LOCATION AND PRESERVATION OF ARCHAEOLOGICAL SITES IN THE FERGANA VALLEY: A GEOARCHAEOLOGICAL ANALYSIS

Alisher A. Aloxunov
Uzbekistan–China Joint Department of Archaeology, Fergana State University, Fergana, Uzbekistan
https://orcid.org/0000-0002-2210-990X

DOI: https://doi.org/10.5281/zenodo.24495890 · Received: 18 November 2026 · Accepted: 21 November 2026 · Published: 24 November 2026

Abstract: The article examines the natural factors that govern the location of archaeological sites in the Fergana Valley. The relief, Quaternary deposits, seismotectonic setting, hydrography and climate of the valley are analysed as a single geoarchaeological system. On this basis, a five-group classification of the sites is developed according to the relief element they occupy and the type of deposit enclosing the cultural layer, and for each group the risk factors leading to the burial, displacement and destruction of cultural layers are identified. The analysis draws on data from Selungur Cave, Eylatan and Kuyultepa, Mingtepa, Akhsikent and Kuva, as well as on the results of geoinformation research in the Sokh River basin.

Keywords: Fergana Valley, geoarchaeology, archaeoseismology, relief, alluvial fan, loess, cultural layer, Eylatan, Mingtepa, Akhsikent

INTRODUCTION

The Fergana Valley is one of the regions of Central Asia where irrigated agriculture and urban culture first took shape. Systematic archaeological study of the valley began with the expeditions led by B.A. Latynin in the 1930s [12], while in the 1940s–1950s the expeditions of A.N. Bernshtam covered Fergana, the Alay and the Pamirs [3]. Subsequent research by Yu.A. Zadneprovsky, U.I. Islamov, V.A. Bulatova, A.A. Anarbaev, B.Kh. Matbabaev and others created an extensive source base for the history of the valley from the Stone Age to the late Middle Ages [2; 4; 7; 8; 13]. The emergence of the earliest towns in the valley has also been examined: on the basis of town-forming factors, the sites have been divided into three groups, and Dalverzin has been identified as the oldest town in the valley [1].

At the same time, the relationship between the sites and their natural environment – that is, the landform on which each site lies, the genetic type of deposit in which its cultural layer is preserved, and the extent to which natural processes have altered that layer – has not yet been adequately studied as a research subject in its own right. In recent years this gap has begun to be filled by two lines of research. The first is archaeoseismology: traces of earthquakes in the ruins of ancient towns of the Fergana Depression were specifically investigated in 2019, using Eylatan and Kuyultepa as examples [9, pp. 77–78]. The second is landscape archaeology based on geographic information systems (GIS) and remote sensing data, the results of which have been published for the Sokh River basin [20]. The aim of this article is to analyse the natural setting of the archaeological sites of the Fergana Valley as an integrated geoarchaeological system and, on this basis, to develop a classification of the sites that identifies the main risk factors for the preservation of their cultural layers.

LITERATURE REVIEW AND METHODOLOGY

The literature on the subject can be divided into three groups. The first comprises the principal archaeological studies describing the sites of the valley. These include the results of the expeditions of B.A. Latynin and A.N. Bernshtam [3; 12], the works of Yu.A. Zadneprovsky on the Chust culture and Eylatan [6; 7], the monograph by U.I. Islamov and V.I. Timofeev on the Stone Age of Central Fergana [8], the monographs by V.A. Bulatova on Kuva [4] and by A. Anarbaev on Akhsikent [2], the dissertation by B.Kh. Matbabaev on the local variants of the Chust culture [13], a study of the formation of the earliest towns in the valley [1], and the results of the joint Uzbek–Chinese expedition working at Mingtepa [18; 21]. In these works the natural setting of the sites is usually given only as a general description.

The second group consists of geoarchaeological and archaeoseismological studies. Of particular importance here are the methodology for describing the natural conditions of a study area and identifying the genetic types of deposits [5], the works on traces of ancient earthquakes at Eylatan, Kuyultepa and Akhsikent [9; 10; 11], and the application of geophysical methods in Selungur Cave [16; 19]. The third group is landscape archaeology based on GIS and remote sensing data, clearly represented by the study published on the Sokh River basin [20]. In the literature known to us, the data of these three lines of research have been used separately, and no classification synthesising the natural and geomorphological setting of the valley's sites has yet been developed.

The source base of the study comprises monographs and research articles on the archaeology of the Fergana Valley, publications on geology and seismology, encyclopaedic physical-geographical data, and long-term meteorological observations. The sources were analysed using comparative-analytical and systems approaches.

The description of the area follows the sequence accepted in geoarchaeological research: relief; bedrock and unconsolidated deposits; surface water and groundwater; climate [5, pp. 60–61]. Seismotectonic conditions were added to this sequence, since in the Fergana Valley they are among the principal factors determining the fate of the sites. The methodological basis adopted is the principle that, by linking an archaeological site to a particular landform, it is possible to determine the genetic type and age of the deposits containing the cultural layer and the degree to which the finds are preserved in situ (in their original position) [5, p. 10].

© 2026 Bulletin of International Journals · Germany · ISSN 2750-3402 · CC BY 4.0

Two criteria were used to classify the sites: 1) the relief element on which the site is located; and 2) the genetic type of deposit enclosing the cultural layer. Climatic indicators are given on the basis of the long-term normals of the Fergana weather station; annual precipitation was calculated by summing the monthly values [17].

RESULTS AND DISCUSSION

The Fergana Valley is an intermontane depression between the Tien Shan and the Hissar-Alay mountain systems. Its shape is close to a triangle: it is bounded on the south by the Turkestan and Alay ranges, on the north-west by the Kurama and Chatkal ranges, and on the north-east by the Fergana Range. The depression is about 300 km long and up to 170 km wide, and covers an area of nearly 22,000 km²; in the west it opens through a narrow passage onto the Mirzachul (Hungry Steppe) plain [15]. The valley floor rises gradually from west to east, from 320 m to 500–1000 m; its flat terraced surface is overlain by the alluvial fans of the Sokh, Isfara and other rivers [14]. The largest of these is the Sokh fan, which is about 70 km wide and 50 km long, and whose surface descends from 700 m at the river's exit from the mountains to 300 m near the floodplain terraces of the Syr Darya [20].

Thus, several relief zones succeed one another in the valley from the centre to the margins: the valleys and terraces of the Syr Darya and its tributaries; the saline and sandy interior of the depression; a periphery of alluvial fans and oases; the adyrs (low foothill ridges) and foothill hills; and the mountain ranges enclosing the valley. A continuous ring of oases runs along the margins of the valley floor, enclosing solonchaks and wind-blown sands; this ring is interrupted only in the north-west, in front of the slopes of the Kurama Range, which lack abundant rivers [15]. The south-eastern part of the valley is separated from the main plain by a belt of low loess-and-gravel foothills – the adyrs [14].

The Fergana Depression is built of Palaeozoic, Mesozoic and Cenozoic rocks, while its floor is covered mainly by loess deposits on which fertile soils have developed [9, pp. 77–78]. The upper part of the valley floor is composed of Quaternary alluvial and proluvial-alluvial sediments, and the high foothills of Meso-Cenozoic and Palaeozoic limestones and shales [15]. The Upper Pliocene–Quaternary stratigraphy of the depression is summarised in Table 1.

Table 1

Upper Pliocene–Quaternary deposits of the Fergana Depression

Age	Formation (series)	Main composition
Upper Pliocene – Lower Pleistocene	Bactrian series	Grey conglomerates with light-brown siltstone and clay interlayers; finer material towards the centre of the depression
Lower Pleistocene	Sokh formation (Northern Fergana)	Sands and loess-like loams; clays and sandstones on the Chust-Pap anticline
Middle Pleistocene	Tashkent formation	Grey conglomerates and a thick loess cover
Upper Pleistocene	Golodnaya Steppe (Mirzachul) formation	Loess underlain by pebbles; on the terraces of the Syr Darya and its tributaries and on young alluvial fans
Holocene	Syr Darya formation	Sands, gravel and, less commonly, pebbles

The formation and present-day seismic activity of the Tien Shan mountain system are explained by the collision of the Indian and Eurasian lithospheric plates [9, p. 77]. In Northern Fergana the Namangan seismogenic zone is particularly hazardous: it is 240 km long and 10–15 km wide and is capable of generating earthquakes of magnitude up to 7.5 and intensity up to IX; earthquakes of intensity IX were recorded in its north-eastern part in 1494 and 1620, and of intensity VIII in its south-western part in 1927 and 1929 [9, p. 79]. According to GPS measurements, the present-day rate of crustal movement around Namangan is 15–22 mm per year, which is associated with the growth of the Chust-Pap, Kasansay and Namangan anticlinal folds [9, p. 81].

At the Eylatan town site, two meridional walls have been found to be displaced sinistrally by up to 4 m along a latitudinal seismogenic fault; the walls now stand 2–3 m high and survive for a length of 250–300 m [9, p. 84]. On the basis of the size of this displacement, the earthquake that destroyed the town has been estimated at magnitude 7.6, with an epicentral intensity of X on the MSK-64 scale [9, p. 85]. At Kuyultepa, a mound up to 15 m high located 1.5 km west of Eylatan, numerous faults and cracks were recorded in the wall of the 2017 excavation [9, p. 84].

The principal watercourse of the valley is the Syr Darya, formed by the confluence of the Naryn and the Kara Darya. The rivers are fed mainly by glacial and snowmelt water, while in the north-west the share of groundwater increases [15]. There are glaciers on the summits of the surrounding ranges, and the snow accumulated on the slopes in winter provides, as it melts, sufficient water to irrigate the fields [9, p. 77]. In the Akhsikent area, a canal of the 10th–9th centuries BC drawn from a now-dry branch of the Kasansay and an agro-irrigation layer 0.75 m thick have been identified [10, p. 40]; in the mid-10th century AD an underground water-supply system of fired brick was built in the town and remained in use for more than 250 years [10, p. 44]. In the Sokh basin, too, settlements, fortresses and cemeteries have been shown to be located in close connection with irrigation systems and natural water sources [20].

The climate is sharply continental and dry. According to the long-term normals of the Fergana weather station (584 m above sea level), the mean January temperature is 0.8 °C and the mean July temperature 27.9 °C; annual precipitation is about 199 mm, and in each month from July to September it does not exceed 3–4 mm [17]. Precipitation is unevenly distributed across the valley: 100–120 mm in the western part, increasing eastwards to 500 mm [15].

On the basis of the above data, it is proposed to divide the archaeological sites of the Fergana Valley into five groups according to the relief element they occupy and the type of deposit enclosing the cultural layer (Table 2).

Table 2

© 2026 Bulletin of International Journals · Germany · ISSN 2750-3402 · CC BY 4.0

Geoarchaeological classification of the sites of the Fergana Valley (preliminary version)

No.	Relief element	Main deposits	Examples	Main risk factors
I	Caves in the mountains enclosing the valley	Cave (speleogenic) deposits	Selungur Cave	Mixing of layers, chronological uncertainty
II	Inner sandy and saline plains of the depression	Aeolian sands, saline deposits	Mesolithic and Early Neolithic sites of Central Fergana	Deflation, sand drift, agricultural development
III	Zone of alluvial fans, deltas and oases	Proluvium, proluvial-alluvial deposits, loess	Eylatan, Kuyultepa, Mingtepa, Kuva, Dalverzin, sites of the Sokh basin	Deep burial, farming and irrigation, seismic impact
IV	Terraces of major rivers	Alluvium, loess	Akhsikent (right bank of the Syr Darya)	Strong earthquakes, river erosion
V	Adyrs and foothill hills	Loess and loess-like deposits	Osh settlement (on a mountain slope)	Slope wash and creep

Group I. Selungur Cave (Kyrgyzstan) is the largest karst cavity in Western Central Asia containing traces of early humans together with palaeoanthropological and palaeontological finds [16]. Although in the 1980s the site was assigned to the Lower Palaeolithic, new research in 2014–2017 showed that its stone artefacts have Middle Palaeolithic characteristics [16]. Two-dimensional electrical resistivity tomography has been used in the cave to determine the depth of the bedrock surface and the thickness of the sedimentary layers [19].

Group II. The Mesolithic and Early Neolithic sites of Central Fergana have been synthesised by U.I. Islamov and V.I. Timofeev, whose monograph devotes a separate chapter to the physical-geographical conditions of the area [8]. Mesolithic–Neolithic sites in the lower Sokh basin have been reported as destroyed or heavily altered [20].

Group III. This group comprises the bulk of the valley's sites. B.Kh. Matbabaev records large settlements of the Chust culture in the eastern part of the valley, such as Dalverzin (25 ha) and Ashkaltepa (13 ha) [13]. According to [9], the town of Eylatan arose in the east of the valley, in the Maylisuu delta, no later than the 5th century BC; however, according to the excavations of 1988–1990 and 1994, its lowest layers and citadel wall date from the late 4th to the first half of the 3rd century BC, and its upper layers from the second half of the 3rd to the 2nd century BC, while life in the town ceased at the beginning of the 1st century BC [9, p. 84]. The initial study and dating of the site were published by Yu.A. Zadneprovsky [6]. At Mingtepa, the joint Uzbek–Chinese expedition, working since 2012, has identified a large town consisting of an inner and an outer city, with the remains of buildings erected on high rammed-earth platforms, walls, gates, roads and craft workshops [21]; the structure of the site (citadel, inner and outer city), the stratigraphy of its cultural layers and its defensive system have also been described [18]. At Kuva, residential quarters of a large urban centre on the eve of the Arab conquest and a Buddhist temple of the 7th–8th centuries AD have been uncovered [4].

In the Sokh basin, surveys conducted in 2019–2023 combining CORONA imagery, an SRTM elevation model, Soviet military topographic maps and field reconnaissance recorded 112 sites and findspots, 29 of which were previously unknown; this figure considerably exceeds the 41 sites recorded by N.G. Gorbunova (1979) and the 63 recorded by A. Anarbaev and M. Saidov (2014) [20].

Group IV. Akhsikent lies on the right bank of the Syr Darya, in the Turakurgan district of the Namangan region, near the village of Shahand [10, p. 40]. The town arose in the 3rd century BC, comprising a citadel, a shahristan and a rabad [10, p. 41]; its area exceeded 50 ha in antiquity, was about 70 ha in the early Middle Ages and exceeded 400 ha in the 9th–12th centuries [10, pp. 41–42]. Researchers have identified traces of strong earthquakes at Akhsikent dated to the 1st century BC and to the period from the 11th to the first half of the 12th century AD [10, p. 39], while the seismic catastrophes of the era of Timur and the Timurids have been studied separately [11]. In the earthquake of 1620, the town of Akhsi (Akhsikent) was completely destroyed [9, p. 79].

Group V. B.Kh. Matbabaev describes the Osh settlement as a large site located on a mountain slope [13]. At such sites, slope processes – wash and slow creep – directly affect the integrity of cultural layers.

First, the results reveal the main regularity in the location of the valley's sites: agricultural settlements and towns are concentrated in the peripheral zone close to water sources – on alluvial fans, deltas and the terraces of major rivers. This is because, in a climate with low precipitation and very dry summers, stable agriculture was impossible without artificial irrigation. This conclusion is corroborated by the construction of a canal from the Kasansay at Akhsikent as early as the 10th–9th centuries BC [10, p. 40] and by the dependence of settlements in the Sokh basin on irrigation networks [20].

Second, the question of the environment in which cultural layers are preserved is of particular importance. Table 1 shows that loess accumulation predominated in the valley during the Middle and Upper Pleistocene, and that Upper Pleistocene loess is directly associated with the terraces of the Syr Darya and with young fans. In the thick loess sequences of the Central Asian foothills, periods when sedimentation ceased are preserved as buried soils, and cultural horizons of different ages are associated precisely with these soils [5, p. 40]. It is therefore recommended that buried soil horizons be recorded as stratigraphic reference levels at sites on the adyrs and foothill plains. On alluvial fans the situation is different: on the fans formed by rivers emerging from the mountains onto the plains, proluvium may reach a thickness of hundreds of metres [5, p. 49], so ancient cultural layers there are highly likely to be deeply buried beneath younger sediments.

© 2026 Bulletin of International Journals · Germany · ISSN 2750-3402 · CC BY 4.0

Third, the seismic factor in the valley is not only a force that destroys structures but also a historical factor explaining the cessation of urban life and the migration of the population. The authors of the 2019 study showed that after the destruction of Eylatan the population founded small settlements in the vicinity, including Kuyultepa, and that this settlement was later also abandoned as a result of an earthquake of intensity VIII–IX [9, p. 88]. A 2021 study dated the intensity X earthquake that destroyed Eylatan to 91–90 BC and noted that Akhsikent also suffered severe damage at the same time [10, p. 39]. Consequently, the joint analysis of archaeological and seismological data makes it possible to date the breaks in urban history more precisely, while archaeoseismological data are in turn valuable for assessing the seismic hazard of the region.

Fourth, the preservation of the valley's sites is strongly affected not only by natural but also by anthropogenic factors. In the Sokh basin, it has been established that about one quarter of the sites have disappeared over the last 70 years and that another fifth are on the verge of disappearing; the reasons given include erosion, sand drift, the expansion of villages and infrastructure, the intensification of irrigated agriculture and the conversion of sites into cemeteries [20]. These data are especially relevant to the Group III sites, as they lie precisely within the modern oases.

At the same time, certain limitations of the study should be noted. The proposed classification is based on published data and therefore needs to be refined through field geomorphological observations, laboratory analyses of the deposits and absolute dates. Moreover, the present-day landscape has undergone strong anthropogenic change, so palynological and soil analyses are required to reconstruct the ancient natural environment. As a practical recommendation, it is proposed that for each site a relief sketch map and intersecting profiles be prepared on a large-scale topographic base, the type of deposit enclosing the cultural layer be recorded, and, at sites in seismogenic zones, archaeoseismological observations be made a mandatory part of the excavation records.

CONCLUSION

The study leads to the following conclusions. First, the structure of the Fergana Valley as an intermontane depression and the succession of relief zones from its centre to its margins determine the main regularity in the location of its sites: agricultural settlements and towns are located mainly on alluvial fans, deltas and the terraces of major rivers, whereas Stone Age sites occur in caves in the surrounding mountains and in the inner sandy areas. Second, in a climate with low precipitation and dry summers, the location of ancient towns was closely tied to water sources and to the possibilities for irrigation. Third, Middle and Upper Pleistocene loess and young proluvial fans are the principal environments preserving cultural layers in the valley. Fourth, the examples of Eylatan, Kuyultepa and Akhsikent show that the seismic factor directly determined the fate of towns in the valley. Fifth, the proposed five-group geoarchaeological classification makes it possible to identify the risk factors for each group in advance and to select appropriate research methods accordingly. Future tasks include enriching the classification with field geomorphological observations and absolute dates and creating a digital geoarchaeological map of the valley.

References

1. Алохунов А.А. Фарғона водийсида илк урбанизация жараёнлари (археологик материаллар асосида) // FarDU ilmiy xabarlari. – 2022. – Т. 28, № 3. – Б. 53–57. – DOI: 10.56292/SJFSU/vol28_iss3/a10. Aloxunov A.A. Farg‘ona vodiysida ilk urbanizatsiya jarayonlari (arxeologik materiallar asosida) [Early urbanisation processes in the Fergana Valley (based on archaeological materials)]. FarDU ilmiy xabarlari [Scientific Bulletin of Fergana State University], 2022, vol. 28, no. 3, pp. 53–57. DOI: 10.56292/SJFSU/vol28_iss3/a10. (In Uzbek)

2. Анарбаев А. Ахсикет – столица древней Ферганы. – Ташкент: Tafakkur, 2013. – 535 с. Anarbaev A. Akhsiket – stolitsa drevnei Fergany [Akhsiket: The Capital of Ancient Fergana]. Tashkent: Tafakkur, 2013. 535 p. (In Russ.) Бернштам А.Н. Древняя Фергана (научно-популярный очерк). – Ташкент: Изд-во АН УзССР, 1951. – 48 с.

3. Bernshtam A.N. Drevnyaya Fergana (nauchno-populyarnyi ocherk) [Ancient Fergana: A Popular Science Essay]. Tashkent: Izdatel’stvo AN UzSSR, 1951. 48 p. (In Russ.)

4. Булатова В.А. Древняя Кува. – Ташкент: Фан, 1972. – 92 с. Bulatova V.A. Drevnyaya Kuva [Ancient Kuva]. Tashkent: Fan, 1972. 92 p. (In Russ.)

5. Воробьева Г.А., Бердникова Н.Е. Картография для археологов: учебное пособие по работе с крупномасштабными топографическими картами и созданию пояснительных записок для территорий исследования. – Иркутск: Оттиск, 2007. – 100 с. Vorob’eva G.A., Berdnikova N.E. Kartografiya dlya arkheologov: uchebnoe posobie po rabote s krupnomasshtabnymi topograficheskimi kartami i sozdaniyu poyasnitel’nykh zapisok dlya territorii issledovaniya [Cartography for Archaeologists: A Textbook on Working with Large-Scale Topographic Maps and Compiling Explanatory Notes for Study Areas]. Irkutsk: Ottisk, 2007. 100 p. (In Russ.)

6. Заднепровский Ю.А. Городище Эйлатан (к вопросу о датировке памятника) // Советская археология. – 1960. – № 3. – С. 29–45. Zadneprovsky Yu.A. Gorodishche Eilatan (k voprosu o datirovke pamyatnika) [The Eilatan town site: on the dating of the monument]. Sovetskaya arkheologiya [Soviet Archaeology], 1960, no. 3, pp. 29–45. (In Russ.)

7. Заднепровский Ю.А. Древнеземледельческая культура Ферганы. – М.; Л.: Изд-во АН СССР, 1962. – 328 с. – (Материалы и исследования по археологии СССР; № 118). Zadneprovsky Yu.A. Drevnezemledel’cheskaya kul’tura Fergany [The Ancient Agricultural Culture of Fergana]. Moscow; Leningrad: Izdatel’stvo AN SSSR, 1962. 328 p. (Materialy i issledovaniya po arkheologii SSSR [Materials and Research on the Archaeology of the USSR], no. 118). (In Russ.)

8. Исламов У.И., Тимофеев В.И. Культура каменного века Центральной Ферганы. – Ташкент: Фан, 1986. – 304 с. Islamov U.I., Timofeev V.I. Kul’tura kamennogo veka Tsentral’noi Fergany [The Stone Age Culture of Central Fergana]. Tashkent: Fan, 1986. 304 p. (In Russ.)

9. Корженков А.М., Усманова М.Т., Анарбаев А.А., Максудов Ф.А., Муродалиев Р.Х., Захидов Т.К., Рахманов З.О. Недооцененная сейсмическая опасность Ферганской впадины: новые археосейсмологические данные // Геофизические процессы и биосфера. – 2019. – Т. 18, № 3. – С. 77–90. – DOI: 10.21455/GPB2019.3-5. Korzhenkov A.M., Usmanova M.T., Anarbaev A.A., Maksudov F.A., Murodaliev R.Kh., Zakhidov T.K., Rakhmanov Z.O. Nedootsenennaya seismicheskaya opasnost’ Ferganskoi vpadiny: novye arkheoseismologicheskie dannye [Underestimated seismic hazard of the Fergana Depression: new archaeoseismological data]. Geofizicheskie protsessy i biosfera

© 2026 Bulletin of International Journals · Germany · ISSN 2750-3402 · CC BY 4.0

[Geophysical Processes and Biosphere], 2019, vol. 18, no. 3, pp. 77–90. DOI: 10.21455/GPB2019.3-5. (In Russ.)

10. Корженков А.М., Анарбаев А., Усманова М.Т., Родина С.Н., Кубаев С., Кораева З., Омонов Ш., Захидов Т. Следы сильных землетрясений в Ахсикете – древней столице Ферганской долины // Вулканология и сейсмология. – 2021. – № 2. – С. 39–58. – DOI: 10.31857/S0203030621020048. Korzhenkov A.M., Anarbaev A., Usmanova M.T., Rodina S.N., Kubaev S., Koraeva Z., Omonov Sh., Zakhidov T. Sledy sil'nykh zemletryasenii v Akhsikete – drevnei stolitse Ferganskoi doliny [Traces of strong earthquakes in Akhsiket, the ancient capital of the Fergana Valley]. Vulkanologiya i seismologiya [Volcanology and Seismology], 2021, no. 2, pp. 39–58. DOI: 10.31857/S0203030621020048. (In Russ.)

11. Корженков А.М., Анарбаев А.А., Усманова М.Т., Нурматов У.А., Насриддинов Ш.Н., Артиков У.Л., Захидов Т.К., Юсупджанова У.А., Корженкова Л.А., Сенцов А.А., Агибалов А.О. Сейсмические катастрофы в Ахсикете (Ахси) – столице Ферганы в эпоху Тимура и Тимуридов // Вестник Московского университета. Серия 4: Геология. – 2023. – № 1. – С. 20–30. Korzhenkov A.M., Anarbaev A.A., Usmanova M.T., Nurmatov U.A., Nasriddinov Sh.N., Artikov U.L., Zakhidov T.K., Yusupdzhanova U.A., Korzhenkova L.A., Sentsov A.A., Agibalov A.O. Seismicheskie katastrofy v Akhsikete (Akhsi) – stolitse Fergany v epokhu Timura i Timuridov [Seismic catastrophes in Akhsiket (Akhsi), the capital of Fergana in the era of Timur and the Timurids]. Vestnik Moskovskogo universiteta. Seriya 4: Geologiya [Moscow University Bulletin. Series 4: Geology], 2023, no. 1, pp. 20–30. (In Russ.)

12. Латинин Б.А. Некоторые итоги работ Ферганской экспедиции 1934 г. // Археологический сборник Государственного Эрмитажа. – 1961. – Вып. 3. – С. 109–170. Latynin B.A. Nekotorye itogi rabot Ferganskoi ekspeditsii 1934 g. [Some results of the work of the 1934 Fergana expedition]. Arkheologicheskii sbornik Gosudarstvennogo Ermitazha [Archaeological Collection of the State Hermitage], 1961, iss. 3, pp. 109–170. (In Russ.)

13. Матбабаев Б.Х. Локальные варианты чустской культуры Ферганы: дис. … канд. ист. наук: 07.00.06. – 1985. – 236 с. Matbabaev B.Kh. Lokal'nye varianty chustskoi kul'tury Fergany [Local Variants of the Chust Culture of Fergana]. Cand. Sci. (History) Dissertation, specialty 07.00.06. 1985. 236 p. (In Russ.)

14. Ферганская долина // Большая российская энциклопедия: электронная версия. – URL: https://bigenc.ru/c/ferganskaia-dolina-ed362f Ferganskaya dolina [Fergana Valley]. In: Bol'shaya rossiiskaya entsiklopediya: elektronnaya versiya [Great Russian Encyclopedia: Online Edition]. Available at: https://bigenc.ru/c/ferganskaia-dolina-ed362f (In Russ.)

15. Ферганская котловина // Большая советская энциклопедия. – 3-е изд. – М.: Советская энциклопедия, 1969–1978. Ferganskaya kotlovina [Fergana Basin]. In: Bol'shaya sovetskaya entsiklopediya [Great Soviet Encyclopedia]. 3rd ed. Moscow: Sovetskaya entsiklopediya, 1969–1978. (In Russ.)

16. Цибизов Л.В., Кривошапкин А.И., Осипова П.С., Оленченко В.В., Григоревская А.В., Виола Б., Чаргынов Т., Колобова К.А., Шнайдер С.В. Апробация комплекса геофизических методов в пещере Сельунгур (Кыргызстан) // Теория и практика археологических исследований. – 2017. – № 4 (20). – С. 169–177. – DOI: 10.14258/tpai(2017)4(20).-13. Tsibizov L.V., Krivoshapkin A.I., Osipova P.S., Olenchenko V.V., Grigorevskaya A.V., Viola B., Chargynov T., Kolobova K.A., Shnaider S.V. Aprobatsiya kompleksa geofizicheskikh metodov v peshchere Sel'ungur (Kyrgyzstan) [Testing a set of geophysical methods in Selungur Cave (Kyrgyzstan)]. Teoriya i praktika arkheologicheskikh issledovanii [Theory and Practice of Archaeological Research], 2017, no. 4 (20), pp. 169–177. DOI: 10.14258/tpai(2017)4(20).-13. (In Russ.)

17. Japan Meteorological Agency. Normals Data: Fergana, Uzbekistan (40.38°N, 71.75°E, 584 m). Available at: https://www.data.jma.go.jp/cpd/monitor/nrmlist/NrmMonth.php?stn=38618

18. Matbabayev B.Kh., Aloxunov A.A., Mirzarakhimov B.Kh. Regarding the results of scientific research conducted by the joint Uzbek-Chinese international archaeological expedition in the Mingtepa city ruins. Acta Universitatis Lodziensis. Folia Archaeologica, 2025, vol. 40, pp. 347–359. DOI: 10.18778/0208-6034.40.22.

19. Olenchenko V.V., Tsibizov L.V., Osipova P.S., Chargynov T.T., Viola B.T., Kolobova K.A., Krivoshapkin A.I. Peculiarities of using 2D electrical resistivity tomography in caves. Archaeology, Ethnology and Anthropology of Eurasia, 2020, vol. 48, no. 4, pp. 67–74. DOI: 10.17746/1563-0110.2020.48.4.067-074.

20. Pardaev M.Kh., Omanov Sh.A., Oynazarov Kh. Digital Documentation and GIS-Based Research on the Archaeological Landscape of the Sokh Basin // Вестник НГУ. Серия: История, филология. – 2026. – Т. 25, № 5. – С. 87–102. – DOI: 10.25205/1818-7919-2026-25-5-87-102.

21. Sino-Uzbek Joint Archaeological Team. Archaeological survey and excavation of the Mingtepa site in Andijan Region, Uzbekistan. Chinese Archaeology, 2019, vol. 19, no. 1, pp. 150–162. DOI: 10.1515/char-2019-0011.

© 2026 Bulletin of International Journals · Germany · ISSN 2750-3402 · CC BY 4.0