ANTHROPOLOGIE • LIII/1–2 • pp. 157–166 • 2015

SANDA BALESCU, ALAIN TUFFREAU, ROXANA DOBRESCU

MAMAIA SAT (ROMANIA): A LATE MIDDLE PLEISTOCENE PALAEOLITHIC SITE?

ABSTRACT: The multi-stratified Palaeolithic site of Mamaia Sat site, located north of Constanţa (Dobrogea) was discovered by K. Valoch and J. Jelínek. It includes two intraloessic archaeological layers which have been assigned to the Last Interglacial (MIS 5.5) and the Early Last Glacial (MIS 5.3–5.1). The lithic material is characterised by discoid debitage together with a few pieces also showing Levallois debitage. Side-scrapers are the most common flake-tools. The presence of foliate tools is an original feature of this material. In this paper, the chronological context of the Mamaia Sat site is reassessed in the light of recent luminescence (IRSL) dating results obtained on loess from the nearby reference loess-palaeosol sequences of Tuzla and Mircea Vodă in Dobrogea. At Mamaia Sat, we have evidence for human occupation during at least two successive Middle Pleistocene interglacial periods prior to the Last Interglacial, which could reasonably be correlated with MIS 7 and MIS 9.

KEY WORDS: Middle Palaeolithic – Loess – Luminescence dating – Late Middle Pleistocene – Romania

INTRODUCTION

The Middle Palaeolithic open-air site of Mamaia Sat, lying in a loessic environment, is located a few hundred meters to the west of the Black Sea coast, north of the city of Constanţa, in the Dobrogea region of southeastern Romania (*Figure 1*). It was discovered in 1960 by Jan Jelínek, director of the Moravian Museum in Brno (Czech Republic), within the cutting of the Poarta Albă-Midia Năvodari section during construction of the Danube-Black Sea Canal. In 1961, Karel Valoch and his son, and Jan Jelínek, while on holiday along the Black Sea shore, collected many artefacts within the loess-palaeosol sequence of Mamaia Sat along this trench and brought them back to Brno. Karel Valoch pointed out this discovery to C. S. Nicolăescu-Plopşor (letter of 20/2/63 in the Institute of Archaeology "Vasile Pârvan" archives). He requested him to publish the study of this material in a Romanian journal and suggested further collaborative field research (letters of 20/2/63 and 1/4/63). Despite a favourable response (letter of 9/4/1963), the collaboration was never realised. The majority of the lithic material collected by K. Valoch at Mamaia Sat is currently housed in the collections of the

Received 6 February 2014; accepted 5 March 2014.

FIGURE 1. Location map and extension of the Romanian loess. 1, Tuzla; 2, Mircea Vodă; 3, Mostiştea; 4, Mamaia Sat.

"Vasile Pârvan" Institute of Archaeology. The characteristics of the lithic material were presented in two publications (Valoch 1968, 1993). The pedological findings of the loess-palaeosol sequence of Mamaia Sat were published by J. Pelíšek (1993) based on the samples collected by J. Jelínek and K. Valoch.

Palaeolithic artefacts have also been collected in the same area (Poarta Albă-Midia Năvodari section of the Danube-Black Sea canal) by C. S. Nicolăescu-Plopşor, Al. Păunescu and Fl. Mogoşanu in the years 1958–1963 and 1965–1973 (Păunescu *et al*. 1972). Later, in 1972–1973, Al. Păunescu undertook a rescue-excavation at Mamaia Sat within the walls of a small diversion canal adjacent to the main canal and collected more Palaeolithic artefacts (Păunescu 1999).

The multi-stratified Mamaia Sat site delivered two intraloessic archaeological layers separated by 2.5 m of sterile loess. However the site has never been dated radiometrically. Most of its chronological assignment was based solely on pedostratigraphic evidence and lithic typology and should therefore be considered with some caution.

In this paper, the chronological context of the Mamaia Sat site is tentatively reassessed in the light of recent luminescence (IRSL) dating results obtained by Balescu *et al.* (2003, 2010) on loess from the nearby reference loess-palaeosol sequences of Tuzla and Mircea Vodă (*Figure 1*).

THE LOESS-PALAEOSOL SEQUENCE OF MAMAIA SAT

The loessic deposits at Mamaia Sat belong to the Dobrogea loess area. The latter is part of the vast south-eastern European loessic domain extending from Bulgaria to Moldavia and Ukraine. The Dobrogean loess-palaeosol sections are the thickest and longest stratigraphic sequences of Romania, reaching a thickness of 20 to 25 m and recording the last 800 ka. The Bruhnes-Matuyama paleomagnetic event has been found at the bottom of the Tuzla section on the Black Sea coast, north of Constanţa (J. Hus, in Balescu *et al*. 2010), whereas in Moldova, in the Danube Plain and in the

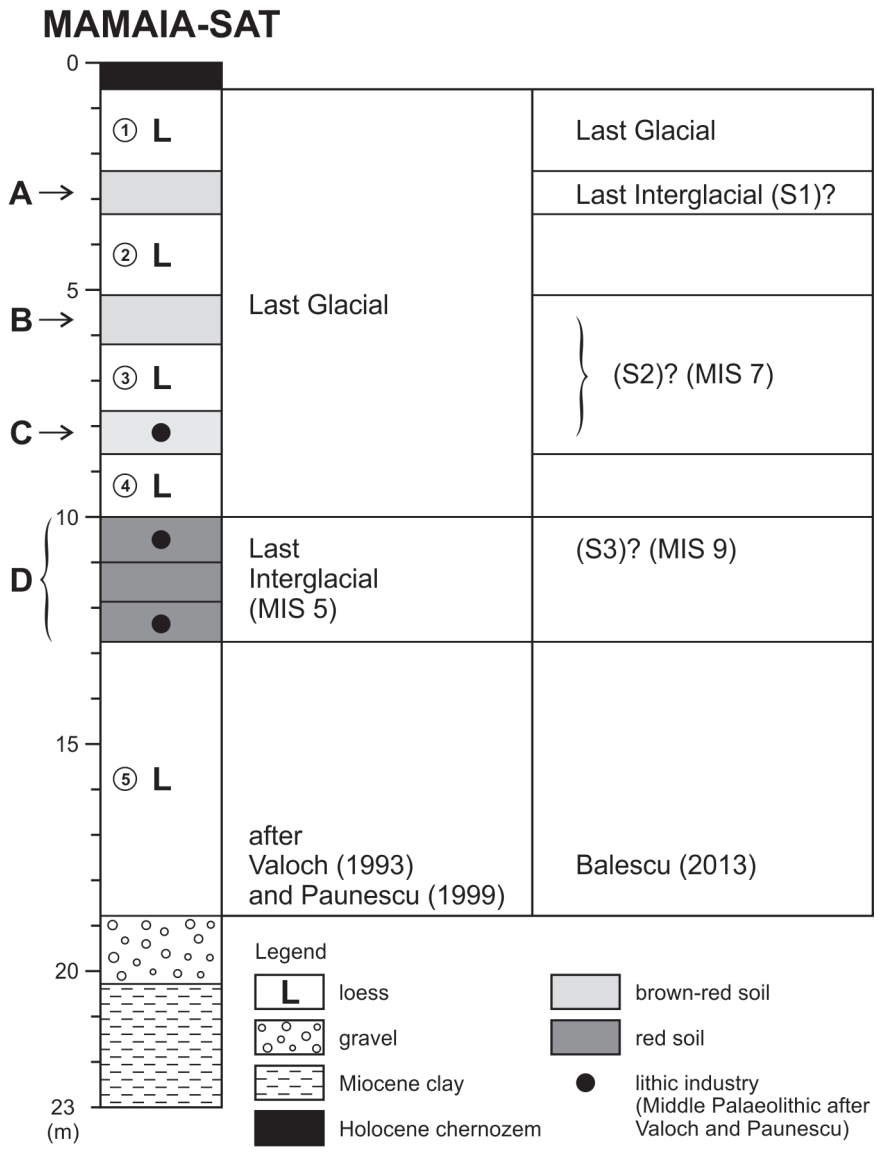

FIGURE 2. Loess-palaeosol sequence of Mamaia Sat and its chronostratigraphic interpretations.

Banat area, the loess sections are thinner and cover only the last 200 or 300 ka. Overall, the Dobrogean loess-palaeosol sequences provide the most valuable archive of paleoclimate and paleoenvironmental change in Romania.

The 19 m thick loess-palaeosol sequence of Mamaia Sat (*Figure 2*), observed within the trench of the Danube-Black Sea Canal, showed a succession of five loessic units (1 to 5) with four interstratified pedocomplexes, named A to D (Pelíšek 1993, Valoch 1968, 1993). The pedocomplexes A to C (later renamed palaeosols I to III by Valoch) are brown-red soils. The oldest pedocomplex D observed at the bottom of this trench, is characterised by a superposition of two red soils of "mediterranean type" (later renamed palaeosols IV and V by Valoch). Both soils are highly illuviated and rubified. Their clay content (51–60%) is much higher than in the upper palaeosols A–C (41–53%) (Pelíšek 1993). These loess units rest on marine gravels overlying Miocene clayey deposits.

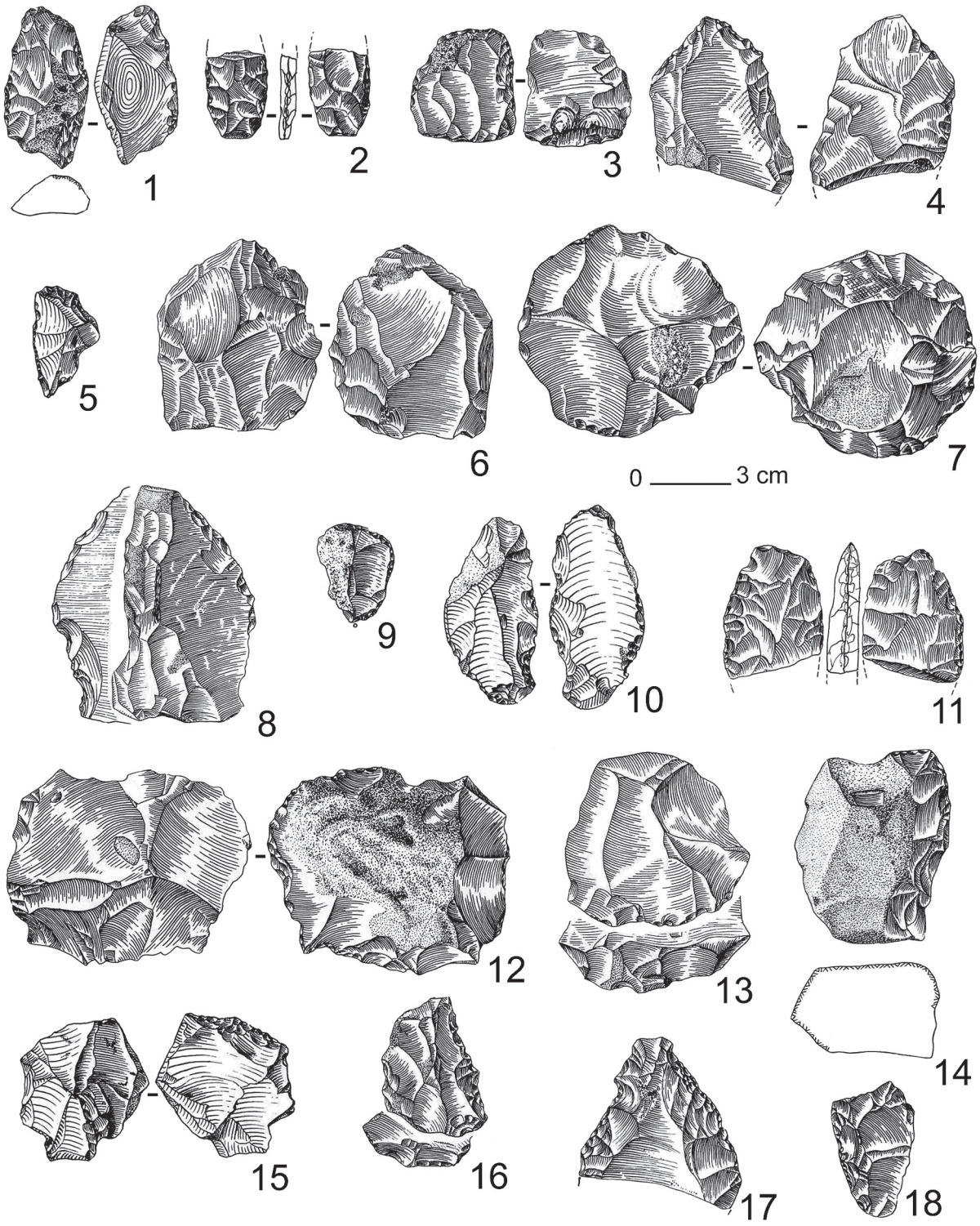

FIGURE 3. Mamaia Sat. 1–9, assemblage I; 10–18, assemblage II. 7, 12, Levallois cores; 6, discoïd core; 13, Levallois flake; 1, 2, 11, foliate tools; 8, 14, 16, 18, single side-scraper; 4, side-scraper with bifacial retouch; 17, convergent side-scraper; 5, 9, end-scraper; 3, End-scraper and side-scraper; 10, denticulate; 15, flake with inverse distal removals. Drawings modified after K. Valoch.

The loess-palaeosol section of Mamaia Sat was assumed to record a time interval extending from the penultimate glaciation (*Riss récent*) to the Holocene (Păunescu 1999, Pelíšek 1993, Valoch 1968, 1993). The lower pedocomplex D was correlated with the Last Interglacial, following the chronostratigraphic scheme of the Dobrogean loessic sequences proposed by G. Haase and H. Richter (1957) and by A. Conea (1969, 1970). The pedocomplexes A to C were described as Last Glacial interstadial soils.

THE PALAEOLITHIC SITE OF MAMAIA SAT

In his first publication, K. Valoch (1968) indicated that the lithic material, attributed to the Middle Palaeolithic, was found within the walls and at the bottom of the trench of the Danube-Black sea Canal. In 1993, K. Valoch identified three lithic assemblages (I, II, and III). Artefacts of assemblage I were found within the wall of the trench, in the surroundings of palaeosols II and III (palaeosol B and C) while some flakes were found in situ at the top of palaeosol C. This assemblage was assigned to the Early Last Glacial (Brørup). Artefacts of assemblage II were found within palaeosol D and in the reworked sediments accumulated at the bottom of the trench. This assemblage II was attributed to the Last Interglacial. Assemblage III included pieces whose stratigraphic provenance remained unclear.

Since the lowest palaeosol (D) of the Mamaia Sat was assumed to be of Last Interglacial age, the lithic material was regarded as Middle Palaeolithic which was initially restricted to the Upper Pleistocene. However, in 1970s and 1980s, it became increasingly clear that Middle Palaeolithic assemblages were present in Europe in the Late Middle Pleistocene (Bosinski 1982, Tuffreau 1979).

Two palaeosols have been described in two small rescue-excavations (15 and 7 m^2) performed by Păunescu at Mamaia Sat, in the wall of a small adjacent diversion canal (Păunescu 1999). These palaeosols were correlated with palaeosols C and D of Valoch (1993) but the topographic location of these excavations has not been reported either in his publication or in the archives of the "Vasile Pârvan" Institute of Archaeology. Hence, the interval between Păunescu's excavations and the profiles described by Valoch (1993) and Pelíšek (1993) remains unknown.

LITHIC INDUSTRIES OF MAMAIA SAT

The lithic material of Mamaia Sat has been described by Valoch (1968, 1993) and Păunescu (1999). They both differentiated three assemblages (I, II, and III).

The Mamaia Sat lithics deposited at the "Vasile Pârvan" Institute of Archaeology include artefacts collected by Valoch and other researchers between 1958 and 1978 (Păunescu 1999, Păunescu *et al*. 1972). Details of the year of discovery (china ink) and the stratigraphic position (pencil marks): "NI", "NII" (= levels I and II) or "passim" (= without stratigraphic provenance, probably assemblage III) are recorded on all artefacts.

The counts published by Păunescu (1999) were based on all the artefacts (more than one thousand pieces) collected at Mamaia Sat by different researchers including K. Valoch, between 1958 and 1978, as observed by Tuffreau and Dobrescu.

The most common raw material for both assemblages I and II is a local flint (flint nodules are present within the in situ underlying gravel bed). Some blocks of quartzose sandstone and limestone were also used.

Assemblages I and II show the same technological and typological features (*Figure 3*). They include Levallois cores, Levallois flakes, discoïd cores and other non Levallois cores. Side-scrapers are the most common flake-tools with numerous abrupt retouches whose origin is natural for many pieces. Single side-scrapers are well represented. Some double, convergent, transverse and inverse side-scrapers are also present. Taphonomic phenomena could also explain the high percentage of notches and denticulates. The presence of some truncated-facetted pieces is noteworthy. All artefacts in assemblage I and II show the same white patina.

Valoch (1993) emphasised the presence of foliate tools in both assemblages I and II. These are known from other sites in Romania: Mitoc-Valea Izvorului in Moldavia, Gura Dobrogei in Dobrogea, Nandru, Obaha Ponor in Transylvania, Remetea Şomoş in Oaş (Bitiri 1967, Cârciumaru 1999, Chirica 1995). Such foliate tools usually belong to industries of the Last Glacial (Kozlowski 1995) but recent chronostratigraphic and chronological interpretation of the loess-palaeosol sequence at Korolevo in Ukraine (Haesaerts, Koulakovska 2006) has shown that foliate tools were also present during the Late Middle Pleistocene. At Korolevo, these tools were found in assemblage Va (Gladilin *et al*. 1995), at the bottom of the upper palaeosol V (layer 11) which is correlated with MIS 7.

At Mamaia Sat, the tools of both assemblages I and II have no necessary chronological significance: they may occur in Late Middle Pleistocene or in Upper Pleistocene lithic industries.

CHRONOSTRATIGRAPHY OF THE DOBROGEAN LOESS

In Dobrogea, Conea (1969, 1970) identified seven loessic units intercalated with seven palaeosols (GS1 to GS7). The chronostratigraphic scheme of the Dobrogean loess proposed by her was based on geomorphic and pedostratigraphic evidence (that is, the characteristics of the palaeosols). According to Conea, the first most developed and most illuviated red soil (5YR) under the surface soil, the GS3 palaeosol, was assigned to the Last Interglacial. The palaeosols GS2 and GS1 were described as interstadial soils. Consequently, the three upper loess units, lying above GS3, were correlated with the Last Glacial.

In 2001, Panaiotu *et al*. suggested a correlation of the loessic section of Mostiştea in the south eastern Danube plain (*Figure 1*) with the marine $\delta^{18}O$ records based on the magnetic susceptibility analysis of the loess-palaeosol horizons. The magnetic susceptibility variations in the Mostiştea profile were found to be in close correspondence with the marine $\delta^{18}O$ records and the susceptibility variations observed in the Bulgarian loess section of Koriten (NE Bulgaria) (Jordanova, Petersen 1999a, b) where the Bruhnes-Matuyama palaeomagnetic boundary has been identified within the lower loess horizon L7. These results have been used to support the assignment of palaeosol S1 (equivalent to the GS1 palaeosol of Conea) to the Last Interglacial while the S3 soil (equivalent to the GS3 palaeosol of Conea) was assigned to MIS 7. This scheme, however, was not supported by any chronological evidence.

In 2003, Balescu *et al*. applied luminescence dating to the Romanian loess for the first time. They applied the IRSL dating technique to K-feldspar grains extracted from the loess deposits of Tuzla, located along the Black Sea shore, close to Constanţa (*Figure 4*) and demonstrated that the three upper loess units, L1, L2, and L3, lying above S3, were deposited during the three last glaciations, respectively MIS 2–4, MIS 6, and MIS 8 (*Figure 5*). Consequently, the S1, S2, and S3 palaeosols were developed during respectively MIS 5, MIS 7, and

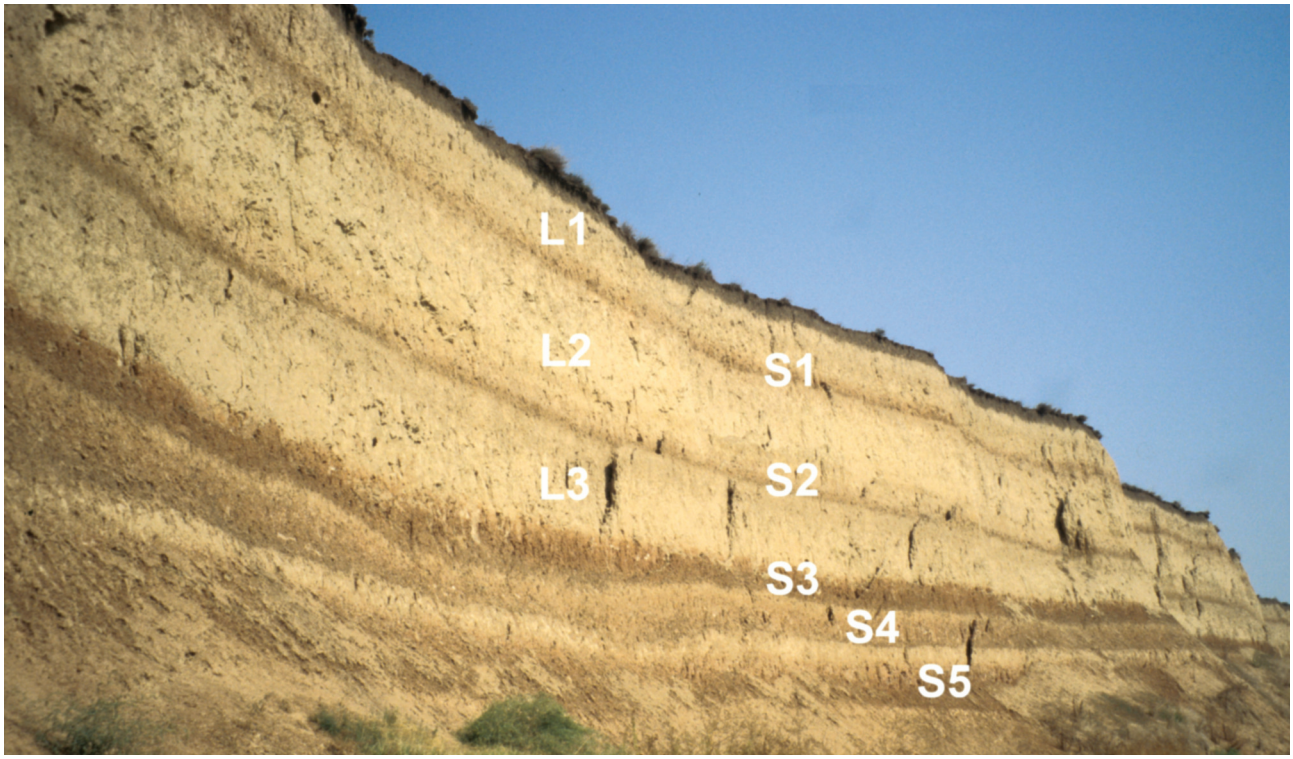

FIGURE 4. Loess-palaeosol section at Tuzla. L1–L3, loess units; S1–S5, palaeosols.

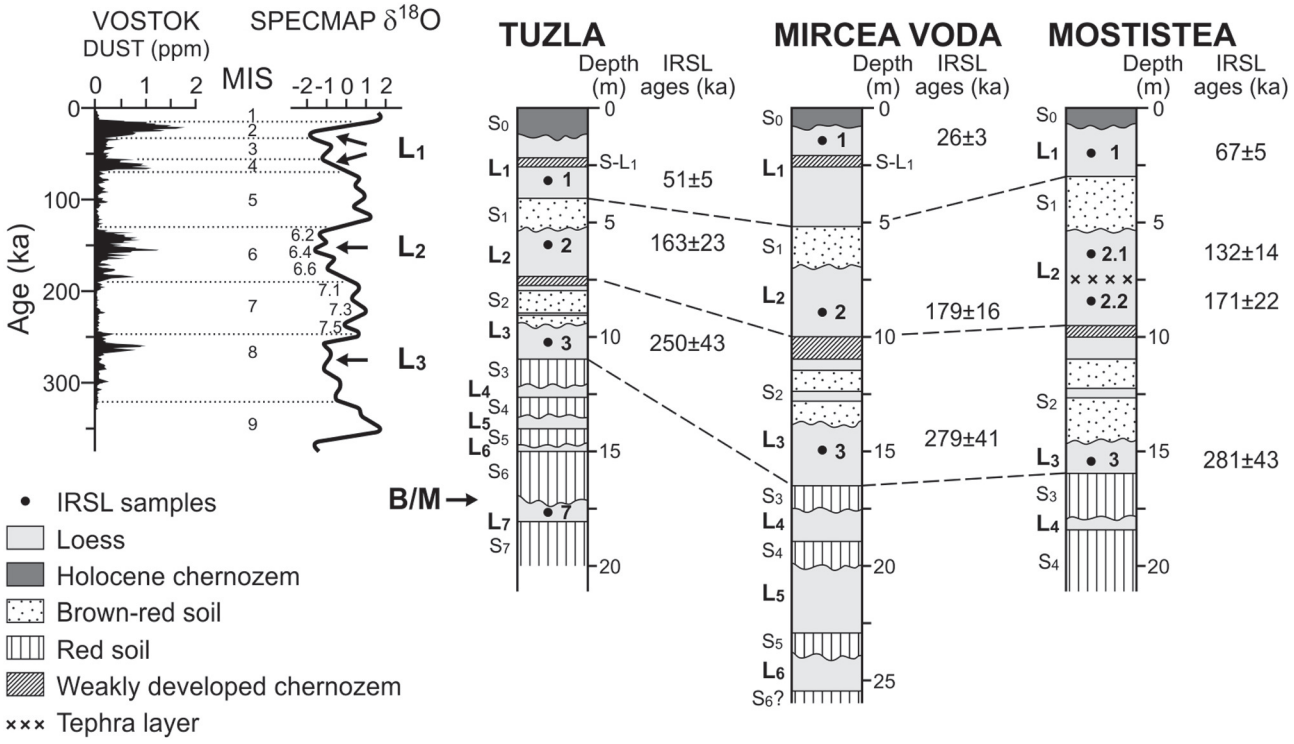

FIGURE 5. Reference loess-palaeosol sequences from southeastern Romania. Lithostratigraphy, IRSL results and chronostratigraphic interpretation of the loess-palaeosol sequences: Tuzla, Mircea Vodă, and Mostiştea.

MIS 9. Identical IRSL results were obtained for the loess sequences of Mircea Vodă and Mostiştea (Balescu *et al*. 2010). Moreover, it has been shown by Balescu *et al.* (2010) that at Tuzla, Mircea Vodă (*Figure 6*) and Mostiştea, MIS 7 is characterised by the development of two palaeosols (*Figure 5*). All these loess sequences show evidence for two phases of soil development during MIS 7 (bipartition or dichotomy of the S2 pedocomplex) (*Figure 7*).

Assignment of the S1 palaeosol to MIS 5 has been subsequently confirmed by the OSL dating results on quartz grains extracted from loess L1 and L2 at Mircea Vodă and Mostiştea (Timar *et al*. 2010, Vasiliniuc *et al*. 2012).

Analysis of the magnetic susceptibility variations within the loess-palaeosol sections of Mostiştea (Panaiotu *et al*. 2001) and Mircea Vodă (Buggle *et al*. 2009, Timar *et al*. 2010) suggest that the red soils S3 to S7 were developed in comparatively warmer and more humid forest environments than those for the S1 and S2 brown red soils.

NEW CHRONOSTRATIGRAPHIC INTERPRETATION OF THE LOESS-PALAEOSOL SEQUENCE OF MAMAIA SAT

Recent investigations of the Dobrogean loess sections, at Tuzla and Mircea Vodă, show that the first brown red soil (S1) below the surface, correlates with the Last Interglacial (MIS 5) whereas the first highly rubified and illuviated red soil (S3), corresponds to the antepenultimate Interglacial (MIS 9). Moreover, at Tuzla and Mircea Vodă, the S2 pedocomplex (MIS 7) is characterised by the development of two palaeosols (the dichotomy of S2). Consequently, at Mamaia Sat (*Figure 2*) the first brown red palaeosol (pedocomplex A) should correspond to the Last Interglacial (S1) palaeosol of Tuzla and Mircea Vodă. Pedocomplexes B and C would therefore be equivalent to the pedocomplex S2 (MIS 7) of Tuzla and Mircea Vodă. Finally, the most developed, illuviated and rubified pedocomplex D, including two palaeosols, should correlate with palaeosols S3 (MIS 9) and S4 (MIS 11) which at Tuzla are superposed.

FIGURE 6. Loess-palaeosol section at Mircea Vodă. L1–L5, loess units; S1–S4, palaeosols.

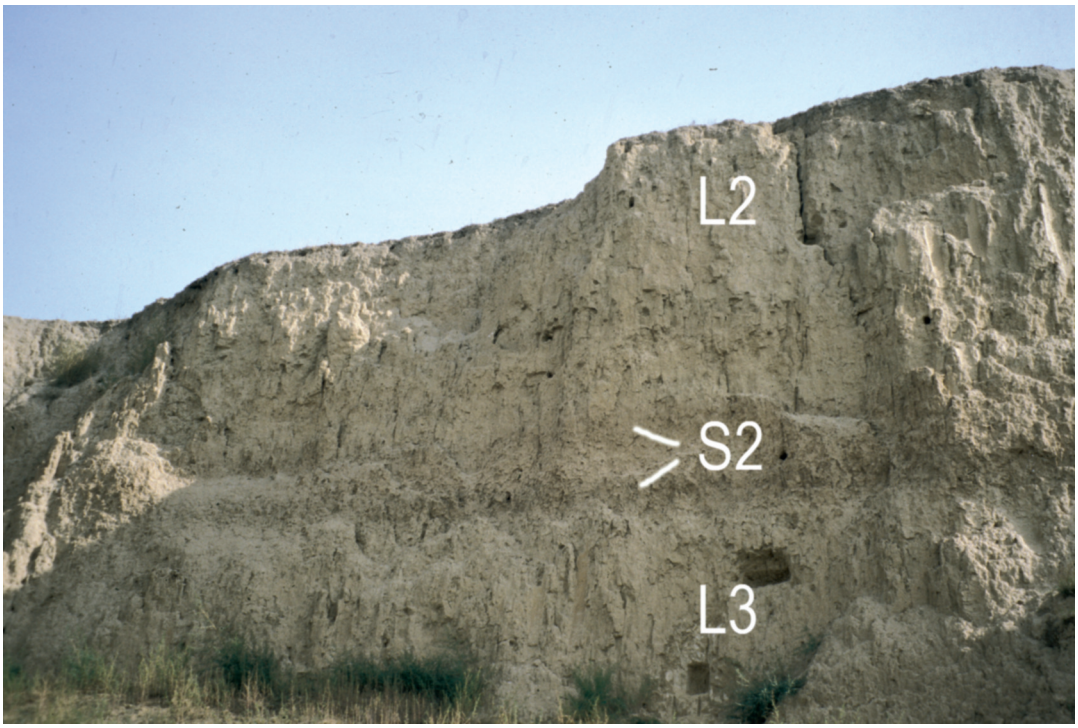

FIGURE 7. Dichotomy of the S2 pedocomplex (MIS 7) at Mircea Vodă. L2–L3, loess units; S2, palaeosol.

ARCHAEOLOGICAL IMPLICATIONS

Comparison of the Mamaia Sat loess sequence with the nearby dated loess sequences of Tuzla and Mircea Vodă suggests that the Palaeolithic industries of Mamaia Sat collected within the pedocomplexes C and D, most likely pre-date the Last Interglacial. Hence, assemblages I and II of Mamaia Sat could tentatively be assigned to MIS 7 and MIS 9. It should be stressed that these industries do not show any diagnostic characteristics of the Middle Palaeolithic apart from the foliate tools and some Levallois cores and flakes. The presence of foliate tools within assemblage I (palaeosol C and B) is consistent with those found at Korolovo (assemblage Va) whose stratigraphic position (upper palaeosol V) suggests a MIS 7–late MIS 8 age (Haesaerts, Koulakovska 2006). The foliate tools associated with assemblage II, found at the bottom of the trench, are most likely not in situ: they might have been collected in the waste sediment (dug earth) originating from the upper palaeosols (palaeosol C, B, or A?). Moreover, Levallois debitage dating from MIS 7 is already known from different sites in Podolia (Sytnik 2000).

To conclude, we have at Mamaia Sat, evidence for Palaeolithic occupation during at least two successive Middle Pleistocene interglacial periods prior to the Last Interglacial (MIS 5), which could reasonably be correlated with MIS 7 and MIS 9. This tentative reassessment is supported by the IRSL dating results recently obtained on loess from the nearby reference loess-palaeosol sequences of Tuzla and Mircea Vodă (Balescu 2013, Balescu *et al*. 2003, 2010).

This finding of human presence in Dobrogea during the Middle Pleistocene is consistent with the recent discovery of Lower Palaeolithic artefacts at Dealul Guran, where assignment to MIS 11 relies on luminescence dating results (320–392 ka) obtained on sediments (Iovita *et al*. 2012).

The Palaeolithic multi-stratified site of Mamaia Sat discovered by K. Valoch is exceptional and remains unique in the Lower Danube valley. It offers new perspectives for further archaeological investigation of this area where evidence for human presence during the Middle Pleistocene still remains scarce as in other parts of Central Europe (Rocca 2013).

REFERENCES

BALESCU S., 2013: Datation IRSL des loess de Dobrogea : implications pour la chronologie des occupations paléolithiques. In: J. Saint-Martin (Ed.): *Recherches croisées en Dobrogea*. Pp. 87–96. Amanda-Edit, Bucharest.

BALESCU S., LAMOTHE M., MERCIER N., HUOT S., BALTEANU D., BILLARD A., HUS J., 2003: Luminescence chronology of Pleistocene lœss deposits from Romania: testing methods of age correction for anomalous fading in alkali feldspars. *Quaternary Science Reviews* 22: 967–973.

BALESCU S., LAMOTHE M., PANAIOTU C. G., PANAIOTU C. E., 2010: La chronologie IRSL des séquences loessiques de l'Est de la Roumanie. *Quaternaire* 21, 2: 115–126.

BITIRI M., 1967: Paläolithische Blattspitzen in Rumänien. *Quartär* 18: 139–155.

BOSINSKI G., 1982: The transition Lower/Middle Palaeolithic in Northwestern Germany. In: A. Ronen (Ed.): *The transition from Lower to Middle Palaeolithic and the origin of modern man*. Pp. 165–173. BAR International Series 151, Oxford.

BUGGLE B., HAMBACH U., GLASER B., GERASIMENKO N., MARKOVIC S., GLASER I., ZÖLLER L., 2009: Stratigraphy, and spatial and temporal paleoclimatic trends in Southeastern/Eastern European lœss-paleosol sequences. *Quaternary International* 196, 1–2: 86–106.

CÂRCIUMARU M., 1999: *Le Paléolithique en Roumanie*. Editions Jérôme Millon, Grenoble.

CHIRICA V., 1995: Les pièces bifaciales et la transition du Paléolithique moyen au Paléolithique supérieur en Roumanie. *Paléo, Supplément* 1: 105–109.

CONEA A., 1969: Profils de lœss en Roumanie. In: J. Fink (Ed.): *La Stratigraphie des lœss d'Europe*. Pp. 127–134. Association Française pour l'Étude du Quaternaire, Paris.

CONEA A., 1970: *Formaţiuni cuaternare în Dobrogea (Lœssuri şi paleosoluri).* Editura Academiei Republicii Socialiste România, Bucharest.

GLADILIN V., SLITLVYJ V., TKACHENKO V., 1995: Les premières industries à pointes foliacées en Europe centrale. *Paléo, Supplément* 1: 111–116.

HAASE G., RICHTER H., 1957: Fossile Böden im Löss an der Schwarzmeerküste bei Constanta. *Petermanns Geographische Mitteilungen* 101: 11–173.

HAESAERTS P., KOULAKOVSKA L., 2006: La sequence pédosédimentaire de Korolevo (Ukraine transcarpatique) : contexte pédosédimentaire et chronologique. In: L. Koulakovska (Ed.): *The European Middle Palaeolithic*. Pp. 21–37. Institute of Archaeology of the National Academy of Sciences of Ukraine, Kiev.

IOVITA R., FITZSIMMONS K. E., DOBOS A., HAMBACH U., HILGERS A., ZANDER A., 2012: Dealul Guran: evidence for Lower Paleolithic (MIS 11) occupation of the Lower Danube loess steppe. *Antiquity* 86: 1–16.

JORDANOVA D., PETERSEN N., 1999a: Paleoclimatic record from lœss-soil profile in northeastern Bulgaria – I. Rock magnetic properties. *Geophysical Journal International* 138: 520–532.

JORDANOVA D., PETERSEN N., 1999b: Paleoclimatic record from lœss-soil profile in northeastern Bulgaria – II. Correlation with global climatic events during the Pleistocene. *Geophysical Journal International* 138: 533–540.

KOZLOWSKI J., 1995: La signification des outils foliacés. *Paléo, Supplément* 1: 91–99.

PANAIOTU C. G., PANAIOTU C. E., GRAMA A., NECULA C., 2001: Paleoclimatic record from a lœss-paleosol profile in Southeastern Romania. *Physics and Chemistry of the Earth* 26: 893–898.

PĂUNESCU A., 1999: *Paleoliticul şi Mezoliticul de pe teritoriul Dobrogei II*. Editura Satya Sai, Bucharest.

PĂUNESCU A., MOGOŞANU F., CÂRCIUMARU M., 1972: Unele consideraţii privind paleoliticul mijlociu din Dobrogea. *Pontica* 5: 11–28.

PELÍŠEK J., 1993: Sédiments quaternaires dans la région de Mamaia-Sat en Roumanie sur le littoral de la Mer Noire. *L'Anthropologie* 97: 265–270.

ROCCA R., 2013. *Peut-on définir des aires culturelles au Paléolithique inférieur ? Originalité des premières industries lithiques en Europe centrale dans le cadre du peuplement de l'Europe*. Unpublished PhD thesis. Université Paris Ouest Nanterre La Défense, Paris.

SYTNIK O. S., 2000: *Serednii paleolit Podillia (Middle Palaeolithic of Podolia).* National Academy of Sciences of Ukraine, Lviv.

TIMAR A., VANDENBERGHE D., PANAIOTU C. E., PANAIOTU C. G., NECULA C., COSMA C., VAN DEN HAUTE P., 2010: Optical dating of Romanian lœss using fine-grained quartz. *Quaternary Geochronology* 5, 2–3: 143–148.

TUFFREAU A., 1979: Les débuts du Paléolithique moyen dans la France septentrionale. *Bulletin de la Société préhistorique française* 76: 140–142.

VALOCH K., 1968: Gisement du Pléistocène supérieur à Mamaia sur la côte de la Mer Noire. In: R. Vaufrey (Ed.): *La Préhistoire : problèmes et tendances*. Pp. 465–472. Centre National de la Recherche Scientifique, Paris.

VALOCH K., 1993: Les industries du Paléolithique moyen de Mamaia-Sat, Roumanie. *L'Anthropologie* 97: 239–264.

VASILINIUC S., VANDENBERGHE D. A. G., TIMAR-GABOR A., PANAIOTU C. E., COSMA C., VAN DEN HAUTE P., 2012: Testing the potential of elevated temperature post-IR IRSL signals for dating Romanian loess. *Quaternary Geochronology* 10: 75–80.

Sanda Balescu
Halma-Ipel UMR 8164
Université Lille 1 – Sciences
et Technologies
59655 Villeneuve d'Ascq Cedex
France
E-mail: sanda.balescu@univ-lille1.fr

Alain Tuffreau
Halma-Ipel UMR 8164
Université Lille 1 – Sciences
et Technologies
59655 Villeneuve d'Ascq Cedex
France
E-mail: alain.tuffreau@univ-lille1.fr

Roxana Dobrescu
Institute of Archaeology "Vasile Pârvan"
str. Henri Coandă n° 11, sector 1
010667, Bucharest
Romania
E-mail: roxana_dobrescu@yahoo.fr