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AT THE CROSSROADS

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In honor of Arkady Karakhanyan

International conference organized by B. PERELLO | R. BADALYAN | K. MELIKSETIAN
In honor of Arkady Karakhanyan
(1951 - 2017)
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7 rue Raulin - 69365 LYON cedex 07, France

INSTITUTE OF ARCHAEOLOGY AND ETHNOGRAPHY - ARMENIAN NATIONAL ACADEMY OF SCIENCES
15 Charents st., 0025, RA, Yerevan, Armenia
http://iae.am/en

INSTITUTE OF GEOLOGICAL SCIENCES - ARMENIAN NATIONAL ACADEMY OF SCIENCES
24A M. Baghramyan , Ave. 0019, Yerevan, Armenia
http://www.geology.am/en/home.html

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9.30 Holocene volcanism and human occupation in Armenia: new data


10.00 Volcanic eruptions witnessed by prehistoric people in Armenia


10.30 - Coffee Break

11.00 Archaeoseismological studies of the eastern branch of the Syunik pull-apart basin structure

S. Balasanyan, A. Karakhanyan, Kh. Meliksetian

11.30 Analysis of soil liquefaction effect: new evidence on the seismic activity of the Syunik highland (Armenia)

Kh. Makaryan, A. Karakhanyan, S. Balasanyan

12.00 Multiple Holocene morphoclimatic factors and their impact on the landscapes and societies of the Lesser Caucasus

V. Ollivier, M. Fontugne

12.30 - Lunch

14.00 Climate of Abandonment: contextualizing environmental change and abandonment events during the Early Bronze and Late Iron Age on the Tsaghkahovit Plain, Armenia

A. Cromartie, S. Joannin, C. Blanchet, C. Barhoumi

14.30 Upper Holocene vegetation history from the Kalavan Red Lake in Armenia

S. Joannin, V. Ollivier, O. Bellier, P. Tozalakian, A. Karakhanyan, B. Perello

15.00 The Early Holocene in Armenia and in Georgia: climate, vegetation and Neolithic expansion

E. Messager, C. Hamon, S. Joannin, B. Lyonnet, C. Leroyer, R. Badalyan, V. Ollivier, C. Chataigner, M. Jalabadze

15.30 Environmental pressures in prehistory and variability of animal and botanical stable isotope ratios (6th - mid-4th millennium BC, Armenia)

E. Herrscher, R. Hovsepyan, A. Balasescu

16.00 Seeds from vishap contexts: Archaeobotanical finds from the high-mountain site of Karmir Sar (Mt. Aragats, Armenia)

R. Hovsepyan

16.30 - Coffee —Break

**Session 2. Archaeology of Ancient Armenia**

17.00 Preliminary results on Paleolithic through Bronze Age settlement patterns from ArAGATS' Kasakh Valley Archaeological Survey (KVAS) Project (2015-17)

A. F. Greene, K. Azatyan, I. Lindsay, A. Mkrtchyan

17.30 The macro lithic tools from Akhnashen: cultural links and economy of a Neolithic site in the Arax Basin (South Caucasus)

C. Hamon

18.00 The problem of the cultural and chronological attribution of the upper horizon at Akhnashen

A. Harutyunyan, K. Azatyan, R. Badalyan

18.30 Geographical proximity and material culture: the interplay between Iran and Armenia in the 6th to the 3rd millennium BC

S. Maziar

19.00 Evening dinner and entertainment
09.00 Lithic technology from the chalcolithic layers of Getahovit 2
N. Tardy, I. Kalantaryan, B. Perello

09.30 Desert kites and agglomerated cells of the Mount Aragats: Spatial Coincidences?
O. Barge, E. Régagnon, I. Kalantaryan, B. Perello

10.00 How old are they? An up-to-date synthesis on the chronology of Mount Aragats’ kites in Armenia
J.É. Brochier, O. Barge, F. Magnin, R. Crassard

10.30 - Coffee Break

11.00 Aspects of funerary practices of the Kura-Araxes culture (based on Early Bronze Age sites in Armenia)
R. Badalyan

11.30 Diachronic changes in human activities and diet in Armenia from the Neolithic to the Bronze Age: the contribution of anthropological data

12.00 New burial elements in Early Bronze of Armenia: the discovery of Karnut cemetery
L. Aghikyan

12.30 - Lunch

14.00 Toward the periodization and chronology of archaeological cultures of the Middle and Late Bronze Ages in Armenia
P. Avetisyan

14.30 Recent rock art research in Armenia: case studies from Aragats and Syunik regions
A. Khechoyan, A. Danielyan, T. Walkling, B. Gasparyan, D. Nadel

15.00 The Church of the Transfiguration (Kumaraghan) in Garni: archeoseismology and transformation of this monumental building from Antiquity to the 19th century
B. Helly, A. Rideaud

15.30 The research of the Franco-Armenian mission on the plain of Ararat and at Chirak; from Urartu to Achaemenid period in the first millennium B.C.
F. Fichet De Clairfontaine, S. Deschamps, M. Karapetian

16.00 The French-Armenian archaeological mission of the LA3M (Aix-en-Provence) at Yereruyk (Armenia): main results
P. Donabedian

16.30 - Coffee Break

17.00 Archaeological pottery as a source in the study of medieval landscape of the Silk Road: material recorded by the VayotsDzor Silk Road Survey
A. Babajanyan, K. Franklin

17.30 Current pastoral practices in Armenia: mobility of men, mobility of animals and festive rituals
M. Thevenin

18.00 Earthen construction and architecture in Armenia
S. Monnot

Opening of the photographic exhibition: «Bergers et Bergères des montagnes d’Arménie», by M. Thevenin in the MOM (7 rue raulin, 69007)
Ancient Armenia at the crossroads
ABSTRACTS
Holocene volcanism and human occupation in Armenia: new data

KH. MELIKSETIAN1, A. KARAKHANYAN1, R. BADALYAN2, I. NEILL3, A. AVAGYAN1, A. HARUTYUNYAN2, KH. MAKARYAN1, S. BALASANYAN1, G. NAVASARDYAN1, D. MIGGINS4, A. KOOPERS4

1 - Institute of Geological Sciences, NAS RA, Armenia
2 - Institute of Archaeology and Ethnography, NAS RA, Armenia
3 - School of Geographical and Earth Science, University of Glasgow, Scotland, UK
4 - Geochronological laboratory of Oregon State University, Oregon, USA

At least several Holocene lava flows in Armenia are associated with monogenetic volcanoes within the Gegham, Vardenis and Syunik volcanic uplands (Karakhanyan et al., 2002, 2003, Avagyan et al., 2005, Meliksetian, 2013). In this contribution we present recent 40Ar/39Ar age determinations that will allow us to fill gaps in our knowledge regarding the precise age of Holocene volcanic activity in Armenia and reveal possible effects on Neolithic - Bronze Age communities.

Volcanism in the whole of the Anatolian-Armenian-Iranian orogenic plateau is associated with the ongoing collision of Arabia and Eurasia. It has been active since the Miocene (Keskin 2003, Chiu et al., 2013, Meliksetian 2018). The territory of Armenia and the surrounding area have been inhabited since Palaeolithic times. Early farming communities appeared in the Ararat valley in the early 6th millennium BC (Badalyan et al. 2010).

The following 40Ar/39Ar ages were recently obtained for some lava flows in Armenia: 8.3 ± 0.75 (1σ) Ka for the 2nd generation (of a total of 4) lava flow of the Karkar Holocene field and 3.7± 2.1 (1σ) Ka for the fissure eruption within the Porak volcano cluster sampled near the Geghakar settlement. Considering the reported data, it is obvious that Neolithic and Bronze Age communities within the territory of Armenia could have been affected by volcanic eruptions and associated seismic activity.

However, considering that the nature of Holocene volcanism in Armenia is relatively low-explosivity-Strombolian to non-explosive, being predominantly effusive, coupled with the fact that the distances are more than 100 km between Smbatasar, Porak (Vardenis), Karkar (Syunik volcanic upland) and the Ararat Valley, any effect on contemporary Neolithic early farming communities in the Ararat Valley would have been unlikely.

However, the volcanism of 3000 to 8000 years ago may have had significant effects on some Neolithic-to-Bronze Age sites located in close
proximity to these monogenetic volcanoes. Such effects are yet to be studied in detail. 14

One such example is the fissure eruption of the 3.7± 2.1 Ka (40Ar/39Ar) lava flow which occurred near the Geghakar Middle Bronze Age settlement. It has already been demonstrated from archaeological evidence that the settlement of Geghakar was abandoned around 1770-1600 BC, based on 14C dates (Harutyunyan, Badalyan 2008) and evidence of a collapsed wall attributed to an unknown seismic event around this time interval (Karakhanyan et al. 2017). In the light of new information concerning the determination of the age of a lava flow located less than 1 km from the Geghakar settlement which erupted from fissures located 5.6 km SE of the site, we conclude that the Geghakar Middle Bronze Age settlement was abandoned; this was possibly
due to the volcanic eruption that occurred nearby and to the pre-eruption seismic activity associated with the opening of volcanic fissures that may have reached a magnitude of 5.5, as observed during the famous Great Tolbachik fissure eruption of 1975 (Fedotov et al., 1976).

References

Avagyan A., Sosson M., Philip H., Karakhanian A., Rolland Y., Melkonyan R., Rebai S., Davtyan V.

Badalyan R.S., Harutyunyan A.A., Chataigner C., Le Mort F., Chabot J., Brochier J., Balasescu A., Radu V., Hovsepyan R.

Fedotov S., Khrenov, A., Chirkov, A.

Harutyunyan A., Badalyan R.
2008 Geghakar settlement: new Middle bronze Age site in Sevan lake basin. in Ancient cultures of Armenia, XIV, Proceedings of scientific conference, Institute of Archaeology and Etnography, Armenian NAS.


Karakhanyan A., A., R. Djrbashian, V. Trifonov, H. Philip, S. Arakelian, A. Avagian

Volcanic eruptions witnessed by prehistoric people in Armenia

A. Avagyan¹, J.-F. Ritz², P.-H. Blard³, K. Meliksetian¹, P. Munch², P. Valla⁴, K. S. Tokhatyan⁵, M. Mkrtchyan¹, T. Atalyan¹

¹ - Institute of Geological Sciences, NA RA, Yerevan, Armenia
² - Géosciences, CNRS UMR 5243, Univ de Montpellier, Montpellier, France
³ - CRPG-CNRS UMR 7358, Univ. Nancy, Vandoeuvre-lès-Nancy, France
⁴ - Institute des Sciences de la Terre (ISTerre), CNRS UMR 5275, Université Grenoble Alpes, Grenoble, France
⁵ - Institute of History, NAS RA, Yerevan, Armenia

Tens of thousands of petroglyphs have been discovered in the Armenian highland, at elevations ranging from 600 to 3300 ma.s.l. In the Syunik volcanic upland, 10 km south of the Porak volcano, at an altitude of about 3 000 m, several petroglyphs are engraved on basalt boulders measuring about 1.5 m in diameter (Figure 1D). In these petroglyphs prehistoric humans represented lava explosions with volcanic bombs similar to volcanic eruptions of Strombolian type. The depiction of such a geological phenomenon is unique for the entire region that includes the Armenian highlands, Transcaucasia and the Iranian plateau, and demonstrates that prehistoric populations in this region witnessed one or more volcanic eruptions.

To date the petroglyphs, we first used an indirect approach based on the hypothesis that the petroglyphs were intended to represent the last Porak volcanic eruptions (Figures 1 A, B, C) that could have been observed from the rock-art site, situated 11 km to the NW.

We used ³He cosmic-ray exposure dating to determine the age of the last two eruptions. The analysis of 10 samples taken from points distributed over the two lava flows yielded an age of 28±6 ka (1σ). This is consistent with preliminary-exposure ages of the engraved boulders at the petroglyph site, which lie between 16 and 30ka.

Dating by ⁴⁰Ar-³⁹Ar of the last two volcanic flows as well as 10 more ³He dates at the petroglyphs site is in progress, associated with OSL dating of fluvioglacial sediments below an engraved boulder (Figure 1D), and should enable us to confirm these initial results. So far, we cannot be certain that these petroglyphs do represent the last Porak eruptions 28±6 ka ago, since another source of lava flow in the Karkar plateau, 25 km to the SE, has been determined to be younger, with ³He ages of 9.4±1.2 ka and 5.2±0.4 ka. However, this site cannot be observed from the rock-art site.
(A) Schematic map showing the location of the Porak volcano and its associated lava flows south of the Sevan Lake, along the Pambak-Sevan-Syunik fault: 1: Petroglyph site, 2: 3He (in situ–produced cosmogenic nuclide) dated samples, 3: active faults; (B) Landsat coloured satellite image showing the Porak volcanic cone (1), and its last two lava flows (2, 3) and their emission points; (C) 3D view of the Porak volcano in a satellite image showing its last two emission points (red stars); (D) Photographs of the petroglyphs depicting the volcanic eruptions.
Ancient Armenia at the crossroads

Archaeoseismological Studies of the Eastern Branch of the Syunik Pull-apart Basin Structure

S.V. BALASANYAN, A.S. KARAKHANYAN, KH. MELIKSETIAN
Institute of Geological Sciences of National Academy of Sciences of the Republic of Armenia

In 2016, a scientific team from Institute of Geological sciences of Armenian National Academy of Sciences, carried out detailed studies to map the active faults of the eastern branch of the Syunik pull-apart basin structure. The studies were implemented in the framework of international project of Laboratoires Internationaux Associés (LIA). Field studies were conducted on 3 sites located on fault scarps of the eastern branch of the pull-apart basin structure to north of Lake Sevlich, which is located in Syunik province of Armenia. Here, a major north-south striking depression is formed between main faults segments. There are 3-4 branches of secondary faults between the main faults, which are of normal kinematics with right strike-slip component. Topographical relief profiles were compiled with a resolution of 1.5-2 meters along several fault scarps. The vertical anomalies of topography and small depressions are well manifested on the fault zone profiles. In addition, numerous ancient burial mounds and walls are situated on the scarps of secondary faults. The macroseismic study of the monuments have not revealed any deformations that could be associated with strong earthquakes. Moreover, the main fault scarp of the eastern branch of the structure to south of Lake Sevlich is overlapped by a lava flow (fig. 1.), without any signs of displacement. The $^{40}\text{Ar}/^{39}\text{Ar}$ sample dating of the lava flow pushed back the date of the last dislocations along the fault by at least 8.3Ka ±1.5 2σ.

Fault scarps of the eastern branch of the pull-apart basin structure located to the north of Lake Sevlich and covered by lava flow, without any signs of displacement. The location of dated sample is shown.
Analysis of Soil Liquefaction Effect: New Evidence on the Seismic Activity of the Syunik Highland (Armenia)

KHACHATUR MAKARYAN, ARKADI KARAKHANYAN, SERGEY BALASANYAN
Institute of Geological Sciences, National Academy of Sciences of Armenia, Yerevan, Armenia

In 2017 the group headed by A. Karakhanyan conducted macroseismic studies in the region of the Syunik Highland. During field work signs of a strong earthquake manifested in soil liquefaction effect and angular discordance of strata were recorded not far from the town of Sisian. These discoveries demonstrate the presence of a fault that could be a southern extension of PSS active fault and a source of a strong earthquake.

One of the intruded sand dikes documented in the field is exhibit complex structure, with multiple intrusion channels and has a total length of about 20 m and is more than 5 m thick, including intrusion channels (fig.1). The granulometric analysis of samples collected from the sand dike demonstrated high likelihood of the occurrence of soil liquefaction phenomenon. The analysis indicates that according to the international INQUA scale, the recorded soil liquefaction effect may correspond to an intensity - I earthquake.

Fig. 1. 1 – Modern soil layer, 2 – Clayey sediments, 3 – River deposits presented as pebbles, 4 – The filling of the soil liquefaction crack with finely-grained sand, 5 – Modern soil collapse, 6 – Grave, 7 – Displacement direction, 8 – Direction of sand layer intrusion, 9 – Sand layer intrusion channel.
Three samples for radiocarbon 14C analysis were collected from the paleosol layers aiming to estimate the date of the recorded strong seismic event. Samples were dated in Beta Analytics Inc. laboratory (USA) and yielded the following ages: 878 - 1013 cal. AD as a predate and 1485 - 1650 cal. AD, 1726 - 1814 cal. AD as postdates of the event. In correlation of these results with the historical catalogue, the seismic event could possibly be related to the devastating earthquake of 1406 AD or other, so far unknown strong earthquake within the same time interval. It is suggested, that continuous studies in this area could improve the localization of the 1406 earthquake epicenter and estimate its magnitude by relating it with the documented fault and soil liquefaction effects. Another important direction of future studies could be an attempt to show if the discovered SE continuation of the Pambak-Sevan-Syunik fault system has structural links with the Khoustoup-Ghiratagh fault further south.
Multiple Holocene morphoclimatic factors and their impact on the landscapes and societies of the Lesser Caucasus

V. Ollivier¹, M. Fontugne²

¹ - LAMPEA, CNRS UMR 7269, Univ. Aix-Marseille, Aix-en-Provence, France
² - LSCE, CNRS UMR 8212, Univ. de Versailles Saint-Quentin-en-Yvelines, Gif-sur-Yvette, France

The evolution of variation in the relative level of the Caspian Sea is based on the occurrence of high-frequency and wide-amplitude rhythmicity, well defined for the Pleistocene Late Glacial period and with high resolution for the Holocene. These variations are not strictly correlated with components of global and/or rapid climate changes (RCC). and the inland effects of such marine oscillations are poorly known at the present time. Our main research is focused on the retroactive impact of these “climato-eustatic” variations of the Caspian on the main fluvial system, the Kura and the Arax rivers and their tributaries, as well as on the Holocene societies present in the Lesser Caucasus (Armenia, Azerbaijan and Georgia). The geomorphological analyses (stratigraphy, sedimentology, morpho-sedimentary changes) and the geochronological and geoarchaeological studies (14C dating and studies of Neolithic/Bronze Age sites) have provided us with some precious data that correlates the sea movement to the sedimentation rhythmicity and the human occupation phases on a regional scale. Since the Upper Pleistocene, the upstream hydrographic network has reacted to marine regressions by causing powerful riverbed incisions (13 000-11 000; 3 200-2 900; 2 100-1 600; 1 000-400; 150-0 cal. BP) and to transgression phases by thick valley infilling (eg. 27 000-13 000; 11 000-3 200; 2 900-2 100; 1 600-1 000; 400-150 cal. BP). The retroactive morphogenic effects were also perceived in the intra-mountain area far from the Caspian shoreline. These different sedimentary factors and the variations in the fluvial geomorphology led to landscape changes affecting land use availability for agriculture and herding in the vicinity of the riparian zone. This is also spatially and diachronically expressed in the settlement locations (depending upon the sedimentological/pedological factors and water accessibility) and in their abandonment and their destruction and/or burial by erosive processes. The direct RCC also plays an important role, providing hydrological flow that feeds rivers and lakes, increasing or decreasing the efficiency of erosion processes, flood and sediment transfers in the hydrosystems. In this RCC context, evidence for the beginnings of water management and flood impact on the Neolithic settlements in the Kura hydrographic network will be presented.
The data for climatic oscillations and base level changes are now differentiated and integrated into the geomorphological/geoarchaeological analyses concerning human occupation, land use and water management in the Caspian Sea hydrographic basin within the framework of international research programs (ANR, AMIDEX, ECCOREV, OT-Med and LIA).
Climate of Abandonment: Contextualizing environmental change and abandonment events during the Early Bronze and Late Iron Age on the Tsaghkahovit Plain, Armenia

A. Cromartie\textsuperscript{1}, S. Joannin\textsuperscript{2}, C. Blanchet\textsuperscript{2-3}, C. Barhoumi\textsuperscript{2}, E. Messenger\textsuperscript{3}, D. Etienne\textsuperscript{3}

\textsuperscript{1} - Department of Anthropology, Cornell University, Ithaca, New York, USA
\textsuperscript{2} - ISEM, CNRS UMR 5554, Univ. Montpellier 2, Montpellier, France
\textsuperscript{3} - EDYTEM, CNRS UMR 5204, Univ. Grenoble Alpes, Savoie Mont Blanc, Chambery, France

Pollen reconstructions from the lake site of Shenkani have revealed that the Tsaghkahovit plain, located in Central Armenia, has been a grassland steppe throughout the Holocene. A landscape similar to today.

Results from this core are the first analyzed from the study region of the joint Armenian/American Project for the Archaeology and Geography of Early Transcaucasian Societies (Project ArAGATS).

Results reveal a decline in arboreal pollen and potential climate events beginning around 2700 cal. BC and then again around 300 cal. BC. Changes, which correspond roughly to two major phases of regional abandonment at the end of the Early Bronze Age and subsequently during the Late Iron Age.

To date, these abandonment events are not clearly understood, and most likely multiple social, political, and environmental factors contributed to these eras of settlement disruption.

In this talk, we present our results from a Holocene perspective from the Shenkani core and discuss the possible role of environmental change in chronologically disparate decisions to abandon the plain. We will contextualize these findings with regional climate records and discuss if these changes in tree taxa can be explained by environmental events alone. Finally, we will contextualize these results with the archaeology from these periods to explore the connections between climate and settlement disruption in the South Caucasus.
Image of Shenkani located near the Tsaghkahovit plain, Armenia (A. Cromartie)
Upper Holocene vegetation history of the Kalavan Red Lake in Armenia

S. Joannin¹, V. Ollivier², O. Bellier³, P. Tozalakian⁴, A. Karakhanyan⁵, B. Perello⁶

1 - ISEM, CNRS UMR 5554, Univ. Montpellier 2, Montpellier, France
2 - LAMPEA, CNRS UMR 7269, Univ. Aix-Marseille, Aix-en-Provence, France
3 - CEREGE, CNRS UMR 7330, Univ. Aix-Marseille, Aix-en-Provence, France
4 - Department of Cartography and Geomorphology, Yerevan State University, Armenia
5 - Institute of Geological Sciences, NAS RA, Armenia
6 - Archéorient, CNRS UMR 5133, Univ. Lumière - Lyon II, Maison de l’Orient et de la Méditerranée, Lyon, France

Vegetation change based on the study of pollen from sediments in the Kalavan Red Lake (1912 m a.s.l.), located on the northern side of the Miapor mountain ridge in Armenia, has been interpreted.

This exceptional small lake with red shores coloured by iron oxides is ideally placed in the beech-oak vegetation zone, about three kilometers from archaeological remains. It thus has the potential to cover large gaps in our knowledge of vegetation history, climate and human impact for the Lesser Caucasus. However, this lake was formed as the result of a large landslide, which necessitates investigation of erosion and recolonisation processes in the catchment area.

Pollen and XRF analyses have been carried out on a core 5 meters in length which covers the last 3800 years.

The basal age of the Kalavan sediment may approximate the age of the landslide, which would indicate a slope without vegetation cover, including the lake catchment area. Erosion and sedimentation processes produced at first coarse, heavy minerogenic elements, then erosion in the catchment area decreased due to the development of grass meadows, which led to a shift in the sedimentation. Throughout the stratigraphy, it is noteworthy that arboreal pollen increases due to the increasing presence of Quercus (oak), Carpinus orientalis (oriental hornbeam) and Fagus (beech), the last two being late invaders having a shade-tolerant ecology.

These ecological processes had a major influence on the development of vegetation on Kalavan’s landslide, but this masks other long-term forcing factors such as climate change and human impact. Relating the vegetation and erosion histories of Kalavan to regional climate and archeological data was useful for their identification. The ancient arid phase (2000-1600 cal. BP), the Medieval Warm Period and the Little Ice Age affected the vegetation, while demography variations that occurred during the medieval period are demonstrated by the presence of pastoralism.
The Early Holocene in Armenia and in Georgia: climate, vegetation and Neolithic expansion

E. Messager¹, C. Hamon², S. Joannin³, B. Lyonnet⁴, C. Leroyer⁵, R. Badalyan⁶, V. Ollivier⁷, C. Chataigner⁸, M. Jalabadze⁹

1 - EDYTEM, CNRS UMR 5204, Univ. Grenoble Alpes, Savoie Mont Blanc, Chambéry, France
2 - Trajectoires, CNRS UMR 8215, Université Paris 1 Panthéon-Sorbonne, France
3 - ISEM, CNRS UMR 5554, Univ. Montpellier 2, Montpellier, France
4 - PROCLAC, CNRS UMR 7192, Collège de France, École pratique des Hautes Études, Paris, France
5 - CReAAH, CNRS UMR 6566, Université Rennes 1, France
6 - Institute of Archaeology and Ethnography, NAS RA, Armenia
7 - LAMPEA, CNRS UMR 7269, Univ. Aix-Marseille, Aix-en-Provence, France
8 - Archéorient, CNRS UMR 5133, Univ. Lumière - Lyon II, Maison de l’Orient et de la Méditerranée, Lyon, France
9 - Georgian National Museum, Georgia

The palaeoecological studies carried out on sites in Georgia (Paravani and Nariani) as well as in Armenia (Zarishat), all located on the Javakheti-Armenian Plateau, suggest that a regional environmental change occurred between 9 000 and 8 200 cal. BP. According to pollen records, the vegetation history is marked by a clear shift from steppic to more forested vegetation. The dry climate during the growing season is expected to have favored steppe vegetation up to 9 000 - 8 500 cal yr BP and to have delayed forest expansion at the end of the Early Holocene. This is interpreted as being the result of variation in seasonal distributions of moisture (transition from an autumn/winter to a spring precipitation regime).

In the South Caucasus, the first Neolithic villages appeared at the beginning of the 7th millennium, with the expansion of the Aratashen-Shulaveri-Shomutepe culture in the Araxes and Kura basins. Looking closely at the chronology of the earliest known sites, we can observe that there is no evidence of Neolithic settlement before 6 100-6 000 cal. BC (i.e. 8 100-8 000 cal. BP). Considering the clear contribution of Middle East cultures to the spread of agriculture in the South Caucasus, its appearance appears to have been late in the region.

Why is there is no earlier Neolithic expansion in this region? Did the low amount of spring rain up to 9000-8500 cal BP slow the expansion of agriculture in the region? Is this climatic scenario also relevant for Anatolia?

In this paper, we discuss the startling chronological convergence between the climatic change that occurred in the Early Holocene and the expansion of the Neolithic towards the South Caucasus.
Environmental pressures in prehistory and variability of animal and botanical stable isotope ratios (6th - mid-4th millennium BC, Armenia)

E. Herrschere1, R. Hovsepyan2, A. Balasescu3

1- LAMPEA, CNRS UMR 7269, Univ. Aix-Marseille, Aix-en-Provence, France
2 - Institute of Archaeology and Ethnography, National Academy of Sciences of Armenia, Yerevan
3 - Institute of Archaeology, Romanian Academy, Bucharest, Romania

Characterized by several high mountain chains and valleys with different climatic and biogeographic systems, Armenia presents a mosaic of environments having exceptional biodiversity that include numerous endemic plants and animals. In order to contribute to the reconstruction of past human dietary practices based on carbon and nitrogen stable isotope ratios, the intention of our research is to examine the isotopic variability of animal and botanical archaeological material from two Armenian archaeological sites, Aknashen (Late Neolithic) and Godedzor (Late Chalcolithic). Analyses of stable carbon and nitrogen isotopes were carried out on 128 samples that include terrestrial domestic animals (5 species), wild animals (10 species) and freshwater fish (3 species) as well as 50 wild and domestic archaeobotanical remains (15 species).

The isotopic variability of the cereals suggests that the crops were managed in different ways, including water management and the use of natural fertilizer. High carbon values for the wild animals indicate variable but significant consumption of the C4 plants, suggesting the presence of both C3 and C4 plants along the Araxes River. The high stable carbon isotope values for domestic animals confirm the presence of wild C4 plants in the surrounding environment. Different positions of the domestic animals in the food chain suggest different herding managements linked to the environment and to human practices. This research was funded by the National Agency for Research (ANR13- JSH3-0003-01).
Only a small part of the seeds recovered from the site of Karmir Sar, situated on the southern flanks of Mt. Aragats, belongs to cultivated plants. Although few, these archaeobotanical finds are unique because of their geographical, chronological and cultural attributes: there are no archaeobotanical remains recovered from such a high altitude (2850 m a.s.l.) in the region; practically no remains of cultivated plants have been recovered from other Middle Bronze Age sites in the country (except for the transitions at the end of MBA and MBA-LBA); finally, this is the first time that plant remains have been recovered from the sacred contexts of vishap monuments (stone stelae called “dragon stones”). The Middle Bronze Age remains of cultivated plants have been identified as common bread wheat, hulled barley, and emmer; these cereals were probably the main plant food for the communities that erected and worshipped the vishap monuments of Karmir Sar. The charred grains of cereals found in the vicinity of the vishaps (and related structures) and attributed to the Middle Bronze Age are in all probability related to the ritual activities that occurred at the vishaps and represent remnants of offerings and/or festive food used during rituals. The finds of medieval seeds on the site are probably related to the activity of transhumant pastoralists.
Preliminary Results on Paleolithic through Bronze Age Settlement Patterns from ArAGATS’ Kasakh Valley Archaeological Survey (KVAS) Project (2015-17)

A. F. Greene¹, K. Azatyan², I. Lindsay³, A. Mkrtchyan²

¹ - New York University, New York, USA
² - Institute of Archaeology and Ethnography, NAS, RA, Armenia
³ - Purdue University, USA

The South Caucasus witnessed multiple long-term shifts in settlement systems, social organization, and political life between the Paleolithic and the close of the Bronze Age; the initial peopling of the region, the emergence of complex mortuary rituals and social inequality, and the construction of hilltop forts and the proliferation of warfare are just a few of the transitions visible in the archaeological record between these periods. Throughout this long history, local environments and human landscapes served as important material and social frameworks through which processes of community (re)production unfolded. In this paper, we discuss results of the last three seasons of pedestrian survey and test excavations in the upper Kasakh River Valley in northwestern Armenia, which have broadened our understanding of changing land-use and settlement patterns. In terms of Paleolithic archaeology, our survey has documented regional occupation spanning from the Lower Paleolithic (Acheulean) through the Mousterian and Epipaleolithic, including open and sheltered sites on edge the Kasakh George, the tributaries of Mt. Aragats, and the Tsaghkunyats foothills. We have also collected tools and lithic production remains from several Tsaghkunyats obsidian sources (T’tvakar, Damlik 2), documenting the range and extent of their distribution across the foothills. Our survey work and test excavations have located Kura Araxes settlements at Aparani Berd, Chknagh, Lusagyugh, Vardenis, and Vardenut; unexplored Bronze and Iron Age fortresses at sites such as Aver Berd, Horomi Paler, and Berdi Chairner; and numerous settlements dating to the Medieval and Modern Eras.

This paper also highlights some innovations in our survey data collection methods, such as our cloud-based mobile GIS data collection system, and drone-based multi-spectral photogrammetric mapping techniques. On survey we employ a digital platform that utilizes tablets with onboard cellular and GPS technology, in which spatial and archaeological data are entered, edited, and ported to the broader ArAGATS database to ensure long term curation and security. Our aerial data collection program facilitates site reconnaissance, mapping, and remote sensing in both standard RGB (for photography,
videography, and photogrammetry) and multi-spectral thermal imaging (to remotely detect and map near-surface architecture and paleo-landscape features). These methods allow us to analyze diachronic land use patterns at new levels of scale, speed, and precision.

![ArAGATS Pedestrian Transect and Drone Survey Areas, 2017](image)
The desert kites and agglomerated cells of Mount Aragats: spatial coincidence?

O. Barge¹, E. Régagnon¹, I. Kalantaryan², B. Perello¹

¹ - Archéorient, CNRS UMR 5133, Univ. Lumière - Lyon II, Maison de l’Orient et de la Méditerranée, Lyon, France
² - Institute of Archaeology, NAS RA, Yerevan, Armenia

The structures called agglomerated cells were discovered during the fieldwork on desert kites conducted on the western slopes of Mount Aragats between 2011 and 2015, not surprising as the two types of construction share locations in the landscape and it has been discovered that their respective extension areas in Armenia are very similar. Moreover, although the questions concerning function may be only partially explained, it would appear that they imply animal management in both cases. Is it reasonable to advance the hypothesis of a coexistence of these two types of construction, and even of their functional complementarity? The chronology, which is difficult to establish in the case of the kites and still preliminary in that of the agglomerated cells, could support the possibility of contemporaneity. However, certain rare examples of superimposition tend to indicate the anteriority of the agglomerated cells.
How old are they? An up-to-date report on the chronology of the kites of Mount Aragats in Armenia

J.É. Brochier\textsuperscript{1}, O. Barge\textsuperscript{2}, F. Magnin\textsuperscript{3}, R. Crassard\textsuperscript{4}

\textsuperscript{1} - LAMPEA, CNRS UMR 7269, Univ. Aix-Marseille, Aix-en-Provence, France
\textsuperscript{2} - Archéorient, CNRS UMR 5133, Univ. Lumière - Lyon II, Maison de l’Orient et de la Méditerranée, Lyon, France
\textsuperscript{3} - IMBE, CNRS UMR 7263, Univ. Aix Marseille Univ., Aix-en-Provence, France
\textsuperscript{4} - CEFAS, CNRS, Kuwait

Identified in 2010 by Arkadi Karakhanyan, the 205 kites scattered over the slopes of Mount Aragats are no easier to date than any other kites in the Old World. Combined results from geoarchaeological, bioarchaeological, archaeological and radiochronological examinations led to the construction of two alternative Bayesian chronological models. The most probable (Model B) suggests that they were constructed within a short time span between a late period of the Bronze Age and the first centuries of the Common Era. The activity of hunting large mammals related to them appears to have been particularly developed during the Iron Age.
This report tackles the main problems associated with the cultural and chronological attribution of the upper horizon of the Aknashen settlement. Here we present the results of excavations conducted in 2009 and 2015-16, during which our team studied trenches 9-12, which cover a total area of 110 square meters. This section of the settlement, of which horizons I-IV were excavated, is notable for the presence of various intrusions, such as burials of the Bronze Age, medieval occupancy, burials of the modern period, modern garbage pits, and animal burrows. The study of this section facilitates a more thorough understanding of the stratigraphy of the settlement in general and its upper, most damaged horizons in particular.

The upper horizons I and II, the most disturbed by the intrusions, which are essentially a cemetery of the modern period, in our context are represented only by obsidian and pottery. Horizon III, represented in squares 1-6 by a relatively dense system of adobe buildings, was distinguished by large fragments in situ of vessels from the Grit-tempered I group. Only isolated features and structures have survived in trenches 9-12 from that horizon. In all four squares, a clear layout of buildings appears only in the level of horizon IV. A dense system of pisé/cob round and oval buildings form this horizon,
where two construction periods, or rather two periods when the buildings were in use, can be discerned.

The analysis of the ceramic material showed that, despite a strong disruption of the layer, the distribution of pottery by horizons is identical to that from the excavations of previous years. Pottery of the Chaff-tempered group, traditionally identified as Chalcolithic, predominate among the materials of horizon I. Moreover, the amount of pottery with plant inclusions decreases with depth, while the amount of the Grit-tempered I pottery increases 2.5 times in horizon II. Pottery of the Grit-tempered II group appears in the third horizon.

In horizon III, in general pottery of the Grit-tempered groups appears almost three times as much as pottery of the Chaff-tempered group.

Because of the physical disturbances, the stratigraphic attribution of the obsidian artefacts found in the upper horizon is not obvious. The available material from the upper horizon of trenches 1-8, according to J. Chabot's studies, does not present any fundamental differences from the Neolithic material of the underlying horizons. At the same time, it is possible that the ratio of blades to flakes is more variable in trenches 9-12. In other words, there is clearly a contradiction between the dominant features - pottery and obsidian. Thus, the situation described above presents the difficulty of selecting criteria for the attribution of the settlement's upper layer.
The macrolithic tools from Akhnashen: the cultural links and the economy of a Neolithic site in the Arax Basin (South Caucasus)

C. Hamon
Trajectoires CNRS UMR 8215, Univ. Paris 1 Panthéon-Sorbonne, Nanterre, France

In the South Caucasus, the development of Neolithic economies (6th millennium BC) is often examined through the prism of contrasted landscapes, strategies for exploitation of natural resources and the conditions under which the domestication of cereals and animals was introduced. These economic shifts were also accompanied by technical innovations in food processing and artisanal activities. Through an overview of the technological and functional characteristics of ground stone tools from the site of Akhnashen (Armenia), several questions will be addressed. What can they tell us about the links between the Neolithic settlements of the Arax basin and the Anatolian and Mesopotamian cultures to the south, and with the Kura basin to the north, during the first half of the 6th millennium BC? What picture of the activities practiced do macrolithic tools provide us, and what do they tell us about the economy of the Neolithic populations?
Lithic technology from the chalcolithic layers of Getahovit 2

N. Tardy¹, I. Kalantaryan², B. Perello¹

1 - Archéorient, CNRS UMR 5133, Univ. Lumière - Lyon II, Maison de l’Orient et de la Méditerranée, Lyon, France
2 - Institute of Archaeology, NAS RA, Yerevan, Armenia.

The cave of Getahovit 2, discovered in 2010, is situated in the valley of the Khachakhpyur river, in the Tavush region of northeastern Armenia. The excavation of the cave over a period of 7 years revealed human occupations ranging from the Late Palaeolithic periods up to the medieval period.

This paper only focuses on the procurement strategies for and the technologies of lithic artefacts recovered from the Chalcolithic layers, of a period when the cave was mostly used as a sheepfold for transhumant shepherds.

The lithic assemblage from these Chalcolithic layers is predominantly obsidian that originates from 3 obsidian sources in Armenia; a difference in the technologies used is observed:

The majority of the lithic industry consists of small flakes, cores and chips deriving from simple production techniques such as hard-hammer direct percussion and anvil technique on small nodules with cortical residues. The lithic analysis suggests a direct procurement strategy from the obsidian sources in the form of small nodules knapped in the cave itself (opportunistic model).

On the other hand, the presence of a few very regular blades produced using pressure techniques, which appear to have been imported to the site as finished products, raises the question of a totally different procurement strategy, probably through exchanges with neighboring villages located closer to the source (down-the-line exchange).
The region that is known today as Armenia is spatially and geographically a close neighbour of Iran. The Araxes River forms a natural geographical boundary and separated the Moghan, Khoda Afarin, and Jolfa plains in the southern part of the basin from its northern parts, which are known today as Azerbaijan, Armenia and Nakhichevan. Our understanding of the early societies of this basin, on both sides of the present border, is still fragmented and rudimentary.

Political upheavals and political boundaries hindered fieldwork in some areas of this basin for many years. However, in the last decade, many archaeological projects have provided a considerable amount of data and information on settlement patterns, social entities and networks. The archaeological project of the Araxes valley (APAV) is one of these projects, which has focused on the southern basin of the Araxes River. The results of the excavations of two sites, Kohne Pasgah Tepesi and Kohne Tepesi, and the intensive survey carried out in this area, enable us to shed more light on the settlement dynamics, material culture and economic/social networks of this area and its neighbours.

The time period from the 6th millennium BC up to the middle part of the 4th millennium represents the Neolithic and Chalcolithic periods in this region. The material culture of both periods has many common characteristics with contemporary traditions at sites of the southern Caucasus: Shulaveri-Shomutape, K’ultepe Nakhichevan, Aknashen-Khatunarkh, Aratashen, Teghut, Tsopi in the Neolithic, and the Chaff-tempered and Sioni traditions in the Chalcolithic period.

Later, in the last part of the 4th millennium BC, a cultural tradition that originated in the southern Caucasus, known as the Kura-Araxes cultural tradition, expanded over a vast area, including Iran as well as westward into eastern Anatolia and as far as the Levant.

Based on a multidisciplinary study of artefacts in this article, I will examine the patterns of interconnection between regions, communities, and sources, through the material culture, that is, pottery styles, commodity flows and the role of the Araxes River and its tributaries in this interplay over the stated time
span. Furthermore, I will investigate whether spatial propinquity had any impact on commodity flows and exchange, and if so, whether this impact affected the material culture and the technological practices of populations in the 6th to the 3rd millennium BC or not.
Towards the periodisation and chronology of archaeological cultures of the Middle and Late Bronze Ages in Armenia

P. Avetisyan
Institute of Archaeology and Ethnography, NAS, RA, Armenia

The archaeological periodisation and chronological scales currently applicable for Armenia came into use in the 1990s, while the assemblages of material culture unearthed since then as well as regularly published extensive results of radiocarbon dating and new stratigraphic data now require additional analysis and exact definition of the time frame involved.

It would also appear that there is a need for discussion of matters related to the concepts and methodology of periodisation systems. Specifically, there is a commonly accepted opinion that the Armenian archaeological complexes attributed to the Bronze and Iron Ages (with their cultural layers, dwelling and burial structures, typological composition of the assemblages, etc.) may be grouped into 8 mega-complexes forming original cultural environments, which in turn are thought to be archaeological cultures (Early Bronze: ‘Shengavit’ or ‘Kura-Araxes’ culture; Middle Bronze: ‘Early Kurgan’, ‘Trialeti-Vanadzor’, ‘Sevan-Artsakh’, Karmirberd, Karmirvank and Van-Urmia ceramic traditions, Late Bronze-Iron Age: Lchashen-Metsamor, and beginning with the 9th century BC, the Urartian and Van-Tosp cultures).

These archaeological cultures are strongly distinguished from each other by their characteristic features as well as by their sustainability, chronology and areas of distribution. In addition, each of these cultures is represented by groups of sites that present chronological or local/regional changes. Thus, definition of the stage division and dating of these ‘archaeological cultures’ and their sub-stages is of key importance for recording or interpreting any change or dynamics of change in the cultural environment of the region.

In view of this, we have attempted to present a periodisation scale developed by us for ‘archaeological cultures’ attributed to the Middle Bronze/Late Bronze based on the analysis of new data necessary for stage division and periodisation.
Recent rock art research in Armenia: case studies from Aragats and Syunik regions

A. Khechoyan¹, A. Danielyan², T. Walkling³, B. Gasparyan¹, D. Nadel⁴

1 - Institute of Archaeology and Ethnography, NAS RA, Armenia
2 - Université Paris 1 Panthéon-Sorbonne, ED 112, CNRS UMR 7041, ArScAn, Paris, France
3 - Landscape Research Centre, UK, United Kingdom
4 - Zinman Institute of Archaeology, University of Haifa, Mt Carmel, Israel

Understanding rock art sites within their environment, cultural and natural landscape, is becoming a central research topic in rock art studies. Over the last decade, due to systematic rock art researches in Armenia, a considerable amount of new data has been collected and studied.

Open-air petroglyph sites make a great majority in Armenia. Most of them are located beyond the settlements in the volcanic highlands of Aragats, Gegham, Vardenis and Syunik (between 2500 and 3300 m). The lowest altitude rock art sites extend along the southern slopes of Mt. Aragats and the fringes of the Ararat Depression at 900-1200 m. A small number of rock shelters with paintings have also been discovered in the region in recent years.

This paper proposes to examine the main results of recent researches focusing particularly on the case studies of two open-air petroglyphic complexes of different altitudinal environmental zones, which have been documented in their entirety: Ughtasar (in Syunik highlands) and Lernamerdz-Voskehat-Aghavnatun (on the southern slopes of Aragats) located within or adjacent to other archaeological sites (e.g. campsites, graveyards, kites, enclosures, etc.).
Foregoing studies were carried out by the Institute of Archaeology and Ethnography of the National Academy of Sciences of Armenia, in the frame of international collaborations\(^1\).

According to the multi-scalar approach, the rock art will be discussed at various scales from macro to the micro level, considering its relations to the landscape (topographical, archaeological, geological features, distribution of petroglyphs, etc.) and the rock surface (use of the natural features of the rock, etc.), as well as the examination of the pictorial context (thematic and stylistic aspects).

Besides telling much about life of the ancient societies and broadening the understanding derived from archaeological record, these irremovable rock images, unlike movable artifacts, also mark the itineraries of people (transhumant pastoralists?) and suggest intriguing patterns of iconographic and stylistic diffusion on trans-regional level.

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\(^1\) Aragats Rock Art Project - The Institute of Archaeology and Ethnography of the National Academy of Sciences (Armenia) with mission «Caucase» (Maison de l'Orient et de la Méditerranée, France), Ughtasar Rock Art Project, IAE NAS RA with Landscape Research Centre (UK), Rock Art & Kite Project, IAE NAS RA with the Zinman Institute of Archaeology at the University of Haifa (Israel)
Diachronic changes in human activities and diet in Armenia from the Neolithic to the Bronze Age: the contribution of anthropological data

M. Poullmarc'h¹, B. Chamel¹, G. André², P. Avetisyan³, R. Badalyan³, C. Chataigner¹, B. Gasparyan³, A. Harutyunyan³, G. Palumbi², E. Herrscher², F. Le Mort¹

¹ - Archéorient, CNRS UMR 5133, Univ. Lumière - Lyon II, Maison de l’Orient et de la Méditerranée, Lyon, France
² - LAMPEA, CNRS UMR 7269, Univ. Aix-Marseille, Aix-en-Provence, France
³ - Institute of Archaeology and Ethnography, NAS, RA, Armenia

In the last few years, research in the field of biological anthropology has intensified in Armenia, notably through such approaches as isotopic analyses and the search for para-masticatory activities. Thanks to the discovery of burials at 4 sites spread across Armenian territory - Aknashen (Neolithic and end of Early Bronze Age), Godedzor (Late Chalcolithic), Kalavan 1 (Kura-Araxes culture) and Gegharot (Bronze Age), diachronic changes related to human activities and diet could be determined.

Specific activities are inferred from pathological conditions observed on the skeletal remains and from traces of para-masticatory activities discovered on the Early Bronze Age teeth from Kalavan 1. Until now, para-masticatory activities on ancient skeletal remains from the southern Caucasus had never been described.

Isotopic analyses carried out on 14 human skeletal remains show a wide dispersion over time for both carbon and nitrogen isotope ratios. The Neolithic humans present the largest carbon and nitrogen isotope variability, indicating a wider choice of food, which could be related to the location of the site in the Araxes valley (Aknashen). In contrast, the isotope ratios for the Chalcolithic and Bronze Age sites present a very low dispersion, interpreted as a dietary norm for populations who lived at high altitude during the Kura-Araxes period in the southern Caucasus.

The anthropological data confirm biological variability within these Armenian sites, suggesting an impact of environmental factors on activities and dietary choices.
In the territory of Armenia, the earliest intentional burials can be attributed to the Late Neolithic period and based on current data these were carried out within the settlement. So far they have been excavated in Aknashen and Masis Blur. During the following Chalcolithic period, this practice continued (Areni 1) and separate burials appeared that had no relation to habitation areas (Aknalich).

With the Early Bronze Age Kura-Araxes culture (cal. 3500 -2500 BC), manifestations of a general burial ritual become evident for the first time.

The purpose of this presentation is to introduce new data on the burial ritual of the Kura-Araxes culture and to encourage preliminary discussion on the interrelation of settlement and cemetery based on the sites of Armenia. The following relationship types between settlement and cemetery have been identified:

- Cemeteries without settlements
- Extramural cemeteries
- Intramural cemeteries

The recent excavations at Karnut have provided additional opportunities to study the association between settlement and cemetery. This Early Bronze Age Kura-Araxes site is located in the village of Karnut on the eastern edge of the Shirak plain. Excavations of the site conducted by Ruben Badalyan in the 1980s exposed a single-layer settlement attributed to the final stage of the Kura-Araxes culture. However, recent construction activity has exposed burials at the site. Six Early Bronze burials were excavated in 2015-2017; there are several variations of burial types among these. The following were identified in past excavations:

- Two types of tomb/chamber structure
- Individual and collective burials
- Early and late period burials in the same chamber
The burials at Karnut are unique in that we have identified two new factors of burial practice that had not previously been found in the territory of Armenia:
1) the interrelation between the settlement and the cemetery
2) burials in front of the chamber entrance.

These discoveries need further study to determine whether the newly identified interrelation is reuse of sacred space or abandonment and whether the remains outside the tombs are related to sacrifice or to secondary use of the chamber.
Aspects of funerary practices of the Kura-Araxes culture (based on Early Bronze Age sites in Armenia)

R. BADALYAN

Institute of Archaeology and Ethnography, NAS, RA, Armenia

Based on evidence from recent excavations of Armenian sites of the 4th-3rd millennia BC, this report examines certain aspects of the Kura-Araxes burial customs. The new data raises questions concerning the spatial relationships of settlements and cemeteries of the Kura-Araxes culture and the changes in these relationships over time, the functions of architectural structures associated with the burials, and the cultural and chronological variations in the funerary rites that determined their socio-economic causes.

First, the report draws attention to sites in which burials are associated with architectural structures of unusual form. These are found in both extramural cemeteries on the periphery of settlements (such as Gegharot) and in cemeteries unrelated to settlements (such as Talin). This report presents an interpretation of the functional purpose of these structures in light of the character of the burials associated with them. This is considered in the context of the recent popular proposition concerning the absence of buildings and/or open stages in the Kura-Araxes culture intended for collective ceremonial activity (Sagona, Sagona 2009, Palumbi 2016, Sagona 2018).

Second, the report analyzes evidence of the reuse of funerary structures in the Kura-Araxes culture. These structures are classified according to their synchronous/diachronic nature and the degree of preservation or damage of previous burials. Excavations in recent years have established that in the Kura-Araxes culture the practice of repeated use of burials is observed not only in the widespread practice of accumulation (adding to the burial a new one, occurring both synchronously and diachronically), but also reburial (removal of the previous one from the chamber - Karnut, Gegharot). It is noteworthy that in the latter cases, the replacement of the remains took place during KA II. In other words, the reburial occurred during a single cultural-chronological period, apparently without changes in the ethno-cultural composition of the population.

This study pays particular attention to the question of the chronological correlation of individual and collective accumulative graves, in which a couple, several dozen (Karchghbyur, Berkaber, Mentesh, Uzun Rama), or even hundreds (Velikent) of individuals are buried.

The report highlights the fact that the accumulative burials are represented by all burial types inherent to the Kura-Araxes tradition: those without pits (Jrarat,
Lchashen), stone boxes (Gegharot, Keti, Lanjik, Aragats, Samshvilde, etc.), pit chambers (Karchaghbyur, Menteshtepe), and catacombs (Velikent).
The Church of the Transfiguration (Kumaraghan) in Garni: archaeo-seismology and transformation of this monumental building from Antiquity to the 19th century

B. Helly, A. Rideaud

HiSoMA, CNRS UMR 5189, Univ. Lumière - Lyon II, Maison de l’Orient et de la Méditerranée, Lyon, France

The Church of the Transfiguration (Kumaraghan) in Garni occupies a privileged position in the center of the village of Garni, a few hundred meters from the fortress and the ancient temple that attract the curiosity of tourists. Our observations show that this building presents obvious traces of destruction and reconstruction resulting from a succession of events related to human interference and to environmental effects, in particular successive earthquakes attributed to the Garni fault. The comparison of these destructive and reconstructive sequences with those that have been recognized in many other monuments of the region helps to define the seismic history of this major fault in modern Armenia.
The research of the Franco-Armenian mission on the plain of Ararat and at Chirak: from Urartu to the Achaemenid period in the first millennium B.C.

F. FICHET DE CLAIRFONTAINE¹, S. DESCHAMPS², M. KARAPETIAN³

¹ - Ministère de la culture, Inspection des patrimoines, collège archéologie
² - Ministère de la culture, direction régionale des affaires culturelles d’Île-de-France
³ - ArScAn, CNRS UMR 7041, Université de Paris 10, Nanterre

The study of the sites of Beniamin (6th-4th c. BC) and Erebuni in Yerevan (8th-6th c. BC) by the Franco-Armenian mission (supervised by S. Deschamps between 2002 and 2017), enabled the consideration of several themes in order to better understand the development of these sites between the end of the Urartian period and the beginning of the Hellenistic period. The goals thus concerned the modalities of occupation of the fortress-palace of Erebuni at the end of Urartu, the morphology and the characteristics of the so-called phase of transition, often called post-Urartu, and finally the organization of an Achaemenid domain in the Chirak territory and its architectural and economic influence in the 6th – 4th c. BC.
The French-Armenian archaeological mission of the LA3M (Aix-en-Provence) at Yereruyk (Armenia): main results

P. Donabedian

LA3M, CNRS UMR7298, Univ. Aix Marseille, Aix-en-Provence, France

Since 2009, the mission has carried out surveys of the early Christian and medieval site of Yereruyk, situated at the northwestern extremity of the Republic of Armenia, on its border with Turkey, a few kilometers from the remains of the medieval capital of Ani.

The site contains, around the ruins of an undated but obviously early Christian basilica with unusual features, the vestiges of several constructions which raise many questions concerning both their function and their dating. The site also poses more general questions concerning the nature of the complex and the reasons for its location in a place which is particularly deprived today, as well as several enigmas that appeared during the investigations. The multidisciplinary team set up by the LA3M of Aix-en-Provence and the Regional Museum of Shirak (the province where the site is located) is striving to provide answers, even if only to a few of these questions.

After the discovery, near the church, of a cemetery and a memorial area, the mission began to explore a field that until then was very marginal, even taboo, in medieval Armenian archeology, that of funerary archeology. The detailed archaeological and anthropological study of more than seventy graves, and 27 dates obtained thanks to radiocarbon analysis of human bones, have provided an initial picture of the long evolution of a Christian cemetery in Armenia, from late Antiquity almost to today. The study of the basilica, meanwhile, led to a revisitation of the field of Armenian-Syriac relations in the early Christian period. A geomorphological analysis of a seasonal stream bordering the site was also carried out in an attempt to better understand the place of this “wadi” in the past life of the complex. This enabled reconsideration of the relations that Yereruyk would have had with the neighboring town of Ani around the year 1000.
Ancient Armenia at the crossroads
Archaeological pottery as a source in the study of medieval Landscapes of the silk road: material recovered by the Vayots Dzor Silk Road Survey

A. Babajanyan¹, K. Franklin²

1- Institute of Archaeology and Ethnography, NAS RA, Armenia
2- Oriental Institute at the University of Chicago, USA

This research is based on analyses of pottery recorded and studied in the course of the Vayots Dzor Silk Road Survey (VDSRS) project over the past three years. The VDSRS is focused on the study through archaeology of medieval landscapes in the Vayots Dzor region, which figured in the material and cultural exchanges that took place along the Silk Road. During the medieval period, the routes which run along the Arpa River formed part of the wider network of roads that connected local towns and settlements to cities such as Bardaa, Dvin, Tbilisi and Tabriz, and the coasts of the Black and Caspian Seas.

Ceramic material collected during surveys and through excavations at the medieval town of Arpa (located 0.5 km to the northeast of the contemporary village of Areni) closely corresponds to a time period between the late 12th century and the beginning of the 15th century. The pottery assemblage consists of wares of daily domestic use, mainly employed for storage and cooking, and vessels used for the serving and consumption of food and liquids. The latter category is divided into glazed (clayey and fritware fabrics) and unglazed wares. The pottery is characterized predominantly by local production; however we can distinguish (especially in the glazed pottery) imported wares as well as their influences on the local production. This corroborates the wider arguments that the Vayots Dzor region was actively integrated in the trade, economic and cultural interconnections created by the phenomenon of the Silk Road.

In the ceramic corpus we observe a specific type of pottery which is preeminent in the Vayots Dzor region, which the VDSRS project has termed “Vayots Dzor style pottery” or “Medieval-Urartian”. This bright red burnished pottery was produced in the medieval period (12th -15th centuries); significantly however the surface treatment resembles the pottery of the Urartian or Classical periods. In most cases this type of pottery consists of fine or medium to coarse red fabrics with a grey core.

Although red burnished pottery was widespread on medieval sites in other regions of Armenia, this particular style is so far found only in the region of Vayots Dzor. This supports the conclusion that this local production corresponded to local “taste” and was compatible with the “imported taste” seen in the glazed wares.
In terms of resolving the problems of understanding the Vayots Dzor Silk Road culture, this study represents only the current state of research in this region, but it does provides exact and detailed data for use as a comparison model for other sites and future studies.
Current pastoral practices in Armenia: mobility of men, mobility of animals and festive rituals

M. THEVENIN
URMIS, CNRS UMR 8245, France & IFPO-Irak

The ethnographic missions which are funded by the LIA France-Armenia, the URMIS laboratory (Paris 7) and the CIRAD (international center for agricultural research for development) have as their goal the study of current pastoral mobility in Armenia.

They are part of the research project of the NHASA program (Natural Hazards and Adaptation Strategies in Armenia, from 10 000 BC onwards), as well as my thesis in anthropology whose subject is the new places of memory in nomadic and transhumant pastoralism, in the northern zone of the former Fertile Crescent.

In addition to the traditional and sometimes complex seasonal movements of the sheep of Armenian and Yezidi herders, the missions have also highlighted the mobility injunctions that affect all of the actors, those related...
to the geopolitical stakes specific to the Armenian nation-state, but also to the
national and cross-border trade flows of sheep in the era of globalization.

At the same time, pastoral festive rituals have been observed: the
practice of Barân Bardân, a thousand-year-old festive ritual of setting rams in
the herd on the return from pastures, still practiced among Yezidi herders (and
known in Turkey under the name Ko54c Katimi), and the sheep-shearing festival
in the Syunik Marz. These two events provide a framework for comparison and
study of the relations between heritage, pastoralism and the nation-state.

Thus, through the study of pastoral practices in Armenia, the geopolitics
of sheep-herding may be observed.
Earthen construction and architecture in Armenia

S. Monnot
EVS - CNRS UMR 5600, Ecole Nationale Superieure d’Architecture de Lyon, Lyon, France

The point of view of this architect, a teacher-researcher at the ENSAL laboratory EVS-LAURE who takes a militant stance in favor of earthen constructions, will dictate the presentation of the materials used in the constructions of the Urartian period, and also those of the 19th and 20th centuries, with particular emphasis on the presence of earthen material.

Earthen material is present both in monumental constructions in Armenia (on archaeological sites for example) and in the traditional semi-buried habitat (Glkhatun house) as well as more recent constructions.

The current research will take stock of the various construction techniques (adobe, mud, rammed earth ...) identified during the field investigations in Armenia, mainly in 3 regions/provinces of the plain of Ararat, in connection with historical contexts and events. How have local resources enabled a variety of forms and uses?

We will emphasize that these located architectural constructions represent solutions resulting from a territory, a climate, a culture, in short from a particular milieu. We will explain the actions used to strengthen the conservation of the remains so that this part of the historical and architectural culture of Armenia does not disappear definitively.
LIST OF PARTICIPANTS
AGHIKyan LEVON
Institute of Archaeology and Ethnography, NAS RA, Armenia

Andre Guy
LAMPEA, CNRS UMR 7269, Univ. Aix-Marseille, Aix-en-Provence, France

ATALYAN T.
Institute of Geological Sciences, NA RA, Yerevan, Armenia

AvAGYan Ara
Institute of Geological Sciences, NA RA, Yerevan, Armenia

AvetiSyan Pavel
Institute of Archaeology and Ethnography, NAS RA, Armenia

AzATyAn Karen
Institute of Archaeology and Ethnography, NAS RA, Armenia

BABAjANYan Astghik
Institute of Archaeology and Ethnography, NAS RA, Armenia

BADALYAN Ruben
Institute of Archaeology and Ethnography, NAS RA, Armenia

BalASAnyAN Sergey
Institute of Geological Sciences, NA RA, Yerevan, Armenia

BalaseScu Adrian
Institute of Archaeology, Romanian Academy, Bucharest, Romania

BARGE Olivier
Archéorient, CNRS UMR 5133, Univ. Lumière - Lyon II, Maison de l’Orient et de la Méditerranée, Lyon, France

Barhoumi Chéïma
ISEM, CNRS UMR 5554, Univ. Montpellier 2, Montpellier, France

Bellier Olivier
CEREGE, CNRS UMR 7330, Univ. Aix-Marseille, Aix-en-Provence, France

Blanchet Claire
EDYTEM, CNRS UMR 5204, Univ. Grenoble Alpes, Savoie Mont Blanc, Chambéry, France

Blard Pierre-Henri
CRPG, CNRS UMR 7358, Univ. Nancy, Vandoeuvre-lès-Nancy, France

Brochier Jacques-Elie
LAMPEA, CNRS UMR 7269, Univ. Aix-Marseille, Aix-en-Provence, France

Chamel Bérénice
Archéorient, CNRS UMR 5133, Univ. Lumière - Lyon II, Maison de l’Orient et de la Méditerranée, Lyon, France

Chataigner ChrStine
Archéorient, CNRS UMR 5133, Univ. Lumière - Lyon II, Maison de l’Orient et de la Méditerranée, Lyon, France

Crassard Remy
CEFAS, CNRS, Kuwait

Cromartie Amy
Department of Anthropology, Cornell University, Ithaca, New York, USA
Ancient Armenia at the crossroads

LEROYER CHANTAL
CReAAH, CNRS UMR 6566, Université Rennes 1, France

LINDSAY IAN
Purdue University, USA

LOMBARD PIERRE
Archéorient, CNRS UMR 5133, Univ. Lumière - Lyon II, Maison de l’Orient et de la Méditerranée, Lyon, France

LYONNET BERTILLE
PROCLAC, CNRS UMR 7192, Collège de France, École pratique des Hautes Études, Paris, France

MAGNIN FRÉDÉRIC
IMBE, CNRS UMR 7263, Univ. Aix Marseille, Aix-en-Provence, France

MAKARYAN KHACHATUR
Institute of Geological Sciences, NAS RA, Armenia

MAZIAR SEPIDEH
Goethe-University Frankfurt am Main, Germany

MELIKSETIANT KHACHATUR
Institute of Geological Sciences, NAS RA, Armenia

MESSAGER ERWAN
EDYTEM, CNRS UMR 5204, Univ. Grenoble Alpes, Savoie Mont Blanc, Chambéry, France

MIGGINS DAN
Geochronological laboratory of Oregon State University, Oregon, USA

MKRTCHYAN M.
Institute of Geological Sciences, NA RA, Yerevan, Armenia

MONNOT SUZANNE
EVS - CNRS UMR 5600, Ecole Nationale Supérieure d’Architecture de Lyon, Lyon, France

MUNCH PHILIPPE
Géosciences, CNRS UMR 5243, Univ. de Montpellier, Montpellier, France

NADEL DANI
Zinman Institute of Archaeology, University of Haifa, Mt Carmel, Israel

NAVASARDYAN GEVORG
Institute of Geological Sciences, NAS RA, Armenia

NEILL IAIN
School of Geographical and Earth Science, University of Glasgow, Scotland, UK

OLLIVIER VINCENT
LAMPEA, CNRS UMR 7269, Univ. Aix-Marseille, Aix-en-Provence, France

PALUMBI GIULIO
Archéorient, CNRS UMR 5133, Univ. Lumière - Lyon II, Maison de l’Orient et de la Méditerranée, Lyon, France

PERELLO BÉRENGÈRE
Archéorient, CNRS UMR 5133, Univ. Lumière - Lyon II, Maison de l’Orient et de la Méditerranée, Lyon, France

POULMARC’H MODWENE
Archéorient, CNRS UMR 5133, Univ. Lumière - Lyon II, Maison de l’Orient
et de la Méditerranée, Lyon, France

**RÉGAGNON EMMANUELLE**
Archéorient, CNRS UMR 5133, Univ. Lumière - Lyon II, Maison de l’Orient et de la Méditerranée, Lyon, France

**RIDEAUD ALAIN**
HiSoMA, CNRS UMR 5189, Univ. Lumière - Lyon II, Maison de l’Orient et de la Méditerranée, Lyon, France

**RITZ JEAN-FRANÇOIS**
Géosciences, CNRS UMR 5243, Univ. de Montpellier, Montpellier, France

**SHAKHMURADYAN MARIAM**
Institute of Archaeology and Ethnography, NAS RA, Armenia

**TARDY NICOLAS**
Archéorient, CNRS UMR 5133, Univ. Lumière - Lyon II, Maison de l’Orient et de la Méditerranée, Lyon, France

**THEVENIN MICHAËL**
URMIS, CNRS UMR 8245, France & IFPO- Irak

**TOKHATYAN K. S.**
Institute of History, NAS RA, Yerevan, Armenia

**TOZALAKIAN PETROS**
Department of Cartography and Geomorphology, Yerevan State University, Yerevan, Armenia

**VALLA PIERRE**
Institute des Sciences de la Terre (ISTerre), CNRS UMR 5275, Université Grenoble Alpes, Grenoble, France

**WALKLING TINA**
Landscape Research Centre, Yedingham, United Kingdom
Ancient Armenia at the crossroads
AFFILIATION OF THE PARTICIPANTS
ARMENIA

• Institute of Geological Sciences, NAS RA, Yerevan
• Institute of Archaeology and Ethnography, NAS RA, Yerevan
• Institute of History, NAS RA, Yerevan
• Department of Cartography and Geomorphology, Yerevan State University

FRANCE

• Archéorient, CNRS UMR 5133, Univ. Lumièrè - Lyon II, Maison de l’Orient et de la Méditerranée, Lyon
• ArScAn, CNRS UMR 7041, Université Paris 1 Panthéon-Sorbonne, et Université Paris 10, Nanterre
• CEREGE (Centre Européen de Recherche et d’Enseignement des Géosciences de l’Environnement), CNRS UMR 7330, Université Aix-Marseille, Aix-en-Provence
• CRPG (Centre de Recherches Pétrographiques et Géochimiques), CNRS UMR 7358, Université de Nancy, Vandoeuvre-lès-Nancy
• CReAAH (Centre de Recherche en Archéologie, Archéosciences, Histoire), CNRS UMR 6566, Université Rennes 1, Rennes
• EDYTEM (Environnements, DYnamiques et TErritoires de la Montagne), CNRS UMR 5204, Université Grenoble Alpes, Savoie Mont Blanc, Chambéry
• EVS (Environnement Ville Societe) - CNRS UMR 5600, École Nationale Supérieure d’Architecture de Lyon, Lyon
• Géosciences, CNRS UMR 5243, Université de Montpellier, Montpellier
• HiSoMA, CNRS UMR 5189, Université Lumière - Lyon II, Maison de l’Orient et de la Méditerranée, Lyon
• IMBE (Institut Méditerranéen de la Biodiversité et d’Ecologie marine et continentale), CNRS UMR 7263, Université Aix Marseille, Aix-en-Provence
• ISEM (Institut des Sciences de l’Évolution de Montpellier), CNRS UMR 5554, Université Montpellier 2, Montpellier
• ISTerre (Institute des Sciences de la Terre), CNRS UMR 5275, Université Grenoble Alpes, Grenoble
• LA3M (Laboratoire d’Archéologie Médiévale et Moderne en Méditerranée), CNRS UMR7298, Université Aix Marseille, Aix-en-Provence
• LAMPEA (Laboratoire méditerranéen de préhistoire Europe-Afrique), CNRS UMR 7269, Univ. Aix-Marseille, Aix-en-Provence
• LSCE (Laboratoire des Sciences du Climat et de l’Environnement), CNRS UMR 5600, École Nationale Supérieure d’Architecture de Lyon, Lyon
8212, Université de Versailles Saint-Quentin-en-Yvelines, Gif-sur-Yvette

- **PROCLAC** (Proche-Orient-Caucase : langues, archéologie, cultures), CNRS UMR 7192, Collège de France, École pratique des Hautes Études, Paris
- **Trajectoires**, CNRS UMR 8215, Université Paris 1 Panthéon-Sorbonne, Nanterre
- **URMIS** (Unité de Recherche Migrations et Société), CNRS UMR 8245, universités Paris Diderot et Nice Sophia Antipolis, Paris
- **Ministère de la culture**
- **IFPO** (Institut français du Proche-Orient) - Irak
- **CEFAS** (Centre Français d’Archéologie et de Sciences Sociales), CNRS, Kuwait.

### EUROPE

- **Landscape Research Centre**, UK
- School of Geographical and Earth Science, **University of Glasgow**, Scotland, UK
- **Goethe-University Frankfurt am Main**, Germany

### OTHERS

- **Georgian National Museum**, Georgia
- Zinman Institute of Archaeology, **University of Haifa**, Mt Carmel, Israel
- **Institute of Archaeology, Romanian Academy**, Bucharest, Romania
- Department of Anthropology, **Cornell University**, Ithaca, New York, USA
- Geochronological laboratory, **Oregon State University**, Oregon, USA
- **New York University**, New York, USA
- **Oriental Institute at the University of Chicago**, Chicago, USA
- **Purdue University**, Indiana, USA