

KHI-LAND PROJECT
MONGOLIAN - HUNGARIAN
ARCHAEOLOGICAL RESEARCH

Hungarian Academy of Sciences
Research Centre for the Humanities

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2017

KHI-LAND

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INSTITUTE OF HISTORY
AND ARCHAEOLOGY
MONGOLIAN ACADEMY OF SCIENCES

Tahiméter Kft.

...survey on earth, in water and air...

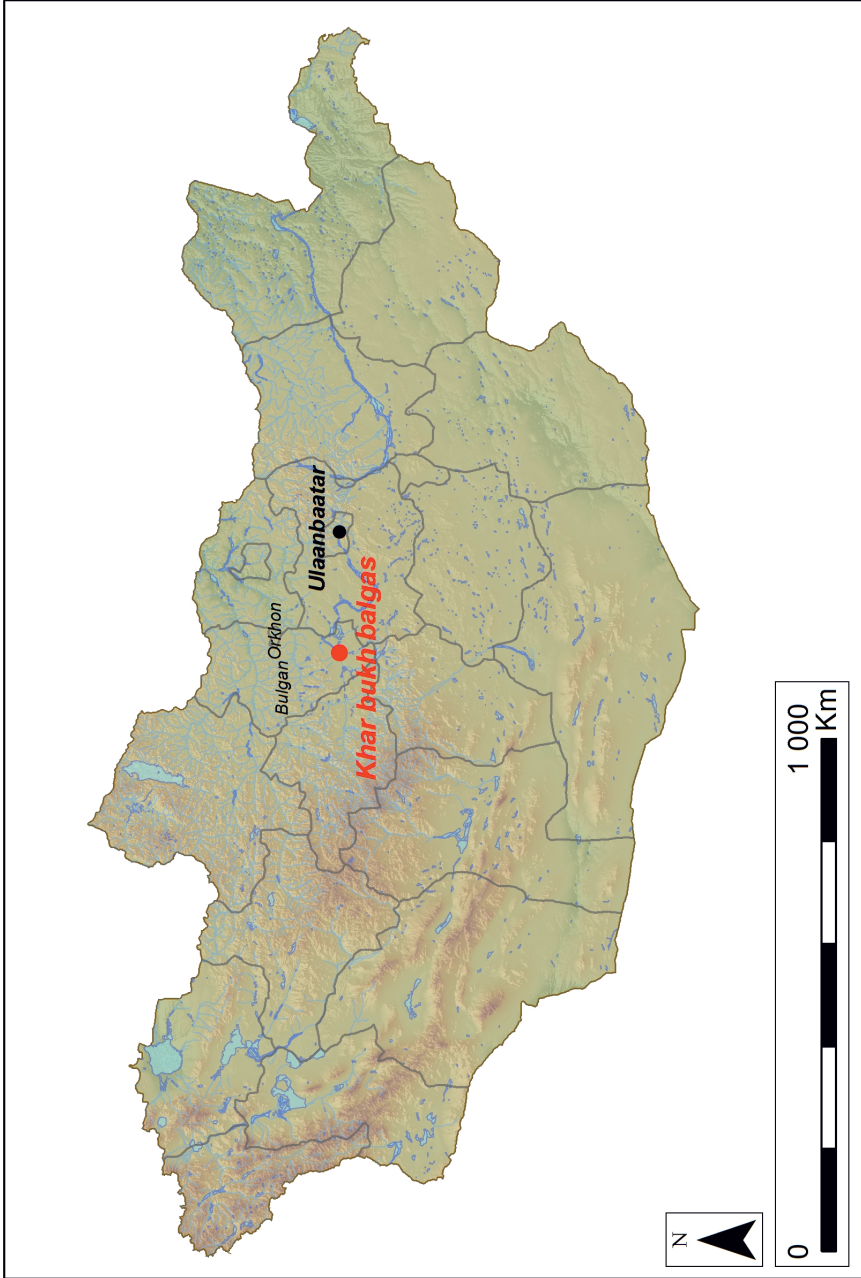


CONTENTS

THE KHITAN EMPIRE.....	b
ABAOJI, THE FOUNDER OF THE EMPIRE.....	7
LIAO DYNASTY.....	8
THE QARA KHITAI.....	9
KHITANS IN THE TERRITORY OF PRESENT DAY MONGOLIA.....	10
THE PROJECT.....	12
KHAR BUKH BALGAS.....	13
PREVIOUS RESEARCH.....	14
NOMADIC LIFESTYLE.....	18
MEASUREMENT METHODS.....	20
GIS.....	23
THE NEXT PHASE OF THE PROJECT.....	26
RESEARCHERS.....	31



KHI-LAND



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The KHI-LAND project involves landscape archaeological studies of the monuments of the Khitan period (10th-11th century) in Bulgan aimag (province) of Central Mongolia with a special focus on the fortified settlement of Khar bukh balgas situated in Dashinchilen sum (district). Although archaeological research was carried out in several Khitan period cities in the territory of Mongolia, their environment and contacts with the contemporary settlement network has not yet been studied in detail.

Due to the development of landscape archaeology recent research does not focus exclusively on a single archaeological site, but with the involvement of non-invasive technologies it observes the wider environment of these settlements. The aim of our project is to examine the Khitan sites in the surrounding landscape in order to understand their role in the history and organization of the Liao Empire, and to gain information on their function in the northern frontier zone of the empire.



THE KHITAN EMPIRE

The northern nomads always regarded China as the symbol of wealth, prosperity, and continuity therefore it is no wonder that nomadic tribes founding an empire aimed to seize the Chinese throne. The early nomadic empires in their campaigns against settled civilisations usually saw the opportunity of quick looting, while others often imitated the Chinese manners in order to stabilize their rule. They often adopted elements of the Chinese administration, built settlements and even copied the Chinese military organization. One of the peculiarities of the Chinese history is that four dynasties founded by nomads ruled the Chinese throne during the last millennium of the imperial age. Apart from the Mongols who founded the most significant empire of the Yuan dynasty (1271-1368) and a still existing state, the founders of three dynasties came from the Manchurian area. These are the dynasties founded by Khitans called Liao (947-1125), by the Jurchens called Jin (1125-1234), and by the Manchus called Qing (1644-1911). All of these three dynasties were in close connection with the Mongols, and while the power of Jin Empire was only limited to the frontiers of the nomads, Khitans and Manchus ruled a significant part of the area populated by Mongols. The founders of the Liao Empire were also attached to the Mongol population from another aspect, namely they spoke an early Mongolian dialect, while Jurchens and Manchus belonged to the Manchu-Tungus branch of the Altaic language family. Khitan people first appeared in Chinese

annals in the 5th century, but at that time they were probably part of the Xianbei Empire the leading tribe of which was a proto-Mongolian population speaking an early dialect. Khitans fought several times during the 7th century with the Turks for the rule over a significant part of Central Asia. They suffered defeat from the Turks, but by 751 Khitans stroked the Chinese troops lead by An Lushan. Between 745 and 840 during the Uyghur Khaganate the Khitans lost their territory, but the Kirghiz incursion sweeping away the Uyghur rule, and later the weakening of the Tang dynasty in China and it's collapse suddenly created a power vacuum giving the Khitans opportunity for a major breakthrough by founding their own state including large part of present-day Mongolia and Manchuria.





ABAOJI, THE FOUNDER OF THE EMPIRE

The Khitans significantly empowered by the end of the 9th century. The most dominant of their eight tribes mentioned by Chinese annals were called Yelü the leader of which, Abaoji (872-926) gained power over the rest of the tribes. Abaoji breached the former tradition, according to which the tribal federation was led by a leader elected every third year, and he did not give up his rule voluntarily, but secured his power over the Khitan tribes by arms. Under his rule a well-organized united tribal federation arose by 906, which already menaced the northern frontiers of China. Historical legends rose the new leader into a powerful ruler who according to the tradition was able to walk in the age of three months, talked fluently when he was one year old and could foresee the future. In 924 Abaoji

had ousted the Kirghiz people ruling the area of present-day Mongolia and tried to build a new alliance with the Uyghurs. Abaoji had a Chinese advisor, founded Buddhist, Confucian and Taoist temples and in 920 he ordered to create the 'large script' (Dazi) of the Khitans inspired by Chinese characters. Several Khitan sources written by using this script had survived, while the 'small script' which was invented in 925 by using the Uyghur script, and was used in parallel with the large script is known much less. Although Abaoji died in 926 during a campaign against the Bohai, he left a strong centralised rulership as his legacy.

LIAO DYNASTY

Abaoji lost his life in 926 during a campaign against Korea, and his legacy descended to his son and heir, emperor Taizong (927-947). In 947 the Khitan state accepted the name Liao and beginning from this date the dynasty ruled North-Eastern China, Mongolia and Manchuria for almost two centuries. The Khitans adopted Chinese customs during their rule, but not only the Chinese civilisation left its traces on the Khitans, but they also left their mark on China. Buddhism became the most crucial religion of the Liao period, and in 1078 during the reign of Daozong emperor sources registered 360,000 monks and nuns composing one tenth of the whole population. In the same time religious tolerance was characteristic for the Khitan administration, therefore besides the Buddhism as state religion Manicheism and Nestorian Christianity were also present in the empire as well as the two main beliefs of Chinese civilisation, Taoism and Confucianism. In Inner Asia Khitan cities were the leading centres of religion, trade and agriculture. Merchantry on the Silk Road and diplomatic relations with Central Asia were controlled from these cities. Liao dynasty fought several successful wars with the Northern Song dynasty over the rule of Chinese territories, and as a result of these the Song emperors were obliged to pay great sums of annual taxes. These taxes largely contributed to the flourishing economy and culture of the Khitan Empire. The administration of the Liao state combined numerous elements of both nomadic and settled

traditions. It was gradually divided into two distinct parts where the northern territories with pastoral population were governed according to the traditional nomadic military system, while the southern area with the settled, agricultural population was controlled by a Chinese system. These great differences in central administration decreased later, but never disappeared.



THE QARA KHITAI

In 1125 the power of the Khitans was swept away from northern Manchuria by the Jurchens, who were speaking a Tungusic language. Jurchens occupied the territory of the Liao state and they even overthrew the Northern Song dynasty, therefore the Jurchen state became the ruler of Northern China. Part of the Khitans fled to the western part of Central Asia where Yelü Dashi founded the Western Liao dynasty staying in power for a century. For historiography this state is known as the Qara Khitai Empire. In 1216 the Qara Khitans were obliged to awe to Genghis Khan, and the former state absorbed in to the Great Mongol Empire where Qara Khitans assisted in the configuration of the administration as advisors. This small

tribal federation deriving from present day Manchuria played a very important role in the history of China and Central Asia. After their sudden rise the Khitans had a significant influence on the Chinese area and they did not disappear from the historical stage even after the fall of their dynasty. A small group of them managed to create a nomadic state in western Central Asia and finally they joined to the conquering army of Genghis Khan not as vanquished, but as allied warriors.



KHITANS IN THE TERRITORY OF PRESENT DAY MONGOLIA

The Khitans occupied the eastern and central parts of present day Mongolia and they had established major settlements in this area. According to our recent knowledge they founded more than 150 cities in the steppes. The most important examples of these fortified settlements are in the valley of Kherlen (Kerülen) river in Eastern Mongolia, not far from Öndörkhaan in Khentij Aimag. The cities of the valley of Tuul (Tola) river in Bulgan aimag are prominent, especially the sites at Chin tolgoi balgas and Khar bukh balgas, which were built on the ruins of former Uyghur settlements. These fortified settlements and their remains were continuously used even after the fall of the Khitan Empire offering opportu-

nity to study the reuse of ruins in subsequent periods. For the defence of frontiers and control of the neighbouring nomadic population the Khitans built a series of forts in the valley of Tola and Kerülen Rivers, and parallel with these the agricultural population appeared in this area.





The plan of the mentioned fortified settlements is usually rectangular in shape, the surrounding walls are mainly oriented towards the cardinal points, and in most of the cases projecting quadrangular towers can be observed on the walls. The Khitans built these fortification walls by using a building technique well known in Northern China called 'hangtu' in Chinese. This technique is based on rammed earth: layers of soil were compressed together by ramming, resulting a structure solid as concrete in dry climatic conditions. Gates with a common in this period L-shaped protecting screen walls were erected at the middle section of each wall of the settlements. The inner parts of the fortresses were usually divided by two main streets, intersecting each other in

right angle, into four equal parts. Remains of buildings can be observed in shape of mounds or roof tile slides. The settlements in question are covering a great territory: their side-length is of 5-800 metres, while their ground-space is between 40 and 80 hectares. Chin tolgoi balgas is the largest amongst the Khitan forts, it reaches 80 hectares and consists two larger quadrangular areas. This settlement was identified as the city of Kedun by a roof tile inscription found on the surface. The city of Kedun was registered in Chinese sources, and was the administrative centre of the North-Western area called Zhenzhou.

THE PROJECT

The main focus of our work is not the study of single sites, but rather the environment of the fortified settlements. Topographical survey, aerial photography by using a drone and the 3D modelling of the acquired imagery play a great role in our research, as well as the mapping of archaeological features beyond the surrounding walls of the settlements including burial mounds, plough-marks, field boundaries, channels and pottery kilns. Khar bukh balgas, as the site studied by our project, belongs to the larger fortified settlements, and it is situated near the Khar bukh stream (tributary of the Tola river) in Bulgan aimag (province) 12 km from the neighbouring district centre, Dashinchilen. The ruins are located at the coordinates 47° 52' 249" N and 103° 53'

051" E, 1015 meters above the sea level at the middle reach of Khar bukh stream around 600 meters from its banks. The ruins are surrounded by the following landscape elements: to the east Borogchingiin bor tal, to the north the curve of Khar bukh stream, beyond that to the north Böörtolgoi, Böörlake, and from that point about 5 km away the mount Yamaat. There is a volcanic hill covered by rocks called Khüremts to the west of the walls which hosts the spring called Namuun flowing into the Khar bukh stream. The small hill called Khadaasan tolgoi is situated about 1 km away from the southern walls of the ruins.





KHAR BUKH BALGAS

Khar bukh balgas is surrounded by stamped earthen walls oriented to the cardinal directions. The walls are placed to form a square however they are not the same length on the eastern and northern sides, therefore the square is not well-proportioned. On its northern side the wall is 660 m long, 760 m on the east, 670 m on the south, while 690 m on west. Walls at present time remained at a width of 3-4 m, and at a height of 2-2.5 m. An earthen gate with L-shaped outer structure was opened in the middle section of each settlement wall. The corners were further strengthened with corner towers. Between the corner towers

and the middle gates further 3 or 4 square shaped towers were erected on each side. Within the walls the four gates were joint with roads running from N-S and E-W. These app. 30 m wide roads divide the inner area of the fortified settlement into 4 parts, within which remains of buildings and roof tile accumulations can be found. The outer wall is surrounded by a 3-3.5 m wide ditch with smaller side ditches run out. The main ditch gains its water from the Khar Bukh River, which arrives to the fortified settlement at its western gate. Within the settlement from the main road further hardly identifiable smaller paths are opened.



PREVIOUS RESEARCH

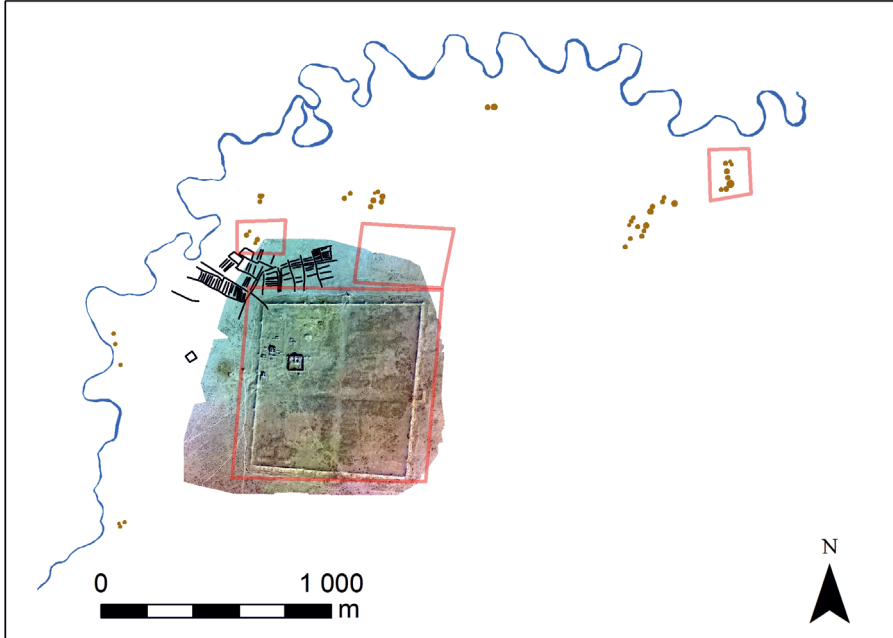
The remains at Khar bukh balgas were first studied by Russian researchers. The explorer of the Russian Geographical Society, A. Paderin studied the history and culture of the Orkhon river area in 1870 at the central part of Mongolia. It was him who along with his research fellows discovered the remains of Khar bukh balgas and published a description of it. In 1890 the research team led by N.M. Jadrincev prepared a plan of the ruins, while in 1909 the research team of J. G. Granö published images of the site. In 1833-34 the plan of the fortified settlement was also created by D. D. Bukinich from the Mongolian Academy of Sciences. In 1948-49 the famous Russian archaeologist, S. V. Kiselev also conducted research on the settlement and on Khitan period kurgans. In the 1970's the Mongolian archaeologist Kh. Perlee conducted research at the ruins of Khar bukh balgas and compiled a plan of the site. He further declared that the site can be dated to the Khitan period. Small scale excavations were led at that time by the team of Kh. Perlee and E. V. Savkunov at the buildings located to the NE part of the junction of the roads. In the valley of the Tuul river A. Ochir and L. Erdenebold

conducted excavations in 2002-2003 and 2011-2012, along which they also studied the later periods of the site.

Large number of ceramic remains came to light along with the excavation. Ceramics from Khar bukh balgas resembles in shape and style to those found at the Khitan period fortified settlement of Chin tolgoi which ensures its dating to the 10-11th century. Within the settlement large number of the so-called Khitan-decoration type (carved narrow lines) ceramics came to light which also supports the dating of the site. The potsherds found at the site have smooth surface and mostly created on pottery wheels with decoration and splayed rim. According to the finds it can be concluded that these were mainly large vessels, in which airag (fermented horse milk), wine, grain, rice etc. were stored. The wall of the potsherds are app. 0.2-0.4 cm.

KHI-LAND

According to the observations the site can be considered to be a Khitan period settlement and a large number of further archaeological features can be detected at the site and at its vicinity. Remains of a pottery kiln were detected 35 m far from the NW corner of Khar bukh balgas at the eastern bank of Khar Bukh River. Most probably the water was used in the cooling process of ceramics. Remains of agricultural work in the form of small ditches and millstones can also be observed around the walls of the fortified settlements. Further buildings within the walls are verifying the idea that the population was involved in agriculture.





In the 16-17th century a Buddhist monastery was built between the walls. Buildings of the monastery were made by ashlars, and remained standing at 2-3 m height. The stupa, built onto the outer part of the northern gate also belonged to the monastery. The monastery included several buildings. Within its centre a 60x60 m large enclosed area bounded the 26x18 m large sanctuary. Excavation within this building resulted a large number of artefacts in connection with religious activities as Buddha depictions, textile- and metal remains. A peculiarity of the excavation that manuscripts were also found within the remains preserved in very good conditions.



KHI-LAND



NOMADIC LIFESTYLE

Predecessors of the Mongols has lived nomadic lifestyle for thousands of ages, as a fundamental style of their living. They are closely related to this lifestyle, their traditions and culture adapted well to this way of life. One would think, that people living a nomadic life are not familiar with the life in stable settlements, but this assumption is not right. They had continuous trading connections with the towns and the two different types of cultures had their imprints on each other. In this relationship they not only copied the habits of the agricultural people, but also shaped it according to their own needs and developed it in unique ways. The towns of the nomads are a good example of that.

It is often told in the research history, that

the nomadic people followed their herds to the lands rich in grass and water, and they were moving as the migratory birds and did not accept the settled lifestyle. However this assumption can be challenged by our site, the Khar bukh balgas. It is a good question for the future research to determine the scale of urbanisation at the site and to reveal how it was connected to the nomadic lifestyle. One of the largest challenges of our project is to understand this relationship between the site and its environment.



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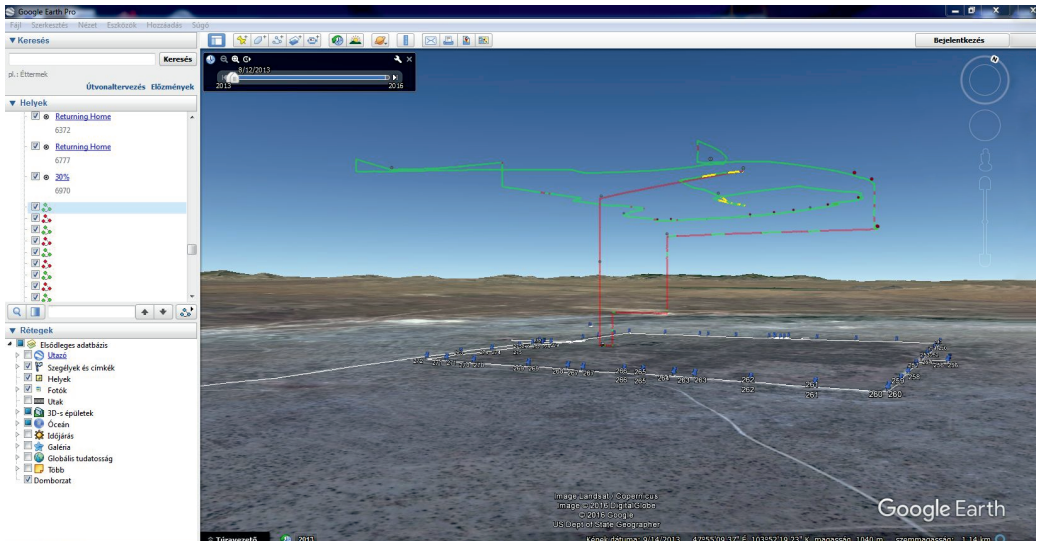


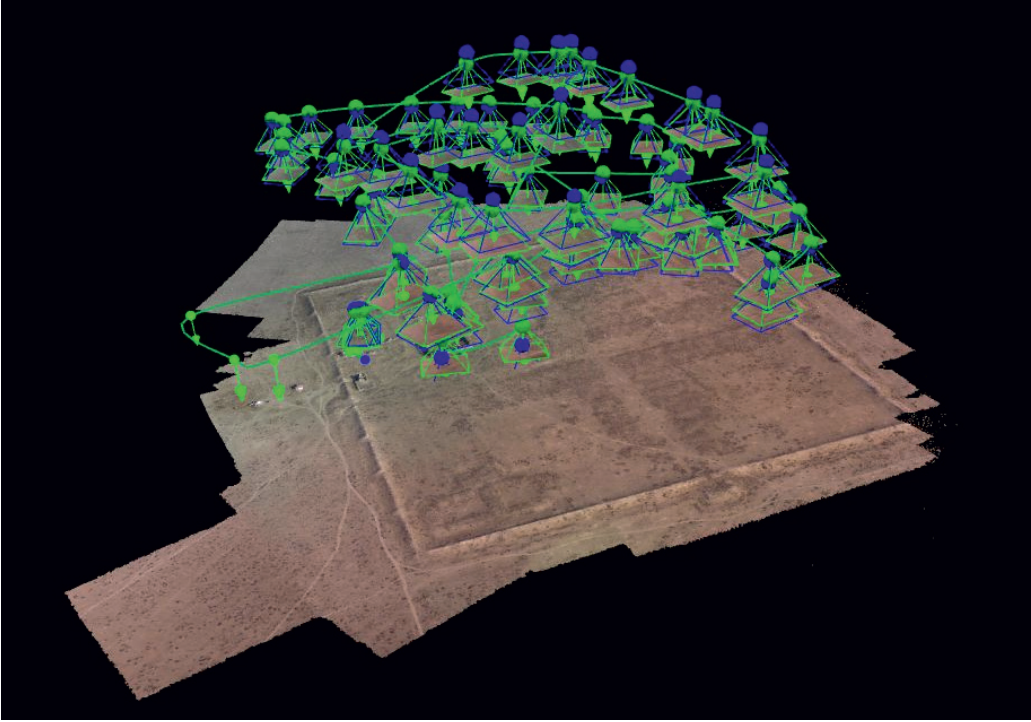


confirms the usability of the method. We ensured more than 70 % overlapping between the images, which is crucial for the 3D model creation. We achieved that at the 90% of the flight area the number of overlapping images is 5 or more. This also means the each and every point was determined with the use of 5 different images, which ensured the appropriate quality.

MEASUREMENT METHODS

Five of our team visited the site at the end of October 2016, where we determined the position of the walls with handheld GPS, and made aerial photographs with DJI Phantom 3 Standard drone. For these flights we prepared flight plans in advance. In 2016 we covered a 1 km²-large-area, as a result of which 100 images were appropriate for further analysis. This meant 90% efficiency which





During the image processing we determined the 3D coordinates of more than 500 000 surface points. The main aim of the drone flight was the creation of a 3D model of its surface. The resulting point cloud is appropriate for a more detailed mapping and analysing of the features and their geometric relations. Images were taken in WGS84 projection system, as the exif files of the aerials store GPS coordinates. This also helps in their localization within a GIS system. Image processing was conducted in Pix4D, which besides point cloud generation also suitable for orthophoto rectification. Orthorectification is essential from a geodesic point of view, to create images which are suitable for measurements and

make a more elaborate and detailed map than it was previously available. A further result of the data acquisition is that we can gain more information on the surrounding walls of the fortified settlement and its cross-sections.

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The real 3D model of the fortified settlement provides excellent basis for further digital reconstructions.

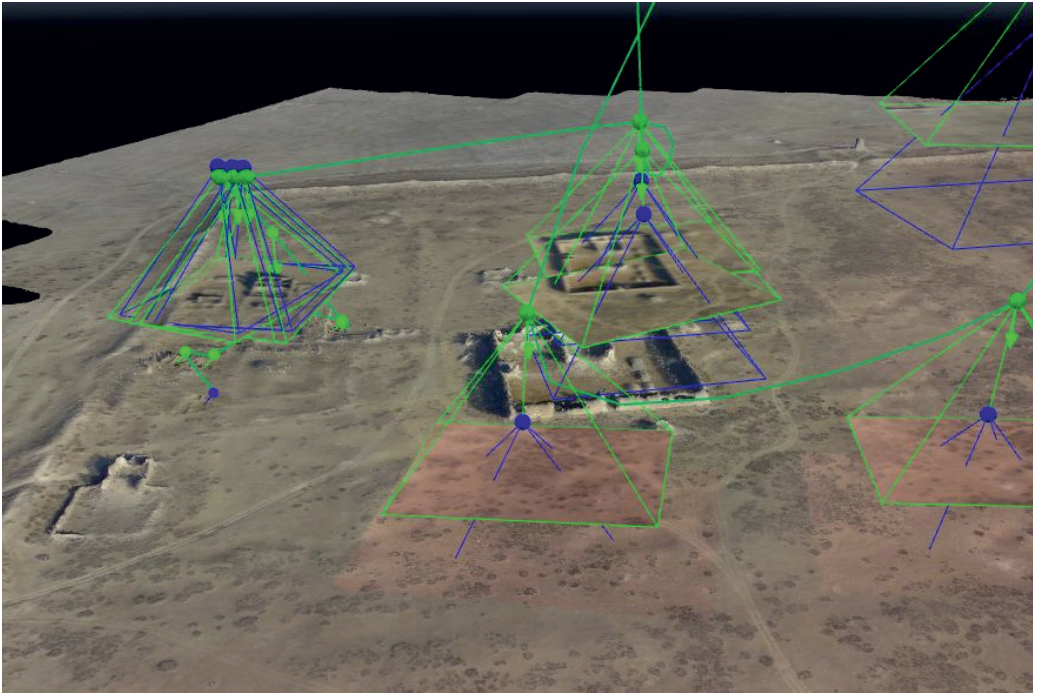


GIS

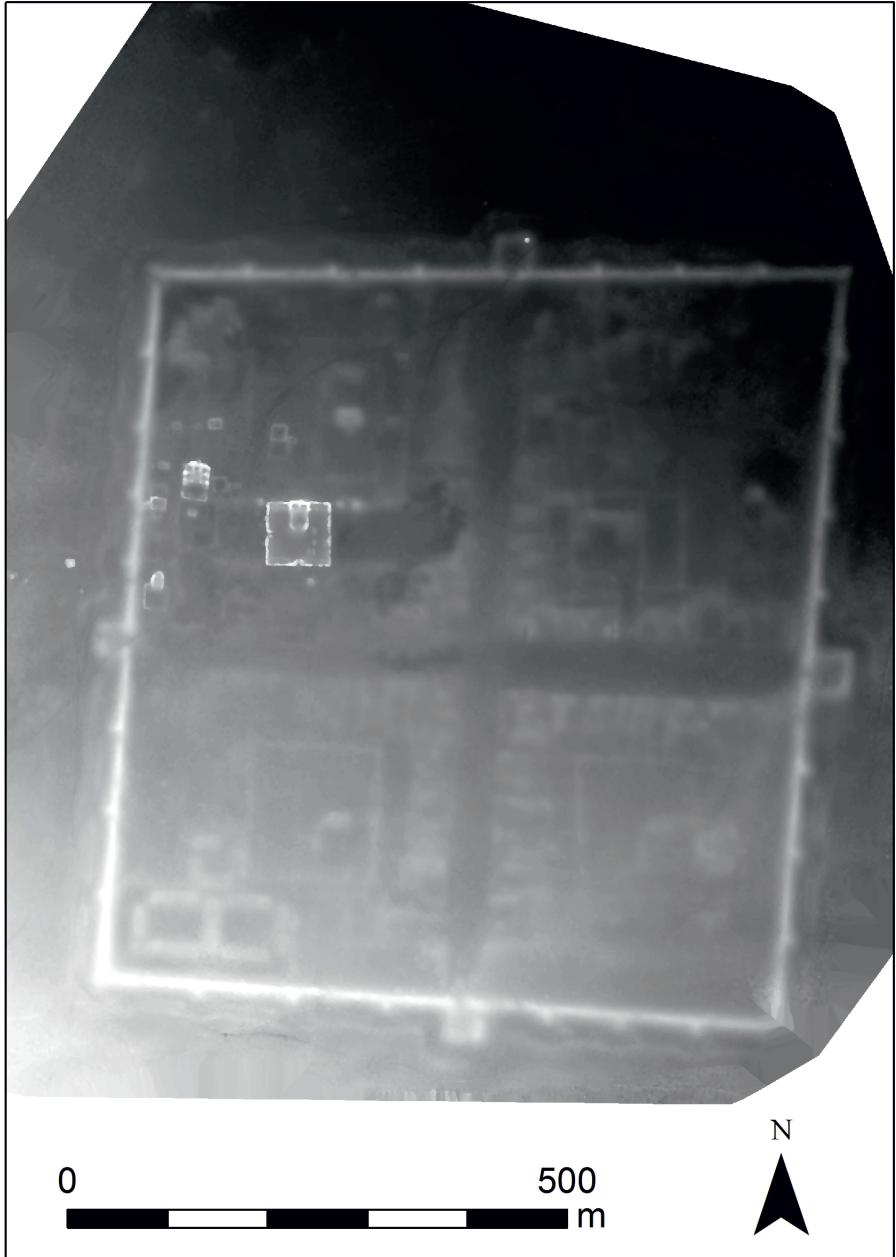
Data gathered on site is processed within GIS environment. GIS system enables us to analyse various source data in a complex way. With the help of GIS the datasets acquired with different methods (UAV, total station, GPS, aerials) at different times can be studied and interpreted together with each other. Stepping from one layer to another helps in the interpretation process.

Our system based on the orthophoto and 3D model derived from the aerials. The whole system was created in WGS84 UTM48N coordinate system. A detailed map of the fortified settlement is the result of the vectorised images. The

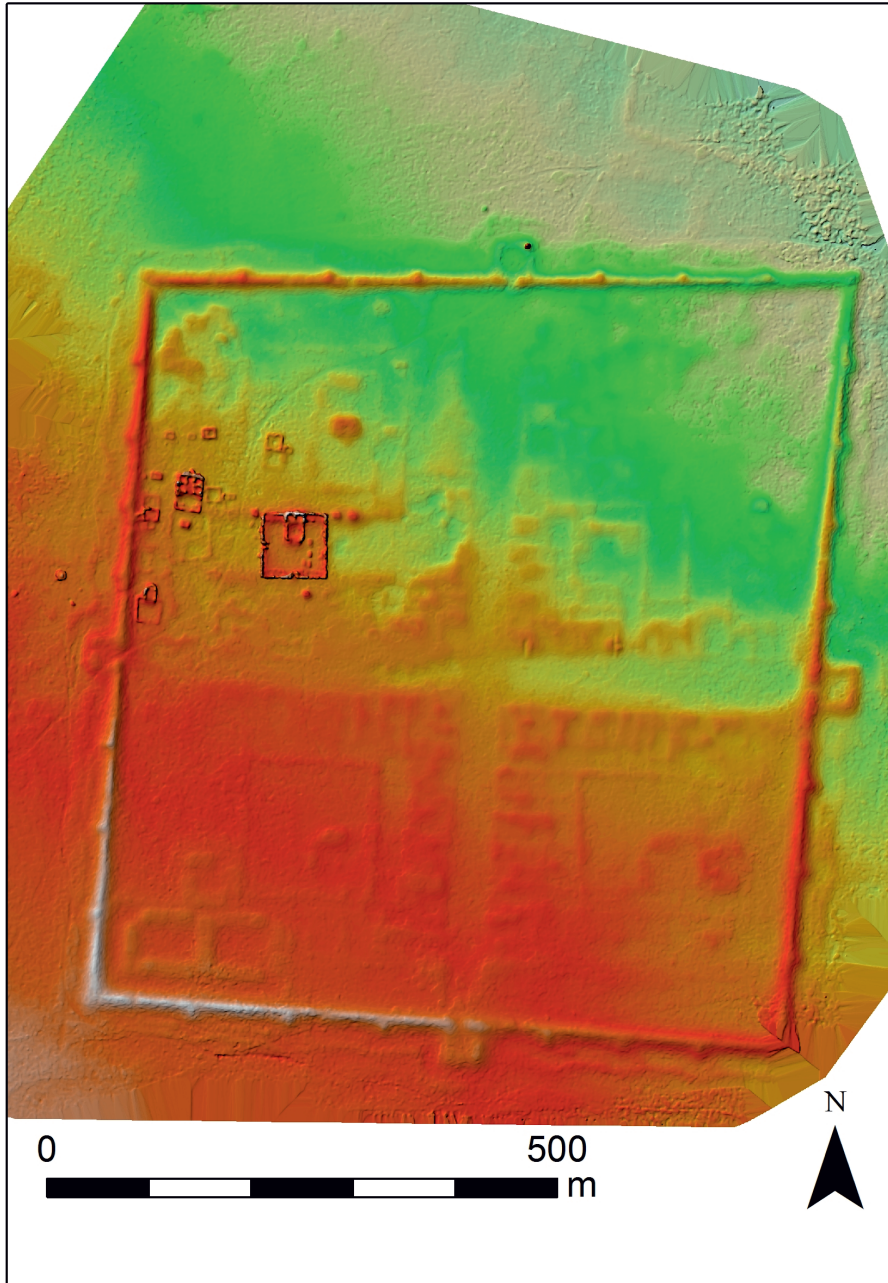
buildings in the area within its surroundings can be mapped with the help of remote sensing images. We detected linear and circular features in the area enclosed by the river, from which we also made vectorised datasets. We are planning future flights on the areas of the features detected on remote sensing images.



KHI-LAND



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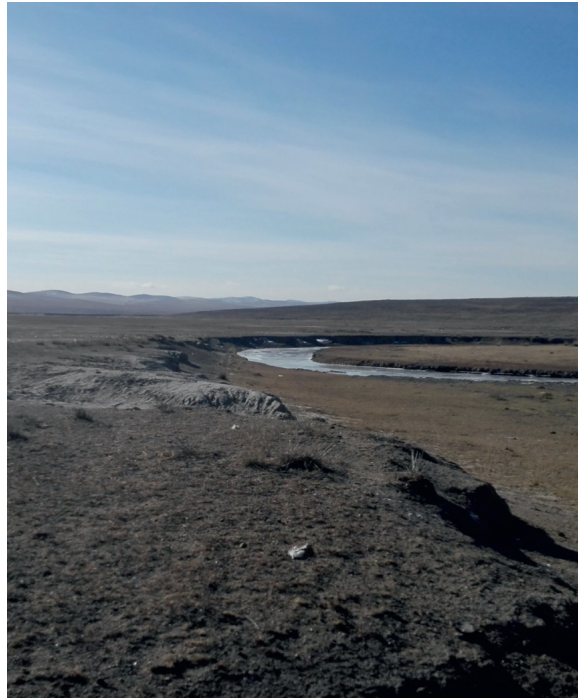
THE NEXT PHASE OF THE PROJECT

In our next field season we plan to confirm the existence of the detected features with field measurements. For that we visit the features signed in the vector datasets with Garmin GPS.

Garmin GPS with its 5 m accuracy is appropriate for positioning and measuring waypoints. The stored data can be exported and inserted easily to GIS. This accuracy is appropriate for us in mapping the places of archaeological interest, but it is not suitable for precise discrete point measurements. This will be conducted with Leica total station, which provides millimetre accuracy in geometry. As a first step we create a coherent geodesic base point net, which is appropriate both in horizontal and vertical meaning for field engineering requirements. The base points will be fixed on site for the duration of the project, ensuring us to

have our measurements in the same coordinate-system. Along the geodetic measurements we also store the extents of the significant ceramic concentrations and map them on a general plan.

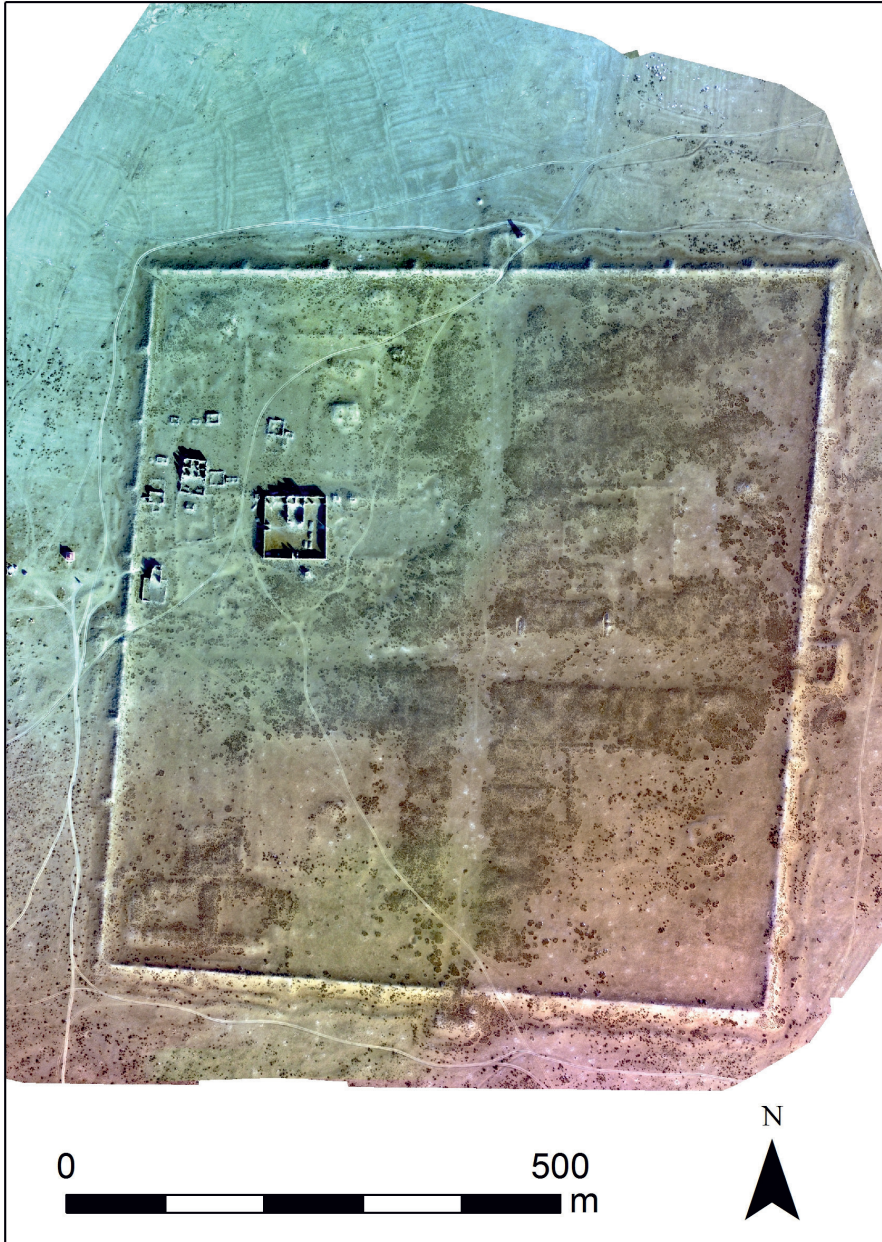
As a next step we plan to conduct detailed survey to supplement the 3D model created based on drone images at points where we faced overlapping problems. We have upgraded our drone from a DJI 3 Standard drone to an Advanced version and also we plan to use different flying programs as Litchi and Dronedeploy.



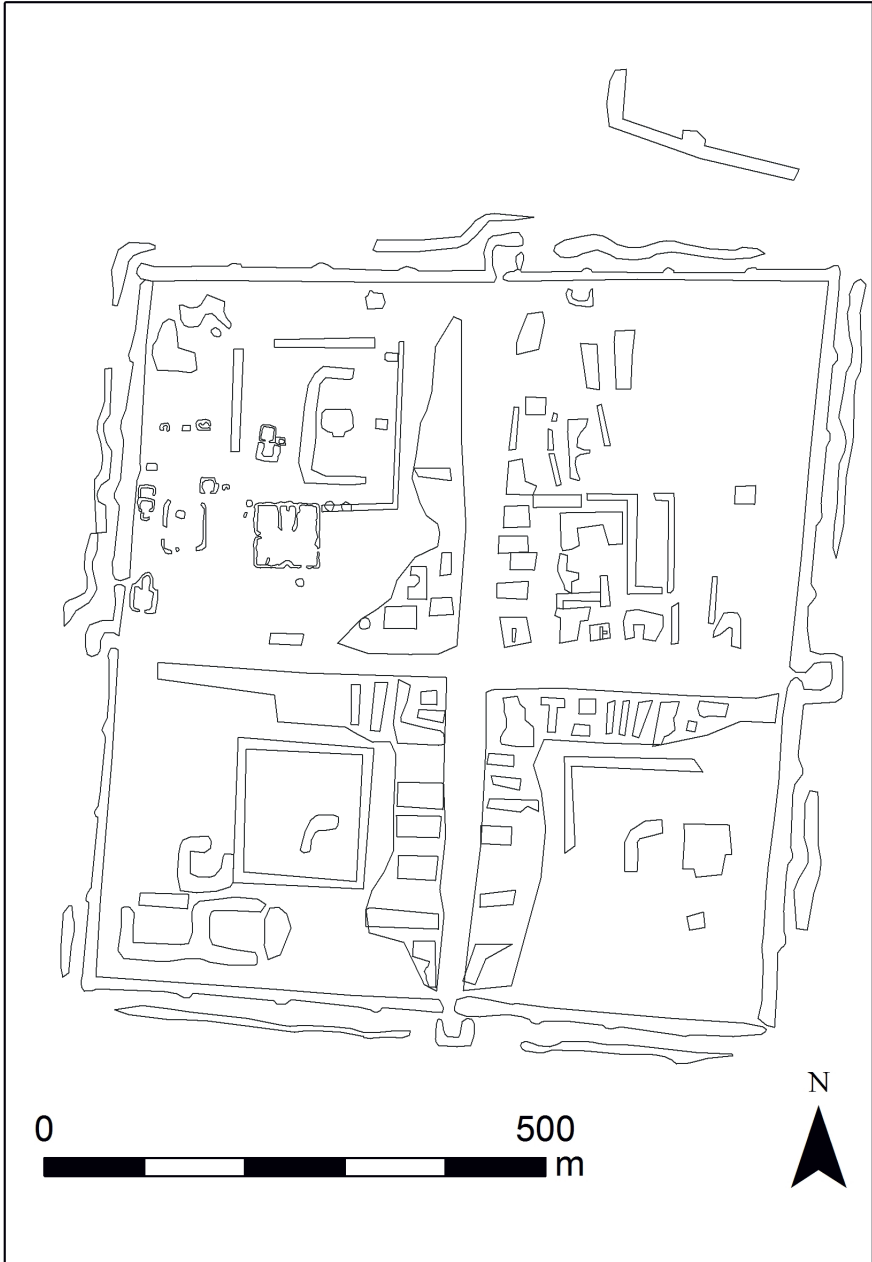
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In May 2017 we will return to the field. Based on our previous experience we will open up our project and begin the detailed topographical measurements of the settlement and its surrounding, and we will take a new set of aerial photos. However, for our research it is more important to observe the features detected on the aerial photos and on the remote sensing images outside of the fortified walls. These agricultural land remains are located between the wall and the stream in small, irregular parcels, and we will also visit two larger accumulations of mounds which likely can be identified as gravemounds. Besides these we will also visit the smaller, oblong-shaped bounded area at the northern sidewall of the settlement. All these remains, the imprints of the once lived people could provide new information on the life of the settlement presently hidden under the earth. Khar bukh balgas and its surroundings however raise further questions as well. Can we consider this settlement as the result of urbanisation process? Where were the real boundaries of the habitants' activities? What was the relationship like between the settled habitants and the surrounding nomads? What was the role of this settlement in region? Why did the settlement cease to exist? However, to answer these question several years of research are needed.

