Quantifying Ritual Funerary Activity of the Late Prehistoric Southern Kanas Region (Xinjiang, China)

Gino Caspari

ABSTRACT

Identifying peaks in anthropogenic activity in a landscape is an important starting point for understanding past social dynamics in the *longue durée*. Through intensive surveys and remote sensing surveys of the Heiliutan Basin (Heiliutan Dacaoyuan 黑流滩大草原) in the southern Kanas Region (Kanasi 喀纳斯), Xinjiang, China, a high-resolution dataset for over 4000 years of material culture is established. The complete coverage of the area of interest allows for the quantification of ritual funerary activity based on the number of constructed monuments per century. The data show that the intensity of ritual funerary activity was very low and only left marginal traces in the landscape from the Eneolithic Age to the Late Bronze Age. During the Early Iron Age (ca. 850–200 B.C.E.), the basin became a center for construction of burials for social elites of nomadic tribes and the area was rapidly transformed into a landscape of the dead. The Late Iron Age (starting ≈200 B.C.E.) saw a decline of ritual funerary activities in the basin as it became an unimportant side scene to the cultural developments of the wider region.

Keywords: landscape archaeology, archaeological remote sensing, funerary activity, Dzungaria, Xinjiang, Bronze Age, Iron Age, Scythian.

INTRODUCTION

Few detailed, large-scale archaeological surveys of the landscape have been conducted in Xinjiang. Our knowledge of the macroregional distribution of material remains is extremely limited despite the obvious importance of Xinjiang for answering questions relating to early Eurasian transmission processes and cultural dynamics along the prehistoric "Silk Road(s)" and "Inner Asian Mountain Corridor" (Frachetti 2013; Frachetti et al. 2017; Kuzmina 2008). Most available datasets, including those from the *Xinjiang Weiwu'er Zizhiqu Disanci Quanguo Wenwu Pucha Chengguo Jicheng* 新疆维吾尔自治区第三次全国文物普查成果集成 [Compendium of the Third Xinjiang Uyghur Autonomous Region Cultural Relics Survey, XIA 2011], lack the detail, in terms of spatial and chronological accuracy as well as archaeological documentation, necessary for landscape archaeology analyses. If available at all, most archaeological maps of the region

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are of insufficient quality to be used for spatial analyses on a regional scale. For example, the hand-drawn, bare-bone depictions of geographical contexts published by the journal *Xinjiang Wenwu* 新疆文物 (a major source of maps of the area) provide little accurate information on the position and shape of monuments or important supporting data such as topography and coordinates. When it comes to investigating the diachronic relations between different architectural remains, the intensity of usage of particular landscapes over the course of Xinjiang's prehistory, or even the importance of a particular landscape to the people of the past, current data are unreliable.

The approaches to surveying in Xinjiang that have been employed in the past have been rather selective and tended to focus on narrow time periods, a single type of monument, the immediate surroundings of known sites, or easily accessible areas. Some archaeologists seem to have applied a "cherry-picking" methodology when selecting sites for documentation. Such approaches create manifold biases and potentially obscure the existence of entire categories of monuments. They also do not allow for the assessment of human–environment interactions over the *longue durée*, which is important for answering macrolevel questions related to past climate shifts, the impact of human activity on the landscape, and the significance of social change on the environment. More holistic approaches toward the archaeological survey, long established in other areas, are in dire need in Xinjiang (Barker and Lloyd 1991; Bourgeois et al. 2004; Grzymski 2004; Potter and Stoddart 2001).

The Dzungaria Landscape Project was established in order to start addressing this gap in the archaeology of Xinjiang by collecting data on the archaeological heritage of the southern Chinese Altai Mountains and adjacent steppe and desert zones. Efforts have been made to systematically document the archaeology of the region and provide a quantitative spatial overview of the diachronic cultural development of late prehistoric northern Xinjiang. This article provides the first overview of the late prehistoric cultural heritage of the Heiliutan Basin (Heiliutan Dacaoyuan 黑流滩大草原) in the southern Kanas Region (Kanasi 喀纳斯). The Area of Interest (AOI) was covered through a series of remote sensing surveys (Balz et al. 2016; Caspari et al. 2014) and intensive field-walking (line-walking) from 2013 to 2016 with the main on-ground survey occurring in 2015 (Caspari, Plets, et al. 2017).

Only through the systematic documentation of the surviving material remains can we develop an understanding of the importance of a particular landscape over the *longue durée*. This article provides insight into the diversity of monuments that can be found in the Heiliutan area and a quantitative measure of anthropogenic activity through different stages of Xinjiang's late prehistory. Quantifying ritual funerary activities throughout a wide chronological range grants insight into the changing foci of ritual landscape use among different broadly defined material cultures. Identifying peaks of anthropogenic activity in specific locations over a larger area could eventually allow us to see shifts in geographic preferences among these different material cultures and understand the reasons for and effects of changing human impacts on a particular environment. For now, the data presented here show a peak in the construction of funerary monuments in the Early Iron Age with changing cultural influences from northern Altai and the Semirechye.

ENVIRONMENTAL CONDITIONS OF THE AOI

The AOI is the topographically isolated Heiliutan Basin, located in the southernmost part of the Chinese Altai Mountains (A'ertai shanmai 阿尔泰山脉). This open basin

measures roughly 200 km^2 and lies between the altitudes of 1150 and 1300 masl in an area of rich steppe vegetation (Fig. 1). It is surrounded by mountain ranges reaching altitudes of up to 2000 masl to the north and south, from which flow numerous mountain rivulets. Within the broader landscape of the southern Altai, the basin connects the lower plains around Burqin County (Bu'erjin Xian 布尔津县) with the heart of the Altai Mountains. In the east, two mountain passes lead to lower fertile flatlands. Pathways through adjacent valleys connect the north to the large Lake Kanas (Kanasihu 喀纳斯湖), whose headwaters are sourced close to the high mountains and archaeologically rich Ukok Plateau in Russia. In the west, another mountain pass provides a passage through a series of valleys in the direction of present-day Kazakhstan (Fig. 2).

The AOI lies on the border between two vegetation zones. Due to the region's continental climate, the vertically structured vegetation zones are dominated by hot summers and cold winters (Klinge et al. 2003:299). Whereas the valley floor is a steppe landscape providing ample resources for livestock, some of the side valleys show alpine vegetation. Winter in the AOI is harsh with a lot of snowfall. According to local residents, snowfall has increased since the 1960s and 1970s, when it was still possible to have winter camps in the area. Nowadays, the snow is usually too deep for livestock to plow through to access the grass underneath. Most people now spend winters down in the Dzungar Basin. Dzungaria (Zhunge'er Pendi 准噶尔盆地) and the southern Altai are climatically dependent on humidity-carrying westerlies since the influence of the Asian monsoon does not reach into arid Central Asia (Chen et al. 2009; Chen et al. 2008). The highest peaks of the Altai mountain range to the north of the AOI block

Fig. 1. Steppe landscape of Heiliutan Basin [*heiliutan dacaoyuan* 黑流滩大草原] (photo by Gino Caspari).

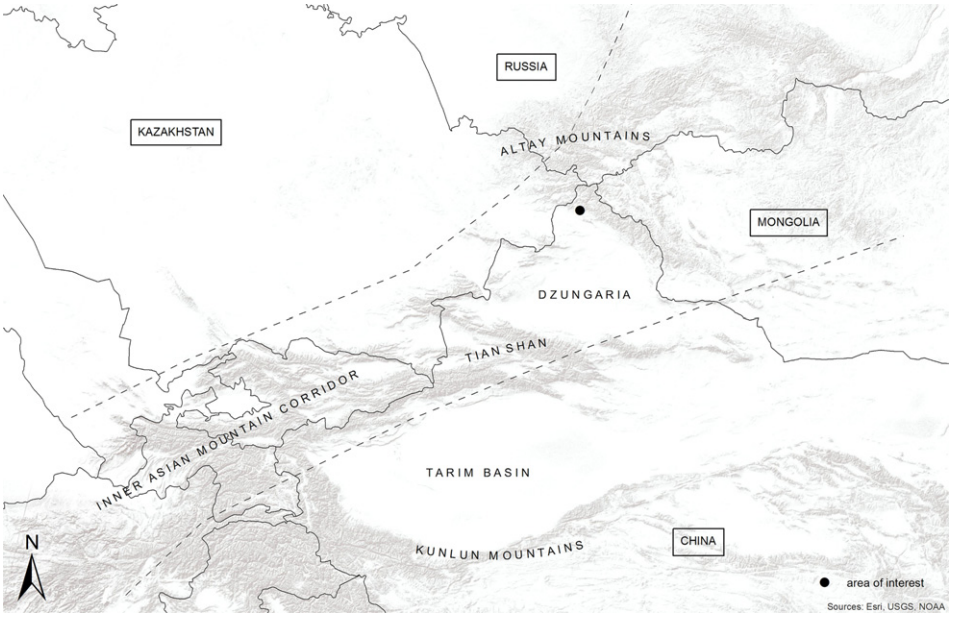

Fig. 2. Location of the AOI within the broader geography of Central Asia (map by Gino Caspari).

clouds from moving across the plain, so the basin and foothills receive more precipitation than the adjacent flatlands.

FIELD RESEARCH METHODS

Prior to intensive ground survey, a series of systematic remote sensing surveys of the AOI was conducted. Accessibility is a major issue in Xinjiang; therefore, remote sensing is an extremely valuable tool for survey planning and understanding the cultural heritage of restricted areas such a military border zones (Caspari, Plets, et al. 2017). High-resolution optical satellite imagery and Synthetic Aperture Radar (SAR) were used to generate the first detailed archaeological maps and digital elevation models of the AOI. The high-resolution optical data IKONOS-2 (0.82 m panchromatic, 3.28 m multispectral) and WorldView-2 (0.46 m panchromatic, 1.85 m multispectral) were provided by the Digital Globe Foundation. Corona imagery from U.S. spy satellites of the 1960s and 1970s was acquired to gain insight into agricultural land use of the last century, which has had a heavy impact on archaeological surface structures in the AOI. Terra-SAR X data StripMap, SpotLight, and staring SpotLight data were provided by the German Aerospace Center. To facilitate the mapping of archaeological monuments over large geographical areas, machine-learning algorithms were employed and developed further (Caspari et al. 2014; Caspari and Crespo 2019).

Due to the difficulties of accurately establishing monument categories and the potential of false positives based on remote sensing data, only data points from on-ground surveys were used for the following broad statistical analysis. The ground survey project was set up as a collaboration between the Chinese Academy of Natural Sciences, University of Wuhan, and University of Hamburg under the name

"Dzungaria Landscape Project." The survey was led by the author with support from Fu Bihong and Timo Balz.

The intensive ground surveys focused on visible architectural surface structures, that is, "monuments." We define monuments as spatially distinct architectural objects built from stone or soil. For the survey, we focused on the primarily ritualistic and funerary purpose of these archaeological objects and excluded other architectural remains used for domestic or agricultural purposes. A wide range of research has expanded and elaborated upon the changing meanings, uses, and reuses of monumental structures, including among others as territorial markers (Renfrew 1973), emanations of power of their creators in terms of architectural energetics (Abrams and Bolland 1999), or places of memory and memory destruction (Osborne 2017). We consider "costly signaling" theory, as suggested by J. Wright (2017), as a possible explanatory model for the patterns we see in the data further down.

An intensive survey of the AOI, especially in areas where remote sensing surveys had not shown any monuments, ensured that the dataset would be as representative as possible of the situation observable on the ground. Artifacts were not recorded since there were usually no surface material finds associated with the monuments. The survey team relied upon GPS, photography, drawing, and, in some cases, 3D-modeling to generate detailed maps and document the structures' characteristics and state of preservation. Each individual monument received an ID starting with a two-letter code for the survey region (i.e., HT), a three digit code representing the site, and a three digit code for the monument itself.

Due to the great number of different transliterations and translations of Russian, Kazakh, Mongolian, and Chinese words, archaeologists are far from having a unified terminology for monuments in the steppe (Gheyle 2009:168–169). With the exception of the terms "*kurgan*," "*khirigsuur*," and "*ogradka*," which are well-established archaeological categories in the literature of Inner Asia, it seemed reasonable to use a descriptive terminology as much as possible. Each monument category is defined at the beginning of the pertinent subsection under the Results below.

After the completion of the field research, unexcavated monuments were compared to excavated and dated structures in the region to generate hypotheses as to their probable dates. A rough date could be provided for a surprisingly large number of structures based on their morphological parallels with excavated sites. Although most monuments are well-preserved and the dating is likely to be accurate, the chronology derived from this method should be seen as tentative until more excavations can be conducted. However, according to personal communications from Jian Yu (10 October 2016), the archaeologist responsible for overseeing work in Burqin County in October 2016, an excavation by the Xinjiang Institute of Archaeology (XIA), has confirmed one case by excavating a burial mound and finding Early Iron Age items.

RESULTS

Over a thousand monuments (1052 total) were recorded through ground and remote sensing surveys conducted between 2013 and 2016. The straight white line bisecting Figure 3 indicates the western limit of the AOI, beyond which access was restricted by the Chinese military border control. Sporadic visits to the area were possible, but no intensive surveys were conducted there. All data about the sites west of the line were obtained only from high-resolution optical imagery. The jagged white line to the west

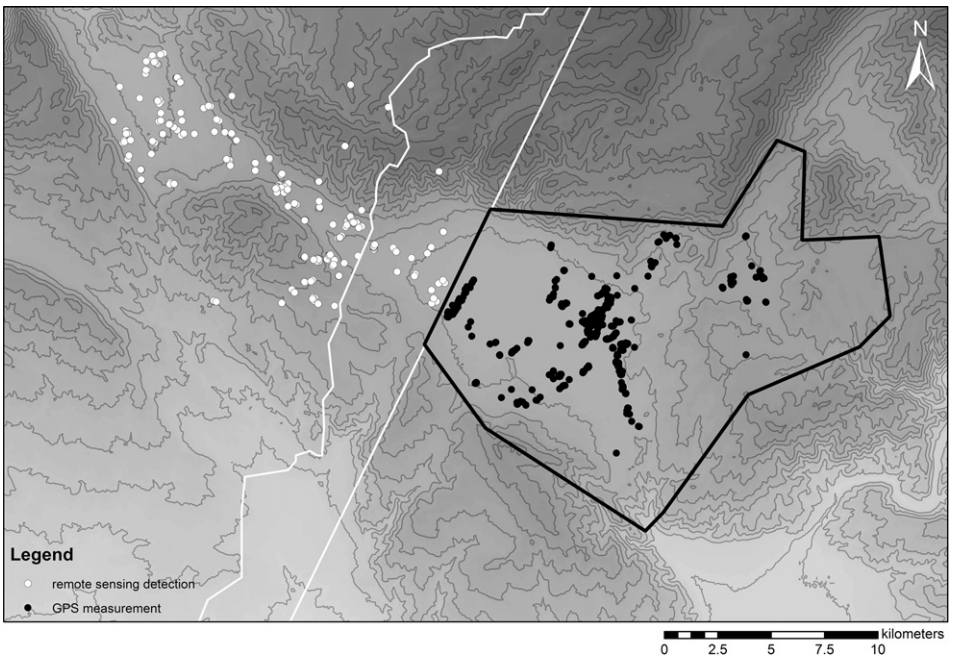

Fig. 3. Location of AOI in the Chinese Altai Mountains, showing locations of remote-sensed sites (white dots) and ground surveyed sites (black dots) (map by Gino Caspari).

marks the border between Burqin and Kaba (Habahe 哈巴河) counties. The straight white line was arbitrarily set by local authorities and we were not allowed to cross it. The white line enclosing the mapped monuments denotes the area we surveyed on ground. Only monuments that were surveyed on the ground are used in the following analysis (i.e., sites marked with black dots to the right of the prohibited access line).

The largest category of recorded monuments ($n = 182$) comprises remains that cannot be dated based on morphology. These are mainly burial mounds that lack distinctive datable features or association with datable archaeological structures and therefore cannot be attributed to a certain time period. The cultural affiliation of the many small oval stone burial mounds ($n = 172$) is also unclear; some of them might date to the Late Iron Age, while others date to the Turkic period (552–745) or later. Stone kurgans dated to the Early Iron Age, known as the "Scythian" period, make up the largest datable category. A total of 149 burial mounds from this period have been documented. The total number will likely increase once excavations are conducted, since no date can yet be assigned to many of the isolated mounds. The second category of earthen Early Iron Age *kurgans* finds its closest parallel in the Saka mounds of Semirechye and Ili (*yili* 伊犁) Valley (Gass 2011, 2014). These impressive mounds of up to 6 m in height are surrounded by circular ditches; they are by far the most visible structures in the AOI.

The Turkic period is represented by 32 memorial structures, the ritual enclosures known as *ogradki*. Many stand-alone stone mounds might also date to the Turkic period. Relatively few structures resembling *khirigsuurs* (11) can be dated back to the Late Bronze Age. A variety of subsidiary smaller structures including stone circles

(104), stone platforms (14), and stelae (125) can be found on the peripheries of larger monuments. With an outline similar to that of the foundations of domestic architecture, stone settings dubbed "dwellings" are found in association with monuments of different time periods. Open stone cists (15), which are structures half exposed on the ground surface as four slabs, can be associated with a number of steppe cultures and need further analysis.

Khirigsuur

The term *khirigsuur* is applied to a number of highly varied monuments that yet bear striking similarities. All monuments in this category have a central mound built from rocks and larger stones. The mound is flat-topped and has a circular or square fence built around it. Sometimes radial lines, referred to as "spokes" or "rays" in the literature, connect the fence to the central mound (Bourgeois et al. 2006; Fitzhugh, 2011). A total of 11 such structures are found in the AOI, all well-preserved or at least without traces of direct anthropogenic destruction. The average diameter of these *khirigsuur* monuments is 15.03 m (median 15.15 m). The average diameter of the fences is 28.35 m (median 22.85 m). These are relatively small *khirigsuur* monuments compared to others in the Chinese (e.g., at Sandaohaizi 三道海子) and Mongolian Altai (Frohlich et al. 2008; Wright 2012:151). The average height of the monuments surveyed in the AOI is a mere 0.35 m, making it difficult at times to spot these structures in areas with higher vegetation.

Most of these *khirigsuurs* belong to the type with fences occurring in single or double concentric circles. Only one khirigsuur (HT030001) had a square fence. HT030001 measures 32.0 m by 32.2 m. The central mound has a north–south diameter of 23.0 m and east–west diameter of 24.0 m. Clear parallels for *khirigsuurs* with either circular or square fences are found in the Mongolian Altai (Allard and Erdenebaatar 2005:547–563; Wright 2007:350–365) and Russian Altai (Bourgeois et al. 2004:10; Bourgeois et al. 2006:167–179). The structures are relatively simple. Based on the most recent ^{14}C analyses from Mongolia (Allard and Erdenebaatar 2005:551), both types can be dated to between the 1500 and 700 B.C.E. Usually, a date in the Late Bronze Age is assumed.

"Scythian" Kurgans

The term "*kurgan*" is Russian. It refers to a tumulus in the archaeological context regardless of cultural or temporal attribution. Monuments marked as "Scythian" *kurgans* during the field survey show the following characteristics. The mound is relatively flat and consists of round or broken stones 5–20 cm in size. Such mounds have indentations at the center of the top, which appear to have been caused by the collapse of central wooden grave chambers under the stones.

Scythian-type *kurgans* often align in an approximate north–south direction more or less parallel to other monuments of their type. They all date to the Early Iron Age (ca. 850–200 B.C.E.) and are likely to be affiliated with the Pazyryk Culture (most of these monuments would thus date to the late Scythian phase, ca. 450–200 B.C.E.). In many cases, the mounds show extensive traces of looting, focused mostly on the central burial chamber (Caspari 2018). Except in severe cases, looting does not change the form of the monument so greatly as to make it unrecognizable.

A total of 149 Scythian *kurgans* were identified during the survey. Their preservation condition varies considerably. On the valley floor, agricultural experiments in the 1950s and 1960s have led to the destruction of many monuments. On slightly steeper slopes, most Scythian *kurgans* are in pristine condition. The average Scythian *kurgan* in the AOI has a diameter of 9.6 m (median 9.0 m). Only a handful of *kurgans* have diameters larger than 20 m. Most (96.6%) are substantially smaller. All these mounds are relatively flat and usually not higher than 50 cm.

The Scythian *kurgans* of the AOI are comparable to monuments found in the northern and western Altai Mountains, including at Katun Valley (Kubarev 2001:127–128) and the Ukok Plateau (Polosmak and Seifert 1996:89–91). They may also be compared to the smaller *kurgans* of Berel' and Tar Asu (Samashev et al. 2002:237–248). In the summer of 2013, archaeological investigations were conducted by the Xinjiang Institute of Archaeology (XIA 2014) a few kilometers north of the AOI at the southern end of Lake Kanas. One of the *kurgans* (M5) excavated there measured 10.5 m in diameter but was only 45 cm high. Its rectangular grave chamber was 1.9 m deep. At the bottom of the pit, a chamber was built from larch logs. The buried adult female was in a flexed position on her right side, her head facing east. Burial goods included a knife, earrings, and fragments of gold foil possibly from a decayed headdress. A ceramic vessel was placed at the feet of the deceased and what is often described as meat offerings of sheep or goat were also interred (Parzinger 2004:47). Between the northern wall of the pit and the log chamber, a horse skeleton was found with an intact bridle in its mouth. Similar burial assemblages could be expected for most of the Scythian *kurgans* in the AOI. Few areas in the Russian Altai in which archaeological surveys have been conducted have yielded Early Iron Age *kurgans* with a diameter of more than 20 m (Gheyle 2009:180). However, we found five *kurgans* with diameters of over 20 m. In addition to their size, the abundance of burials, stone circles, and stelae on the periphery sets these monuments apart as burials of the elite (Caspari et al. 2019). Parallels may be drawn with the large, so-called "princely" tombs of Pazyryk, Tuekta, Bashadar, Karakol, and Berel' (Gryaznov 1969; Rudenko 1970; Samashev 2007). The presence of five large kurgans suggests that the AOI was an important funerary location at the macroregional scale of the mountain range during the Early Iron Age.

Of the five big tombs we mapped, HT001020, with a north–south diameter of 28.0 m and east–west diameter of 29.5 m, was the most extravagant Scythian *kurgan* in the AOI (Fig. 4). The center of the *kurgan* shows an extensive shallow indentation indicative of a large burial chamber. It looks as if attempts were made to loot the burial in the past, but since deep ditches at the center of the kurgan are absent, the chamber might still be largely intact. The flat mound was built from rubble from the mountains surrounding the basin. A stela was erected in the western part on top of the monument. A double row of slanted slabs forms a circle around the *kurgan*. This architectural detail can be found in other Early Iron Age *kurgans* such as Kurgan 18 at Berel', which displays a single ring of slanted slabs (Samashev et al. 2002:246). Two smaller *kurgans* (5.3 m and 6.2 m diameters) built north of the monument might also date to the Early Iron Age. A small stone circle (3.3 m diameter) lies east of the burial.

Out of all the mapped Early Iron Age structures, the Kurgan HT001110 has the widest periphery (Fig. 5). With a north–south diameter of 28.6 m and an east–west diameter of 26.1 m, the burial is only a little smaller than HT001020, but it is badly preserved due to extensive looting. To the west of the *kurgan*, a semicircle of stone

Fig. 4. *Kurgan* HT001020, 28.0 m N-S diameter × 29.5 m E-W diameter (photo by Gino Caspari).

circles was constructed that makes HT001110 comparable to some of the large burial mounds of Uyuk Valley (Caspari et al. 2019). This configuration is also well known from sites ON-022 and ON-042 in Karakol Valley, where princely graves are often accompanied by stone circles laid out in rows (Gheyle 2009:184). In many cases, the circles are constructed so closely to each other in a line that it is difficult to distinguish individual circles. In the case of Kurgan HT001110, there are more than 70 small stone circles lined up to the west of the burial mound in a semicircular fashion. It is entirely possible that these stone circles contain remains of animal bones or charcoal, as has been observed in stone circles dating to the Late Bronze Age. It would be interesting to

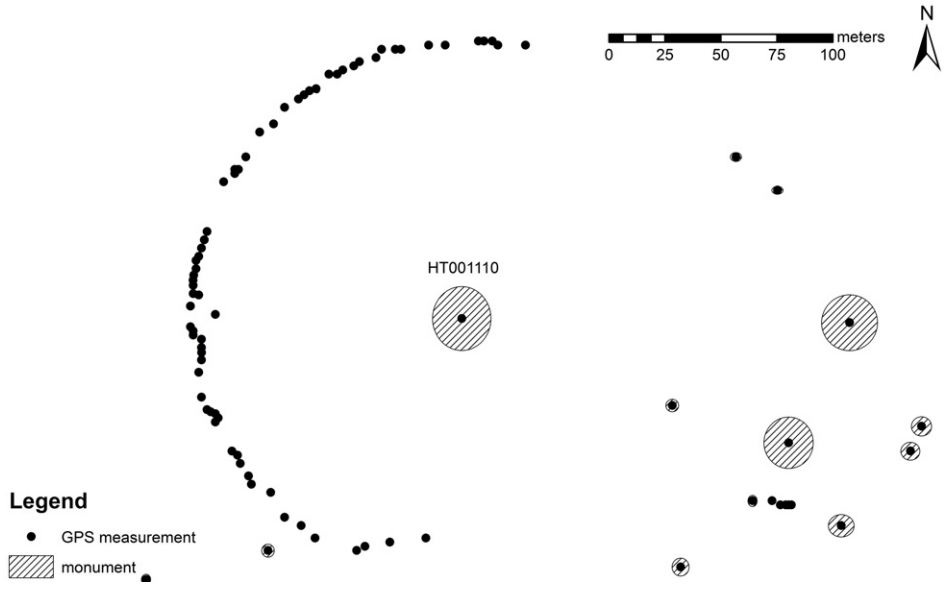

Fig. 5. *Kurgan* HT001110, with extensive stone circle periphery (map by Gino Caspari).

investigate if these circles were all constructed at the same time or sequentially over a longer period of time and whether they were used multiple times.

Kurgan HT010013 has a north–south diameter of 26.4 m and an east–west diameter of up to 23.0 m. The *kurgan* is centrally located within a concentration of Iron Age burials. It has been destroyed by looting and, apart from its size, shows no special characteristics in comparison with the smaller surrounding burials.

HT002001 has a north–south diameter of 22.6 m and an east–west diameter up to 23.1 m. Similar to HT001020, it features a ring of slanted slabs. The surface of the mound is bumpy due to a large number of looting pits.

HT046005 has a north–south diameter of 19.6 m and an east–west diameter of up to 20.2 m. It has been heavily destroyed and no special construction characteristics distinguish it from smaller *kurgans* in its vicinity.

"Saka" Kurgans

Like "Scythian," "Saka" is a relatively unspecific ethnic term drawn from Persian texts (P'jankov 1994:37–46). "Saka" is used here to describe a category of burial mounds that are morphologically very similar to Early Iron Age monuments from Semirechye. The Saka material culture in southeastern Kazakhstan is dated to between the seventh or sixth century B.C.E. and third century B.C.E. (Parzinger 2006:659).

Saka-type *kurgans* are distributed all over the AOI (Fig. 6). The mounds of these *kurgans* are usually built of a mixture of pebbles, larger round stones, and earth brought

Fig. 6. *Kurgans* in the west AOI: (a) four large Saka *kurgans*, looking south; (b) single *kurgan* with double circular stone fence, looking west (photos by Gino Caspari, enhanced with 30% white overlay).

from the alluvial terraces. These *kurgans* are usually higher than the Scythian-type and they exhibit a typical profile with steep sides and a flat top. The maximum diameter of most of these monuments (89.5%) ranges between 15.5 m and 34.1 m, with an average diameter of 27.9 m (median 26.8 m), but a group of six outliers in our sample measure more than 40 m across (Caspari and Crespo 2019:4). The height of these *kurgans* averages 2.0 m (median 1.4 m), but the largest mounds can be as high as 6.5 m. The diameter and height of these *kurgans* make them comparable to those from Issyk (Gass 2011:61–62).

Nearly identical materials were used to build all the Saka kurgans. The cross-sections of the mounds are also largely homogeneous. All of them feature circular structures around a central mound. Nevertheless, two subtypes may be distinguished: one type features a stone ring and the other a circular ditch (with rows of stones located at the bottom of the ditch in some cases). It seems as if these two architectural elements might have served the same purpose since they are always located in exactly the same position vis à vis the mound; however, the purpose so far escapes our understanding. The mounds encircled by single or double stone rings are smaller than kurgans rimmed by circular ditches. (Sometimes the ditches were difficult to discern in the field; in these instances, we cross-checked with high-resolution satellite data to reassess our field classification.) While Saka kurgans with circular ditches are the largest architectural structures found in the AOI, there are some smaller ones with identical architectural composition. These monuments are morphologically closest to Early Iron Age burials in the Semirechye (Gass 2014:95). The most significant monuments of the Saka *kurgan* category are next described in brief.

Figure 7 maps one of the largest clusters and depicts the relative sizes of mounds with stone circles compared to those surrounded by ditches. This cluster includes HT013011, the largest datable structure in the AOI. It lies at the center of the Heiliutan Basin within a chain of 28 kurgans of its kind. With a mound diameter of 53.5 m and height of 6.0 m and a circular ditch measuring 91.5 m across, this kurgan is typical of the ditch subtype in having a 5:3 ratio between ditch diameter and mound diameter. Such proportions are found in similar kurgans in eastern Kazakhstan. Due to these morphological characteristics, it seems likely that this type of kurgan was constructed in the AOI in the latter part of the Early Iron Age (ca. 500–200 B.C.E.). Looters dug a 12.0 m × 8.1 m pit in the top of the mound and there is a completely destroyed monument to the west that might be associated with HT013011. Few other traces of peripheral monuments have been found nearby. This part of the AOI was the most intensively used agricultural area in the 1970s. Corona satellite images taken at the time show deep plough marks, hinting at the use of heavy vehicles. Any small peripheral structures would probably have been destroyed by such agricultural activities.

It is nevertheless likely that peripheral monuments were originally present around HT013011, since a number of additional stone structures have been found in association with the second largest (ca. 50 m mound diameter) Saka kurgan of the AOI, HT013042. These additional structures include a 1.4 m high stone stele erected at the top of the mound and a cluster of eleven small oval graves and stone circles to the east of the kurgan.

All the other Saka kurgans with ditches (i.e., HT013023, HT013026, HT013033, HT013035, HT013036, HT013041) in this cluster are around between 20 and 40 m in diameter. Apart from lacking peripheral structures, most of these monuments are well preserved. This large congregation of Saka kurgans, spanning a distance of almost

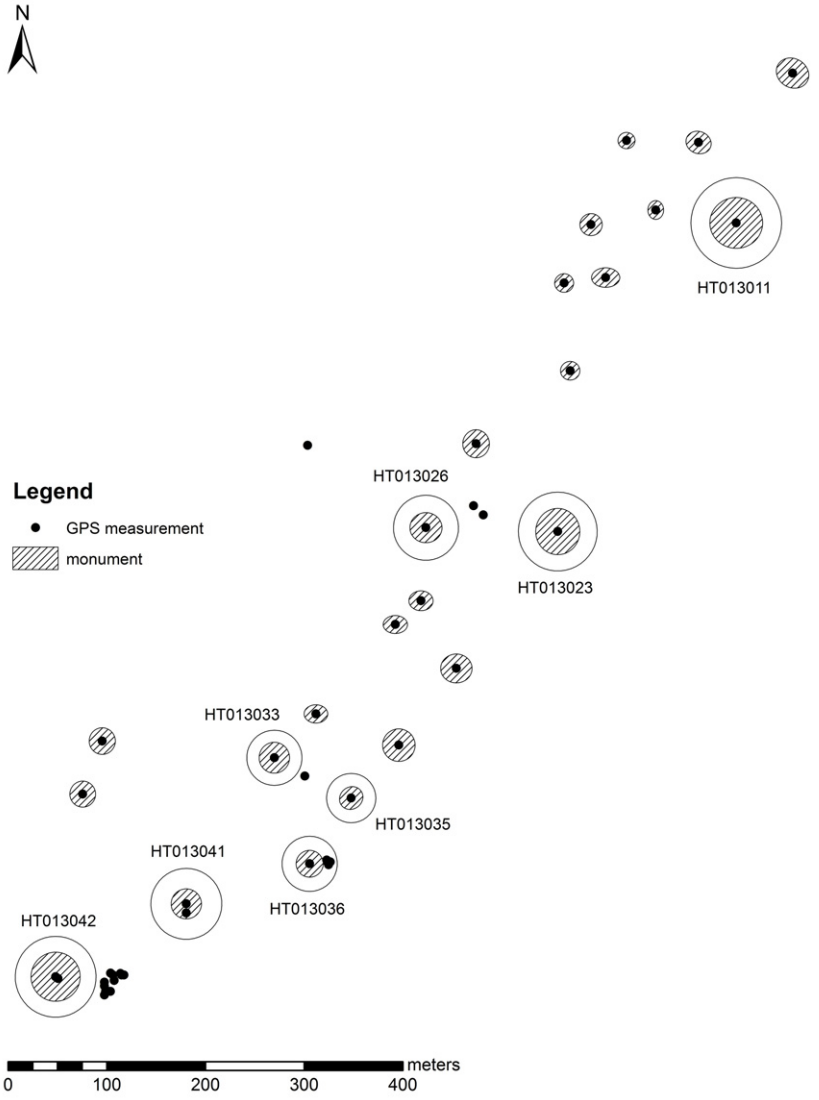

Fig. 7. Map of largest cluster of Saka *kurgans* in the west AOI; *kurgans* with circular ditches are marked with monument numbers (map by Gino Caspari).

2 km, is widely visible and constitutes one of the dominant archaeological features in the landscape.

Two slightly larger Saka kurgans, HT005002 (48.2 m diameter) and HT005003 (49.2 m diameter), belong to a site containing four Saka kurgans in the north Heiliutan area. HT005002 has clearly been looted, but the other mounds in this cluster seem to be in good shape. Again, peripheral structures are scarce. The cluster is aligned in a NE–SW direction.

HT043005 (44 m diameter) is the central mound in a NE–SW-oriented chain of seven kurgans (Fig. 8). The ditches of the kurgans in this chain were impossible to see

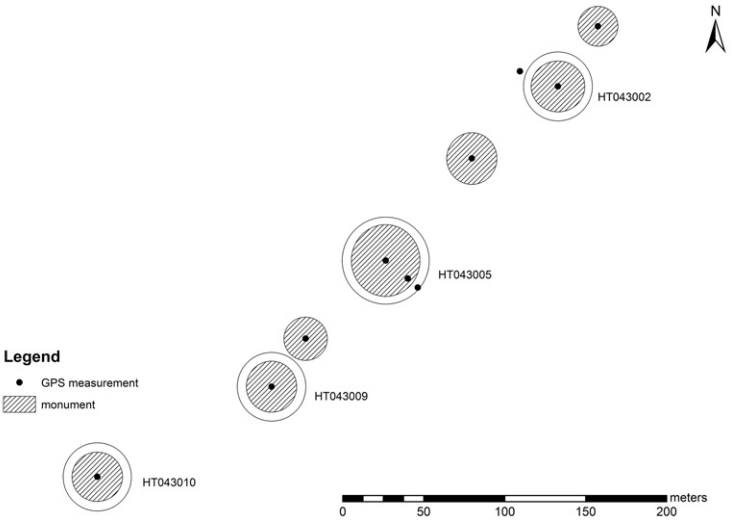

Fig. 8. Saka *kurgans* in the northeast AOI; *kurgans* with circular ditches are marked with monument numbers (map by Gino Caspari).

on the ground, but were clearly visible in satellite imagery. HT043005 features two smaller stone circles within its surrounding ditch, but no other peripheral structures.

Ogradki

The Turkic memorial complexes known as *ogradki* are monuments fenced by a rectangle or square made of vertically buried slabs (Tishkin et al. 2017). Most are north–south oriented. They occur both individually and in groups. A row of small standing stones is often found east of these structures, with the first stone usually erected on or directly adjacent to the monument. In the northern Altai, such rows can consist of up to 90 standing stones (Gheyle 2009:209).

A total 32 *ogradki* were identified in the AOI (Fig. 9). Most have just one or no standing stone. Only four of the structures had three or more standing stones, with a maximum of five. None of the stones show any traces of stonework or carvings in anthropomorphic form although anthropomorphic stelae are known in the region. According to local residents, such stelae were found in the AOI in the past, but most have been relocated to build a tourist attraction south of Lake Kanas.

Most fenced memorial structures are almost square in shape, with lengths of the sides varying from 2 to 5 m. The size of the fence is correlated with the number of standing stones. The larger the fenced area, the more standing stones can be expected.

The *ogradki*-type monuments will not be further described in this article. They were included in our analysis only because the Turkic period represents a transition between prehistoric and historic periods in the southern Altai. A finer chronological segmentation involving the Uyghur and Rouran periods also does not seem reasonable before excavations can be conducted.

Fig. 9. *Ogradka* HT018024 with standing stone and 4.5 × 4.6 m fence, looking east (photo by Gino Caspari).

Dwellings

Dwellings are stone arrangements that look like ground plans of buildings. Until recently, relatively little was known about the purpose and function of these structures (Bourgeois et al. 2017; Gheyle 2009:216–221). They do not have an obvious burial function, but could represent other kinds of ritual structures or be the actual foundations for domestic residences. Jacobson-Tepfer (2008:33) refers to them as "houses for the dead," but this phrase is misleading since there is little to evidence demonstrating that they were associated with burial customs. Newer findings from Bortala Valley (*bo'ertala* 博尔塔拉) suggest they are likely the architectural remains of seasonal settlements of nomadic pastoralists (Jia et al. 2017; Jia et al. 2018). On-going discussion suggests that some are related to ritual practices and some to actual habitation (Caspari 2019). Most seem to date to the Bronze Age, but so far the sample size of excavated dwellings is small and further research is needed.

Such "dwelling" structures are relatively scarce in the AOI and usually not visible in the remote sensing data. Only six were documented during the survey. Most are simple rectangular structures with protrusions that could be interpreted as entryways. With the exception of HT008001 and HT008030, which are situated in the vicinity of a Late Iron Age cemetery, they are all isolated structures (Fig. 10).

Fig. 10. Possible dwelling HT008030, 7.7 m N-S × 7.0 m E-W, looking south (photo by Gino Caspari).

Mounds

The term "mound" is used for mapped but otherwise unclassifiable mound structures. There are 182 mapped structures in this category, constituting the largest category of ritual funerary monuments in the AOI. These mounds could not be assigned to a specific time period either because they lack context or their morphology does not match well-dated forms. Although these monuments can be broken down into several subgroups based on their morphology, even tentative dates for the subtypes cannot be established at this point. Table 1 shows a possible classification for this category of monuments following parameters of material composition and general morphology.

A few of these types of monuments seem to be especially noteworthy and could be the target of future excavations in Heiliutan Basin. Approximately 10 percent of the

Table 1. Possible Segmentation of Undated Mounds Based on Morphology

MORPHOLOGY/COMPOSITION	NUMBER	PERCENTAGE
Flat/small stones	125	68.7%
<2.5 m/small stones	20	11.0%
Flat/large stones (>0.3 m)	18	9.9%
High/small stones	3	1.7%
High/grass covered, soil	15	8.2%
Grass covered, soil, >100 m	1[a]	0.5%
Total	182	100%

[a] HT016001.

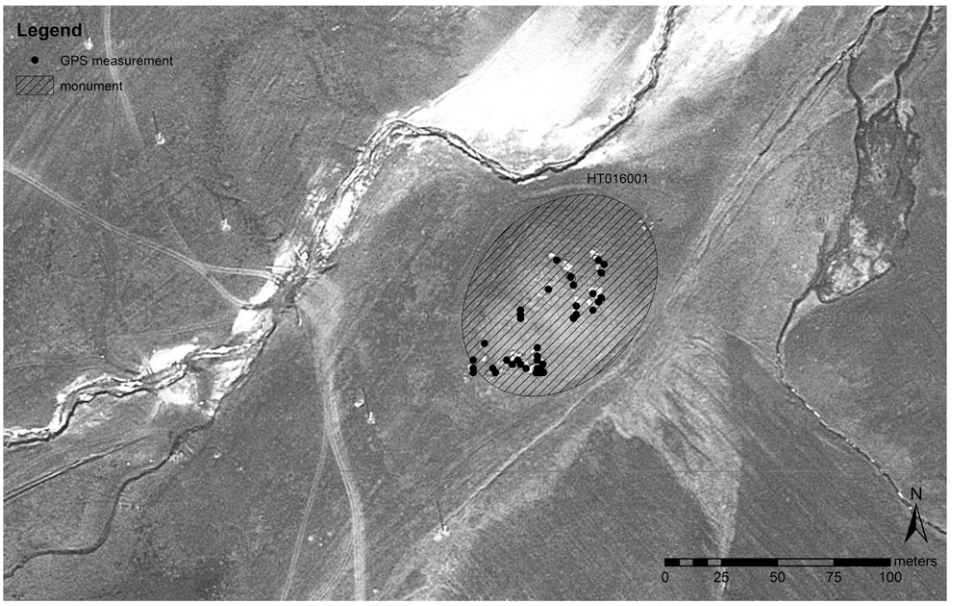

Fig. 11. HT016001, the largest structure in the AOI (WorldView-2 data, courtesy of DigitalGlobe Foundation).

undateable mounds in the AOI are built from large stones (>0.3 m). These are usually situated on alluvial fans and some are clearly marked with corner stones. Gheyle (2009:192) has described similarly four-cornered mounds in the northern Altai, and dated them to the Bronze Age.

HT016001 is worth mentioning because of its enormous size and unique oval outline (Fig. 11). It measures 110 m across and is roughly 10 m high. Two clusters of Kazakh graves made of granite blocks and quartz were built on top of this mound. The mound could be of geological origin, but Worldview-2 satellite data suggest that it might be an anthropogenic structure. No similar geological structures (i.e., hills) in terms of form or size are found in the area. Considering its position on the otherwise flat steppe area of Heiliutan Valley, this makes it at least somewhat likely that the mound was constructed by humans. No comparable structures are known from the region, but monuments of similar size have been found in the northern Black Sea region and Minusinsk Basin; these date to the Iron Age (Polin and Dragan 2011).

Oval Mounds

Small oval stone mounds appear all across the AOI, often in large groups. They usually have a length to width ratio of 2:3, with maximum diameters between 1.0 m and 5.0 m. A variety of different stones, usually obtained from the immediate vicinity, were used to build these oval mounds. The stones include rubble, pebbles from riverbeds, and pieces of schist, quartz, and granite. In total, 179 of these burial structures were mapped.

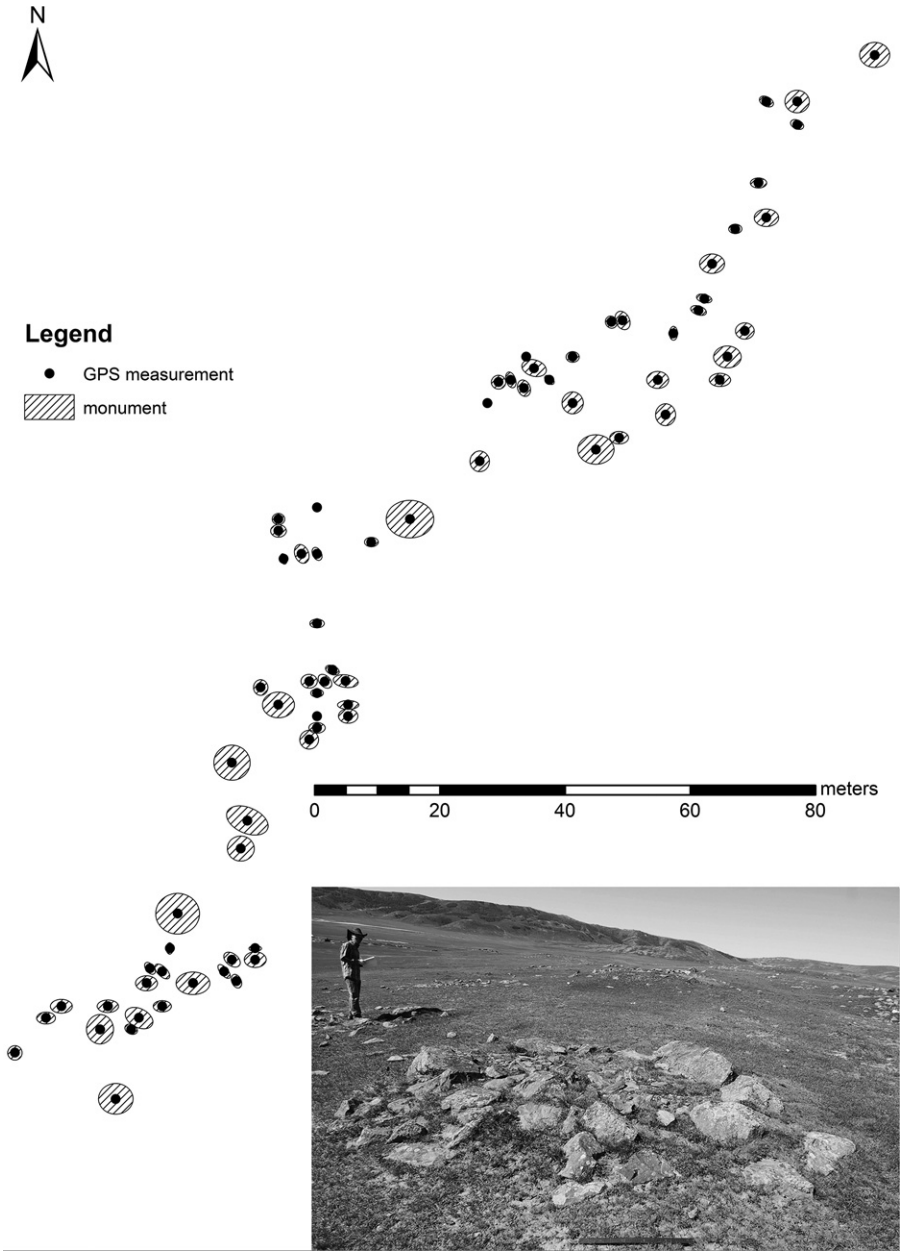

Fig. 12. Map of HT017, a cluster of possible Late Iron Age oval graves (map and inset photo by Gino Caspari).

Table 2. Clusters of Oval Graves with 10 or more Individual Structures

CLUSTER	NUMBER OF OVAL GRAVES	POSSIBLE PERIOD
HT013	10	?
HT048	12	Late Iron Age
HT054	14	Kazakh?
HT045	14	?
HT058	15	Kazakh?
HT008	23	Late Iron Age
HT016	26	Kazakh?
HT017	47	Late Iron Age

Most of the oval mound clusters mapped in the AOI had obviously been constructed relatively recently, possibly within the last 500 years. Preserved remains of wood can be seen underneath some of the loosely piled stones that constitute recent grave mounds. However, only oval mound accumulations potentially dating to the Late Iron Age will be described here.

Clusters, defined as including at least four oval mounds, were generated using the Archsphere cluster algorithm (Caspari and Jendryke 2017). We found a total of eight clusters in the AOI, all of which included 10 or more oval graves (Table 2).

Cluster HT017 lies on top of a hill, overlooking the valley floor. The site is spread out in a northeast–southwest direction. A total of 47 small oval graves were aligned in rows in this cluster (Fig. 12).

Similar to cluster HT017, the HT008 burial site is located on top of a hill overlooking the Heiliutan Basin. Cluster HT008 consists of 23 oval graves. Each of these well-preserved oval graves is framed in granite. Sharp slate stones sourced from the immediate surroundings have been placed in the middle of each mound.

Site HT048 consists of 12 oval graves that are similar to the oval graves in HT008. This site is also situated on top of a hill and can be tentatively dated to the Late Iron Age.

Sites HT008, HT017, and HT048 lie in very similar positions. They are all located on tops of hills on the basin floor. They all consist of small oval graves built from materials sourced from the vicinity. There are only minor differences in construction techniques. For example, the grave mounds at HT008 were erected with greater care than at the other sites and were given a visually distinctive outline made of different types of stones. Nevertheless, all the oval mounds at these sites seem to belong to a similar material culture.

Stone Circles

Stone circles are a widespread type of structure in the AOI. Usually, placed in the periphery of larger monuments, they are a longstanding construction phenomenon that dates back to at least the Bronze Age. Stone circles often fulfill a ritual function, as is indicated by the burial of horse skulls at the center of Eneolithic sites in the Altai (Parzinger 2006:191). Their high variability and frequency suggests they could fill multiple functions, however.

A total of 108 stone circles were mapped. The circles are highly heterogeneous both in terms of the types of stones used for construction and in terms of size. The average stone circle measures 2.4 m (median 2.1 m). Circles are usually built from stones taken from the immediate surroundings. Therefore, stone circles in the river plain tend to be constructed from larger pebbles, whereas circles on hillsides are made of sharp stones from the outcrops.

Stone Platforms

Stone platforms are round or oval structures built in the periphery of larger monuments. Only 14 such structures were mapped in the AOI; however, it was often difficult to distinguish between stone circles and stone platforms since a platform can in essence be considered a "filled" circle. Furthermore, there are indications that stone platforms and stone circles served a similar purpose as subsidiaries to larger monuments.

Excavations in Mongolia revealed platforms under which bones have been found (PAJMJM 2005:64). Further research might result in the merging of the two categories. However, neither of these two categories was integrated into the analysis presented here, since both types are peripheral structures that can only be tentatively dated through association with other structures.

Stone Cists

Stone cists are small structures visible on the surface that consist of a few slabs vertically sunk into the ground. The largest cist found in the survey measures 3.8 m × 2.2 m, while the smallest is 1.0 m × 0.4 m. The average width of the cists is 1.3 m (median 1.3 m) and average length is 2.0 m (median 1.7 m).

Stone cists mostly appear isolated from other monuments in the AOI, which makes it impossible to assign tentative dates. They could be sepulchral structures similar to the one excavated near the village of Alahak (Alahake 阿拉哈克) that contained materials from the Chemurchek Culture (Tong et al. 2013:15–19). However, similar structures were built across a long time span, possibly for different purposes. They are therefore not integrated in the analysis presented here.

Standing Stones

A variety of standing stones has been erected in the AOI. This category encompasses almost 3 m high stelae as well as broken and fallen standing stones. The term "*balbal*," originating from rune inscriptions in Mongolia and the middle Yenisei, is often used to refer to small standing stones (Stark 2008:126). As an interpretive term, it is not ideal for referring to standing stones in general. The more descriptive term "standing stone" is therefore preferred here. Whereas the "standing stone" category encompasses all free-standing, vertically positioned stones, we use the term "stelae" as a subcategory denoting standing stones that are at least 1.0 m tall.

The tradition of positioning stones vertically in the ground dates back to at least the Bronze Age and continues into the ethnographic period. A total of 125 standing stones were mapped. Some fallen stones could be interpreted through context as having originally been upright. The average standing stone was 0.61 m high (median 0.45 m).

Table 3. Standing Stones Dated by Affiliation with Monuments from Different Time Periods

PERIOD	DURATION	NUMBER OF STANDING STONES
Bronze Age	2400–850 B.C.E.	2
Early Iron Age (Scythian)	850–250 B.C.E.	50
Early Iron Age (Saka)	850–250 B.C.E.	12
Late Iron Age	250 B.C.E.–C.E. 450	?
Turkic	C.E. 450–900	26
Unknown	–	35

Standing stones are found in the context of Bronze Age *khirigsuurs*, Scythian and Saka *kurgans*, and Turkic enclosures. The standing stones in the AOI are made from special stones like quartz or stones containing pyrite, which display a peculiar texture. No standing stones with carvings were found even though both deer stones (XIA 2014:12) and Turkic image stones are known from the region (Wang 1995:52–75).

Table 3 shows that the most common standing stones probably date to the Early Iron Age. This is probably because Scythian and Saka burials are easy to distinguish and quite abundant in the AOI. Standing stones near Scythian burial mounds are usually on the eastern side of the tumulus, while standing stones on Saka burials are often installed on the top of the mound, giving the burial additional visibility.

Most of the largest stelae are isolated and are therefore very difficult to date from context. The two tallest stelae, HT055013 and HT055014, are contextualized by another monument, however. They are both located to the east of the Scythian kurgan HT055004. This configuration is known in the Russian Altai, but rarely seen in the AOI (Gheyle 2009:183).

Stone Concentrations and Zones

The terms "stone concentration" and "zone" are both used to describe monuments that have been destroyed beyond recognition. A stone concentration is usually constituted of only one architectural element, whereas a zone describes a site where a number of monuments have been destroyed such that they can no longer be clearly differentiated. Sometimes, it is possible to guess cultural affiliation through context, but most of the concentrations and zones were recorded without further interpretation. The mapping of destroyed monuments does not contribute to a diachronic analysis of the landscape, but it does help us identify the areas that have been most affected by agriculture and looting. It also helps us assess where prior anthropogenic activities have occurred that would influence our analysis of this archaeologically rich landscape.

DISCUSSION

Meticulous survey and analysis has enabled us to produce a preliminary image of ritual funerary activity in Heiliutan Basin (Fig. 13). Although traces of Palaeolithic anthropogenic activities have been found in the Altai Mountains (Chlachula 2001; Rybin 2005), no remains dating to that early period were identified in the AOI. The

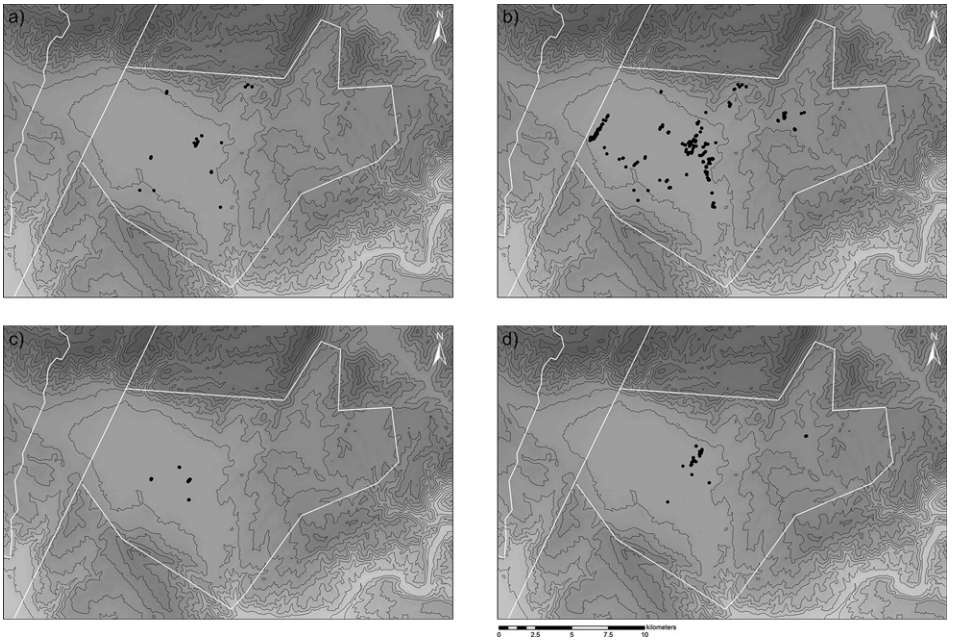

Fig. 13. Distribution of monuments in Heiliutan Basin likely from (a) Bronze Age, (b) Early Iron Age, (c) Late Iron Age, and (d) Turkic Period (maps by Gino Caspari).

imprint those early hunter gatherer societies left on the landscape seems to have been minimal and transient. Our survey approach, which focuses on visible surface structures, is not ideal for recovering material from very early periods, so the possibility that settlements, burial grounds, and other activity zones from the Palaeolithic, Mesolithic, and Neolithic might be present in the AOI cannot be excluded. The rivers and lakes in the area are certainly rich enough in fish and diverse mammalian fauna to have supported small groups of hunter gatherers.

The earliest clearly visible burial structures in the Altai were constructed during the Eneolithic period (ca. 3200–2400 B.C.E.) (Parzinger 2006:188). We identified only one single small stone mound that potentially dates to the Eneolithic during our survey and even this attribution is rather uncertain. Early stages of the Chemurchek necropolis, situated around 90 km to the east of the AOI, might provide a frame of reference. For the time being, we surmise that the AOI was not a focus of anthropogenic activity during the Eneolithic.

The earliest clearly identifiable structures emerge in the valley during the Bronze Age between 2400 and 850 B.C.E. (Parzinger 2006). Traces of human activity in the valley are scarce and small scale during this time. Integrated into the landscape, sometimes seemingly mimicking rock outcrops, small burial mounds are built on hill flanks and alluvial fans. Few in number and in close vicinity to each other, these mounds might be the grave sites of small families of nomadic pastoralists who lead their livestock to the productive high-altitude pastures every summer (Caspari, Betts, et al. 2017).

There is considerable overlap between the Early Iron Age "Scythian" material culture, in particular the early barrows in the Uyuk Valley, which appear as early as

830 B.C.E. (Caspari 2020; Caspari et al. 2020), and the Late Bronze Age deer stone *khirigsuur* complex. Deer stones are absent in the valley, although they do occur a few kilometers north of the AOI in Early Iron Age graves, where they have been reused in those contexts (Aruz et al. 2006:188; XIA 2014). For our analysis of stone structures in the AOI, we work with a rough chronological range of 1200–850 B.C.E. for the Late Bronze Age.

Starting in the Late Bronze Age (ca. 1200–850 B.C.E.), the *khirigsuur* monuments built on the river terraces are the first structures demonstrating a sustained human presence in the landscape (Fitzhugh 2011:183). On a narrow terrace alongside the creeks where everyone who travels across the valley must pass, the location of these monuments seems to have been chosen specifically for communication (Allard and Erdenebaatar 2005). The monuments therefore constitute group efforts that might have served the purpose of social cohesion in these herding societies (Wright 2012:146). The spatial arrangement is consistent with findings by Seitsonen and colleagues (2014:102) showing that *khirigsuurs* might "have ordered and channeled the seasonal mobility pattern(s) on the local level."

All khirigsuur monuments in the AOI are built in the northeast part of the valley. The scale of the monuments demands a sizeable input of human resources into their construction. Although of a smaller scale, the *khirigsuur* monuments in the AOI are very similar to those in the Mongolian Altai (Wright 2007:350–365). The largest *khirigsuur* of the AOI was built not far from where today's main axis of transport meets a road originating in the southern pass, leading toward Lake Kanas. The *khirigsuur* monuments seem to form the nucleus of a dense accumulation of ritual and burial sites that date from the Bronze Age to the Middle Ages.

The developments, which started with the construction of the Late Bronze Age *khirigsuurs*, intensified during the Early Iron Age (ca. 800–200 B.C.E.). Within a relatively short period of time, the Heiliutan Basin becomes the focus of a vibrant burial tradition. Clear evidence of a stratified society of nomadic herders makes its first appearance and, as elsewhere around the Altai Mountains, large tombs very similar to the "royal" cemeteries of the Pazyryk culture are built in the AOI (Caspari et al. 2018; Gryaznov 1984; Parzinger 2004). Smaller graves presumably for people from lower social strata are found in their vicinity. These changes suggest an increasing complexity of social structure, which is usually assumed to have accompanied the appearance of highly mobile nomadic pastoralists of the Early Iron Age (Parzinger 2004).

The increase in anthropogenic activity is obvious. Dozens of Scythian kurgans are constructed on river terraces and on gentle lower slopes. These omnipresent stone mounds were often built in chains aligned north–south regardless of topographical barriers. The natural relief seems to matter less than the alignment. This points to connections with other monuments. Earlier monuments are respected, reused, and extended. Elite members of society chose places close to the Late Bronze Age *khirigsuurs* to build burial monuments that were almost 30 m in diameter (Seitsonen et al. 2014:85). Some Early Iron Age *kurgans* are furnished with an extensive periphery of stone circles and stelae, many of which are made from stones, which could not have been found in close vicinity. The largest of these "Scythian" *kurgans* required considerable logistical planning and effort to build.

At an as yet undefined point during the Early Iron Age, the material culture of the AOI underwent another sudden change. Numerous gigantic earthen "Saka" *kurgans* with flat tops and surrounding circular ditches were built in places that had not

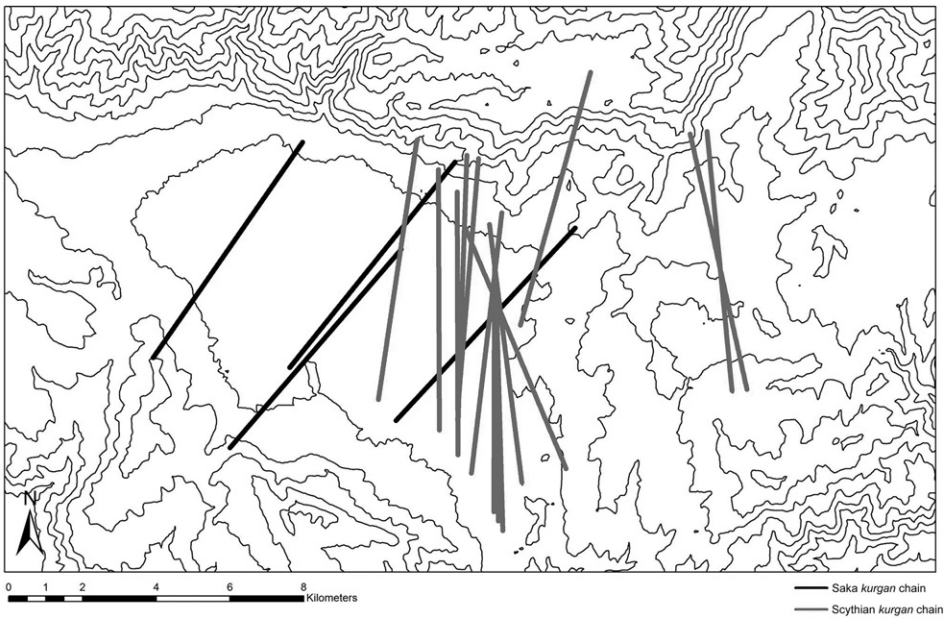

Fig. 14. Saka *kurgan* chains (black) aligned NE-SW and Scythian *kurgan* chains (gray) aligned approximately N-S (length of lines do not reflect number of *kurgans* per chain or extent of each site) (map by Gino Caspari).

previously been used for ritual funerary activities. The construction techniques and spatial distribution of the "Saka" kurgans are very different from the "Scythian" ones and suggest close connections to eastern Kazakhstan and Ili Valley. It could be that Saka tribes were extending their reach to the southern Altai during the fifth through third centuries B.C.E., to occupy a larger area than has previously been assumed. The two kurgan types pertaining to Early Iron Age material cultures (Scythian and Saka) were clearly spatially separated within the landscape of the Heiliutan Valley. Additionally, even though both monument types were formed into chains, the chains were aligned in different directions (Fig. 14). Scythian rows of kurgans usually show a north–south alignment with some variability, whereas Saka kurgans show a consistent northeast–southwest alignment. This hints at an important conceptual, possibly cosmological, change. Both kinds of constructions would have required a large input of human and also natural resources, so would have had a significant impact on the landscape of the AOI.

The Late Iron Age shows a departure from the funerary traditions of the earlier periods in the AOI. The necropolises consisting of many small oval tombs are spatially separated from most other ritual structures. They cluster densely high above the valley floor on rocky hill slopes. In most cases, the graves are built from stones found in the immediate surroundings and they are not accompanied by additional subsidiary structures such as standing stones or stone circles. The people who inhabited the valley in the Late Iron Age chose places for the dead that were removed from the valley floor where most life activities would have been conducted. Surrounded by an open, treeless landscape, the cemeteries were positioned in places that had a wide field of view.

Table 4. Estimated Monuments Built Per Century

PERIOD	DURATION	NUMBER OF MONUMENTS	MONUMENTS PER CENTURY
Eneolithic	3200–2400 B.C.E.	0	0
Bronze Age	2400–850 B.C.E.	34	2.19
Early Iron Age	850–250 B.C.E.	205	34.17
Late Iron Age	250 B.C.E.–C.E.450	96	13.71
Turkic Period	C.E. 450–900	32	7.11

The representative characteristics of Early Iron Age kurgans seem to have been of little concern for the builders of these small oval mounds, since they are barely visible to the occasional passer-by.

In comparison to the Early Iron Age tombs, Late Iron Age remains look poor in their architectural execution and evidence of ritual funerary activities decreases in the landscape. The representative and communicative roles of the monuments also seem to have diminished since most burial clusters are almost invisible to visitors to the valley.

Turkic-type burial mounds and *ogradki* are widely scattered throughout the basin. A large number of currently undateable mounds might be assigned to the Turkic period following excavation. Many burial mounds seem to have been deliberately built within the vicinity of Scythian *kurgans*, perhaps with the intention of revitalizing older burial and ritual sites.

Since we attempted to record all the visible surface structures in the AOI during the survey, statistics can be employed (with all due care and reservations) to assess the intensity of use of Heiliutan Basin in the *longue durée*. If we adopt the admittedly rough temporal divisions presented in Table 4, we can obtain average numbers of monuments constructed for each century by dividing the time by the number of monuments. By drawing a curve through these data points, we get an initial quantitative impression of ritual funerary activity in the region over the course of four millennia (Fig. 15). Of

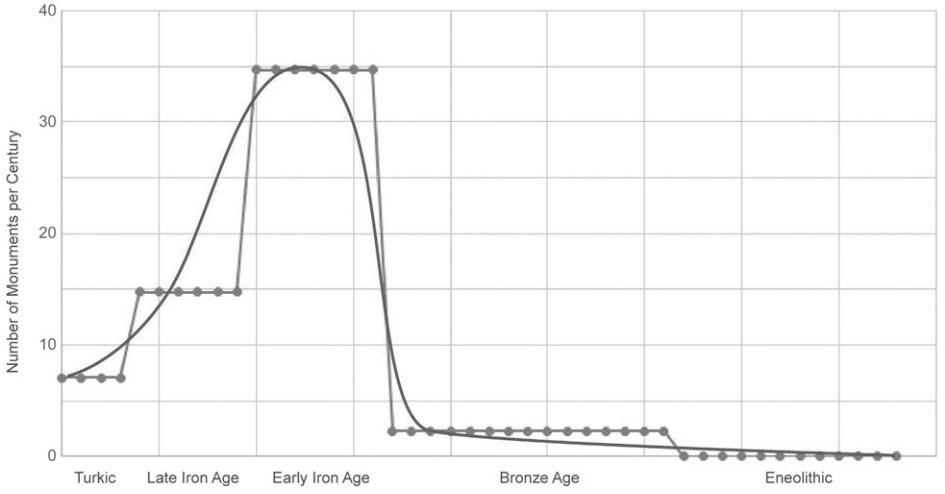

Fig. 15. Graph of number of funerary monuments constructed in the AOI each century from the Eneolithic to Turkic periods.

course, this curve is merely a visualization of the current surviving material remains and any possible inherent biases must be discussed. First, there may be biases in data collection. Despite the meticulous coverage of the AOI with several remote sensing surveys and a series of intensive ground surveys, certain types of structures might have been overlooked. This bias would mainly apply to monuments constructed in the Eneolithic and early to middle Bronze Age. Monuments of these periods are smaller in scale and sometimes located in areas that render them less visible than later monuments. Some of the earlier monuments were built high up in side valleys between rock outcrops or on alluvial fans where they were hard to distinguish from natural features even from the ground. Since a long time had passed since their construction, they might have been affected heavily by taphonomic processes.

Concerning comparative analysis of the monuments, it is important to remark that all dates are tentative. Luckily, many monuments have a very distinctive morphology, but that does not mean that all the assigned dates are unequivocal. It was impossible to assign likely dates to monuments whose shapes had been altered, especially those that had been partially destroyed by agricultural activities. Most such monuments were integrated into the "zone" and "stone concentration" categories and not included in the final analysis. Some could be assigned a category by connecting them to nearby monuments, however. For example, if a large stone concentration was found north of three Scythian *kurgans*, we deemed it likely that an additional *kurgan* belonging to the Early Iron Age had been built there.

Many of the peripheral structures such as standing stones, stone circles, and stone cists were built in different contexts and served different purposes over long chronological periods. They were not included in the data points constituting the curve. Although peripheral structures are assignable to specific monuments, including them would have skewed the distribution further toward the Early Iron Age. Many of Early Iron Age monuments have large peripheries of smaller monuments (Fig. 5).

Even some of the larger monument types such as the *khirigsuurs* are difficult to assign to one period. *Khirigsuurs* essentially represent a transitional phase between the Late Bronze Age and Early Iron Age (Allard and Erdenebaatar 2005). In this study, they have been counted toward the Bronze Age.

Another inherent bias to the curve in Figure 15 is that all monuments are treated the same quantitatively. A small oval grave of the Late Iron Age, which is likely to be an individual grave, is counted the same as a massive Saka *kurgan,* which might contain secondary burials. The two categories are also absolutely unequal in terms of the amount of labor and resources required for construction. If we were to factor in the amount of labor required for construction, it would further increase the height of the curve for the Early Iron Age.

A relatively large number of monuments could not be assigned to any period due to lack of context. These are mostly flat kurgans built from small stones that could either pertain to the Early Iron Age or the Turkic period. If all 125 of these structures fall into the Turkic period, that would speak to a stronger Turkic presence in the AOI than is currently suggested. It is more likely that many of the unassigned mounds belong to the Early Iron Age since the *ogradki*, which clearly belong to the Turkic period, are infrequent and not especially elaborately constructed. There was some Turkic presence, but the valley does not seem to have been of major importance during this period.

Despite the many uncertainties and inexact method, the Figure 15 graph allows us to identify peaks and troughs in ritual funerary activity in the Heiliutan Basin. The graph clearly shows a staggering rise in funerary construction during the Early Iron Age over the preceding Bronze Age, not only in monument size but also quantity. The amount of labor required to construct Scythian and Saka *kurgans* in such numbers far exceeds the amount of labor put toward ritual funerary activity during any other period up to the present day. For the Late Iron Age and Turkic period, it seems clear that the AOI rapidly lost its importance as a center of funerary activity in the macro-regional context, even if some of the unassigned monuments could eventually be attributed to either one of those periods.

It is worth noting that we were able to gain a notion of the absolute number of monuments constructed over a certain time period. Even during the roughly six centuries of the Early Iron Age, during which ritual funerary activity peaked in the AOI, the absolute number of constructed monuments per year stayed relatively low. If we assume that 50 percent of the 125 unassigned flat stone mounds belong to the Early Iron Age and these are added to the 205 monuments dated to that period, there was still only one monument being constructed every two years. The number of constructions per year is a lot lower for the Bronze Age. This raises the question why there are so few Bronze Age monuments in the area. Possible explanations might consist of, but are not limited to, a combination of: low population levels; the AOI not being a focus for ritual funerary activity during the Bronze Age period; a disproportionately heavy impact of taphonomic processes due to monuments frequently being located on alluvial fans; and the low visibility of Bronze Age structures affecting their detection during fieldwork.

The emergence of the hierarchically organized societies of Early Iron Age nomadic pastoralists in the Eurasian steppes and the so-called Scythian material culture appears to happen relatively suddenly at the beginning of the first millennium B.C.E. As a potential explanatory backdrop, several scholars have attempted to connect this rapid cultural transformation to changes in the climate, but the coverage of the wider area in terms of climate data remains relatively poor (Zaitseva et al. 2004). In the case of the Heiliutan Basin, we clearly see an intensification of anthropogenic activity at the beginning of the first millennium B.C.E. similar to that presented in the northern Altai, Tuva, and the Semirechye. The question of whether environmental changes provided a trigger for this sudden intensification is therefore justified. The first problem when trying to answer this question is the absence of climate data for northern Xinjiang. One of the few sources of data for an area reasonably close to the AOI is the examination of sediments in Ulungur Lake (Wulunguhu 乌伦古湖) conducted by Jiang and colleagues (2007). According to that study, a relatively warm and humid climate dominated the area between 3300 and 1600 B.C.E. At around 1600 B.C.E., a moderate climate became prevalent. Only in the first century B.C.E. do we see an abrupt change in the local climate, with evidence of increasingly cool and dry conditions (Jiang et al. 2007). It is important to acknowledge that these data are only suggestive and remain to be substantiated by additional measurements covering a wider region. That said, the climate seems to have worsened toward the beginning of the Late Bronze Age or Early Iron Age, which is when we note a spike in anthropogenic ritual activity in the basin. This seems counterintuitive. It contrasts with the Tuva case, where we seem to see a shift toward a more humid climate coinciding with the construction in the ninth and eighth centuries B.C.E. of the earliest "royal" burial mounds (i.e., Arzhan I and Tunnug I sites) associated with the Scythian material culture (Caspari et al. 2018; Gryaznov

1984). Such a development does not appear to be in evidence for the Heiliutan Basin; rather, we see indications of increased activity despite worsening environmental conditions. It is safe to say that the environmental data do not provide conclusive evidence for an environmental trigger for the increase in anthropogenic activity.

Other interpretive frameworks that provide nondeterministic explanations of the relationship between ritual funerary construction activity and the environment should be considered. A recent article by Joshua Wright (2017) adopts the concept of "costly signaling" from evolutionary biology as a theoretical frame for understanding nomadic pastoralist landscapes in the Late Bronze Age and Early Iron Age in Mongolia. According to Wright, the development of landscapes consisting of large numbers of monuments can be interpreted as costly signals communicating "information about the size and organization of communities and the depth and strength of the connections of their elite lineages with the increasingly far-reaching social networks of this period" (Wright 2017:547). This theoretical frame could offer an explanation for the peak in building activity we see in the Early Iron Age (Fig. 15), especially given the potential competition between two different architectural traditions, that is, the "Saka" and "Scythian" mounds, which differ both in building material composition and in the direction of alignment of rows of multiple burial mounds (Fig. 14).

CONCLUSION

Any attempt to assess past ritual funerary construction activities for a particular landscape over the *longue durée* starts with a careful and complete survey of the chosen area using remote sensing and intensive ground survey methods in order to retrieve the maximum information on surviving archaeological remains. As seen in this study, the meticulous documentation of all visible archaeological surface structures provides an analytical basis from which diachronic qualitative and quantitative descriptions of the intensity of ritual funerary activity can be derived. This results in a broad understanding of changing levels of human activity in the area. Various biases in the data, including an inevitably incomplete set of surviving monuments from past material cultures, can affect the process of creating such visualizations, but the exercise aids our understanding of prehistoric usage of the landscape and allows for the identification of peaks in the ritual funerary activity in a given landscape.

During the Eneolithic and Bronze Ages, the impact of early steppe cultures on the Heiliutan Basin landscape was minimal. Conversely, in the Early Iron Age, the southern Kanas Region saw a drastic increase in ritual funerary activity, far surpassing the burial constructions of any other time period in terms of labor expense and allocated resources. For a few centuries, large Scythian and Saka kurgans, which mark the final resting places of individuals from elite strata of Early Iron Age societies in the area, made the landscape a place of funerary significance. Shifting cultural influences from the northern Altai to the Semirechye can be traced in the material record through the alteration of construction principles during the Early Iron Age, but this phase only lasted for around 500 years. By the dawn of the Late Iron Age, ritual funerary activities had already declined and the landscape lost its meaning as a funerary landscape for the social elite.

Through meticulous archaeological surveys of the landscape, we are able to identify peaks in anthropogenic activity that become the basis for further inquiry, especially regarding possible reasons for sudden rises and declines in ritual funerary building

activities. In the case of the Heiliutan Basin, environmental variables alone cannot account for the increase in the number of monuments seen at the beginning of the Early Iron Age. Although we are far from understanding the situation in its full complexity, the peak in construction activity in the Heiliutan Basin during the Early Iron Age seems to have happened regardless of the stability or instability of climatic conditions. Based on the currently available palaeo-environmental data, changes in climate cannot be considered a main driving factor in the intensification of anthropogenic activity in the basin. By connecting the rising polities associated with social change with increased construction activities during the Early Iron Age, the theoretical concept of "costly signaling" provides an interesting explanatory approach that does not rely on environmental determinism (Wright 2017). To assess the validity of this explanatory concept for the Heiliutan Basin case, additional intensive surveys, data on the local palaeo-climate, and eventually excavations are required.

Understanding shifts of ritual funerary activity involving monuments can only be traced through comprehensive intensive surveys and documentation of all visible surface structures. This study has demonstrated that this approach can provide a quantitative notion of the intensity of landscape usage and the variety of material cultures in an area where archaeological data remain scarce. This method enables us to identify regional hotspots of ritual funerary activity over large areas and investigate the changing foci of different material cultures over the course of late prehistoric times.

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