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Article

Landscape and Settlement over 4 millennia on the south side of Lake Issyk kul, Kyrgyzstan: Preliminary Results of Survey Research in 2019-2021

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Abstract: This paper discusses the preliminary results of archaeological surveys conducted in the Juuku Region of north-central Kyrgyzstan on the south side of Lake Issyk kul. Our goal was to document ancient and contemporary agropastoral systems over a four millenia time period. During the surveys about 350 loci were identified as settlements; burial mounds; graves; single artifact finds; and artifact scatters (ceramic). The areas of Juuku Valley survey included two discrete polygons: Polygon 1; Lower Juuku at 1750 to 1950 m asl in elevation and Polygon 2; Chak Juuku or Upper Eastern Branch Juuku Valley at 2060 to 2100 m asl in elevation. Three radiometric dates and preliminary archaeobotanical studies were conducted at three exposed profile cuts. The methods included here are: (1) pedestrian surveys; (2) use of digital maps (Google Earth; Encarta); (3) placing archaeological loci within known chronological time periods; (4) AMS dating of charcoal samples collected from profile deposits; and (5) preliminary identification of plant remains found from archaeobotanical samples. The results of our research represent the first step toward inventorying and interpreting archaeological data in the Juuku Valley derived from field studies

Keywords: Archaeological survey; Inner Tian Shan Mountain region; Iron Age; Medieval period; agropastoralism

1. Introduction

The preliminary results of pedestrian survey conducted in the late summer months of 2019 and in 2021 by a team of Kyrgyz and American archaeologists is presented here. The objectives of the surveys were to inventory and examine Bronze Age through Ethnographic Kyrgyz period archaeological features, settlements, graves, burial mounds, and artifact findings in the Juuku Valley of north-central Kyrgyzstan, a heavily dissected upland valley and gorge of the Inner Tian Shan. The Juuku Valley is a narrow valley defined by two mountain streams that flow from the Inner Tian Shan Mountain Range. The valley opens up into an alluvial fan that empties into the Lake Issyk kul, the second-largest saline lake in the world. Our research questions focused on developing a model for ancient and contemporary agropastoralism (herding of sheep, goats, cattle, and horses and the cultivation of wheat, barley, and the two millets) and upland seasonal pastoral transhumance in the *jailau* or summer pastured below the higher alpine meadows of the Inner Tian Shan range, peaks reaching elevations of 4800 meters in this region. Moreover the Inner Tian Shan Mountains are the ideal area for testing hypotheses regarding important inner-montane communities along trade routes along the Inner Asian Mountain Corridor [1]. Similar efforts at documenting the complex landscapes and settlement patterns in Eurasia have been made by archaeological survey teams working in the Altai, at the borders of four contemporary nation-states, China, Russia, Mongolia and Kazakhstan examining the ritual and settlement landscapes over at least four millennia from the Neolithic period through the Iron Age, known as the Dzhungaria Landscape Project [2].

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Recently archaeologists such as Lynne Rouse and her colleagues [3,4] have undertaken UAV surveys and GIS mapping in the Kochkor Valley, also in the Inner Tian Shan. The objectives of their surveys and use of digital mapping and UAV technology have been to record upland archaeological features dating from the Bronze Age through Medieval periods in conjunction with archaeological excavations conducted at the upland site of Chap at 2000 m elevation asl. that has deposits dating from 1065 BCE to 825 BCE. Rouse and her colleagues hope to document the Inner Asian Mountain corridors of this important passageway of the Inner Tian Shan range [4]. At the Late Bronze transitional phase, the Chap site has yielded evidence for the cultivation of *Hordeum vulgare* (hulled and unhulled barley), *Triticum* (free-threshing and possible glume wheats), *Panicum miliaceum* (broomcorn millet) *Setaria italica* (foxtail millet) and *Pisum sativum* (pea) [5-7]. Recent research throughout Central Eurasia has stressed the importance of tracing agropastoralism throughout the Bronze through Medieval periods [8].

In the Inner Tian Shan Range, small inter-montane valleys and gorges such as the Juuku probably served as secondary or even primary routes through the Inner Tian Shan into the Syr Daria basin and the Ferghana Valley and south into the Tarim Basin, China. Systematic surveys in these intermontane regions addresses the following : (1) the lack of inventories and registration of archaeological sites and features along the southern side of Lake Issyk kul in upland valleys; (2) the necessity for full-scale planning for sustainable development of natural landscapes and the cultural and historical preservation of this region; and (3) a need for scientific modeling of ancient and contemporary land-use in intermontane valleys of pastoralism, foraging, and agriculture. Also sustainable development of natural and cultural landscapes in Eurasian contexts require the integration of cultural heritage and land development policies [9].

2. Materials and Methods

The pedestrian surveys conducted by a team of three field archaeologists was aided by inspection of the imagery provided by Google Earth, Soviet maps, and other digital maps (Encarta). The loci were recorded using Garmin GPS units and each loci was photographed and recorded in field notebooks. From detailed notes, Excel spreadsheets were used to inventory all site and artifact loci. During 15 field days in 2019 and 30 field days in 2021 we amassed an inventory of over 1000 loci in the Kizil Suu, Saruu, and Juuku Valleys. Field surveys were also carried out in upland areas of Sutti Bulak, Chichi Khan, Kadzhi Sai, and Chong Kizil Suu. Radiocarbon samples were taken from three exposed profiles, one in Lower Juuku polygon and two in Upper Juuku polygon. The charcoal samples were sent to Beta, Analytic for AMS (accelerated mass spectrometry) analysis and the results were obtained in October 2021. Also archaeobotanical samples were extracted from these three sites. The soils were washed using standard flotation methodology in the Republic of Kyrgyzstan and preliminary microscopic analyses and seed sorting and identifications were conducted at the Max Planck Institute for Human History.

3. Results

During the 2019 and 2021 surveys we registered about 350 loci (single artifact finds, sherd scatters, graves, burial mounds (kurgans), house foundations, house depressions from our pedestrian surveys in the Lower Juuku and Chak Juuku. These initial results shall aid in developing methods for undertaking larger landscape archaeology projects in this region and for establishing the time-space systematics for examining the geographical locations of settlements, burial mounds, and artifact scatters. The landscape palimpsests also indicate that large Medieval settlements (fortresses, citadels and their accompanying walled residential areas) often cover earlier Bronze and Iron Age settlements and mortuary complexes. The results of the surveys will also be used to select areas for test excavations and large-scale block excavations of both mortuary and settlement complexes in order to examine early subsistence economies. In the future, archaeobotanical and faunal analyses will be undertaken at a few selected Iron Age sites in the Juuku Valley and the

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surrounding regions in addition to standard interpretations of ancient architecture, households and activity areas, and artifact inventories (ceramic, stone and metal remains).

3.1. Study Area: The Juuku Valley is a small intermontane valley formed by the mountain streams flowing southward to Lake Issky kul. The main glacier peak of this valley is It Tash (elevation 4808 m) and the entire valley extends 50 km north towards the southern littoral of Lake Issyk kul. The narrow valley opens up in the Lower Juuku area forming a large alluvial fan (an area of about 6.7 sq km.)

3.2. Chronology: During the survey we established a local historical chronology based on archaeological and historical sources from the Tian Shan and surrounding regions. These phase designations are based on archaeological research conducted in Kyrgyzstan over the past one-hundred years on settlements, burial mounds, graves, and artifact collections throughout north-central Kyrgyzstan and the Semirech'ye region of southeastern Kazakhstan [10-12]. During the Soviet period Vinnik identified about 17 Medieval period settlements along the SW coast of Lake Issyk kul [13]. Local expertise allowed us to place our survey findings into these chronological and phase designations [10,14].

Table 1. Time Periods, Phase Designations and Dates used for the Juuku Valley Survey.

Time Period	Phase Designation	Dates
Late Bronze Age		2000 BCE – 900 BCE
	Final Bronze	1100 BCE – 800 BCE
Iron Age		800 BCE – 550 CE
	Saka	800 BCE – 260 BCE
	Wusun	140 BCE – 437 CE
	Kenkol (only in TianShan)	200 CE – 550 CE
Medieval Period		500 CE – 1500 CE
	Turkic Period	552 CE – 900 CE
	Qarakhanid	942 CE – 1228 CE
Early Kirghiz		1500 CE – 1700 CE
Kirghiz Ethnographic Period		1700 CE - Present
Soviet Period		1917 - 1991
Post-Soviet, Kyrgyz Nation		1991 -

3.3. *Polygon 1* is about 6.4 sq km and is located on the upper reaches of the Lower Juuku alluvial fan where the terraces rise about 30 m above the entrenched stream bed and is situated about 6 km south from the Lake edge. The alluvial fan rises about 30 m above the entrenched stream and riverbed. Today the upper alluvial fan of Lower Juuku consists of large, irrigated fields of wheat, barley, oats, and fodder crops. The 323 loci documented in the 2019 and 2021 surveys are found between 1750 m asl and 1950 m asl. There is a density of 50 loci per sq km.

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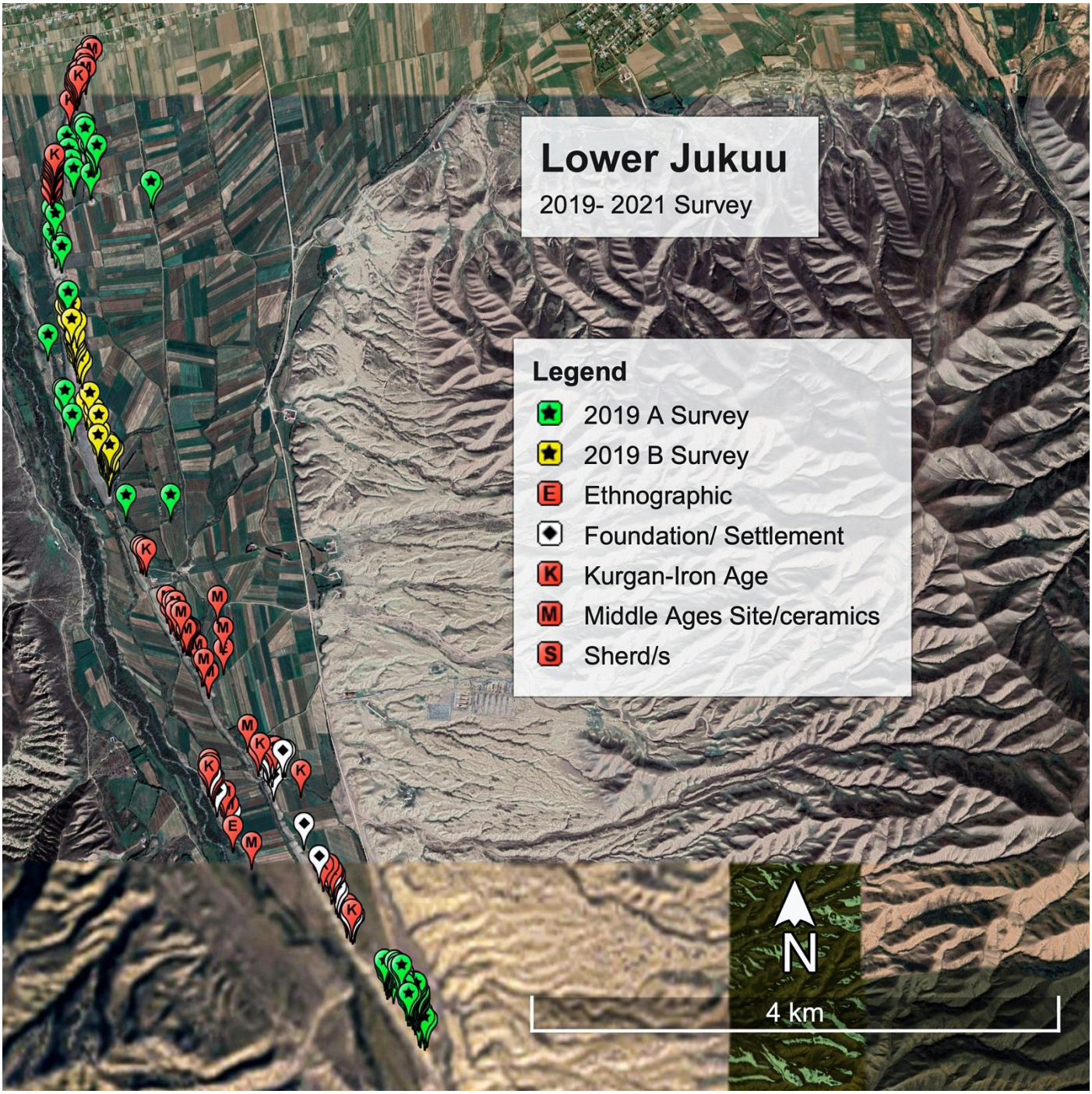

3.3.1. Site types found in Lower Juuku

The majority of loci found from survey were mortuary remains: 192 mortuary remains (burial mounds, graves and 1 mausoleum) were found, a total of 31 settlement and architectural features (17 settlement sites), and 21 artifact finds.

3.3.2 FigSure **2.** Historgram of Site Types in Lower Juuku: Mortuary Features, Settlements and Architectural Features and Artifact Finds.

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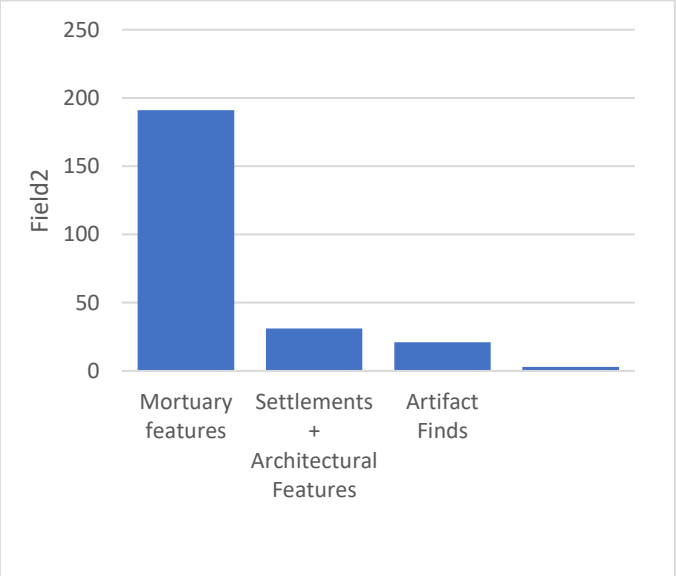

3.3.3 Settlements in Polygon 1

A total of 17 settlements have been identified in Lower Juuku. The settlements assigned to specific time periods according to ceramic and artifact finds in addition to architectural features such as the citadel (shakristan), the surrounding residential areas (rabat), stone foundations and room or house depressions.

3.3.4. Radiometric Dating

One site (KS 21.387) is a large settlement located on the eastern bank above the lower Juuku stream at an elevation of 1892 m asl. The surface remains consist of melted mud-brick walls of indeterminate length and width. Upon initial inspection the site was identified as a Medieval settlement, however the radiometric dating places it within the ethnographic Kirghiz period. On the south side of the terrace where the site is situated a road cut exposed a profile 4 to 5 m in length and about 1 m in depth with thick lenses of charcoal, 50 cm from the present ground surface. A radiometric sample was taken from this charcoal layer, placing this site within the ethnographic Kirghiz time period (*floruit* 1682 – 1932 cal CE).

~~5.1.4 Settlements in Polygon 1~~

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3. Photograph showing the Profile of the Kirghiz Ethnographic Period Settlement

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Table 3. Results from Radiocarbon Sample of KS 21.387.

Beta -603781	Calibrated Dates AD	Conventional radiocarbon age BP (Before Present)
68.6%	1800 - 1932 cal AD	150 - 12 cal BP
25.7%	1682 - 1738 cal AD	268 - 212 cal BP
1.2%	1754 – 1762 cal AD	196 – 186 cal BP

These results were obtained using AMS radiocarbon methods and have been calibrated using INTCAL20 by Beta Analytic, Inc [15].

Two very small flotation samples were taken at this site, a total of 17 L. The archaeobotany team found a total of 41 seeds, the majority were wild plants. The field crops included bareley, wheat, and peas, along with the major component of carbonized chenopods and weed seeds of wild Fabaceae and grasses (Poacae) [16].

3.4. *Polygon 2* or Chak Juuku is 20 km from the edge of the Lake and is a narrow valley that consists of dissected terraces on either side of the eastern branch of the Juuku Gorge, with red sandstone formations forming the steep slopes of the gorge. This survey area consists of the two banks of the Eastern Juuku stream and is about O.5 sq km in area. Approximately 37 loci were identified, or a density of 74 loci to 1 sq km. The loci recorded in 2021 range from about 2060 m asl to 2100 m asl. The natural vegetation includes semi-arid shrubs and grasslands with pockets of spruce in the higher elevations and willows and aspens and other riparian species along the stream banks. Local herders keep flocks of sheep and goats and herds of horses and cattle during the summer months. Tourism includes excursions, horse trips, fishing, and camping in the areas of hot springs waterfalls, and red sandstone caves.

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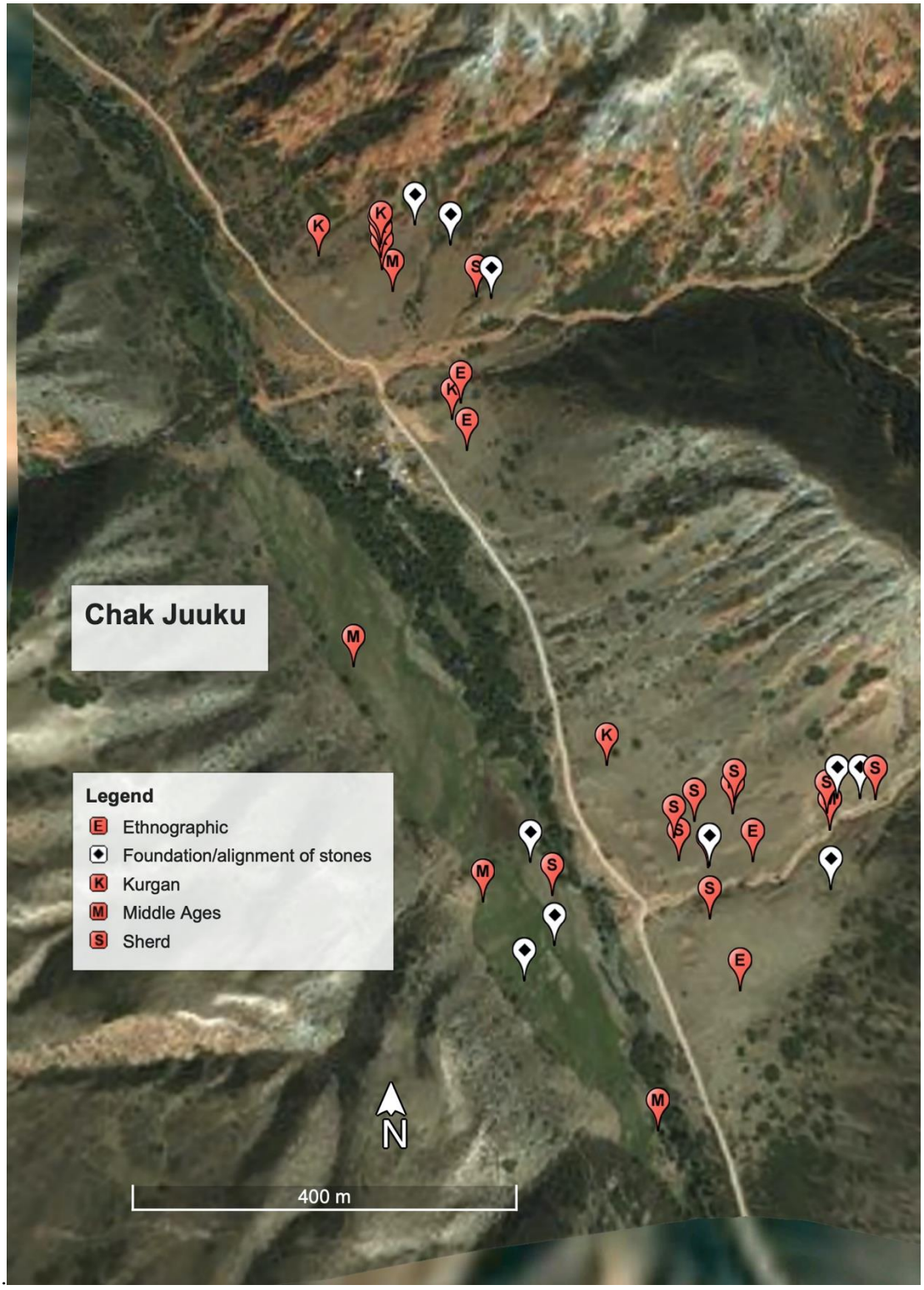

Figure 3. Chak Juuku, Google Image, Survey.

3.4.1 In Table 4 we describe the settlements, burial mounds, and graves, and artifact finds in the Chak Juuku area. In addition there are 2 other settlements of unknown age (KS 21.184 and KS 21.185) found in the vicinity of the Settlement 1, the Wusun period site. It is possible that these stone foundations could be associated with Settlement 1, although no temporal evidence of ceramic sherds were associated with these settlements.

Table 4. Sites and Finds from Upper Juuku by time period.

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Chronological Period.	Settlements	Mortuary Remains	Artifacts
Ethnographic Kirghiz Period (1700 CE to Present)	Stone corral with possible room blocks	Group 1 (10+ stone graves KS 21.144) Group 2 (6+ stone graves KS 21.181) Group 3 (2 stone graves KS 21.174) Single Stone Grave (KS 21.160) Single Stone Grave (KS 21.502) **Total = 20+ graves**	
Medieval Period (500 to 1500 CE)	*Settlement 2* (17,5 m X 12 m), 3-5 rooms, double stone wall construction, Qarakhanid Period, Redware sherd, Grinding Stone fragment (KS 21.165/493) *Settlement 4*: Large mudbrick and stone complex on w. bank of Chak Juuku stream, 51 m X 20 m (KS 21.498) *Settlement 5* or Mill: Double stone wall construction, on west bank of Chak Juuku stream, 8 m X 6 m (KS 21.500) *Settlement 6*: Mudbrick room block (2 rooms), 5 m X 10 m, on west bank of Chak Juuku stream, (KS 21.501) **Total = 4**		3 Qarakhanid glazed ceramics , 5+ redware sherds found at modern corral (KS 21.191) **Total = 8**
Iron Age (Saka and Wusun period, ca. 800 BCE to 437 CE)	*Settlement 1:* Double stone alignments, consisting of four rooms with deep depressions, 15 m X 10 m, , 1 redware rim, (KS 21.182-83 **Total = 1**	Saka kurgan group 1: 5 stone kurgans, (KS 21.186-88 and possibly KS 21.190) 3 separate Saka kurgan, (KS 21.177, KS 21.180, KS 21.192) **Total = 8**	1 redware sherd with yellow slip, (KS 21.192) **Total = 1**
Late Bronze Age (2000 – 900 BCE		Rectangular stone enclosure, possibly 1- 4 graves (KS 21.154) **Total = 4**	

3.4.2. *Settlement 1* situated at 2057 m in elevation on an upper terrace above a ravine. It is a Wusun Period site dating from 22 -206 cal AD (see Table 4). The surface features include rock outlines of four or more rooms and measures approximately 10 m X 7 m. From an exposed profile of charcoal room fill, three archaeobotanical soil samples (14.5 l)

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were taken. There were a small number of carbonized seeds identified from four domesticated crops including barley, wheat, broomcorn millet and foxtail millet. More than half the assemblage included wild plants such as chenopods, wild legumes and cleavers [16].

Figure 4. Profile of the Iron Age Site at Upper Juuku, two archaeologists working at profile.

3.4.3 *Settlement 2* situated at an upper terrace at an elevation of 2090 m asl. It is a series of double walled stone alignments of at least four large room blocks and measures

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about 17.5 m X 12 m. The site is dated to the Medieval Qarakhanid period and has an approximate radiometric dating of 990 – 1050 cal AD (see Table 4). From the two small soil samples (11.5 liters) one barley seed were identified, the rest were wild seeds [16].

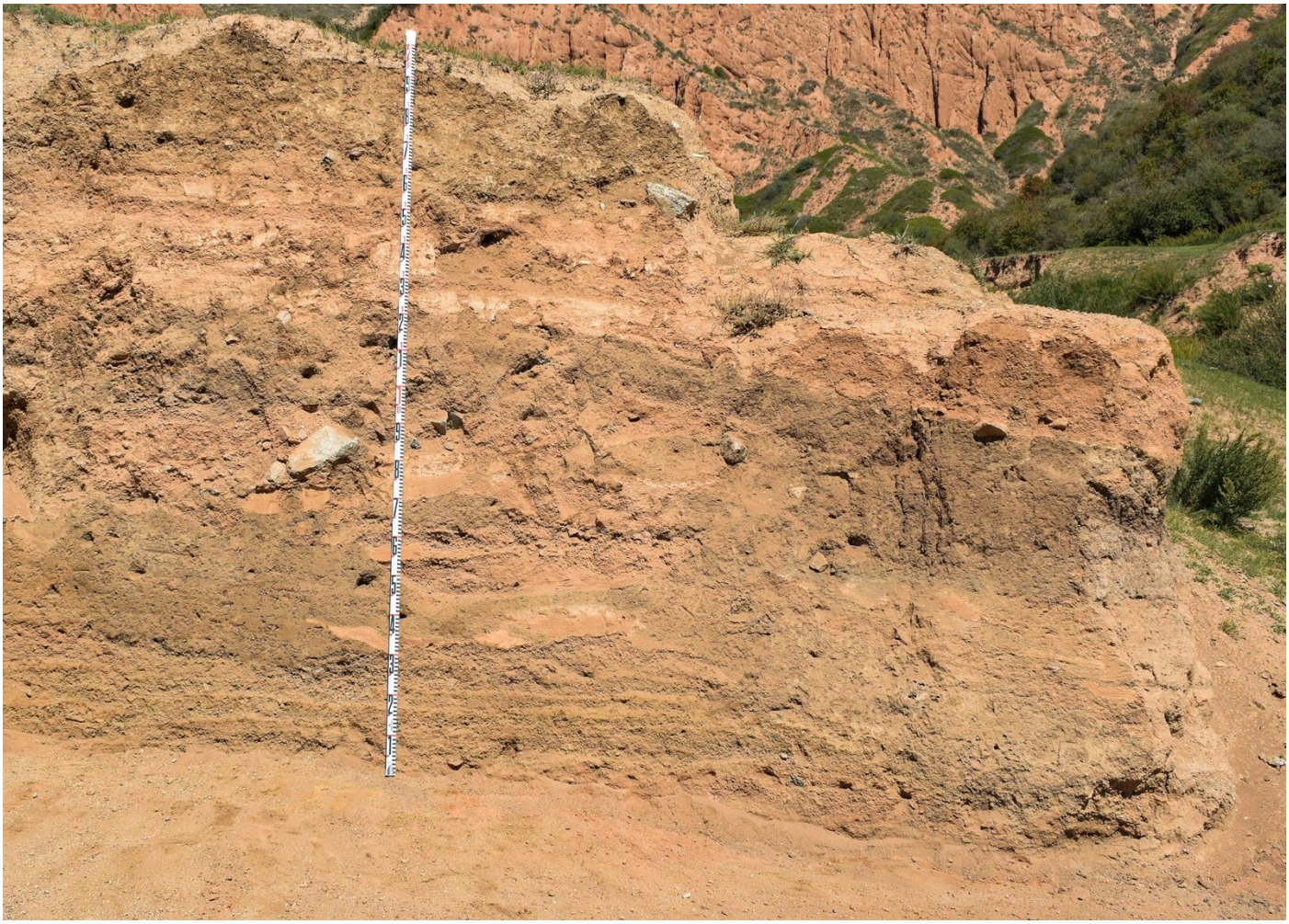

Figure 5. Phogograph at Proflie of Medieval Settlment at Upper Juuku

3.4.4 *Radiometric Dating:*At Settlement 1 (Iron Age site) and Settlement 2 (Qarakhanid Phase, Medieval Period charcoal samples were taken from the profiles. AMS dating was obtained from both settlements. The following dates are reported in Table 6.

Table 5. Radiometric dates from the Upper Juuku Valley, Settlement 1 and Settlement 2.

Site No.	Laboratory No.	Calibrated Dates BC/AD	Conventional radio-carbon age (BP)
Settlement 1 (#183)	Beta-603779	(94.5%) 22 – 206 cal AD	1928 – 1744 cal BP
Settlement 2 (#165)	Beta-603781	(81.7%) 978 – 1130 cal AD	972 – 902 cal BP
“	“	(11.4%)1082 -1130 cal AD	868 – 820 cal BP
“	“	(2.3%) 1127 – 1151 cal AD	813 – 799 cal BP

These results were obtained using AMS radiocarbon methods and have been calibrated using INTCAL20 by Beta Analytic, Inc [15].

3.4.5. Mortuary Complexes

There were many lines of Iron Age burial mounds found in both Upper and Lower Juuku. The largest numbers of burial sites, were earthen or stone mounds known as *kurgans*. In Figure 6 there are two large Saka period earthen mounds found in the Lower Juuku.

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Figure 6. Photograph of large earthen Saka kurgans found in the Lower Juuku Valley.

3.4.6 Stone corral

In the Upper Juuku Valley a stone corral was located. This corral could date to the ethnographic Kirghiz period. It is important to document these landscape features as examples of agropastoralism in the Upper Juuku Valley (Figure 7).

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Figure 7. Photograph showing a stone corral in Upper Juuku.

3.4.7. Artifacts

Many artifacts were either found as isolated finds or as parts of scatters. In Figure 8 is a granite grinding stone found as an isolated surface find. In Figure 9 shows the interior of redware ceramic sherds, some with fabric impressions and red slip. These ceramic pieces probably date to the Iron Age and represent hand-made or slow wheel ceramics.

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Figure 8. A granite grinding stone found on the surface.

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Figure 9. Redware ceramic sherds, interiors showing fabric impressions and red slip, probably Iron Age period ceramics.

4. Discussion

The results of the Juuku Valley survey shows that there is a high density of archaeological materials dating from the Bronze Age through historic/ethnographic Kirghiz period, about 4 millennia of Holocene history. The majority of surface finds represent burial mounds and graves easily visible on landscape surfaces. Settlement locations are easily visible for the Medieval Period since the architectural features consist of standing mud-brick walls, stone foundations and other obvious features, visible on the ground and in satellite imagery. Our primary goal in 2021 was to locate Iron Age settlements, a much more difficult task since many of these settlements could be buried by more recent Medieval settlements or destroyed by modern-day agriculture. Since artifact scatters of Iron Age ceramics were found on ploughed fields this indicates that buried Iron Age settlements are extant throughout the Juuku Valley. A preferred time for pedestrian survey is during the spring months before extensive planting of grain crops and in the fall months after harvesting crops and the tilling of soils. Our survey results are the first step towards developing a systematic study of vertical zones of the Inner Tian Shan in order to test hypotheses about ancient farming and pastoral practices.

We focused on the one valley most intensively surveyed and selected Polygon 1 and Polygon 2 because each polygon represented a different elevational zone and a different set of potential agricultural and pastoral strategies for both contemporary and ancient land use. Today the Lower Juuku Valley is well-suited for the cultivation of wheat, barley, oats and fodder crops during the summer months when large tracts of land can be irrigated and cultivated using large machinery such as tractors and harvesters. Herd

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animals such as sheep, goats, cattle and horses could be pastured on the agricultural stubble after harvest. The Upper Juuku is more suitable for summer pasturelands for cattle, sheep, goats, and horses. It has rich forest and riparian areas that attract a variety of fish and wild animals so it is also suitable for fishing, forestry, and foraging/hunting. There are possible pockets where a limited amount of cultivation of short-growing crops such as barley and the millets might be cultivated. In these field seasons we also initiated preliminary archaeobotanical studies from the three settlements. In the future we hope to construct an ArcView GIS (Geographic Information Systems) database using more sophisticated methods such as UAV surveys, use of satellite imagery, and in-depth spatial analyses.

5. Conclusions

Archaeological surveys are necessary in this region of north-central Kyrgyzstan for two main reasons: (1) the upland areas away from the lake edge are poorly known by Kirghiz archaeologists and therefore there is a considerable gap or lack in the historical context of this region; and (2) Lake Issyk kul is an important tourist area that will be developed, especially the south side of the Lake, where Juuku Valley is located, therefore impacting and possibly destroying the fragile environmental and cultural resources of this region. Settlement archaeology, especially for the prehistoric periods is little known in the Republic of Kyrgyzstan. Recently research on Epipaleolithic through Neolithic layers at Obishir have been conducted by international teams of archaeologists [17-19]. As archaeologists begin to explore the early beginnings of foraging, pastoral, and agricultural economies in Kyrgyzstan, surveys like the Juuku Valley and the Kochkor surveys will become more essential for the next generation of archaeologists [20,3,4]. Our work represents a modest first step in establishing systematic archaeological survey methods in order to reconstruct settlement-subsistence systems in ancient Central Asia.

Author Contributions: C.Chang and P.A. Tourtellotte provided the conceptualization of the paper. The methodolology for the field surveys was designed by S.S. Ivanov and P.A.Tourtellotte; quantitative analyses and tables was prepared by C.Chang; validation of results were undertaken by S.S.Ivanov, C.Chang and P.A.Tourtellotte; resources were obtained by all three authors; writing, including review & editing was performed by all three authors; visualization including photography and digital mapping, and the graphical abstract was designed by P.A.Tourtellotte; field and laboratory supervision undertaken by S.S.Ivanov; project administration conducted by S.S. Ivanov; funding acquisition by C.Chang.Funding: The funding for this fieldwork study was supplied by the National Geographic Society, "The effects of earthquakes on Inner Tian Shan passages: Iron Age and Medieval Landscapes" (NGS-59769R-19). No funds were provided for publication.

Data Availability Statement: The results of the archaeological surveys are currently archived by C.Chang (USA) and S.S.Ivanov (Kyrgyz National University). These include GPS data points, digital mapping, fieldnotes, and preliminary reports. The radiometric data is archived by Beta Analytic Laboratory in Coral Gables, Fl (USA). Artifact collections (ceramics, metal, stone) are archived at the Kyrgyz National University in the Faculty of Far Eastern Studies. The archaeobotanical material is archived at the Max Planck Institute of Human History, Archaeology Department under the supervision of Robert N. Spengler, III, Laboratory Director of the Archaeobotany Laboratory.

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Conflicts of Interest: The funders had no role in the design of the study; in the collection, analyses, or interpretation of data; in the writing of the manuscript, or in the decision to publish the results.

References

1. Frachetti, M.D. Multiregional emergence of mobile pastoralism and nonuniform institutional complexity across Eurasia. *Current Anthropology*,2012, *53*(1), 2-38.
2. Caspari, G.; Plets, G.; Balz, T.; Fu, B. Landscape archaeology in the Chinese Altai Mountains–Survey of the Heiliutan Basin. *Archaeological Research in Asia*, 2017, *10*, 48-53.
3. Rouse, L.M.; Krumnow,J.. On the fly: Strategies for UAV-based archaeological survey in mountainous areas of Central Asia and their implications for landscape research. *Journal of Archaeological Science Reports* 2020,*30*: 102275. https/doi.org/10.1061/jasrep.2020.102275
4. Rouse, L.M.; Tabaldiev,K; Motuzaite Matuzeviciute,G. Exploring Landscape Archaeology and UAV-Based Survey in the Kochkor Valley, Kyrgyzstan. *Journal of Field Archaeology*, 2021, *Volume 47(1)*: 32-58. DOI: 10.1080/00934690.2021.1945744
5. Matuzeviciute, G. M.; Mir-Makhamad, B.; Tabaldiev, K. The first comprehensive archaeobotanical analysis of prehistoric agriculture in Kyrgyzstan. *Vegetation History and Archaeobotany*, 2021, Volume 30(6):743-758. DOI: 10.1007/s00334-021-00827-0
6. Motuzaite Matuzeviciute, G.; Tabaldiev, K.; Hermes, T.; Ananyevskaya, E.; Grikpedis, M.; Luneau, E.; ... Rouse, L. M. High-altitude agro-pastoralism in the Kyrgyz Tien Shan: New excavations of the Chap farmstead (1065–825 cal BC). *Journal of Field Archaeology*, 2020, *45*(1), 29-45. DOI:10.1080/00934690.2019.1672128
7. Motuzaite Matuzeviciute, G.; Hermes, T. R.; Mir-Makhamad, B.; Tabaldiev, K. Southwest Asian cereal crops facilitated high-elevation agriculture in the central Tien Shan during the mid-third millennium BCE. *PloS ONE*, 2020, *15*(5), e0229372. DOI: 10.1371/journal.pone.0229372
8. Spengler III, R. N.; Miller, A. V.; Schmaus, T.; Matuzevičiūtė, G. M; Miller; B. K., Wilkin,S.; ... Boivin, N. An Imagined Past? Nomadic Narratives in Central Asian Archaeology. *Current Anthropology*, 2021, *62*(3), 251- 286. https://www.journals.uchicago.edu/doi/10.1086/714245
9. Chang, C. Archaeological sites, cultural heritage, and sustainable development in the Republic of Kazakhstan. In *Education, Human Rights and Peace in Sustainable Development*; *Volume 87:* Eds. Nugmanova,M.; Mikkola, H.; Rozanov, A.; Komleva, V.Intechopen: London, UK, 2019,Volume 87, pp. 1-8. DOI: 10.5772/intechopen.86916
10. Akishev, K.A.; Kozhomberdiev,I. *Arkheologisheskiye Pamyatniki Priiskk'ukul'ya*. (Archaeological Monuments in the vicinity of Issyk Kul), Izdatel'sko <<Ilim>>:USSR, 1975.
11. Ivanov, S. S. К проблеме культурного разрыва на рубеже сакского и усуньского периодов в Притяньшанье (On the problem of the cultural gap at the turn of the Saka and Wusun periods in the area surrounding the Tian Shan mountains). *Stratum plus. Археология и культурная антропология*, **2016**, *Volume 3: 67-86*.
12. Biran, M. The Qarakhanids' Eastern Exchange: Preliminary Notes on the Silk Roads in the Eleventh and Twelfth Centuries. In Proceedings of the Conference: *Complexity of Interaction along the Eurasian Steppe Zone in the First Millennium CE*, Bonn, Germany, Eds. Bemman, J.; Schamuder, M; Vor-und Frubgeschitchtliche Archaologie Rheinische Friedvich-Wilhelms-Universitat Bonn,**2015**, *Bonn Contributions to Asian Archaeology, Volume 7: 575-595*.
13. Vinnik, D.F.K. K istoricheskoi topographii srednevekov'ih Iss'ik kulskoi kotovin'ye/ *Drevnyaya i srednevekovaya kul'tura Kirgizstana* (The historical topography of medieval Issyk kul basin /Ancient Medieval Cultures of Kyrgyzstan), **1967**, USSR, Republic of Kirghizstan, Frunze.
14. Amanbaeva, B.E.; Kol'chenkov,B.A.; Sulaimanova, A.T. *Archelogicheskiye Pamyatniki na Kirgi'zstanskom uchastke Velikogo Shelkovogo Puti* (Archaeological Monuments of the Kyrgyzstan portion of the Great Silk Road). Institut istorii i kul'tornogo NAN KR (Institute of History and Culture: Bishkek,Republic of Kyrgyzstan, **2015**.
15. Reimer, P.T.; Austin, W.E.N.; Bard,E.; Bayliss, A.; Blackwell, P.G…..The IntCal20 Northern Hemisphere Radiocarbon Age Calibration Curve (0–55 cal kBP). *Radiocarbon*, **2020** *Volume 62(4): 725-757*.
16. Mir-Makhamad,B.(Ph.D. candidate, Max Planck Institute for the Science of Human History, Department of Archaeology, Jena, Germany); Spengler III, R.N.(Laboratory Director, Archaeobotanical Laboratory, Max Planck Institute for the Science of Human History, Department of Archaeology, Jena, Germany). Preliminary Archaeobotanical Report on the Juuku Valley, 2021. (Unpublished work).
17. Shnaider, S.V.; Krajcarz, M. T.; Viola, T. B.; Abdykanova, A.; Kolobova, K. A.; Fedorchenko, A. Y.; ... Krivoshapkin, A. I. New investigations of the Epipalaeolithic in western Central Asia: Obishir-5. *Antiquity*, **2017,** *Volume 91:e3*.
DOI: 10.15184/aqy.2017.213
18. Osipova, E.; Danukalova, G.; Brancaleoni, G.; Krajcarz,M. T.; Abdykanova, A.; Shnaider, S.. Palaeoenvironmental conditions of the Palaeolithic–Neolithic transition in the Fergana Valley (Central Asia)–New data inferred from fossil molluscs in Obishir-V rockshelter (Kyrgyzstan). *Quaternary International*, **2021**,*Volume 605: 287-299*.
19. Taylor, W.T.; Pruvost, M.; Posth, C.; Rendu, W.; Krajcarz, M. T.; Abdykanova, A.; ... Shnaider, S. (2021). Evidence for early dispersal of domestic sheep into Central Asia. *Nature Human Behaviour*, **2021**, *Volume 5(9): 1169-1179*.
20. Tabaldiev, K.Sh. (2011). *Drevniye pamyatniki Tyan Shanya* (Ancient monuments of the Tian Shan). Bishkek, 318 pages.