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Appendices

- Appendix 1

Table 1.1. Paleochannel traces in the Ojakly area were identified through remote sensing analysis. When these traces are likely part of the same channel, they have been grouped under a single paleochannel number (Paleochannel #).

Paleochannel Traces #	Paleochannel #	Characteristics: RA (Research Area)
OJK_Ch_IXa OJK_Ch_IXb	Paleochannel 1	The paleochannel traces are located to the east of the RA. Additionally, OJK_Ch_IXb is situated next to OJK_Ch9, just a few meters away. It is likely that OJK_Ch_IXb represents the result of an avulsion process.
OJK_Ch_X	Paleochannel 2	
OJK_Ch_XIa OJK_Ch_XIb OJK_Ch_XIc	Paleochannel 3	The paleochannel traces of OJK_Ch_XIa, OJK_Ch_XIb, and OJK_Ch_XIc are located in the central-eastern part of the RA. They are interconnected and likely represent different stages of the same channel.
OJK_Ch_XIIIa	Paleochannel 4	The paleochannel trace is located 100 m west of OJK_Ch_XIIIb on the center-north of the RA.
OJK_Ch_XIIIb OJK_Ch_XIIIc	Paleochannel 5	The paleochannel traces OJK_Ch_XIIIb and OJK_Ch_XIIIc are located in the north-central part of the RA. Both traces likely represent the same channel.
OJK_Ch_XIV	Paleochannel 6	The small paleochannel trace is located in the center-north of the RA. Considering its flow direction, it may have been connected to OJK_Ch_XXIV.
OJK_Ch_XXIV	Paleochannel 7	The paleochannel traces are located in the center-north of the RA. Their position just north of OJK_Ch_XIV might suggest that they were part of the same paleochannel.
OJK_Ch_I	Paleochannel 8	The paleochannel trace, OJK_Ch_I, is located in the

		center-east of the RA. It is one of the main channels east of Ojakly
OJK_Ch_Ila OJK_Ch_Ilb OJK_Ch_Ilc	Paleochannel 9	The paleochannel trace OJK_Ch_Ila is located in the center of the RA. Traces OJK_Ch_Ilb and OJK_Ch_Ilc could be interpreted as resulting from the avulsion process. Considering the flow direction, it might be possible that they were part of the same paleochannel, along with OJK_Ch_XXVII to the north.
OJK_Ch_IVa	Paleochannel 10	The paleochannel trace of OJK_Ch_IVa represent the largest paleochannel trace in the RA and is located in the central area.
OJK_Ch_IIII	Paleochannel 11	The paleochannel trace OJK_Ch_IIII represents an isolated meander trace located south of Ojakly in the central area of the RA.
OJK_Ch_IVb OJK_Ch_IVc	Paleochannel 12	The paleochannel traces of OJK_Ch_IVb and OJK_Ch_IVc are located in the central-south area of the RA, partially crossing OJK_Ch_IVa. it is likely they were part of the same paleochannel representing an avulsion process.
OJK_Ch_Va OJK_Ch_Vb	Paleochannel 13	The paleochannel traces OJK_Ch_Va and OJK_Ch_Vb are located in the center-west area of the RA. Their position and the continuity of the traces suggest that they were part of the same paleochannel.
OJK_Ch_Vc	Paleochannel 14	The paleochannel trace OJK Ch5c is a small trace east of OJK_Ch_Va.
OJK_Ch_VI	Paleochannel 15	Paleochannel trace OJK_Ch_VI, together with OJK_Ch4, is one of the longest paleochannel traces detected in the RA. It is considered one of the channels

		that supplied water to the Late Bronze Age site of Auchin 1. Considering its position and flow direction, it might have been connected with OJK_Ch_Vb, forming a single paleochannel.
OJK_Ch_VIIa OJK_Ch_VIIb OJK_Ch_VIIc	Paleochannel 16	The paleochannel traces of OJK_Ch_VIIa, 7b, and 7c are located in the center-northwest of the RA. The flow direction of the paleochannels and their close proximity suggest that they were part of the same channel, likely formed through an avulsion process. Moreover, considering their positions, they may have been part of the same channel as OJK_Ch_VIIIa and 8b to the south.
OJK_Ch_VIIIa OJK_Ch_VIIIb	Paleochannel 17	The paleochannel traces of OJK_Ch_VIIIa and 8b are located in the center-northwest of the RA. The flow direction of the paleochannels and their close proximity suggest that they were part of the same channel, likely formed through an avulsion process. Moreover, considering their positions, they may have been part of the same channel as OJK_Ch_VIIa and 7b to the north.
OJK_Ch_XVIII	Paleochannel 18	The meandering paleochannel trace of OJK_Ch_XVIII is located to the east of the RA. Considering its flow direction, it might have been connected with OJK_Ch_XVII, forming part of the same channel.
OJK_Ch_XVII	Paleochannel 19	The paleochannel trace of OJK_Ch_XVII is located to the east of the RA, and it is north of OJK_Ch_XVIII. Both traces, OJK_Ch_XVII and OJK_Ch_XVIII, might have been part of the same channel.

OJK_Ch_XIX	Paleochannel 20	The small trace, OJK_Ch_XIX, is located southwest of the RA. However, a long trace of what appears to be a paleochannel to the south is visible on CORONA images, though it is of modern origin.
OJK_Ch_XXa OJK_Ch_XXb OJK_Ch_XXc	Paleochannel 21	The paleochannel trace OJK-Ch20 is located on the north-east of the RA.
OJK_Ch_XXI	Paleochannel 22	The paleochannel trace OJK_Ch_XXI is located in the northeast of the RA. Considering the flow direction, this channel likely supplied water to the Late Bronze Age site of Auchin 1.
OJK_Ch_XXIIa OJK_Ch_XXIIb	Paleochannel 23	The two small paleochannel traces, OJK_Ch_XXIIa and OJK_Ch_XXIIb, are located in the northeast of the RA. OJK_Ch_XXIIa is situated to the north of OJK_Ch_XXIIb, and considering the flow direction, they may have been part of the same channel. Moreover, the flow direction of the paleochannel traces suggests that they carried water to the Late Bronze Age site of Auchin 1. Interestingly, OJK_Ch_XXIIa presents the only possible traces of small artificial canals used for irrigation.
OJK_Ch_XXIII	Paleochannel 24	The paleochannel trace of OJK_Ch_XXIII is located north-east of the RA. Its flow direction suggests it was taking water to the Late Bronze Age site of Auchin 1.
OJK_Ch_XXIV	Paleochannel 25	The paleochannel trace of OJK_Ch_XXIV is located on the north-west of the RA.
OJK_Ch_XXVI	Paleochannel 26	The paleochannel trace OJK_Ch_XXVI is a trace located on the north-east of the RA.
OJK_Ch_XXVII	Paleochannel 27	The paleochannel trace of

		OJK_Ch_XXVII is located in the center of the RA and is the closest paleochannel trace east of Ojakly. Considering the flow direction, it might have been connected with OJK_Ch_XIIa and OJK_Ch_XIIb.
OJK_Ch_XIIa OJK_Ch_XIIb	Paleochannel 28	The paleochannel traces OJK_Ch_XIIa and OJK_Ch_XIIb are located in the center of the RA. The location and flow direction of these traces suggest that they were part of the same paleochannel, possibly formed through an avulsion process. Moreover, the flow direction suggests that this paleochannel may have been connected with OJK_Ch_XXVII.

Table 1.2 The table presents the sites recorded in the Ojakly Area by this project.

Site number and Type	Survey Area	Paleochannel	Distance from the paleochannel	Chronology	Size
1747 Large Cluster	Area 11	Paleochannel 10 and Paleochannel 27	650 meters	LBA	0.5–1 ha

Description

Site 1747 lies equidistant between Paleochannel 10 and Paleochannel 27, approximately 650 meters from each. This site, spanning roughly 1 hectare, stands out for its slightly elevated terrain hosting a concentration of pottery, marking it as a Large Cluster site. Notably absent is any sign of a takyr surface, with the area characterized by sparse vegetation featuring small shrubs and saxsaul trees. In contrast to nearby Site 1748, no kiln fragments remnants were uncovered, nor were there any traces of architectural structures. Its position atop a modest rise suggests a potentially more enduring or seasonally occupied settlement.

Photo



Site number and Type	Survey Area	Paleochannel	Distance from the paleochannel	Chronology	Size
1748 Large Cluster	Area 11	Paleochannel 10	310 meters	LBA	0.5–1 ha

Description

Site No. 1748 is designated as a Large Cluster site situated atop a gently elevated terrain. A distinct feature of this site is the presence of kiln fragments scattered across its expanse, indicating a zone of pottery production. Additionally, both ICW (Andronovo) pottery and BMAC pottery have been found here. These findings strongly suggest a more enduring occupation, likely associated with its proximity to the channel.

Photo



Site number and Type	Survey Area	Paleochannel	Distance from the paleochannel	Chronology	Size
1749 Small Cluster	Area 11	Paleochannel 10	190 meters	LBA	0.1–0.5 ha

Description

Site 1749, classified as a Small Cluster site, sits across from Site 1750 on the left bank of Paleochannel 10, approximately 190 meters from its former bank. Encompassing around 0.1-0.5 hectares, the site features a flat sand-takyr surface. Notably, the assemblages found here exhibit less fragmentation compared to other sites, potentially indicating less erosional processes. It has been suggested elsewhere that the presence of small fragmented materials may signal significant aeolian processes (Markofsky 2010:172).

Photo



Site number and Type	Survey Area	Paleochannel	Distance from the paleochannel	Chronology	Size
1750 Large Cluster	Area 11	Paleochannel 10	150 meters	MBA-LBA	0.5–1 ha

Description

Site 1750 was discovered on the right bank of Paleochannel 10, around 150 meters from its former bank. Positioned on a slightly elevated terrain, this site was designated as a Large Cluster. It is distinguished by the concentration of pottery within an area with sparse vegetation. Notably, there are no takyr surfaces present, and no signs of potential permanent structures were observed.

Photo



Site number and Type	Survey Area	Paleochannel	Distance from the paleochannel	Chronology	Size
1751	Area 11	Paleochannel 13	300 meters	LBA	0.1–0.5 ha
Small Cluster	Area 10				

Description

Site 1751 is a Small Cluster site situated roughly 300 meters to the left of Paleochannel 13. The pottery is predominantly scattered across a flat takyr surface, sparsely vegetated and covering an area of approximately 0.1-0.5 hectares. Apart from the pottery cluster, no other evidence was discovered. It is noteworthy that Site 1751, along with sites 1753 and 1752, are all located within 500 m from Paleochannel 13. Interestingly, this site also features ICW (Andronovo) pottery.

Photo



Site number and Type	Survey Area	Paleochannel	Distance from the paleochannel	Chronology	Size
1752 Small Cluster	Area 11 Area 10	Paleochannel 13	90 meters	LBA	0.1–0.5 ha
Description Site 1752 is a Small Cluster site positioned in a gently elevated and sparsely vegetated region, approximately 90 m to the left of the paleomeander of Paleochannel 13. A notable concentration of pottery was found within small interdunal depressions at this site. Remarkably, there were no takyr surfaces linked to this area.					
Photo 					

Site number and Type	Survey Area	Paleochannel	Distance from the paleochannel	Chronology	Size
1753	Area 11	Paleochannel 13	125 meters	MBA-LBA	1-2 ha
Low Mound	Area 10				
Description Site 1753 is located approximately 125 meters to the west of paleochannel 13, and at 250 meters distance from site 1752. Both sites, 1752 and 1753, were located along paleochannel 13. The site cover approximately 1-2 hectares, within an elevated area with a takyr surface at the edges. The site was identified by the large amount of pottery covering almost the entire area. No structures, bricks, or any kiln fragments were recorded that might suggest the presence of a production area. However, the size of the area might suggest a more permanent occupation like farmstead linked to agricultural activities, rather than a very short-term occupation.					
Photo 					

Site number and Type	Survey Area	Paleochannel	Distance from the paleochannel	Chronology	Size
1754 Small Cluster	Area 10	Paleochannel 13	30 meters	LBA	0.1-0.5 ha

Description

Site 1754 is a Small Cluster situated within an interdunal region. It features a small sand-takyr surface and pottery spread across an area of approximately 0.1-0.5 hectares. Located roughly 30 meters from Paleochannel 13, the site likely served as a temporary occupation site, possibly utilized for herding or small-scale agricultural activities.

Photo



Site number and Type	Survey Area	Paleochannel	Distance from the paleochannel	Chronology	Size
1755 Small Cluster	Area 10	Paleochannel 13	200 meters	LBA	0.1-0.5 ha

Description

Site 1755 is a Small Cluster site positioned approximately 200 meters from Paleochannel 13. It is distinguished by the presence of pottery scattered across a vegetated area populated with small shrubs and saxaul trees, covering an area of about 0.1-0.5 hectares.

Photo



Site number and Type	Survey Area	Paleochannel	Distance from the paleochannel	Chronology	Size
1766	Area 10	Paleochannel 13	40 meters	LBA	0.5-1 ha
Large Cluster	Area 11				

Description

Site 1766 occupies a slightly elevated terrain roughly 40 meters from Paleochannel 13. It was identified as a Large Cluster spanning approximately 0.5-1 hectare, notable for a substantial pottery concentration similar to Site 1749, albeit with less fragmented pottery. Notably, numerous kiln wasters are scattered throughout the area. Despite this, no discernible kiln structures were identified on the surface. Nevertheless, it is probable that pottery kilns were present in the vicinity.

Photo



Site number and Type	Survey Area	Paleochannel	Distance from the paleochannel	Chronology	Size
1767 Small Cluster	Area 9	Paleochannel 13	190 meters	LBA	0.1-0.5 ha

Description

Site 1767 is a Small Cluster site positioned roughly 190 meters from Paleochannel 13, situated on the edge of an agricultural zone at the time of the survey. This site is marked by a concentration of pottery on an uncultivated takyr surface. While the site covers approximately 0.1-0.5 hectares, it is possible that a portion of it has been impacted by agricultural activities. Notably, Site 1767 exhibits evidence of both ICW (Andronovo) pottery and BMAC pottery assemblage.

Photo



Site number and Type	Survey Area	Paleochannel	Distance from the paleochannel	Chronology	Size
1768 Small Cluster	Area 6	Paleochannel 28	80 meters	LBA	0.1-0.5 ha
Description Site 1768 is a Small Cluster site positioned roughly 80 meters from Paleochannel 28. It is notable for the dispersion of pottery across a sparsely vegetated takyr surface spanning approximately 0.1-0.5 hectares. Interestingly, the pottery at this site exhibits less fragmentation compared to other sites in the vicinity.					
Photo 					

Table 1.3. The table provides a description of the west and south profiles of the test trench excavated in Paleochannel 13, located in the Ojakly area.

Unit number*	
West Profile Trench (Paleochannel 13) Ojakly Area	
1	The first unit layer is characterized by a clay-silt loam (takyr surface) of grayish color (10YR 6/1) of ca. 15 cm.
2	Between -15 and -50 cm there is a silty-sand layer (10YR 6/3) with visible cross-lamination.
3	Between -24 and -48 cm a small silt unit layer (10YR 8/2).
4	Between -50 and -60 cm there is a small layer of silt (10YR 5/6).
5	Between -60 and -87 cm there is a unit layer of sand (10YR 8/4) with visible ripple cross-bedding.
6	Between -87 and -115 cm there is a unit layer of silt (10YR 7/3)
7	Between -110 and -115 cm, mainly on the north side of the profile there is a unit of reddish silt layer different in color (5YR 6/8) from the preceding one.
8	Between -115 and -140 cm there is a unit layer of silt (10YR 7/3) that shows wave cross-lamination.
9	Between -140 and -170 there is a compact clay unit layer (10YR 7/2) characterized by aggregation of sediments of ca. 2-3 cm.
10	Between -170 and -180 cm there is a small unit layer of silty sand (10YR 7/1).
11	Between -180 and -228 cm there is a compact unit layer of silty clay (10YR 5/6).
South Profile Trench (Paleochannel 13) Ojakly Area	
1	The first unit layer is characterized by a clay-silt loam (takyr surface) of grayish color (10YR 6/1) of ca. 15 cm.
2	Between -15 and -24 cm there is a sloping silty-sand unit layer (10YR 6/3) of ca. 9cm towards the west side of the profile.
3	Between -24 and -49 cm there is a well-sorted silt unit layer (10YR 8/2).
4	Small inclusion unit layer of ca. 3 cm characterized by silty sand (10YR 8/3).
5	Small inclusion unit layer of ca. 5 cm characterized by well-sorted silt layer (10YR 8/2).
6	Small unit layer of ca. 3 cm characterized by very darker silt (5YR 6/6).
7	Between -60 and -85 cm there is a sand unit layer (10YR 6/6) with visible ripple cross-bedding.
8	Between -85 and -165 cm there is a large unit layer of silt (5YR 5/6) with the inclusion of charcoal at about ca. -95 cm.
9	Between -140 and -165 cm there is a compact clay unit layer (10YR 7/2)
10	Between -165 and -175 cm there is a small unit layer of light color silty sand (10YR

	8/3)
11	Between -168 and -175 cm, only on the west side of the profile, there is a small inclusion of silt layer (10YR 7/3).
12	Between -175 and -228 cm there is a compact silty clay unit (10YR 5/6)

*Refer to Figures 5.45 and 5.46 in Chapter 5 for the unite numbers

**From this layer an OSL sample was taken.

- Appendix 2

Table 2. The table present the overview of the OSL results from Ojakly and Togolok trenches.

Sample code	Depth (cm)	Mineral	Grain size (µm)	n _{accepted} /n _{total}	D _{total} (Gy ka ⁻¹)	OD (%) ⁺	D _e IR ₅₀ (Gy)	D _e pIRIR ₁₅₀ (Gy)	D _e IR ₅₀ (Gy)*	D _e corrected pIRIR ₁₅₀ (Gy)*
OJK18-1	76	F	63-100	12/12	2.9 ± 0.1	27.2 ± 5.7	9.9 ± 0.3	18.8 ± 1.5	12.6 ± 0.3	21.4 ± 1.7
OJK18-2	123	PM	4-11	7/7	3.6 ± 0.2	-	11.3 ± 0.2	19.0 ± 0.4	14.4 ± 0.2	21.7 ± 0.4
OJK18-3	202	PM	4-11	7/7	4.1 ± 0.2	-	12.4 ± 0.2	26.0 ± 0.6	15.9 ± 0.2	30.0 ± 0.5
OJK18-4	255	F	100-150	12/12	3.1 ± 0.2	8.8 ± 2.1	10.1 ± 0.2	17.9 ± 0.5	12.9 ± 0.3	20.3 ± 0.6
TGK18-1	72	F	63-100	12/12	2.9 ± 0.1	8.3 ± 2.1	11.9 ± 0.2	24.3 ± 0.7	16.3 ± 0.3	29.3 ± 0.8
TGK18-2	142	PM	4-11	7/7	4.1 ± 0.2	-	15.3 ± 0.2	54.2 ± 1.4	21.0 ± 0.3	68.6 ± 1.7
TGK18-3	184	F	150-250	12/12	3.1 ± 0.1	6.9 ± 1.8	13.5 ± 0.3	19.3 ± 0.4	18.5 ± 0.4	23.0 ± 0.5

Sample code	Grain size (µm)	D _{total} (Gy ka ⁻¹)	OD (%) ⁺	D _e IR ₅₀ (Gy)	D _e pIRIR ₁₅₀ (Gy)	D _e corrected IR ₅₀ (Gy)*	D _e corrected pIRIR ₁₅₀ (Gy)*	Age IR ₅₀ (ka)	Age pIRIR ₁₅₀ (ka)	Age corrected IR ₅₀ (ka)*	Age corrected pIRIR ₁₅₀ (ka)*
OJK18-1	63-100	2.9 ± 0.1	27.2 ± 5.7	9.9 ± 0.3	18.8 ± 1.5	12.6 ± 0.3	21.4 ± 1.7	3.4 ± 0.2	6.4 ± 0.6	4.3 ± 0.1	7.4 ± 0.6
OJK18-2	4-11	3.6 ± 0.2	-	11.3 ± 0.2	19.0 ± 0.4	14.4 ± 0.2	21.7 ± 0.4	3.2 ± 0.2	5.4 ± 0.3	4.0 ± 0.1	6.1 ± 0.2
OJK18-3	4-11	4.1 ± 0.2	-	12.4 ± 0.2	26.0 ± 0.6	15.9 ± 0.2	30.0 ± 0.5	3.0 ± 0.2	6.4 ± 0.4	3.9 ± 0.1	7.3 ± 0.2
OJK18-4	100-150	3.1 ± 0.2	8.8 ± 2.1	10.1 ± 0.2	17.9 ± 0.5	12.9 ± 0.3	20.3 ± 0.6	3.3 ± 0.2	5.8 ± 0.4	4.2 ± 0.1	6.6 ± 0.2
TGK18-1	63-100	2.9 ± 0.1	8.3 ± 2.1	11.9 ± 0.2	24.3 ± 0.7	16.3 ± 0.3	29.3 ± 0.8	4.1 ± 0.2	8.3 ± 0.4	5.6 ± 0.1	10.1 ± 0.3
TGK18-2	4-11	4.1 ± 0.2	-	15.3 ± 0.2	54.2 ± 1.4	21.0 ± 0.3	68.6 ± 1.7	3.8 ± 0.2	13.3 ± 0.7	5.1 ± 0.2	16.8 ± 0.5
TGK18-3	150-250	3.1 ± 0.1	6.9 ± 1.8	13.5 ± 0.3	19.3 ± 0.4	18.5 ± 0.4	23.0 ± 0.5	4.3 ± 0.2	6.2 ± 0.3	6.0 ± 0.1	7.4 ± 0.2

⁺ Overdispersion of pIRIR₁₅₀ D_e values.

* g-values of 3.0 ± 1.0 (pIRIR₍₅₀₎) and 1.6 ± 1.2 (pIRIR₁₅₀) were used for OJK and 2.4 ± 0.9 (pIRIR₍₅₀₎) and 1.2 ± 1.2 (pIRIR₁₅₀) TGK. Correction following Lamothe et al. 2003.

D_e values are calculated using the Central Age Model (Galbraith 1999).

Sample code	Depth (cm)	WC field*	WC used*	Radionuclide concentrations			D_{cosmic} (Gy ka ⁻¹)	D_{total} F and PM [#] (Gy ka ⁻¹)
				U (ppm)	Th (ppm)	K (%)		
OJK18-1	76	1.9	5 ± 3	1.7 ± 0.3	6.2 ± 0.4	1.6 ± 0.1	0.19 ± 0.02	2.9 ± 0.1
OJK18-2	123	3.0	5 ± 3	1.8 ± 0.3	7.5 ± 0.5	1.8 ± 0.2	0.18 ± 0.02	3.6 ± 0.2
OJK18-3	202	10.9	10 ± 5	2.3 ± 0.4	9.4 ± 0.6	2.3 ± 0.2	0.17 ± 0.02	4.1 ± 0.2
OJK18-4	255	2.3	5 ± 3	1.9 ± 0.3	6.0 ± 0.4	1.8 ± 0.2	0.16 ± 0.02	3.1 ± 0.2
TGK18-1	72	1.0	5 ± 3	1.9 ± 0.2	6.7 ± 0.4	1.5 ± 0.1	0.20 ± 0.02	2.9 ± 0.1
TGK18-2	142	7.2	10 ± 5	3.0 ± 0.4	9.3 ± 0.6	2.3 ± 0.1	0.18 ± 0.02	4.1 ± 0.2
TGK18-3	184	1.0	5 ± 3	1.7 ± 0.2	6.9 ± 0.5	1.7 ± 0.1	0.17 ± 0.02	3.1 ± 0.1

* Water content as measured in the field and as used for D_e determination.

Alpha efficiency of 0.05 ± 0.01 and potassium content of 12.5 ± 0.5 % were assumed.

- *Appendix 3*

Table 3.1 Paleochannel traces in the Togolok area were identified through remote sensing analysis. When these traces are likely part of the same channel, they have been grouped under a single paleochannel number (Paleochannel #).

Paleochannel Traces #	Paleochannel #	Characteristics: RA (Research Area)
TGK1_Ch_XIVa TGK1_Ch_XIVb	Paleochannel 1	TGK1_Ch_XIVa is the longest paleochannel trace, located approximately 1.8 km west of Togolok 1. Another small paleochannel trace (TGK1_Ch_XIVb) is situated on the southwest side of TGK1_Ch_XIV and exhibits evidence of a channel bar, suggesting it may have been part of the same paleochannel at an earlier stage.
TGK1_Ch_II TGK1_Ch_III	Paleochannel 2	The paleochannel trace TGK1_Ch_II is approximately 500m from Togolok 1 and is the main paleochannel trace discovered in the RA. The second smallest trace, TGK1_Ch_III, is located 100m east of TGK1_Ch_II. It may represent an old river channel migration.
TGK1_Ch_IV	Paleochannel 3	TGK1_Ch_IV is a small river trace located southwest of Togolok 1. Based on its flow direction, it likely passed on the west side of Togolok 1.
TGK1_Ch_V	Paleochannel 4	The TGK1_Ch_V trace is located 410m southeast of Togolok 1 and was currently part of a cultivated takyr.
TGK1_Ch_VI TGK1_Ch_VIII	Paleochannel 5	TGK1_Ch_VI is located just 50m from TGK1_Ch_V, and its trace passes on the west side of Togolok 1 (Tepe 2) and seems to be connected to TGK1_Ch_VIII.
TGK1_Ch_VII	Paleochannel 6	TGK1_Ch_VII is a small paleochannel trace located 500m south-east of Togolok 1 (Tepe 2).
TGK1_Ch_IX	Paleochannel 7	TGK1_Ch_IX is located 600m from Togolok 1
TGK1_Ch_X*	Paleochannel 8	TGK1_Ch_X is located southeast of TGK1_Ch_IX and intersects the latter. Therefore, it could be a later channel.
TGK1_Ch_XI	Paleochannel 9	TGK1_Ch_XI is located 1300m to the east of Togolok 1.

TGK1_Ch_XII	Paleochannel 10	TGK1_Ch_XII is the eastern paleochannel of the Togolok Area, and it appears to flow towards a modern cultivated area to the northeast.
TGK1_Ch_XIII	Paleochannel 11	TGK1_Ch_XIII is a small paleochannel trace on the south-east of Togolok 1.

*Although the present paleochannel was identified via satellite images, it was not possible to verify its structure on the ground.

Table 3.2. The Tables present the sites recorded in Togolok Area by this project

Site number and Type	Survey Area	Paleochannel	Distance from the paleochannel	Chronology	Size
1756 Large Cluster	Area 2	Paleochannel 7	86 meters	LBA	0.5-1 ha
Description Site 1756 is situated in the central-northern are of Paleochannel 7, along its left former bank. It features a gently flat surface scattered with a significant collection of scattered pottery. The surface is distinguished by takyr, surrounded by sandy soil.					
Photo 					

Site number and Type	Survey Area	Paleochannel	Distance from the paleochannel	Chronology	Size
1757 Low Mound	Area 2	Paleochannel 7	55 meters	LBA	1-2 ha
Description Site 1757 is situated in the northern section of Paleochannel 7 and stands out for the significant presence of scattered pottery on a small, elevated area. Furthermore, various traces of kiln fragments along with pottery were discovered. The surroundings are marked by sandy takyr surfaces.					
Photo 					

Site number and Type	Survey Area	Paleochannel	Distance from the paleochannel	Chronology	Size
1758 Small Cluster	Area 2	Paleochannel 7	32 meters	LBA	0.1-0.5 ha
Description Site 1758 given its proximity to the channel trace and its directional flow, it is probable that the site was situated along the right former bank of Paleochannel 7. The site is distinguished by a takyr surface, surrounded by sand, and marked by the presence of small aggregates of pottery.					
Photo 					

Site number and type	Survey Area	Paleochannel	Distance from the paleochannel	Chronology	Size
1759	Area 2	Paleochannel	59 meters	LBA/IA1	0.5-1 ha
Large Cluster		7			
Description Site 1759 is positioned on the right paleobank of Paleochannel 2. The site is characterized by a collection of scattered pottery, predominantly on a takyr surface, surrounded by sandy terrain. Particularly noteworthy is the presence of kiln wasters on the surface, similar to Site 1757.					
Photo 					

Site number and Type	Survey Area	Paleochannel	Distance from the paleochannel	Chronology	Size
1760 Large Cluster	Area 2	Paleochannel 7	49 meters	IA1	0.5- 1 ha
Description Site 1760 is situated on the left paleobank of Paleochannel 2, approximately 49 meters from the paleochannel. The site primarily consists of sandy terrain, with occasional patches of takyr nearby. Despite the abundant presence of scattered ceramics, no evidence of permanent structures was observed on the surface.					
Photo 					

Site number and Type	Survey Area	Paleochannel	Distance from the paleochannel	Chronology	Size
1761 Large Cluster	Area 4	Paleochannel 7	48 meters	IA1	0.5-1 ha
Description Site 1761 is situated on the southern left paleobank of Paleochannel 7. It occupies a gently flat surface characterized by the presence of pottery and the absence of any permanent structures. While a takyr surface was observed, the area is primarily composed of sandy terrain.					
Photo 					

Site number and Type	Survey Area	Paleochannel	Distance from the paleochannel	Chronology	Size
1762 Small Cluster	Area 5	Paleochannel 8	32 meters	LBA/IA1	0.1-0.5 ha

Description

Site 1762 is the sole site identified in Area 5, situated near Paleochannel 8. It features a Takyr surface with a gentle slope towards the center and sandy terrain surrounding it. Scattered pottery was observed both around the site and within its center.

Photo



Site number and Type	Survey Area	Paleochannel	Distance from the paleochannel	Chronology	Size
1763 Large Cluster	Area 2	Paleochannel 2	65 meters	LBA/IA1	0.5-1 ha
Description Site 1763 is situated on the right paleobank of Paleochannel 2, positioned approximately 65 meters from the channel itself and 100 meters from Site 1764. Like Site 1764, it is also located 415 meters from Togolok 21. The site features a gently flat surface with minimal indications of a takyr surface. No evidence of permanent structures was identified on the surface.					
Photo 					

Site number and Type	Survey Area	Paleochannel	Distance from the paleochannel	Chronology	Size
1764 Small Cluster	Area 2	Paleochannel 2	20 meters	LBA	0.1-0.5 ha
Description Site 1764 is positioned in the southern area of Paleochannel 2, situated on its left paleobank at a distance of 20 meters. It is in close proximity to Togolok 21, just 412 meters to the north, and 100 meters from Site 1763. The site occupies a flat terrain with a sparse takyr surface. Notably, no evidence of permanent structures was discerned on the surface.					
Photo 					

Site number and Type	Survey Area	Paleochannel	Distance from the paleochannel	Chronology	Size
1765 Large Cluster	Area 2	Paleochannel 2	93 meters	LBA/IA1	0.5-1 ha
Description Site 1765 is situated centrally along the left paleobank of Paleochannel 2, at a distance of 93 meters. It occupies a gently flat surface where scattered pottery fragments were discovered. Notably, no takyr surface was evident in the vicinity, and there were no visible structures on the surface.					
Photo 					

Table 3.3. The table provides a description of the west and south profiles of the test trench excavated in Paleochannel 7, located in the Togolok area.

Unit number*	
West Profile Trench (Paleochannel 7) Togolok Area	
1	The first layer of ca. 5 cm is characterized by a compact layer of clay-silt loam (takyr surface) of grayish color (10YR 6/1).
2	Between -5 and -70 cm there is a silty sand compacted unit layer. This layer is darker grey color (10YR 5/1) on the top, until about -50 cm, and lighter grey color (10YR 6/3) from -50 to -70 cm, probably with more sand fraction. This layer was also characterized by the presence of small shells. In addition, there was the presence of a small “root” channel between -50 and -60 cm on the south side of the trench profile.
3**	Between -70 cm and -82cm there is a fine sand unit layer (10YR 7/4) with few laminations visible.
4	Between ca. -82 and -88 cm there is a unit layer of silty clay (10YR 7/4).
5	Between ca. -88 and 95 cm there is a layer of sand (10YR 7/4) with visible small cross-bedding lamination.
6	Between ca. -95 and -100 cm there is a small unit layer of silty-clay (10YR 7/4).
7	Between -100 and -169 cm there is a very cohesive polyhedral unit layer of clay (10YR 6/4). On the top left of this layer there was evidence of small charcoal.
8**	Between -169 and -194 cm there is a unit layer of sand/very fine sand (10YR 5/6) with no particular lamination visible.
South Profile Trench (Paleochannel 7) Togolok Area	
1	The first layer of ca. 5 cm characterized by a compact layer of clay-silt loam (takyr surface) of grayish color (10YR 6/1).
2	Between – 7 and -74 cm there is a compact unit layer of silty sand. The layer is darker grey color (10YR 5/1) on the top and a lighter grey color (10YR 6/2) on the bottom profile with a possible increase in sand fraction.
3	Between -74 and -82 cm there is a fine sand unit layer (10YR 7/3) with visible cross-lamination.
4	Between ca. -85 and -92 cm there is a unit layer of sand (10YR 7/2) within unit layer 5. This layer shows visible cross-laminations
5	Between -82 and – 100 cm there is a unit layer of silty-clay (10YR 7/4). This layer present macro layers of sand in it (units 4,6,7).
6	Between ca. -87 and -92 cm there is a unit layer of sand (10YR 7/2) within unit layer 5. This layer shows visible cross-laminations.
7	Between ca. -94 and -96 cm there is a unit layer of sand (10YR 7/2) within unit layer 5. This layer shows visible cross-laminations.
8**	Between -100 and -170 cm there is a very cohesive polyhedral unit layer of clay

	(10YR 6/4).
9	Between -170 and -194 cm there is a unit layer of sand/very fine sand (10YR 5/6) with no particular lamination visible.

*Refer to Figures 6.42 and 6.43 in Chapter 6 for the unit numbers.

**From this layer OSL sample was taken.

Glossary

The following list aims to offer definitions of selected terms within the thesis. Some definitions may be broad and not exhaustive, as certain fluvial terms are subject to debate (e.g., anabranching). Nonetheless, the purpose is to provide a brief comprehension of the terms.

- **Alluvial fan:** Alluvial fan is a fan-shaped deposit of sediment formed where a stream flattens, slows, and spreads typically onto a plain.
- **Anabranching:** Anabranching is a type of river channel pattern characterized by multiple interconnected channels separated by stable islands or bars, often found in floodplains with a low gradient.
- **Avulsion:** Avulsion refers to a sudden redirection of a channel course to a new path. This typically happens during episodes of flood, resulting in the abandonment of the old channel and the creation of a new one.
- **Bank:** In a river system, the bank refers to the sloping sides of a channel. Riverbanks confine the water within its channel path.
- **Barchanoids:** In arid environments, barchanoids are crescent-shaped sand dunes with an elongated form.
- **Braided:** Braided is a type of river channel pattern characterized by numerous interconnected channels separated by small and often temporary islands or bars, usually found in floodplains with variable discharge.
- **Catchment area:** The catchment area is of land from which water drains into a particular body of water.
- **Channel bar:** A channel bar is a depositional landform typically found within a river channel, often forming inside meanders or in areas of reduced flow velocity. These bars can vary in size and shape
- **Crevasse splays:** Crevasse splays form during periods of high discharge when a river breaches its levee, depositing sediment onto the floodplain. Due to this event, small streams can also form.
- **Cross-lamination:** Lamination consists essentially of parallel stratification, with laminated structures inclined in different directions.
- **Cross-section:** A diagram commonly used in geology and hydrology to depict the structure of landforms or bodies of water, such as a river channel.
- **Discharge:** Discharge is the volume of water flowing through a river channel. This is indicated per unit of time typically measured in cubic meters per second (m^3/s).
- **Furrow irrigation:** A method of irrigation in which water is distributed in small channels or furrows between rows of crops. This method is still used in modern Turkmenistan.
- **Hand auger:** Hand auger is a tool used for drilling small holes in soil in geological and environmental fieldwork. It can be operated by hand or machine.

- **Herringbone canals:** Irrigation canals designed in a herringbone pattern to distribute water across agricultural fields. This structure is common in Mesopotamia.
- **Khak:** In Turkmenistan, 'khak' refers to an artificial structure dug into the Takyr surface to collect water, which can be stored for between 2 and 4 months.
- **Lamination:** Lamination in river sediment refers to the presence of distinct, thin layers or beds of sedimentary material. These laminations are typically the result of changes in sedimentary processes, such as fluctuations in water flow velocity, and they are observable in cross-sections of the channel.
- **Levee:** An embankment built along the banks of a river to prevent flooding and confine the river within its channel.
- **Lithofacies:** In the context of rivers, lithofacies refers to distinctive sedimentary units within a specific formation that share similar characteristics. They represent specific depositional processes within a river system and can vary spatially and temporally along the river channel.
- **Marshes:** Marshes are wetland areas or regions characterized by shallow water with the presence of small vegetation such as grasses and sedges. South Mesopotamia is a typical region known for its marshes.
- **Ostracode shells:** Hard, calcareous shells of tiny aquatic crustaceans called ostracods.
- **Overbank deposition:** Overbank deposition is a process by which sediment carried by a river channel is deposited beyond the confines of its main channel. This happens during periods of high flow regime when a river channel exceeds its channel capacity. In this case, the deposited sediment forms layers of alluvium.
- **Oxbow:** An oxbow is a U-shaped body of water typically formed when a meandering river is cut off from the main channel. This process often occurs during periods of flooding.
- **River ripples:** River ripples are small-scale sedimentary structures that form on the bed of a river channel due to the interaction of flowing water with loose sediment particles. They usually develop perpendicular to the direction of water flow and can vary in size and spacing depending on factors such as flow velocity, sediment grain size, and channel morphology. Typically, they form under relatively low to moderate flow regimes and can be seen in channel sections.
- **Saxaul:** Saxaul is a type of drought-resistant shrub or small tree found in Central Asian deserts, often used for forage and fuel. It can be divided into two main varieties: black saxaul and white saxaul.
- **Takyr:** A takyr is a type of flat, clay-rich desert surface characterized by polygonal crack structures, commonly found in arid regions. In regions other than Central Asia, similar features may be referred to as 'playas' or 'sabkhas.' During periods of high precipitation, water accumulates on takyr surfaces.
- **Tepe or Depe:** Tepe or Depe is a mound formed by the accumulated debris from human occupation. They often represent ancient settlements.

- **Tributary channel:** A tributary channel is a smaller river channel that flows into a larger main one. Tributaries contribute water, sediment, and increase the discharge of the main watercourse, thereby influencing its characteristics
- **Tugai:** Tugai is a typical riparian forest or woodland found along the banks of rivers and streams in Central Asia. It is characterized by a diverse assemblage of trees and shrubs.