	239,502
100	42.24	25.22	Halka_Bunar	Pottery center-Thracia (Early Hellenistic)	BC	-280	-278	-279	TA	12	348.70	62.20	2.70	270	24	20	77.23	2.17	*	ThpT	HB1-17//HB32-34	coins Demetrius, Polircete	173
277	42.25	24.08	Vetren	Pistiros Emporion-hN1,r4+r2;sqB7,B1/B2	BC	-280	-279	-280	TA	5	347.10	66.20	5.20	217	18	17	74.29	6.70	TRM;IRM	ThpT	2066-2094//2247-2255	archaeo;coins;graffiti	239,502
93	42.50	25.40	Kazanlak	Thracian town Seuthopolis-the tomb	BR	-320	-260	-290	T	6	*	66.98	4.21	185	9	7	80.29	7.46	*	THDL	27 28 32 33 34 39-43	coins&archaeological	239,502
282	42.25	24.08	Vetren	Pistiros Emporion-altars-B'2,B'7	BC	-350	-300	-325	TA	15	348.45	64.00	2.22	260	6	1	68.34	5.10	TRM;IRM	ThpT	2228-40//2263-70	coins; archaeol.; graffiti;	502

357	42.65	27.72	Nessebar	Elinistic kiln	BC	-380	-280	-330	TA	7	350.30	69.60	2.90	430	18	8	67.58	4.81	*	THpT	N1-N14	coin&archaeological	239	
283	42.25	24.08	Vetren	Pistiros Emporion-baked floor-sq.B1	BC	-400	-350	-375	TA	9	348.29	58.21	3.03	290	9	8	60.59	5.87	TRM;IRM	THpT	2095-2100/2241-2246	coins; archaeol.; graffiti;	239,502	
92	43.10	24.30	Lazar_Stanevo	Mogila 25, Toros 174, oriented sample	BS	-420	-380	-400	T	3	352.70	60.70	2.60	2250	2	2	77.50	3.41	*	THDL	1665	archaeological	502	
320	43.10	25.70	Veliko_Tarnovo	Two Thracian baked floors	BC	-500	-300	-400	TA	11	351.90	61.10	2.20	423	23	17	64.11	3.88	*	THpT	VT12-VT28	archaeological (ceramic)	370	
362	42.25	25.47	Malko_Tranovo	Remains of Elinistic ovens	BC	-500	-340	-420	*	*	*	*	*	*	10	8	75.44	3.44	*	THpT	2404-2421	archaeological	239	
15	41.60	25.40	Kardzhali	Vishegrad-Iron Age (Thracia)-fired floor	BC	-560	-360	-460	*	*	*	*	*	*	2	2	75.14	0.85	*	THDL	1298-1299	archaeological	197	
366	42.42	27.70	Sozopol	Metallurgic ovens	BC	-500	-450	-475	TA	11	1.70	66.70	2.00	531	12	10	91.72	4.37	ARM	THpT	So27;So31-So36;So38;So41-47	archaeological	239	
365	42.42	27.70	Sozopol	Big pottery oven	BC	-550	-500	-525	TA	21	350.70	63.00	2.40	177	10	8	87.83	5.78	ARM	THpT	So1-So15; So19-So24	archaeological	239	
88	42.20	24.80	Plovdiv	Nebet Tepe-Thracian town Evmolpia	BC	-800	-600	-700	T	3	356.32	65.70	1.40	3641	3	2	69.14	0.19	*	THDL	9-1 4//9-6//9//9-11	archaeological	197	
90	42.50	25.70	Stara_Zagora	Pshenichevo-Iron Age-destructions	BC	-1000	-800	-900	T	6	20.30	66.00	5.30	158	7	6	68.98	6.04	*	THDL	Psh1-Psh27	archaeological	239,502	
252	43.74	26.74	Isperih	Kamen Rid - Kaletto-Thracian fortress	HR	-1000	-900	-950	T	31	17.20	71.20	1.20	431	20	18	75.59	4.37	*	THkD	T1-T3//1901-1912//1959-1987	archaeological	197	
356	42.55	26.78	Malenovo	Early Iron Age	HR	-1012	-914	-963	TA	11	18.60	67.10	2.60	299	*	*	*	*	*	THpT	Ma1-Ma20	14C(Poz-37808,809,810)	239	
87	42.20	24.80	Plovdiv	Nebet Tepe-Evmolpia-I-III hor. dwrđ	BC	-1100	-1000	-1050	T	15	12.53	61.86	3.00	156	6	6	77.83	1.70	*	THDL	PI1-PI17;1-1,8,13,18,21;3	archaeol.-before TrojaVII	197	
82	43.70	28.60	Durankulak	Late Bronze-big pottery furnace-P13	KL	-1302	-986	-1144	T	10	352.50	61.60	3.00	266	6	4	73.63	1.77	*	THDL	Dk1-Dk16	14C(Bln-2571)	239,502	
316	41.77	23.50	Blagoevgrad	Kajmenska chuka-Late Bronze-the fire	BS	-1391	-1130	-1261	*	*	*	*	*	*	10	9	69.37	3.89	TRM;IRM	THpT	2141-2155	14C(Beta-65858;67012;67013)	373	
80	42.20	24.80	Plovdiv	Nebet Tepe-VI hor. dwrđ - Late Bronze	BC	-1500	-1300	-1400	T	7	7.20	56.00	1.70	1213	5	5	68.06	2.51	*	THDL/THpT	5-1,5,11,15;6-1,6,11	archaeological	239,502	
84	41.60	25.40	Kardzhali	Vishegrad-Middle-Late Bronze	KL	-1600	-1400	-1500	T	3	2.50	58.92	3.90	978	3	3	68.40	1.74	*	THDL	1295-1297	archaeological	197	
321	42.10	25.80	Galabovo	Middle Bronze Age-I-II hor.dwrđ	HR	-1800	-1750	-1775	TA	46	2.29	60.41	1.57	181	21	18	60.57	5.24	TRM;IRM	THpT/THpT	GB1-GB54	archaeological	502	
85	42.20	24.80	Plovdiv	Brezov highway - Bronze Age	BC	-1900	-1700	-1800	*	*	*	*	*	*	2	2	60.21	0.47	*	THDL	B219-B224	archaeol.&stratigraphy	239,502	
77	42.20	24.80	Plovdiv	Nebet Tepe-M.Bronze Age-dwelling No4	BC	-2100	-1950	-2025	T	6	9.54	56.34	6.13	120	5	5	63.30	3.90	*	THDL	PI 8-PI 13//PH10-1,5,11	14C; relative chronology	502	
79	42.20	24.30	Yunatzite	Multil.tell-III hor.dwrđ-end of M.Bronze	HR	-2400	-2300	-2350	81//	TA	6	3.88	59.36	4.80	190	3	3	53.87	0.78	*	THDL	Yun1-Yun7	14C&stratigraphy	502
78	42.50	26.00	Nova_Zagora	Tziganska Tell-III+IV hor.dwrđ-M.Bronze	HR	-2559	-2204	-2382	76//	T	10	5.33	56.78	4.18	135	9	5	49.49	1.42	*	THpT	Nz34-Nz45	14C(Bln-1151,1255,1149,1153)	239,502
304	42.60	24.77	Dabene	Sarovka-apses house-Early Bronze IIB	BC	-2573	-2470	-2522	303//	T	30	351.33	51.26	1.80	214	21	14	53.67	1.95	TRM;IRM	THpT/THpT	Sa10-Sa67	14C(Bln-4903;4900)&strat.&syn.	239,502
81	42.20	24.30	Yunatzite	Multil.tell-VII hor. downward-sq.L7	HR	-2575	-2475	-2525	71//79	T	5	1.31	58.55	4.22	330	3	3	52.45	2.39	*	THDL	Yun8-Yun14	14C&stratigraphy	502
76	42.50	26.00	Nova_Zagora	Tziganska tell-VII hor.dwrđ-fired pitus	P	-2620	-2490	-2555	75//78	T	4	0.41	60.20	4.80	356	3	3	60.82	1.18	*	THkD/THpT	Nz5-Nz10	14C(Bln-1150,50A,54,54A)&strat.	502
303	42.60	24.77	Dabene	Under the apses house E.Bronze II	HR	-2620	-2500	-2560	43//304	T	9	359.69	52.14	3.53	213	5	5	55.30	1.95	*	THpT	Sa1-Sa9	relative chronology	239,502
325	41.63	24.40	Trigrad	Haramijska hole-Trans.period LE-EB	HR	-2620	-2520	-2570	65//	TA	10	354.14	47.99	3.90	152	7	5	46.47	0.83	*	THkD	HD11-HD20	archaeological	239,502
278	42.30	26.00	Dyadovo	Multil.tell-II hor.dwrđ-sq.K24,S24	HR	-2640	-2500	-2570	280//	TA	12	0.28	58.37	3.30	169	7	6	54.13	1.57	*	THkD/THpT	D19-28//D58-D60	archaeol.&stratigraphy	239,502
309	42.12	26.08	Galabovo	IV+Vhor.dwrđ-sq.18-20;EBAlI-III,Mihalich	HR	-2650	-2500	-2575	TA	19	354.10	51.40	1.12	253	15	14	45.53	3.89	TRM;IRM	THpT/THpT	M1 - M31	relative chronology	502	
280	42.30	26.00	Dyadovo	Multil.tell-III hor.dwrđ-M26,M27,M28,S25	HR	-2695	-2535	-2615	281//278	TA	35	2.42	56.66	1.50	249	12	12	52.92	4.62	*	THpT	D29-D56//D63-D78	archaeol.&stratigraphy	239,502
71	42.20	24.30	Yunatzite	Multil.tell - X hor.dwrđ-Bronze Age	HR	-2700	-2600	-2650	64//81	T	10	5.20	55.98	2.31	440	8	6	44.69	3.01	*	THDL	Yun30-Yun39	14C&stratigraphy	502
281	42.30	26.00	Dyadovo	Multil.tell-IV hor.dwrđ-sq.P20,R-S-T19-20	HR	-2700	-2620	-2660	289//280	TA	14	357.94	59.19	2.62	232	6	6	62.56	1.71	*	THpT	D80-D91//D115-D120	archaeol.&stratigraphy	239,502
75	42.50	26.00	Nova_Zagora	Tziganska Tell-VIII hor.dwrđ-E.Bronze	HR	-2866	-2461	-2664	//76	*	*	*	*	*	8	5	53.75	3.34	*	THpT	Nz1-Nz4//Nz12-Nz18	14C(Bln-1576A)	239,502	
64	42.20	24.30	Yunatzite	Multil.tell - XI hor.dwrđ-Bronze Age	HR	-2730	-2650	-2690	70//71	T	8	358.88	52.10	2.34	559	7	3	58.16	3.48	*	THDL	Yun22-Yun29	14C&stratigraphy	502
74	42.20	24.80	Plovdiv	Nebet Tepe-E.Bronze-phaze Mihalic	BC	-2750	-2650	-2700	T	8	1.00	56.20	2.00	746	5	4	49.62	0.76	*	THDL	7-1,6,9,11,21; 8-1,5,8,16	14C&archaeol.culture	197	
70	42.20	24.30	Yunatzite	Multil.tell-XII hor. dwrđ-Bronze	BC	-2770	-2690	-2730	83//64	T	7	1.10	52.10	4.30	194	10	6	53.41	4.58	*	THDL	Yu15-Yu21//Yu40-Yu45	14C&stratigraphy	502
43	42.50	24.90	Sarovka	Trench H18-4-1st lev.dwrđ-beg.E.Bronze	BC	-2875	-2624	-2750	193//303	TA	4	359.90	55.10	4.20	478	4	3	46.30	2.10	*	THpT	CA68//CA73-CA76//CA120	14C (Bln-5231)	502
289	42.30	26.00	Dyadovo	Multil.tell-V hor.dwrđ-sq.P19; Q23	HR	-2873	-2634	-2754	290//281	TA	7	359.58	51.74	3.40	316	6	5	50.49	1.81	*	THpT	D121-D123//D127-D132	14C(Bln-3866;3868-71)	239,502
275	42.20	26.10	Staroseletz	Early Bronze-second half	HR	-2850	-2750	-2800	TA	11	356.97	61.75	4.90	85	5	5	40.07	1.80	*	THkD	Str1-Str13	rel.chronology&stratigraphy	197	
193	42.50	24.90	Sarovka	Trench H18-4-2d lev.dwrđ+sq.P16	BC	-2850	-2750	-2800	221//43	TA	10	6.70	52.40	2.45	389	5	3	48.67	1.38	*	THpT	CA79//83-89//91//93//110//112	stratigraphy	502
286	42.50	26.00	Ezero	Multil.tell - X hor. dwrđ - Bronze Age	BC	-2923	-2701	-2812	69//	*	*	*	*	*	3	3	45.06	2.48	*	THDL	533-535	14C(Bln-725-7;Bln-1835)	239,502	

290	42.30	26.00	Dyadovo	Multil.tell-VI hor.dwrđ-sq. Q23,P23,O23	HR	-2866	-2766	-2816	291/289	TA	7	3.51	55.63	3.33	328	7	4	43.00	2.25	*	THpT/THpT	D133-D140	rel.chronology&stratigraphy	239,502
83	42.20	24.30	Yunatzite	Multil.tell-XVI hor.dwrđ-sq.O6/O5	HR	-2880	-2820	-2850	272/70	TA	12	355.46	60.20	1.50	749	5	5	43.22	3.65	*	THkD	Yu46-Yu58	14C;archaeol.&strat.&synchron.	502
291	42.30	26.00	Dyadovo	Multil.tell-VII hor.dwrđ-sq.S23,U25,O19	HR	-2906	-2806	-2856	292/290	TA	32	358.16	57.68	1.14	450	26	23	50.92	5.38	TRM;IRM	THpT/THpT	D92-114//D157-162//D192-207	relative chronology	239,502
272	42.20	24.30	Yunatzite	Multil.tell-XVII hor.dwrđ-Early Bronze	HR	-3000	-2800	-2900	273//83	TA	37	358.83	57.88	1.24	364	9	8	43.26	1.38	*	THkD	Yu59-Yu94//Yu104	14C;archaeol.&strat.&synchron.	502
221	42.50	24.90	Sarovka	Trench H18-3d lev.dwrđ+sq.P16	BC	-3000	-2800	-2900	245//193	TA	8	357.20	56.60	3.30	276	6	6	38.97	2.07	*	THpT	CA94-102//CA114, 118, 119	stratigraphy	239,502
317	42.30	26.00	Dyadovo	Multil.tell-Supp. XIV hor.dwrđ (borehole)	HR	-3000	-2800	-2900		T	*	*	*	*	*	1	1	41.32	2.96	*	THkD	D7-D14	stratigraphy	239,502
292	42.30	26.00	Dyadovo	Multil.tell-VIIIhor.dwrđ-U24,V25,P20-21	HR	-2956	-2856	-2906	50//291	TA	44	357.48	57.98	1.23	305	26	25	41.17	3.95	*	THpT	D98-101//D105-110//D124-126	rel.chronology&stratigraphy	239,502
97	42.30	26.00	Dyadovo	Multil.tell-Japon sector L23	HR	-2975	-2875	-2925		TA	26	1.11	58.60	1.47	374	12	9	40.36	2.57	*	THpT	D210-D249	relative chronology	239, 554
50	42.30	26.00	Dyadovo	Multil.tell-IX hor.dwrđ-sqs.P23,P24,P27	BC	-3000	-2900	-2950	//292	T	18	358.91	54.56	1.57	460	20	15	48.52	2.59	TRM;IRM	THpT	D250-275//D172-173	rel.chronology&stratigraphy	239
350	42.57	26.98	Dragantzi	Early Bronze-fired remains	BC	-3000	-2900	-2950		*	*	*	*	*	*	11	9	46.78	2.49	*	THpT	D1-Dr28	archaeological;synchron.	239,520
68	42.30	26.00	Dyadovo	Multil.tell-Supp.XVI hor.dwrđ (borehole)	HR	-3000	-2900	-2950		T	4	359.49	58.84	4.63	395	2	2	41.12	2.22	*	THDL	D1-D6	archaeological	197
69	42.50	26.00	Ezero	Multil.tell Ezero-XII+XIII hor.dwrđ-Bronze	BC	-3016	-2910	-2963	53//286	T	9	355.67	57.54	1.83	788	9	9	44.44	2.95	*	THDL	520-522//528-530//541-547	14C(Bln-1156, 1841, 1786...)	239,502
245	42.50	24.90	Sarovka	Trench H18-4:4+5th lev.dwrđ+sq.P17	BC	-3100	-2900	-3000	//221	TA	11	4.28	54.52	1.64	772	10	9	42.85	2.91	*	THpT	CA123-131//CA104-109	14C(Bln-5233),strat&rel.chronology	239,502
359	42.30	26.00	Dyadovo	Multil. tell-beg.E.Bronze-central profile	BC	-3100	-2900	-3000	//50	TA	61	0.90	55.40	1.20	218	25	21	44.67	2.42	*	THpT	D279-D380	archaeological	239,520
360	42.30	26.00	Dyadovo	Multil. tell-beg.EB-ovens2010-O13/14	BC	-3082	-2921	-3002	//50	TA	31	356.10	55.00	1.40	338	11	11	44.03	1.19	*	THpT	D381-D415	14C(PLD16899-16901)	239,520
67	43.10	25.50	Hotniza	Vodopada -II hor.dwrđ-TP LE-EB	BC	-3772	-3657	-3715		TA	74	1.41	61.61	1.30	149	25	25	52.18	5.42	*	THDL	H1-H79	14C(Bln-3680-3685)	502
62	41.60	24.30	Trigrad	Jagodinska cave-2 hor.upwrd - LE-EB	HR	-3940	-3706	-3823		TA	16	353.60	55.20	1.90	361	10	9	54.26	5.52	*	THDL	Ja1-Ja11//Ja17-Ja25	14C(Bln-2247,2249,2250)	239,502
133	43.50	23.50	Galatin	Chukata-Transition period LE-EB	HR	-4050	-3900	-3975		T	15	355.65	51.33	3.80	99	9	8	43.93	1.54	*	THkD	G1-G27	(14C) archaeological	197
65	41.60	24.40	Trigrad	Haramijska hole-B8/9;D3;C6-TP LE-EB	HR	-4038	-3949	-3994		TA	17	357.60	53.40	2.70	172	12	9	50.39	0.13	*	THkD	HD1-HD10//HD21-HD28	14C (Bln-3340-3345)	239,502
63	42.12	23.68	Rebarkovo	Djugera - Transition period LE-EB	BC	-4160	-4000	-4080		*	*	*	*	*	*	7	6	39.38	4.06	*	THDL	Dj1-Dj10	archaeological	502
57	43.10	23.78	Krivodol	I hor.upwrd-L.Eneolithic-KVI-Salkuca	HR	-4150	-4050	-4100		T	27	5.11	50.25	2.20	160	13	13	39.22	3.99	*	THDL	Kr1-Kr32	archaeol.&stratigraphy	197
61	43.30	24.30	Telish	Trans.per.LE/E.Bronze-III(IV) hor.upwrd	BC	-4230	-3995	-4113	60//	T	12	352.32	53.48	4.36	100	7	5	46.70	2.50	*	THDL	T35-T45//T66-T68	14C(Bln-2663;2241-44;2388)	239,502
60	43.30	24.30	Telish	Trans. per. LE/E.Bronze-II hor.upwrd	BC	-4150	-4080	-4115	59//61	T	10	359.03	54.41	4.33	126	8	8	46.00	3.02	*	THDL	T12-T24//T29-T34//T56-T60	stratigraphy	239,502
273	42.20	24.30	Yunatzite	Multilevel tell-Eneolithic horizon	HR	-4160	-4080	-4120	//272	TA	8	15.33	48.07	2.60	454	3	3	37.68	1.04	*	THkD	Yun96-Yun103	14C; rel.chronology; stratig.	502
288	41.90	25.00	Dolnoslav	Lopkite-burnt hor.-KVI cult.end of Eneol.	BC	-4170	-4070	-4120		T	45	10.64	46.90	1.59	179	8	8	38.43	3.69	*	THkD	D11-D147	rel.chronology&14C	197
33	43.50	23.20	Bagachina	Burnt horizon - the end of Eneolithic	BC	-4200	-4050	-4125		T	15	8.85	50.00	2.51	232	9	7	49.33	3.62	*	THkD	B1-B23	archaeological	197
58	43.20	23.70	G. Kremena	The end of Eneolithic	BC	-4210	-4070	-4140		*	*	*	*	*	*	8	7	52.15	4.40	*	THDL/THpT	B377-B385	archaeological	502
59	43.30	24.30	Telish	Transition period LE/EB-I(II) hor.upwrd	BC	-4200	-4100	-4150	//60	T	12	7.77	52.98	4.16	110	8	8	45.84	3.25	*	THDL	T1-T11//T25-T28//T46-T55	stratigraphy	502
45	43.20	27.90	Varna	Chernook-L.Eneolithic-KVI-burnt dwell.	BC	-4300	-4000	-4150		*	*	*	*	*	*	3	3	51.10	5.26	*	THDL	320-324	archaeological	502
52	43.00	27.50	Gol_Delchevo	Multil.tell-XIV hor.upwrd - L. Eneolithic	HR	-4200	-4150	-4175	51//	T	12	4.98	49.43	2.70	254	12	9	45.55	5.36	*	THDL	213-224	archaeol.&stratigraphy	197
51	43.00	27.50	Gol_Delchevo	Multil.tell - XIII hor.upwrd - L. Eneolithic	HR	-4250	-4200	-4225	35//52	T	10	6.65	45.95	1.90	646	11	11	39.23	4.93	*	THDL	226-239	archaeol.&stratigraphy	197
297	43.85	26.00	Russe	Eneolithic tell-I hor.dwrđ-L.Eneolithic	HR	-4300	-4200	-4250	298//	TA	29	6.50	48.80	2.20	142	7	3	40.93	3.82	*	THpT	Rs15-Rs44	rel.chronology&stratigraphy	502
49	43.10	27.00	Smjadovo	Multil.tell-II hor.dwrđ-Eneolithic	BC	-4320	-4240	-4280	254//	T	21	2.10	48.70	3.54	84	11	10	48.00	3.84	*	THDL	Sm1-Sm36	rel.chronology&14C	502
298	43.85	26.00	Russe	Multil.tell-II hor.dwrđ-sq.N14,M10-LE	HR	-4350	-4250	-4300	299//297	TA	16	8.36	46.59	2.68	190	5	5	36.14	1.64	*	THpT	Rs1-Rs13//Rs30-Rs34	rel.chronology&stratigraphy	197
53	42.50	26.00	Ezero	Multil.tell-XIV-XVI hor.dwrđ-Early Bronze	HR	-4350	-4290	-4320	//69	T	3	6.63	51.56	4.80	659	11	10	47.20	4.72	*	THDL	151-157//510-527	(14C) archaeol.&stratigraphy	197
254	43.10	27.00	Smjadovo	Multil.tell-III hor.dwrđ-Eneolithic	BC	-4380	-4280	-4330	//49	T	7	11.80	44.10	2.90	415	3	3	42.68	2.93	*	THDL	B22-B23	archaeol.&stratigraphy	197
55	43.20	27.10	Ovcharovo	Eneolithic tell-XII hor.upwrd-L.Eneol.	BC	-4445	-4240	-4343	47//	*	*	*	*	*	*	5	5	35.42	5.07	*	THDL	Q22-Q26	14C(Bln-1357, 1358)	239,502
307	43.70	28.60	Durankulak	Multil.tell-IVa hor.dwrđ-dwell.9a,4z-LE III	HR	-4446	-4257	-4352	306//	TA	8	11.60	47.35	4.37	162	8	4	42.24	1.01	*	THpT	Dk30-Dk46	14C(Bln-2121, 2111)	239,502
306	43.70	28.60	Durankulak	Multil.tell-V hor.dwrđ-dwell.9,7-LE II	HR	-4400	-4300	-4350	295//307	TA	10	8.08	52.19	5.10	91	12	10	42.24	2.12	*	THpT	Dk36-Dk55//Dk82-Dk88	rel.chronology&14C&stratig.	239,502
47	43.20	27.10	Ovcharovo	Multil.tell-VIII+IX+Xhor.upwrd-LE	HR	-4450	-4350	-4400	305//55	TA	9	6.60	48.40	5.10	104	23	17	45.23	4.70	*	THDL	O1-O5//O12-O20//O27-31	(14C) stratigraphy	239,502
299	43.85	26.00	Russe	Multil.tell-III hor.dwrđ-sq.K8-L.Eneolithic	HR	-4460	-4380	-4420	300//298	*	*	*	*	*	*	5	5	42.77	2.80	*	THpT	Rs25-Rs29//Rs45-Rs49	rel.chronology&stratigraphy	197

295	43.70	28.60	Durankulak	Multil.tell-VI hor.dwrd-dwell.3-10-LE I	HR	-4475	-4375	-4425	351/306	TA	24	2.68	45.52	0.90	93	12	12	47.64	1.54	*	THDL	Dk57-Dk91	relative chronology	239,502
46	43.30	26.60	Poljanitza	Multil. tell-VII+VIII hor.upwrd-unoriented	HR	-4480	-4380	-4430	44//	*	*	*	*	*	*	6	6	44.36	3.51	*	THDL	P68-P71	archaeo&stratigr.	197
31	42.40	25.60	Stara_Zagora	Chatalka site-KV-KVI cult.-L.Neolithic	HR	-4550	-4400	-4475		T	8	8.73	52.89	4.30	163	4	3	50.50	3.28	*	THDL	189-198	archaeological	502
48	43.10	26.10	Omurtag	Prehistoric tell - beg. of Late Eneolithic	HR	-4560	-4400	-4480		TA	4	13.90	47.70	5.80	250	6	5	54.53	1.63	*	THkD	12-1 6 11 16	(14C) rel.chronology	502
<b>351</b>	<b>43.70</b>	<b>28.60</b>	<b>Durankulak</b>	<b>Multil.tell-VII hor.dwrd-ME-L.Hamandjia</b>	<b>BC</b>	<b>-4575</b>	<b>-4425</b>	<b>-4500</b>	<b>//295</b>	<b>TA</b>	<b>28</b>	<b>8.00</b>	<b>53.30</b>	<b>1.80</b>	<b>226</b>	<b>11</b>	<b>11</b>	<b>46.36</b>	<b>4.45</b>	*	<b>THpT</b>	<b>Dk92-Dk130</b>	<b>relative chronology</b>	<b>239</b>
305	43.20	27.10	Ovcharovo	Multil.tell-VII hor.upwrd-M.Neolithic	HR	-4520	-4480	-4500	39//47	TA	2	10.60	53.70	5.00	421	4	4	47.72	3.36	*	THpT	O9-O11//OF	(14C) archeol.&stratigraphy	197
37	43.60	27.40	PeT_mogili	Eneolithic tell - Middle Eneolithic	BC	-4550	-4450	-4500		*	*	*	*	*	*	5	5	51.31	4.24	*	THDL	B494-B514	archaeological	239,502
315	42.50	25.90	Karanovo	Multil.tell-KV-KVI culture-Late Eneolithic	HR	-4600	-4400	-4500		TA	5	3.75	50.52	4.16	339	6	5	48.35	0.67	*	THDL	Kn9//Kn14//Kn18//Kn20-21	rel.chronology&stratigraphy	197
40	43.30	26.50	Liljak	Undigged Eneolithic tell	BC	-4580	-4440	-4510		T	6	16.30	58.70	5.10	167	8	8	43.54	3.80	*	THDL	L1-L14	archaeol.&rel.chronology	197
44	43.30	26.60	Poljanitza	Multil.tell-IV hor.upwrd-M.Neolithic	HR	-4560	-4460	-4510	36//46	T	15	13.50	59.90	2.70	202	14	8	43.30	5.65	*	THDL	P1-P32	archaeol.&stratigraphy	239,502
34	43.50	26.50	Radingrad	Multil.tell-0+I+III hor.dwrd-Bojan IV	HR	-4600	-4450	-4525		TA	17	10.59	55.30	2.76	168	11	10	58.79	4.28	*	THDL/THpT	B469-B493	relative chronology	502
300	43.85	26.00	Russe	Multil.tell-V hor.dwrd-sq.E6,N9-M.Neol.	HR	-4580	-4540	-4560	301//299	AF	4	14.50	52.31	1.64	3141	1	1	44.45	1.26	*	THkD	Rs50-Rs53	rel.chronology&stratigraphy	197
35	43.00	27.50	Gol_Delchevo	Multil.tell-IV hor.upwrd-M. Eneolithic	HR	-4600	-4550	-4575	6//51	T	5	15.27	53.27	4.70	257	12	12	49.43	3.50	*	THkD	490-508	archaeol.&stratigraphy	197
287	42.70	23.30	Sofia	Podujane-Eneolithic house No1-Vinca	BC	-4650	-4500	-4575		*	*	*	*	*	*	6	6	44.17	2.24	*	THkD	Po1-Po10	relative chronology	197
257	42.17	23.10	Slatino	Multil.tell-I hor. dwrd-Early Eneolithic	HR	-4630	-4530	-4580	30//	T	10	14.90	54.50	3.90	303	5	4	51.06	1.62	*	THkD	Sl21-Sl33	relative chronology	197
301	43.85	26.00	Russe	Multil.tell-VI hor.dwrd-sq.K6,M6,I5-ME	HR	-4650	-4550	-4600	302//300	TA	22	9.22	54.11	2.46	160	10	7	49.48	2.91	*	THpT	Rs54-Rs86	rel.chronology&stratigraphy	197
39	43.20	27.10	Ovcharovo	Multil.tell-V hor.upwrd-M. Eneolithic	HR	-4630	-4570	-4600	32//305	T	8	4.31	53.72	2.52	485	7	7	48.63	4.95	*	THDL	O32-O39//O49	(14C) archaeol.&stratigraphy	197
38	43.50	23.50	Gradeshnitza	Eneolithic site-KV;Maritza;Gumelnitza I	HR	-4665	-4565	-4615		T	12	7.11	54.25	6.10	51	7	7	49.71	2.94	*	THDL	779-801	archaeological	197
32	43.20	27.10	Ovcharovo	Multil.tell-IV hor. upwrd-Early Eneolithic	HR	-4700	-4580	-4640	276//39	T	5	10.30	44.40	4.10	356	6	6	51.99	6.24	*	THDL	O40-O46	stratigraphy	239,502
276	43.20	27.10	Ovcharovo	Multil.tell-III hor. upwrd-Early Eneolithic	HR	-4730	-4630	-4680	5//32	T	2	9.80	46.70	5.00	900	2	2	51.08	0.91	*	THDL	O47-O48	(14C) rel.chronology	197
30	42.17	23.10	Slatino	II hor.dwrd-hearths,burnt equipm.-EE	HR	-4750	-4650	-4700	//257	T	13	8.60	45.10	4.30	93	8	8	42.17	3.52	*	THDL	Sl1-Sl13	archaeol.&rel.chronology	239,502
36	43.30	26.60	Poljanitza	Multilevel tell-I+II+III hor. upwrd	HR	-4790	-4620	-4705	//44	T	19	12.10	52.50	2.00	273	14	6	47.58	5.29	*	THDL	P33-P45//P50-P66	(14C) archaeol.&stratigraphy	239,502
28	42.00	23.10	Blagoevgrad	Strumsko-Early Eneolithic II hor.	HR	-4981	-4730	-4856		*	*	*	*	*	*	3	3	51.31	3.60	*	THDL	Bl1-Bl3	14C(Bln-2611,12)	239,502
27	43.40	24.20	Brenitza	Early Eneolithic site-KIV, KV cultures	HR	-4900	-4840	-4870		T	15	14.18	49.86	2.60	205	13	12	53.26	5.92	*	THDL	B356-B376	archaeological	197
26	41.90	23.50	Eleshnitza	Late Neolithic site - KIV culture	HR	-5130	-4930	-5030		T	16	3.37	56.46	1.90	343	8	8	51.35	3.25	*	THDL	E5-E23	relative chronology	197
25	42.50	26.00	Nova_Zagora	Industrial bakery-L.Neolithic-KIV culture	HR, BC	-5150	-4950	-5050		TA	5	18.19	53.39	5.07	228	6	6	54.94	3.91	*	THDL	Nz20-Nz33	(14C) rel.chronology	502
260	41.40	23.30	Topolnitza	Multil.tell-III hor.dwrd-KIV-Kremenitza-LN	BC	-5215	-5010	-5113		T	13	18.04	52.12	4.70	78	7	4	51.23	4.71	*	THDL/THpT	To3-To20//KP3	14C(Bln-3348,49,Bln-3381,82)	239,502
24	43.10	25.70	Kachitza	Neolithic-VIII-th sector-KIV,Vincha A cult.	BC	-5218	-5032	-5125		T	7	9.71	49.53	4.25	203	15	13	49.21	5.66	*	THDL	B314-B327//K1-K13	14C(Bln-1685,86,87)	239,502
293	43.70	25.30	Koprivetz	IV hor. upwrd-Late Neolithic	HR	-5200	-5100	-5150	294//	TA	6	22.40	45.08	5.48	317	4	4	45.94	0.66	*	THpT	Kp 1 - Kp 6	relative chronology	502
302	43.85	26.00	Russe	Multilevel tell-VII hor.dwrd-LN-Bojan	HR	-5220	-5110	-5165	//301	AF	2	22.76	57.70	3.15	6307	2	2	46.80	1.84	*	THkD/THpT	Rs82-Rs83	rel.chronology&stratigraphy	502
17	43.10	25.60	Samovodene	Multil.tell-II+III+IV hor.dwrd-M.Neolithic	HR	-5325	-5125	-5225	19//	T	12	10.30	64.10	4.10	111	7	7	44.65	1.30	*	THkD	C'30-C'35//C'51-C'58;	rel.chronology&stratigraphy	197
16	43.30	26.50	Podgoritza	Middle Neolithic site-KIII culture	BC	-5290	-5190	-5240		T	4	12.20	57.60	3.70	624	7	7	46.62	4.48	*	THDL	11-1 5 11 16	relative chronology	197
263	43.30	26.20	Popovo	The reserve-Neolithic-KIII-KIV cult.	HR	-5320	-5180	-5250		T	39	6.60	58.60	1.90	133	8	8	38.23	2.54	*	THkD/THpT	R1-R46	relative chronology	502
<b>353</b>	<b>43.08</b>	<b>25.35</b>	<b>Orlovka</b>	<b>Neolithic settlement</b>	<b>BC</b>	<b>-5316</b>	<b>-5216</b>	<b>-5266</b>		<b>TA</b>	<b>24</b>	<b>8.20</b>	<b>58.10</b>	<b>2.70</b>	<b>123</b>	<b>10</b>	<b>9</b>	<b>40.67</b>	<b>2.64</b>	*	<b>THpT</b>	<b>Or1-Or33</b>	<b>14C(KN-5766, 5769)</b>	<b>239</b>
18	42.60	25.40	Kazanlak	Multil.tell-III+IV+V hor.dwrd-Neolithic-KIII	HR	-5482	-5053	-5268	13//	T	30	11.98	54.04	1.30	379	30	25	40.59	5.58	*	THDL	65-67//434-476	14C(Bln-729)	239,502
23	43.10	27.40	Dalgopol	Usoeto - KIII-KIV cultures	BC	-5330	-5230	-5280		*	*	*	*	*	*	4	4	41.19	3.83	*	THDL	U1-U4	relative chronology	197
19	43.10	25.60	Samovodene	Multil.tell-V+VI hor.dwrd-Neolithic	HR	-5420	-5220	-5320	355//17	T	17	5.70	53.40	3.20	119	9	6	43.78	3.42	*	THkD	C'36-C'50//C66-C72	rel.chronology&stratigraphy	197
5	43.20	26.60	Ovcharovo	Gorata(Ruec)-II hor.upwrd-Neolithic-KII	HR	-5470	-5326	-5398	//276	T	24	353.50	61.12	2.26	172	12	8	32.93	2.64	*	THDL	R1-R39	14C(Bln1544,1620,2030,32)	239,502
294	43.70	25.30	Koprivetz	II hor.upwrd-end of Early Neolithic	HR	-5480	-5380	-5430	358//293	TA	8	348.92	67.60	2.57	466	5	5	30.66	0.38	*	THpT	Kp7 - Kp15	relative chronology	239,502
<b>355</b>	<b>43.10</b>	<b>25.60</b>	<b>Samovodene</b>	<b>Multil.tell-VII+VIII hor. dwrd-Neolithic</b>	<b>HR</b>	<b>-5520</b>	<b>-5380</b>	<b>-5450</b>	<b>354//19</b>	<b>T</b>	<b>11</b>	<b>7.40</b>	<b>59.30</b>	<b>2.60</b>	<b>301</b>	<b>6</b>	<b>5</b>	<b>30.91</b>	<b>2.83</b>	*	<b>THDL</b>	<b>S38-S46//S51-S54</b>	<b>relative chronology</b>	<b>239</b>
326	42.07	25.44	Jabalkovo	I hor.dwrd-the youngest hor.- E.Neolithic	BC	-5520	-5400	-5460		TA	11	3.40	56.00	4.00	130	13	11	34.77	1.08	*	THpT	L20-L49	archaeological	502



6	43.00	27.50	Gol_Delchevo	Multilevel tell-I hor.upwrd - Neolithic	BC	-5520	-5420	-5470	//35	*	*	*	*	*	*	8	7	36.30	5.52	*	THDL	510-518	rel.chronology&stratigraphy	197
262	43.30	26.20	Popovo	The reserve-Neolithic - KII culture	KL	-5530	-5430	-5480		TA	28	353.80	59.90	1.90	192	7	7	39.22	1.01	*	THkD/THpT	R47-R76	relative chronology	502
14	42.10	23.10	Balgarchevo	Neolithic-I hor.upwrd-exhibition hearth	HR	-5520	-5450	-5485		T	6	352.80	55.70	4.50	221	5	5	46.25	2.04	*	THkD	Bl 4 - Bl 9	14C; rel.chronology	197
13	42.60	25.40	Kazanlak	Multil.tell-VIII+IX hor.dwrd-end E.Neolithic	HR	-5530	-5450	-5490	//18	T	11	358.94	54.53	2.50	311	11	10	44.26	4.14	*	THDL	424-443	relative chronology	502
<b>358</b>	<b>43.70</b>	<b>25.30</b>	<b>Koprivetz</b>	<b>I hor.upwrd-Early Neolithic</b>	<b>HR</b>	<b>-5550</b>	<b>-5450</b>	<b>-5500</b>	<b>//294</b>	<b>TA</b>	<b>8</b>	<b>4.27</b>	<b>64.20</b>	<b>2.08</b>	<b>707</b>	<b>5</b>	<b>5</b>	<b>34.89</b>	<b>0.91</b>	*	<b>THpT</b>	<b>Kp16-Kp23</b>	<b>relative chronology</b>	<b>239</b>
<b>354</b>	<b>43.10</b>	<b>25.60</b>	<b>Samovodene</b>	<b>Multil.tell-IX hor. downward-Neolithic</b>	<b>HR</b>	<b>-5620</b>	<b>-5460</b>	<b>-5540</b>	<b>10//355</b>	<b>T</b>	<b>11</b>	<b>5.20</b>	<b>59.70</b>	<b>3.50</b>	<b>174</b>	<b>5</b>	<b>4</b>	<b>47.00</b>	<b>3.65</b>	*	<b>THDL</b>	<b>S59-S6//S73-S76</b>	<b>relative chronology</b>	<b>239</b>
259	42.50	25.90	Karanovo	Multilevel tell-KII-Early Neolithic	BC	-5600	-5500	-5550		TA	26	359.50	63.30	1.60	292	8	7	52.43	2.32	*	THkD	Kn23-Kn48	relative chronology	197
8	41.80	23.60	Dobrinishte	Early Neolithic (second half)	HR	-5625	-5490	-5558		TA	12	356.80	65.50	3.10	187	7	7	41.41	1.49	*	THkD	Db1-Db19	14C(Bln-3785,86)	239,502
10	43.10	25.60	Samovodene	Multilevel tell-burnt dwell.-Neolithic	HR	-5670	-5530	-5600	9//354	T	12	0.80	61.40	2.60	271	10	10	37.17	2.54	*	THDL	S24-S36//S47-S50	relative chronology	239,502
9	43.10	25.60	Samovodene	Multilevel tell-XI hor. dwrd-Neolithic	HR	-5720	-5600	-5660	//10	T	16	355.00	51.80	2.70	192	7	5	41.43	2.59	*	THDL	S1-S23	rel.chronology&stratigraphy	239,502
7	42.50	25.70	Stara_Zagora	Okružhna hospital-KII cult.-burnt dwell.	BC	-5742	-5617	-5680		T	30	351.90	65.17	3.10	72	13	13	48.63	4.12	*	THDL	Sz1-Sz52	14C(Bln-1250,52;1163,64,64A)	239,502
324	42.30	22.67	Kustendil	Early Neolithic site Piperkov chiflik	BC	-5800	-5600	-5700		TA	15	348.20	59.30	2.00	370	22	19	44.04	4.96	*	THpT	Pch1-Pch23	Rel.chronology ceramic features	371
11	42.40	23.10	Galabnik	VIII hor.upwrd-2-2.25m.depth-Neolithic	HR	-5784	-5663	-5724	249//	TA	14	355.90	60.90	2.40	255	16	12	59.03	2.80	*	THkD/THpT	GI2-GI9//GI21-GI32	14C(Bln-3576,4091,92,93,GrN-19783)	239,502
261	41.50	23.50	Kovatchevo	Remains of fire-sq.K13-20-KI culture	BT	-5879	-5569	-5724	247//	TA	10	355.50	63.80	3.30	205	6	6	37.69	4.32	*	THDL	Ko2-Ko14	14C(Ly-6553,54)	239,502
4	42.70	23.30	Sofia	Printing house-Neolithic-KI-Starchevo A	BC	-5830	-5630	-5730		*	*	*	*	*	*	3	3	44.88	0.88	*	THDL	Sf1-Sf6	relative chronology	197
241	42.70	23.30	Sofia	Slatina-E.Neolithic house-the fire	BC	-5740	-5730	-5735		T	10	340.70	57.10	4.80	101	11	11	45.27	2.00	*	THkD/THpT	Sln1-Sln21	archaeological	502
2	42.00	24.10	Rakitovo	Makakov bridge - Starchevo I-KI culture	BC	-5790	-5690	-5740		*	*	*	*	*	*	3	3	52.36	3.96	*	THDL	B386-B397	relative chronology	197
139	42.07	25.44	Jabalkovo	II hor.dwrd-E.Neolithic-site's oldest hor.	BC	-5850	-5650	-5750		TA	21	359.50	62.40	2.50	167	23	22	43.39	4.03	*	THpT	L15-L27//L50-L67	stratigraphy	239,502
249	42.40	23.10	Galabnik	VIIhor.upwrd-2.6m.depth-E. Neolithic	BC	-5834	-5674	-5754	250//11	*	*	*	*	*	*	5	4	63.26	0.84	*	THkD/THpT	GI33-GI36	(14C) stratigraphy	239,502
242	42.70	23.30	Sofia	Slatina-baked floor-E.Neolithic house	BF	-5802	-5717	-5760		TA	6	345.25	59.88	4.70	204	9	9	62.00	1.86	*	THkD	Sln11-Sln31	14C(Bln3434-43;Bln3504,3555)	239,502
243	41.90	23.50	Eleshnitsa	Early Neolithic-KI culture-unoriented	BC	-5836	-5717	-5777		*	*	*	*	*	*	6	5	55.42	2.08	*	THkD/THpT	E1-E4	14C(Bln-3237-42;Bln-3244,45)	239,502
246	42.30	23.20	Krajnitsi	Early Neolithic - beginning	BC	-5870	-5710	-5790		AF	4	335.53	63.63	4.80	367	5	5	56.53	4.52	*	THkD/THpT	KRN1-KRN4	relative chronology	239,502
250	42.40	23.10	Galabnik	I hor.upwrd-4.5m.depth-E.Neolithic	BC	-5991	-5841	-5916	//249	TA	4	340.61	51.50	4.96	344	7	4	46.83	2.36	*	THkD/THpT	GI12-GI20	14C (Bln-3579,79H,80,81,82)	239,502
247	41.50	23.50	Kovatchevo	Earliest stage of E.Neolithic site-sect.L	KL	-5999	-5896	-5948	//261	TA	41	350.80	64.00	1.60	183	19	15	53.72	2.46	*	THpT	Ko15-Ko70	14C(GrA-44365,581;OxA-20247)	172