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Kazakh variations for herders and animals in the Mongolian Altai.
Methodological contributions to the study of nomadic pastoralism

ABSTRACT

Kazakh herders of the Mongolian Altai practice a form of nomadism characterized by high altitudinal amplitude and more frequent movements than in other regions of Mongolia. This paper proposes a local scale study of nomadic practices using an original multidisciplinary methodological approach combining anthropological surveys and several years' GPS data tracking of five herder families' herds. The dialogue between geolocalised and qualitative data over several consecutive years makes it possible to better understand the environmental, economic, social and individual factors that determine nomadisation routes and calendars, and highlights the ways in which herders cope with interannual variations. In particular, this new methodology reveals the importance of temporary herd separations and re-evaluates the nomadisation frequencies which might have been underestimated by the classical anthropological approach.

Keywords: Mongolia, Kazakhs, GPS tracking, nomadism, herd separation

INTRODUCTION

Nomadic pastoralism is the way of life for the majority of Mongolia's rural population and about a third of the country's population. From as early as the 1930s, anthropologists and geographers have been studying nomadic itineraries in order to map major trends in Mongolia, according to regional bioclimatic conditions (Simukov 2007b, Bazargür 2005, Humphrey & Sneath 1999) or major sociopolitical developments (Fernández-Giménez 1999). On the basis of this work, it is now possible to distinguish three types of nomadic systems in Mongolia: mountain, desert and steppe nomadism.

However, within these major trends significant variations can be observed at a local level, which illustrate a variety of ways in which pastoralists and their animals inhabit their territory, shaped also by economic, social and individual motivations. Local variations in nomadisation practices have been investigated in some Mongolian provinces (see for example Tserenkhand 2005: 111–167, Bruun [2006] 2008 and Marchina 2021 in Arkhangai; Mearns 1993 in Arkhangai and Dornogov'; Lkhagvadorj et al. 2013a and 2013b in Zavkhan and Bayan-Ölgii; Finke 2004 in Bayan-Ölgii). But, variations also occur over time, on a small temporal scale: although the nomadic itineraries of Mongolian herders are usually cyclical, the country is characterised by structural climatic fluctuations; and flexibility of land use is still the best response to these irregularities, notably through mobility and collective or public land ownership (see Humphrey & Sneath 1999, Stolpe 2011, Legrand 2011, Murphy 2011, Ericksen 2014, Marchina 2021). It remains however challenging to study changes over time, intimately linked not only to recent climate transformations – which include in Mongolia a regression of hydrography in some regions, and longer and more frequent heat waves (Lkhagvadorj et al. 2013a: 83) – but also to economic, social and individual motivations.

This paper aims to contribute to the knowledge of mountain nomadism in Mongolia based on a case study of Kazakh herders in Bayan-Ölgii Province, in Western Mongolia, by highlighting the driving forces behind the herders' choices in their mobility patterns. Kazakh herders of

Mongolia practice a form of nomadisation typical of western Mongolia, characterised by high altitude summering, which is difficult to access during the rest of the year, while the colder season camps are located lower down (Simukov 2007b: 601-602). In the Mongolian Altai, where pasture productivity is already limited, there is, moreover, an increase in summer droughts and a shift in rainfall from summer to winter (Jordan et al. 2016: 11–12). It has already been shown how, especially since the post-socialist transition, the market integration decreases while the distance from Ulaanbaatar increases (see Murphy 2018: 10). How do, in this furthest region from the Mongolian capital, Kazakh herders cope with these challenging environmental and economic contexts? Our objective is to document the parameters involved in nomadic practices from both a synchronic (studying the different forms of mobility of neighbouring herders at the same time) and a diachronic perspective (following their nomadisations over several years) to better understand their dynamics and adaptation strategies, and to do so by experimenting a new methodology combining qualitative anthropological survey and GPS tracking of herds.

FRAMEWORK AND METHODOLOGY

Data were collected within the framework of multidisciplinary projects[1], which combined geochemistry, archaeology and anthropology, with as main objective to produce geochemical data which could allow for the interpretation of evidence obtained on the archaeological remains dating back to the Bronze Age excavated by our team and contribute to the study of mobility history over the long term (see Lazzerini et al. 2020, Lazzerini et al. 2021a, Lazzerini et al. 2021b).

[1] See acknowledgments

Four field trips were made between 2015 and 2018, at a different month each time: June 2015, September 2016, November 2017 and July 2018. The choice of the animals equipped with GPS collars was made in agreement with the herders, following the needs of the geochemical study: mainly young, non-supplemented male animals. For the horses, the preferences varied according to the herders (regularly ridden horses, mares and even stallions, as it was argued that the collar would protect the latter against theft). Initially, three herders were equipped with GPS collars for one or two horses and three/sheep goats. By July 2018 six horses and twenty-one sheep/goats, belonging to five herders had been equipped.[2] The animals' positions were recorded and transmitted daily to an online server. The advantage of this system is that the data are available in real time and once acquired cannot be lost, even in the event of the animal's death or theft. In three years of monitoring, the GPS collars transmitted nearly 45,000 GPS points, making it possible to establish the precise itineraries and nomadisation schedules for each herder. The herders' campsites were clearly identified on QGIS (version 2.18) thanks to the positions of the small livestock (sheep, goats) that returned to the camp every night, creating clusters of GPS points. Calendar mobility was detected using Lavielle's method (Lavielle 1999; 2005), a method of segmenting a series of observations implemented in the R (version 3.4.2) package adehabitatHR (Calenge 2006). Incidentally, it also became a convenient hotline for herders trying to find their horses if they had not been able to locate them for several days. It should be noted that in Mongolia the herders are now starting to equip themselves with GPS (see for example https://smartspotter.net/, accessed 25/05/2020), but, to our knowledge, this is not yet the case in this region.

In addition to GPS tracking, we conducted qualitative surveys to interview herders about the previous year. While the first two fieldworks (2015 and 2016) took place at the same time as

[2] Globalstar© and Iridium© collars programmed to record their position every 13 and 2 hours (Lote Wireless Inc. - http://www.lotek.com/).

the archaeological fieldwork, the next two (2017 and 2018) were carried out in pairs (Charlotte Marchina and Antoine Zazzo) whilst living in the herders' homes, making it possible to carry out a more participant observation by sharing the herders' daily life at different times of the year. We conducted interviews in Mongolian with each herder – generally the head of the family and often the only Mongolian speaker, as the herders were all Kazakh. From 2016 onwards, we returned with the maps and calendars produced from the GPS data of the previous year, which the herders commented on.

THEMES AND VARIATIONS ON NOMADISM IN NOGOONNUUR

Pastoralism in Nogoonnuur District

[insert Map 1 here]

[insert Figure 1 here]

The study area is located at the northernmost part of the province (*aimag*) of Bayan-Ölgii in the district (*sum*) of Nogoonnuur (see Map 1). In Nogoonnuur District, elevations range from 1500 to more than 4000 metres above sea level. A north–south fault splits the landscapes in half with a lowland plain to the east and the Altai Mountains to the west. The climate is strongly continental with long, cold winters and short, hot summers. During the study period (June 2015 to July 2018), monthly temperatures averaged +18.0°C during summer (June–August) and –18°C during winter (December–February) with extremes ranging from +34 to −44°C (see Figure 1). The vegetation consists of semi-arid and alpine steppes and is mainly composed of grasses, with a few forbs and bushes exclusively near rivers in the lowlands and valley exit.

Average annual rainfall is 131 millimetres with a maximum of precipitation occurring during summer.[3] In the winter there is little snowfall and most of the time no snow cover at all on the plains. Open water is rare, and consists of a few intermittent streams. In the Mongolian Altai, snowfall in the mountains can start in August and last until May–June (Finke 2004: 248). Temperature, precipitation and winds vary from valley to valley, as noted by herders and the literature (Jordan et al. 2016: 11).

The population of the district, which is overwhelmingly Kazakh, is about 6500. The Kazakhs of Mongolia, who have been present in the western part of current Mongolia since the end of the nineteenth century (Diener 2009: 99) now live mainly in Bayan-Ölgii Province, where they represent about 90 percent of the population (Finke 2004: 247). Kazakh herders in Mongolia breed camels, horses, cattle (cows and yaks) and sheep and goats for their meat, milk, body products and labour power (horses and camels). Like the Kazakhs of Kazakhstan (Ferret 2018: 517), Kazakh herders in Mongolia live in permanent houses (adobe, wood and stone; Finke 2004: 258) in winter and in yurts during the other seasons, possibly with small, portable livestock pens. While permanent houses are not very common among Mongolian herders, the Kazakh herders explained this choice due to the size of their yurt: the Kazakh yurt is much larger than the Mongolian yurt making it more difficult to heat in winter.

The importance of the relief allows for the mitigation of climatic extremes through vertical nomadism: for example, winter temperatures are higher in mountain valleys than on the plains, while summer temperatures are cooler at higher altitudes (Finke 2004: 249). Therefore, herders in the Nogoonnuur District experience much lower temperatures in July, when they are at their summer camp in the mountains, than in June, when they are on the plains. In fact, it is generally this cooling that pushes the herders to move down from their high-altitude pastures, which are

[3] Meteorological station based at Nogoonnuur village: http://fr.climate.org.

difficult to access or pass through for most of the year. Winter pastures are generally chosen for their low snow cover (see also Jordan et al. 2016: 3).

While, as elsewhere in Mongolia, the livestock are content to graze for a large part of the year, all the herders feed some of their animals with hay for a short period. They also supplement this feed with lake salt, collected in Uvs Province and purchased commercially, and rock salt, collected from the same location in the district by all herders in the study area.

Seasonal mobility patterns and interannual variations

Beyond those common general features, the five herder families we worked with showed interesting differences in their nomadisation patterns.

Tileujan

Tileujan's family used in average seven campsites for fourteen nomadisations (see Map 2 and Figure 2). They therefore went to the same camps several times, forming itineraries with return trips rather than loops; this practice is found among several herders in the Altai, whereas it is absent in other regions, such as Arkhangai. The periods of residence in the same camp varied greatly (4 to 75 consecutive days), with significant variations in altitude (over 1000 metres). Summers were spent at higher altitudes (F) to access pastures that are inaccessible for most of the year and to flee the mosquitoes. Snow is usually present in the highlands from November to May, and is generally absent from the winter camp (C), which is why Tileujan chose this location. Tileujan always makes sure to be back at camp C for the small livestock birthing period (early March), because it has the necessary infrastructure (pens and sheepfolds), as well as for winter slaughter in November or December, when about 20 cattle are slaughtered.

Tileujan explained part of the interannual variations in the places frequented by the absence of grass due to the drought phenomena. In 2015, he used two different locations on the plain (A1 and A2) between August and October. In the summer of 2017, he set up his summer camp for the first time at an unusual location (G) and relatively far from his usual summer camp (F) because of the late rains. He spent the winter at C instead of E in 2017, and did not go to D in 2017 and 2018 because the grass was poor. Between February and March, of the three years we monitored, Tileujan went with the young cattle that did not calve to camp B due to insufficient pasture at camp C, while the rest of the family and herds stayed put. In the winter of 2017–2018 he left the province altogether for the neighbouring district of Bökhmörön (Uvs Province), where the grass was more abundant, and set up an exceptional *otor* camp. He also spent the winter there in 2013–2014 for the same reasons, and because it was an area where he had Mongolian friends. Going on *otor* (in Mongolian; *otar* in Kazakh), a grazing area that is not used when conditions are normal is a relatively well-documented practice in some parts of Mongolia (see for example Murphy 2011). To go to these kinds of relief pastures the herder must ask permission from the authorities of the neighbouring district and pay the 'livestock foot tax' (*malyn khöliin tatvar*), proportional to the size of the livestock. Only small livestock were driven to the remote *otor* that Tileujan chose, and the two men of the family (Tileujan and his son) took turns in a small yurt, while the rest of the family remained in camp C. Additional environmental factors led to further interannual calendar variations: Tileujan did not travel to E in the winters 2016–2017 and 2017–2018 because it was colder than usual. In 2018, the close return trips between C and B were made by small livestock that did not give birth, as the pregnant females always stayed in C; also, the wind was too strong to stay in camp B for a long time that year, as goats are less resistant to the wind.

[insert Map 2 here]

[insert Figure 2 here]

Nursultan

Nursultan and his family typically used six or seven different camp sites over the course of one year and over the three years of follow-up they nomadised seven to fourteen times a year (see Map 3 and Figure 3). At the summer camp, the yurts are protected from the wind by large stone walls: they are therefore located in exactly the same place every year. However, there was flexibility in the location of the camp on the plain (F1, F2, F3, F4). The variability was explicitly presented as structural by Nursultan, who explained that where he goes in late spring (C, E, or H) is determined by the state of the vegetation. The diagnosis is established in advance based on direct visits on horseback or, more often, by motorcycle, a device introduced to his family in the late 1990s. A person may be sent out to scout specifically for this purpose, or whilst undertaking other activities such as wolf hunting, or when they come across or call on acquaintances. 'It's the grass that knows where we're going,' said Nursultan, to explain some of his movement choices.

Since the spring of 2016 was not favourable for the vegetation, according to Nursultan, two exceptional sites were used in the spring (I – instead of C – before returning to B, where the grass had regrown) and autumn of the same year (A). In October 2016, the small livestock was exceptionally sent to join that of his brothers-in-law (nuclear families 7 and 8 on Figure 8) in A while Nursultan and his wife stayed on the plain (F3) to look after their children who return at weekends from boarding school in Nogoonnuur. It was only in C that they rejoined the herd. In the autumn of 2017, they settled for the first time in G for one month on Janbolat's camp (herder mentioned below), with which Nursultan has distant family ties [Janbolat is his

FFFFBSSDH], as there was no grass in the camp B valley (unlike the valley where Janbolat is located in G). The cause, according to Nursultan, was a near absence of rain in June 2017, adding to a lack of snow the previous winter, and a strong wind that diverted the scarce precipitation. Conversely, in camp G valley, the heavy snow had moistened the soil resulting in good vegetation growth. Nevertheless, they had to return to B, where the birthing facilities and hay supplies were located. Numerous storms (high winds rather than snow) caused herders to travel back and forth between camps C and B in the winter of 2017. During this same period, Nursultan and his family spent most of the time at the winter camp (B), while his brother was with the small livestock in C. They waited until all the kids and lambs were born before moving to D, where Nursultan's wife's younger brother lived and where the grass was more abundant. Grass shortages and the return of high winds to camp B in the spring of 2018 made Nursultan and his family move exceptionally to H, an unusual camp located in another valley, where they stayed for only a short time due to low temperatures. They then passed through the winter camp (B) again to collect hay before leaving for camp C. Finally, they went back down to the winter camp (B) to go to a wedding (but there was not enough grass to stay) before going up to the summer camp in E.

[insert Map 3 here]

[insert Figure 3 here]

Berikbol

Berikbol and his family generally use seven to eight different campsites and over the three years of monitoring they have nomadised eight to eleven times a year (see Map 4 and Figure 4). It is

the mosquitoes that force Berikbol and his family to leave the plain in July (usually for camp G1 where they make their hay), but it is the cold weather that brings them back (A) to fatten the cattle in autumn. Nevertheless, as other herders, who have priority because of their earlier arrival in the territory, have set up their autumn camp there, he cannot stay for long. Berikbol therefore moves to camp B (where he goes several times a year), and from where he is usually chased away by the cold to his winter camp in C. It is also in C that he has the infrastructure to accommodate the birth of small livestock. Berikbol mentioned that a number of camp locations vary according to the climate (especially in the valleys where camps F and J, and G1, G2 and B are located, as well as camps belonging to relatives, as in May 2016, when he visited D). The variability was therefore also presented here as structural.

In the summer of 2015, Berikbol nomadised to his father's summer camp (I) with the small livestock and milked cows, while the horses and other cattle were entrusted to a neighbouring family that was going to be near the usual summer camp (F). The use of this site in summer is far from systematic: Berikbol went there in 2014 and 2015, but not in 2013 and 2016. He said that in some years the grass is not good, but in 2015 he wanted to spend the summer with his father. In general, there is not much snow on the plain but it can be cold. In this case, he goes to the valley of G or B campsites. In May 2016, as the grass was poor, he exceptionally went to D, to a close relative's winter camp, which also has the necessary facilities for combing his cashmere goats. At the beginning of 2017, Berikbol stayed at his winter camp for a long time because the grass had grown well. In May 2017, he returned to D to avoid using the pens in his winter camp because of an infectious disease that had broken out and spread amongst the lambs. In June 2017, he went to E because of the presence of wolves in other campsites. In the winter of 2017–2018, as the grass was poor in winter camp C, he went to B, before returning to C for the birthing period, with the females giving birth, while he entrusted the rest of his cattle to another herder in B. In March 2018, it started to get very cold, so he brought all the small

livestock back to C. Once the lambs and kids were old enough to walk he returned with them to B, where there was more grass but also more wind. The quick move to E was justified by the need to rehabilitate facilities and prepare dung (used as a fuel) for the summer in F. The rest of the family then stayed in B and rejoined him just as he arrived at the summer camp in F.

[insert Map 4 here]

[insert Figure 4 here]

Amanbek

Until the early 2000s, Amanbek and his son Murat followed an itinerary roughly similar to that of Berikbol (see previous section). Some years ago, Murat took over the responsibilities of the herding activities from his aging father. One of the notable features of this herder's nomadic practices was to entrust part of the year's livestock to other herders, including those residing in another region. Thus, from October to February/May he used to divide his small livestock into three groups: 1) sheep, 2) female goats and their young, 3) male goats. The females remained in camp A, while the other two groups were entrusted to Mongolian families, sometimes up to 40 kilometres away (see Map 5 and Figure 5). The sheep were sent to K because there would not be enough grazing at A, whereas the goats can graze on shrubs. In addition, Murat did not like to look after the sheep when it is cold and his father was the same. Finally, he said that the grass was better there and it would be difficult for the sheep to change their habits now.

The unusual B and J passages for the two animals represented movements to other herds that his animals joined while he looked after his sick child in the village. The sheep nomadised with the Mongolians to G, while Murat nomadised to C once all the young were born and mobile.

He then picked up his sheep in J and gathered all the flocks at camp C; from there they nomadised to the summer camp (D). The herds stayed together until October, then the sheep were separated again.

[insert Figure 5 here]

[insert Map 5 here]

Janbolat

Janbolat generally uses four different campsites in one year (see Map 6 and Figure 6). The valley in which he spends the summer (A1 to A4) is generally cooler than the valley where his winter camp is located (B), and it is the cold that leads him to change valleys in late autumn, around November. In January–February 2017, he went to A1, where the grass was abundant. Only part of the family went there, while the rest of the family stayed in B. The return of the animals to B was necessary for the birthing period. The departure of B to A1 in April was due to the tick season, but as soon as the grass started to grow at the beginning of May the ticks disappeared, enabling the herders and animals to return. At the end of June, the family left B, without having exhausted all the pastures in order to keep some for the following months, and returned to the other valley, but higher up, to flee the mosquitoes, which are too numerous, lower down. As the temperatures dropped, they moved back down the valley to A1. In mid-November, as the grass resources ran out and the cold set in, Janbolat and his family returned to their winter camp. In mid-January they returned to A1 again because there was less snow. In mid-February, the cold pushed them to return to B, which they left again in April because of ticks.

In 2017, they joined the winter camp later than usual (mid-November instead of the end of October) because the summer of 2017 was very hot. In the summer of 2018, they decided to spend part of the summer further up the valley (at his cousin's camp [FFBS] (nuclear family number 5 on Figure 10)), where the grass grew better. Overall, Janbolat suffered much less from the irregular climate than his neighbours, probably due to the very low population density of the valley, he told us, as other herders prefer to live in more accessible valleys.

The return to B at the beginning of May each year is determined, among other things, by an economic factor: the sale of goat hair. In recent decades, there has been an explosion across Mongolia, and especially in the Altai, in keeping goats to satisfy the global demand for cashmere, which is a major resource for herders (Murphy 2018, Tsevegmed 2016: 4, Lkhagvadorj et al. 2013a: 84). While in the 1930s there was a ratio of around ⅓ goats to ⅔ sheep in Bökhmörön District (Simukov 2007a: 583), current ratios have more than reversed the trend. Janbolat's camp B has the necessary infrastructure to comb the goats but, more importantly, it provides transport access for trucks.

[insert Map 6 here]

[insert Figure 6 here]

Inherited routes, social organization and herd structure

Beside variations in nomadisation calendar and routes, often inherited from elder family members, the herder families also showed great variations in the size and organization of the family and herd structures.

Tileujan

According to Tileujan, their current itinerary is similar to that of his father's, who arrived in Mongolia from Xinjiang in 1940. When his father stopped working, an additional winter camp was also in use, located a few kilometres from the village of Nogoonnuur, giving him easier access to medical care. This camp is now occupied by one of his brothers-in-law [ZH]. According to Tileujan, the notorious changes in nomadic practices since the socialist period have been more about transport than itineraries: since the mid-1990s, nomadisation has been carried out mainly by truck rather than by camel.

[insert Figure 7 here]

The camp is generally composed of two yurts or houses, depending on the season. One houses Tileujan, his wife and their unmarried children (1); the other houses his eldest son with his wife and their children (2) (see Figure 7). The family owns more than 1000 animals of all species: approximately 1000 sheep and goats, 20 horses, 20 cattle, and 2 camels.

Depending on the time of year, the composition of the domestic group and especially the herds can change. It was during discussions about interannual differences and the use of *otor* during subsequent fieldwork that we discovered the existence of these variations in the structures of human and animal collectives. They are so common and obvious that they had not been spontaneously mentioned by the herders during the first interviews on nomadic practices carried out in 2015, before we started to collect GPS data. In October, while one of the two men in the family was with the goat herders in camp B, as shown in Figure 2, the rest of the family was in camp C with the large livestock. In the spring, the females that give birth are separated from the rest of the small livestock. The females and their young remain in camp C, while the males

are taken to camp E. Tileujan said there is also a separation in the spring between the goats which are taken to camp C to be combed, where the hair (cashmere) is stored for sale, and the sheep which remain in camp E (they go directly to the summer camp from there), guarded by one of the two men; usually, the small livestock is reunited again in June. However, a large part of these movements do not appear in our data due to the small number of equipped animals and because these animals were not specifically chosen, as we were unaware of this practice of separation.

Nursultan

Nursultan's told us that his nomadic itinerary has not changed since the early 1990s, and up until then it was pretty much the same as his father's, who built the winter camp in the early 1940s.

[insert Figure 8 here]

We also encountered changes in herd composition with Nursultan, linked to the human social organisation. In fact, in summer (E), the camp is composed of four yurts, each housing their nuclear family: Nursultan (1), two of his brothers (2, 3), his sister (4), and his sister's brother-in-law [ZHB] (5). The small livestock of these five families are then grouped together, which reduces the workload by introducing shifts in the surveillance of the herd, for example. In the autumn (F), the camp is smaller and consists of four yurts: the first houses Nursultan and his family (1), two others house his brothers-in-law [WB] and their families (7, 8), and the fourth houses his sister-in-law's family [WZ] (9). The mode of residence then changes, with Nursultan and his family joining the in-laws. Nursultan's brothers, who usually share the summer camp

with them in E, are also nearby on the plain. In winter and spring (at camps B and C), Nursultan joins those who share the summer camp with him, except for two of his brothers (2, 3), who then spend the winter with their family in Nogoonnuur, while leaving their livestock with Nursultan and his family. Only in winter does the family of his cousin's wife [FBSW] (6) also join him. Until 2015, Nursultan's brothers (2, 3) and one of his cousins shared all his camps. Under the pressure of growing livestock of these reunited families, which reached more than 3000 head, they began to follow a partially different itinerary in 2015. At the lowest rate of regrouping, Nursultan and his family own 1000 goats and sheep (700 goats and 300 sheep), 20 horses, 70 cattle but no camels. In the course of the interviews, Nursultan also reported a recurrent separation of small livestock, especially breeding males, which are introduced each year into his herd from October to June and then handed over to another herder in the area.

In this case, we observe many movements of separation and reunion, both for humans and animals, at a high level of complexity. In addition, it mixes modes of residence, sometimes with affines, sometimes with consanguines and affines of these consanguines, whereas at Tileujan's the residence is clearly virilocal. This highlights the need to also map the movements of humans, in order to better understand the logics of territory occupation from a social aspects point of view.

Berikbol

Berikbol and his family have been following this nomadic itinerary since the early 2000s, after leaving his father's camp (2).

[insert Figure 9 here]

The Berikbol camp usually consists of a yurt (from spring to autumn) or a house (in winter), in which Berikbol, his wife and their children live (1) (see Figure 9). This composition of the domestic group is stable throughout the year, with the exception of school children, who spend the summer at their parents' camp but attend weekday boarding school during the rest of the year. The livestock consists of about 500 head of small livestock (450 goats and 50 sheep), approximately 20 horses, 15 cattle and 3 camels.

Amanbek

For a short time, we followed Berikbol's father, Amanbek, who lives with his youngest son, his wife and their children (see Figure 9) (2). The family's livestock consists of less than 500 head of cattle (approximately 300 goats, 100 sheep, 20 cattle and 10 horses; a handful of horses are also entrusted to another family near camp A).

Amanbek was following an itinerary that is similar, in part, to that of his father, who was originally from Xinjiang. Unlike Berikbol, however, his grandfather occupied camps in the northernmost valley of the mountain range and near the Bökhmörön River, which separates the two provinces; he thus nomadised over greater distances but with less frequency. This nomadic route was determined by the cooperative. However, while Amanbek kept the location of his winter camp close to the same river, he moved his summer camp several dozen kilometres to the south-west. The reasons he gave were increased cross-border cattle rustling near the Mongolian–Russian border, the presence of Amanbek's son-in-law (who is employed at the border guard post) in the new occupied area and greater accessibility to the latter by car, which makes it easier for Amanbek to visit the health centre.

In 2017, Murat, Amanbek's son, decided to stop herding. At the beginning of October, he divided his herd of small livestock into five groups and entrusted them to five different herding

families. He then settled permanently in Nogoonnuur but stopped caring for his livestock, which he still owns.

Janbolat

Janbolat moved to his current winter camp (B) with his father in the early 1990s, when cattle were redistributed as part of decollectivisation. Prior to this date, a cooperative was established here. Janbolat's itinerary, as he described it, followed patterns comparable to those of neighbouring herders, with summer, autumn and winter camps located in the same areas. His itinerary changed ten years later, when he decided to set up his camps in the valley where he is now after obtaining permission from the Nogoonnuur District administration. The reason for this change is twofold: the location is closer, so he avoids long nomadic journeys, and the few herders who used to live in this valley have now left. Nowadays, Janbolat and his family are alone in the valley, which is only accessible by horse or camel. According to him, the quality of the grass and the low population density of this valley allow him to adopt a relatively short nomadic itinerary compared to the practices of the district, which has earned him the qualification of 'lazy' by the neighbouring herders, even though he nomadises at least six times a year. The nomadisations are always carried out using one or more pack camels.

[insert Figure 10 here]

For most of the year, the camp consists of a yurt or a house (on the winter camp), which shelters Janbolat and his wife, two of their children and sometimes one of their granddaughters on weekends (1). In summer, members of his family form a camp of four yurts (2, 3, 4, 5) a few hundred metres upstream from his (see Figure 9). During this period, the two camps keep their

livestock separate, but outside of the summer their sheep and goats are grouped together. Janbolat and his wife own about 700 sheep and goats (including 600 goats), a few horses, several dozen cattle (yaks) and 3 camels.

CODA: TRACKING VARIATIONS IN NOGOONNUUR

[insert Map 7 here]

The synthetical map (Map 7) allows for a visualisation of the unequal spatial distribution of the herders' campsites: while Janbolat confines himself to a small nomadic territory, the others use the full range of ecosystems, from plains to mountain pastures, including valley bottoms. Current use of pasture by these herders is, as we have seen, highly determined by family history (i.e. nomadisation practices inherited from their father) and constant environmental constraints (heat, cold, mosquitoes, ticks). Individual choices are also associated with access to markets through roads and services such as health care.

The study of the nomadisation patterns of these five herder families highlights the high degree of mobility of the herders in Nogoonnuur District: they used four to eight campsites and nomadised seven to fourteen times a year (Table 1). For all herders, in a same year, periods of residence at the same camp varied greatly (eg. from about 15 to almost 178 consecutive days for Nursultan; from 15 to 178 for Berikbol), as well as the distance between two campsites (eg. from 2 to 44 km for Tileujan; 8 to 73 km for Amanbek). Janbolat quickly caught our attention because his background follows a very different pattern from the other herders, alternating between only two neighbouring valleys, being for this very reason regarded and designated as 'lazy' by the surrounding herders. Data show however that due to remoteness and a low population density in his valley, he is less vulnerable to climatic irregularities.

[insert Table 1 here]

The GPS data and the herders' interviews show a great interannual variability in the movements, in terms of space and time, directly linked to variability in grass grow, rainfall, snowfall, temperature, drought, winds, and infectious diseases, although they can occasionally be linked to individual factors (such as attending a wedding or wanting to spend the summer with one's father). Whereas this variability was spontaneously mentioned to us and presented as structural by herders such as Nursultan during our very first interviews, others described their nomadisation route as regular, with little change from a year to the other. We were surprised to observe, therefore, shortly after our first fieldwork, the GPSs of Berikbol's cattle heading tens of kilometres away from the mountainous area that we had surveyed on horseback to geolocalize all the campsites he used over year according to him.

Berikbol was however the first herder in our discussions to refer to certain campsites as *otor*. He used this term to refer to a camp consisting of a light habitat (the yurt) where a single herder or shepherd takes care of part of the herd (as in early spring 2018) when the conditions of the usually frequented pastures are not satisfactory. Our discussions with herders and analysis of the literature (Finke 2004: 256) indicate that in this region this work is often undertaken by family members, sometimes the younger ones, including distant family members, or even employees. However, Berikbol also used the term *otor* to mean certain sites that are occupied on a regular, yearly basis, by the entire domestic group and herd, but for a shorter period of time than the other camps. In the context of greater mobility than in Arkhangai, for example, this term seems to cover a wider reality than that of just a spare grazing area, and can refer to any camp that is not specifically a winter, spring, summer or autumn camp; the Mongolian and Kazakh languages using these terms rather than the generic term of 'camp'.

This high degree of mobility, compared to other regions of Mongolia, is also associated with changes in social and herd organisation, whether structural (i.e. on a regular basis) or incidental, linked to unusual and mainly climatic conditions.

In this article, we wanted not only to document nomadism among the Kazakhs of the Mongolian Altai, but also to make a methodological contribution to the ways in which geolocalised and anthropological data can, through dialogue, enlighten and help us to better understand the different and complex facets of nomadic pastoralism. At the start of the survey, it was assumed that, in the frame of a mobility study using GPS tracking, 'one animal [can] represent the entire herd' (Moritz et al. 2012). We therefore decided to deploy multiple GPS units per family only as a means of maintaining a backup data set in the event of a malfunction or loss of one of the collars. However, as we progressed through our research we discovered the existence of frequent herd separations and groupings. Therefore, a specific survey of these practices appears to be a necessary prerequisite for insightfully choosing the animals to be equipped. Obviously, this implies a multiplication of the GPS needed to be deployed, whilst keeping in mind that not all separations – such that of the *otor* – are always predictable.

What our study also highlights is the high degree of mobility of the herders in the Mongolian Altai. In fact, the geolocalised data we collected shows higher frequencies of nomadisation than previously thought for this region (i.e. from two to eight nomadisations per year, see; Finke 1995: 204-206, Finke 2004: 254, Jankowski 2009: 51, Lkhagvadorj et al. 2013a: 85, Tsevegmed 2016: 25-26) (see Table 2). These discrepancies can be explained by several factors. Firstly, the needs of the geochemical study made us choose herders who rarely supplement their animals, which could have induced greater mobility. Secondly, local differences, whether environmental, economic or social, could have come into play, as these studies were carried out in other districts. Thirdly – and this is the hypothesis we would like to put forward – these studies may have underestimated the number of nomadisations due to the methodology they

used, as we ourselves did during our first fieldwork. Indeed, even if we had manually surveyed with a GPS the different camps frequented during the year by the Tileujan, Nursultan and Berikbol herders, with their help and based on interviews about heir nomadisation routes and calendars, it is striking that this first mapping revealed that all three of them had a smaller number of camps than those actually used during the following years, not to mention the fact that the different round trips between several camps in the same year had not been mentioned. This methodological bias can be added to the linguistic peculiarities focusing on the camps linked to each of the four seasons (*övöljöö*, *khavarjaa*, *zuslan*, *namarjaa* in Mongolian; *qystau*, *kökteu*, *jailau*, *közdeu* in Kazakh) (see also for example Tsevegmed 2016: 25-26, who surveyed over 200 herder families in the Altai region all nomadising four times a year), which probably overlook secondary camps (sometimes designated as *otor*). It is therefore desirable to further investigate the complex and various facets of pastoralism in new ways combining both qualitative and quantitative data.

ACKNOWLEDGMENTS

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BIOGRAPHIES

Charlotte Marchina is an anthropologist, Associate Professor in Mongolian Studies at Inalco (*Institut National des Langues et Civilisations Orientales*), Paris, and is affiliated with the French Research Institute for East Asian Studies (IFRAE). Her research focuses on human–animal coexistence, communication and collaboration in nomadic pastoralism in Mongolia and Southern Siberia.

Email: charlotte.marchina@inalco.fr

Antoine Zazzo is a bioarcheologist and senior researcher at CNRS; he is affiliated with the AASPE laboratory at MNHN. His research uses geochemical signals contained in bioarchaeological archives in order to better understand the interactions between humans and their environments, including ancient and modern Mongolia.
Email: antoine.zazzo@mnhn.fr

Nicolas Lazzerini holds a PhD from MNHN (*Muséum national d'Histoire naturelle*), Paris, and was affiliated with the Archaeozoology and Archaeobotany: Society, Practices and Environment (AASPE) laboratory. His research focused on ancient and modern pastoralism in Mongolia, using an integrated approach of GPS monitoring and multi-isotopic analysis of animal tissues.
Email: nilazzerin@gmail.com

Aurélie Coulon is a spatial ecologist, Associate Professor at the MNHN, affiliated with the Center for Conservation Ecology and Sciences (CESCO; Muséum national d'Histoire naturelle, Centre National de la Recherche Scientifique, Sorbonne Université, Paris) and the Center of Evolutionary and Functional Ecology (CEFE; Univ Montpellier, CNRS, EPHE, IRD, Univ Paul Valéry Montpellier 3, MNHN, Montpellier). She investigates the effects of the environment, especially landscape structure, on animal movements.
Email: aurelie.coulon@mnhn.fr

Sébastien Lepetz is a zooarchaeologist, senior researcher at CNRS and affiliated with the AASPE laboratory at the MNHN. He is Head of the French Archaeological Mission in Mongolia. He works on human–animal relationships in Europe during protohistoric and historic periods and on Central and Inner Asia since the Bronze Age.

Email: lepetz@mnhn.fr

Tsagaan Turbat is an archaeologist and Head of the Department of Bronze and Iron Age at the Institute of Archaeology, Mongolian Academy of Sciences. For the last fifteen years he has been excavating the Bronze and Iron Age cultures of the Mongolian Altai region.

Email: turbatts@mas.ac.mn

Noost Bayarkhuu is a PhD candidate in archaeology, affiliated with the Institute of Archaeology of the Mongolian Academy of Sciences and the Archaeometry Laboratory of University of Science and Technology of China. His research focuses on early nomadic cultures from the Bronze Age until the medieval period.

Email: bayarkhuun@mas.ac.mn

Camille Noûs is a member of Cogitamus, an interdisciplinary laboratory and committed to research that affirms the collaborative and open nature of knowledge creation and dissemination.

Email: camille.nous@cogitamus.fr

FIGURES, MAPS AND TABLES

Map 1. Location Map of Nogoonnuur District

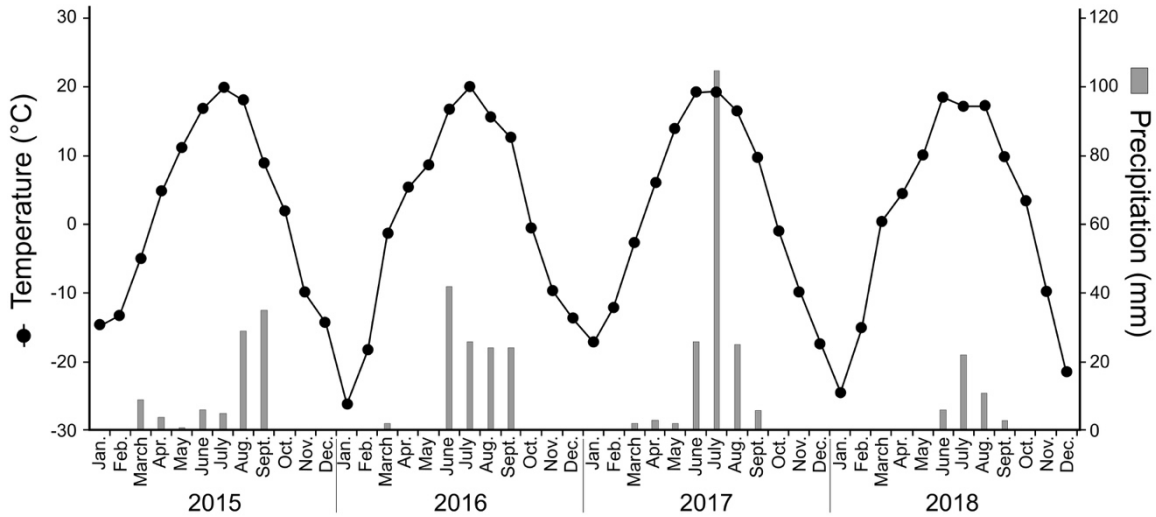
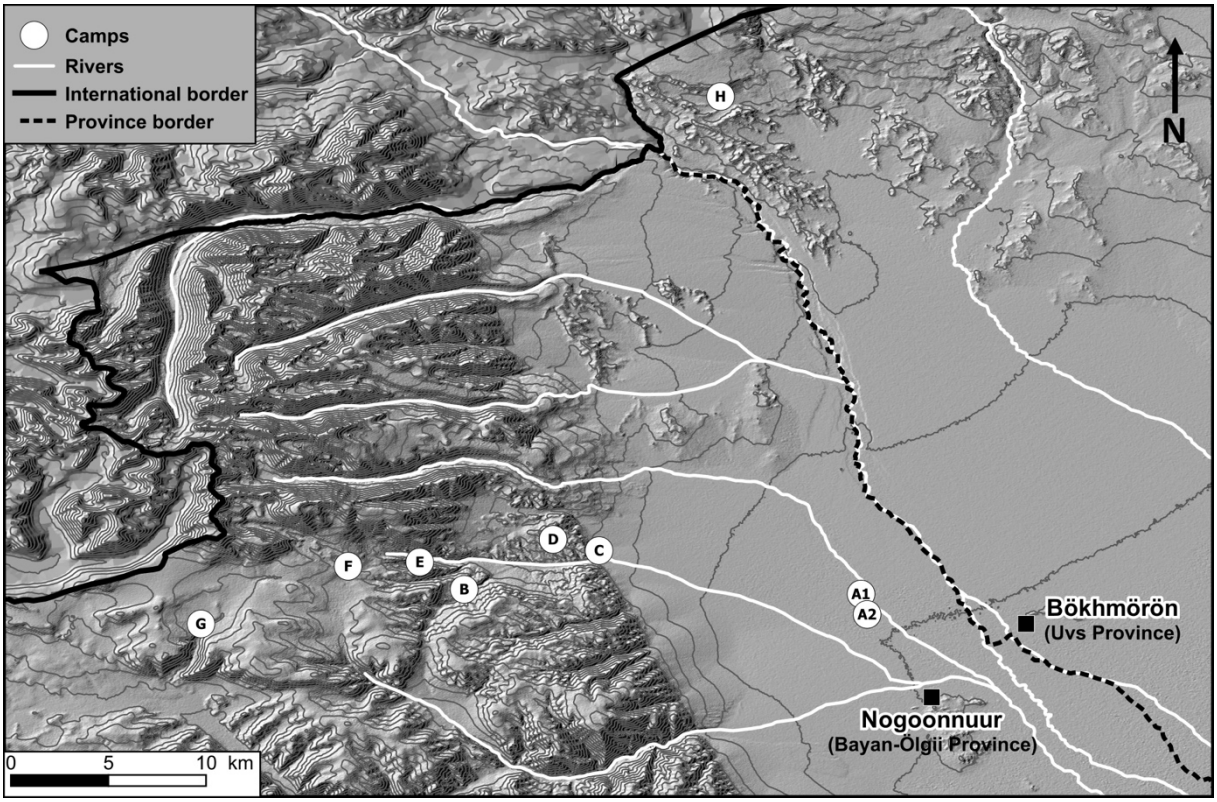


Figure 1. Nogoonnuur District climate data. Source: http://fr.climate.org



Map 2. Location of Tileujan's campsites

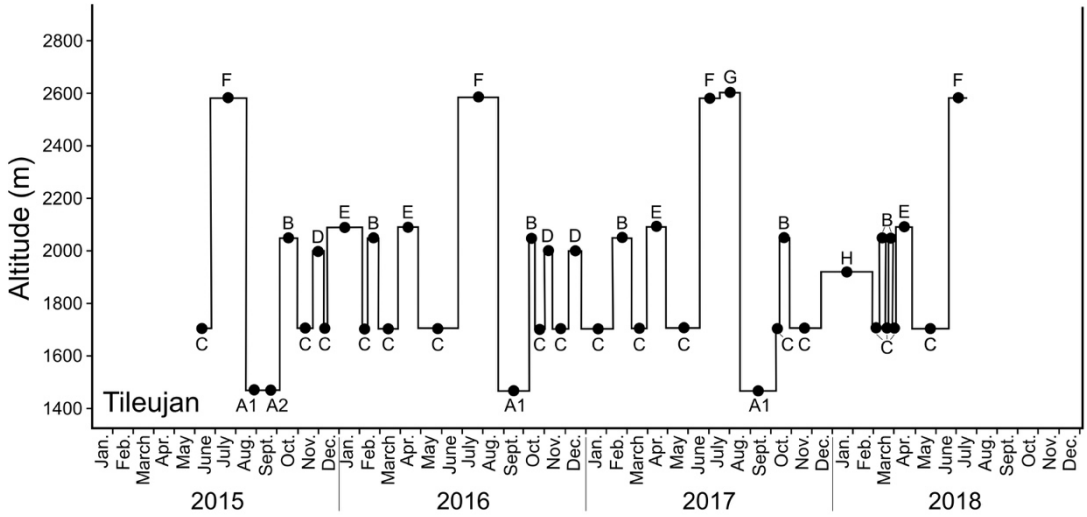
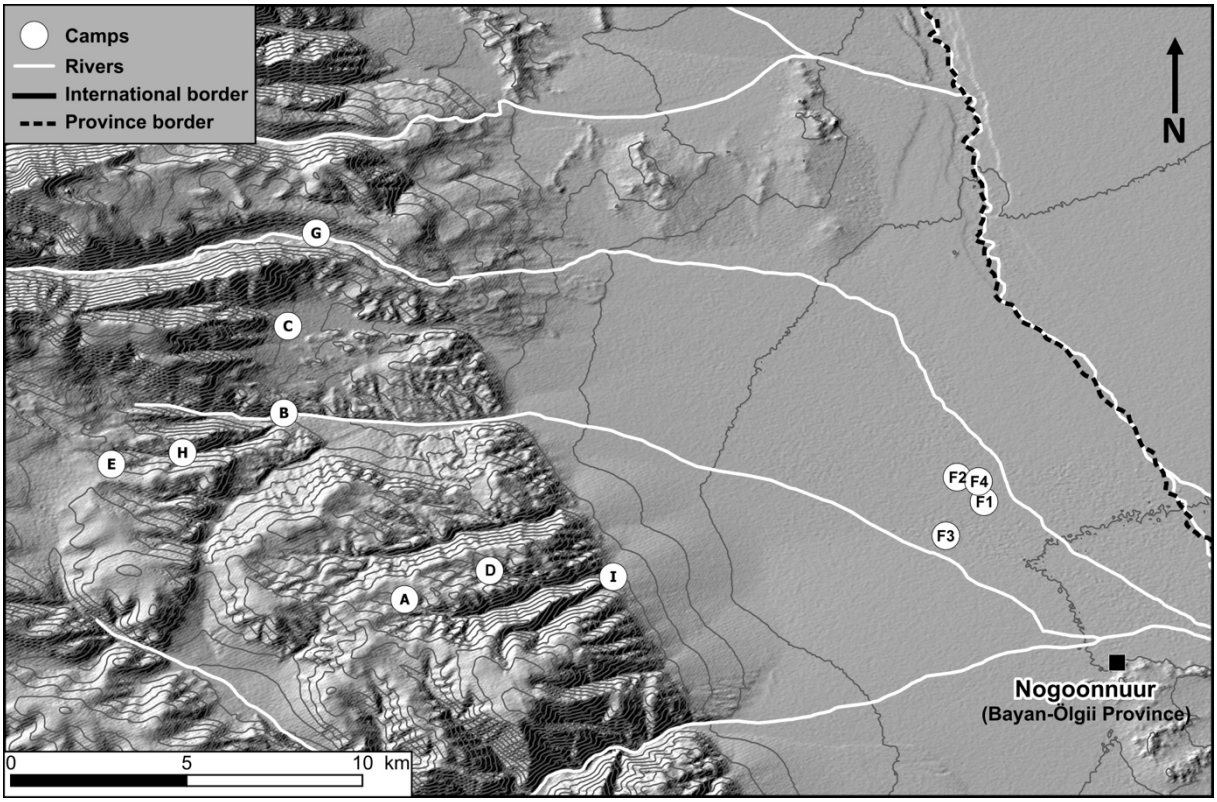


Figure 2. Tileujan's nomadisation calendar



Map 3. Location of Nursultan's campsites

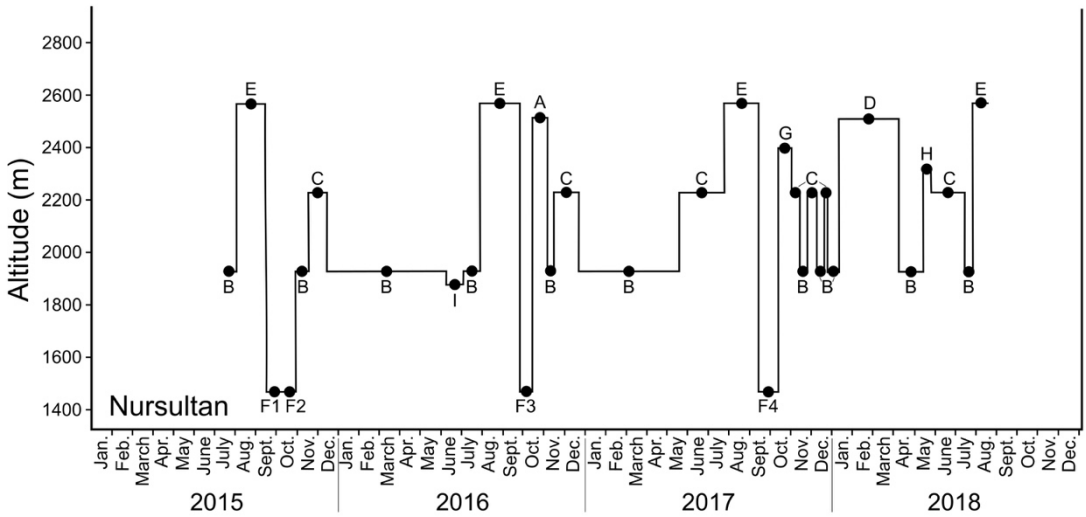
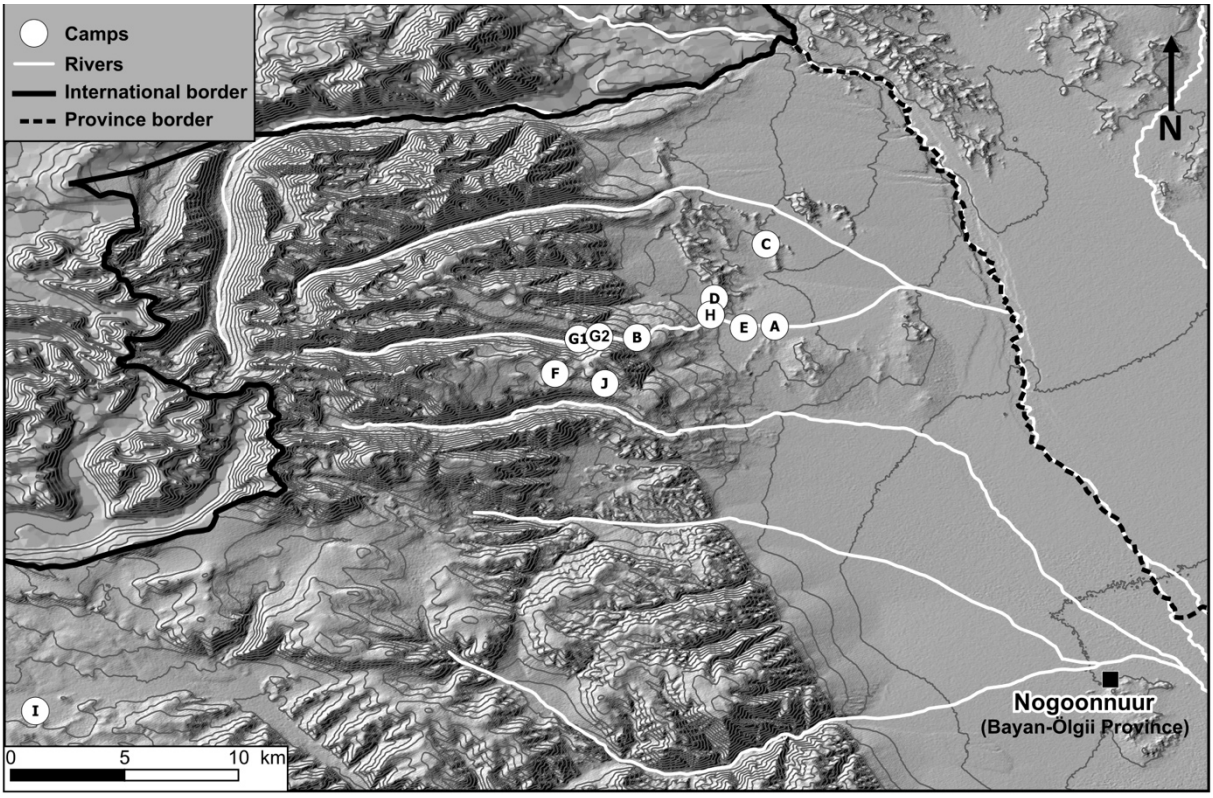


Figure 3. Nursultan's nomadisation calendar



Map 4. Location of Berikbol's campsites

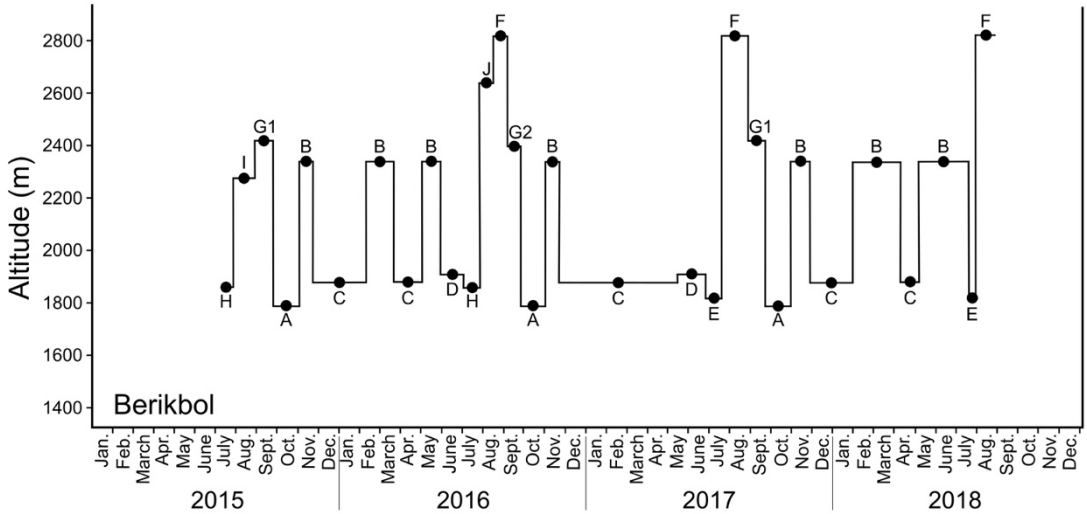
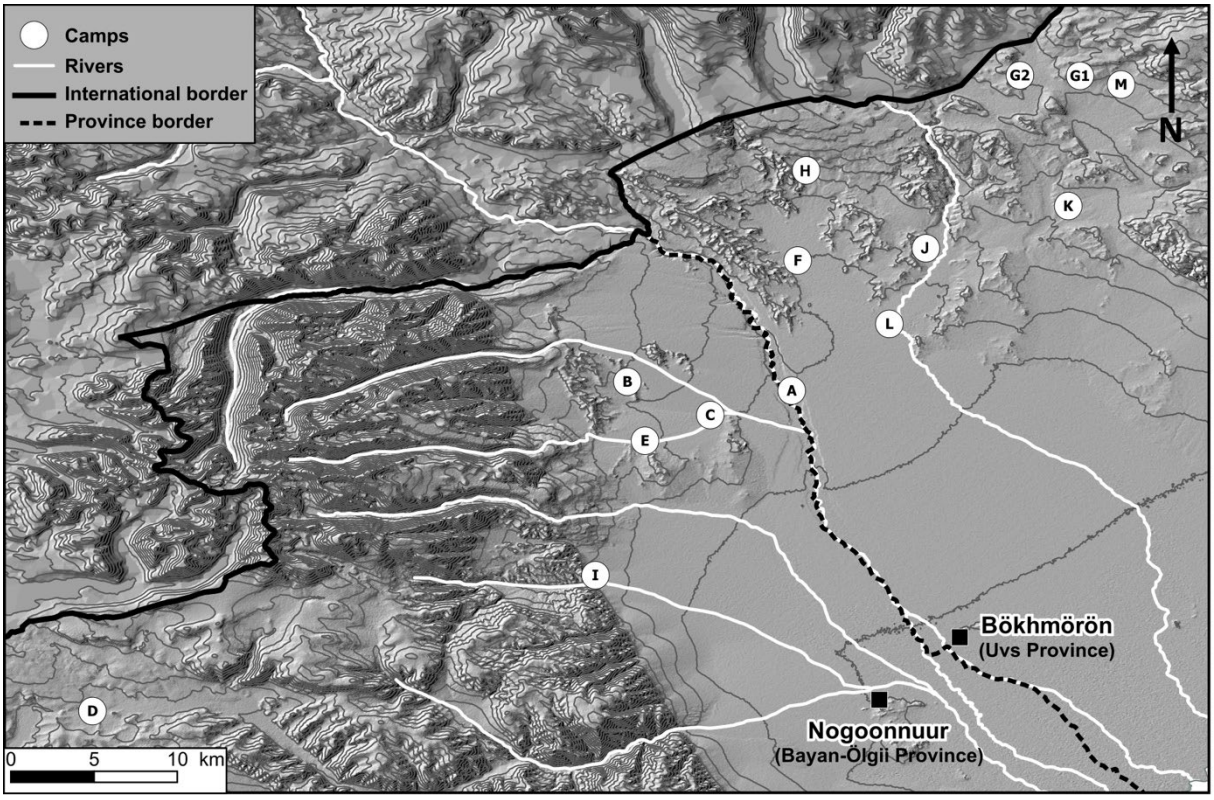


Figure 4. Berikbol's nomidisation calendar



Map 5. Location of Amanbek's campsites

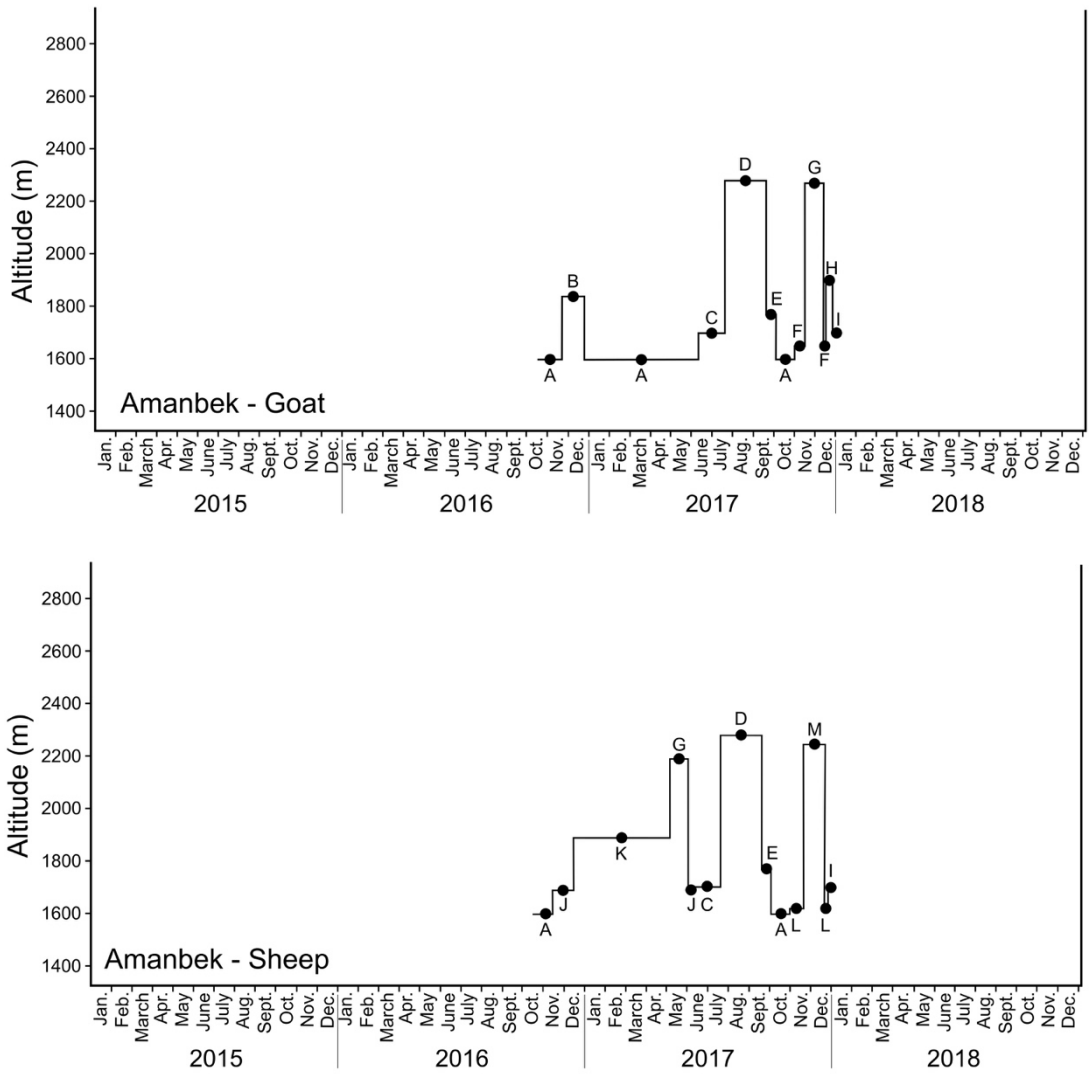
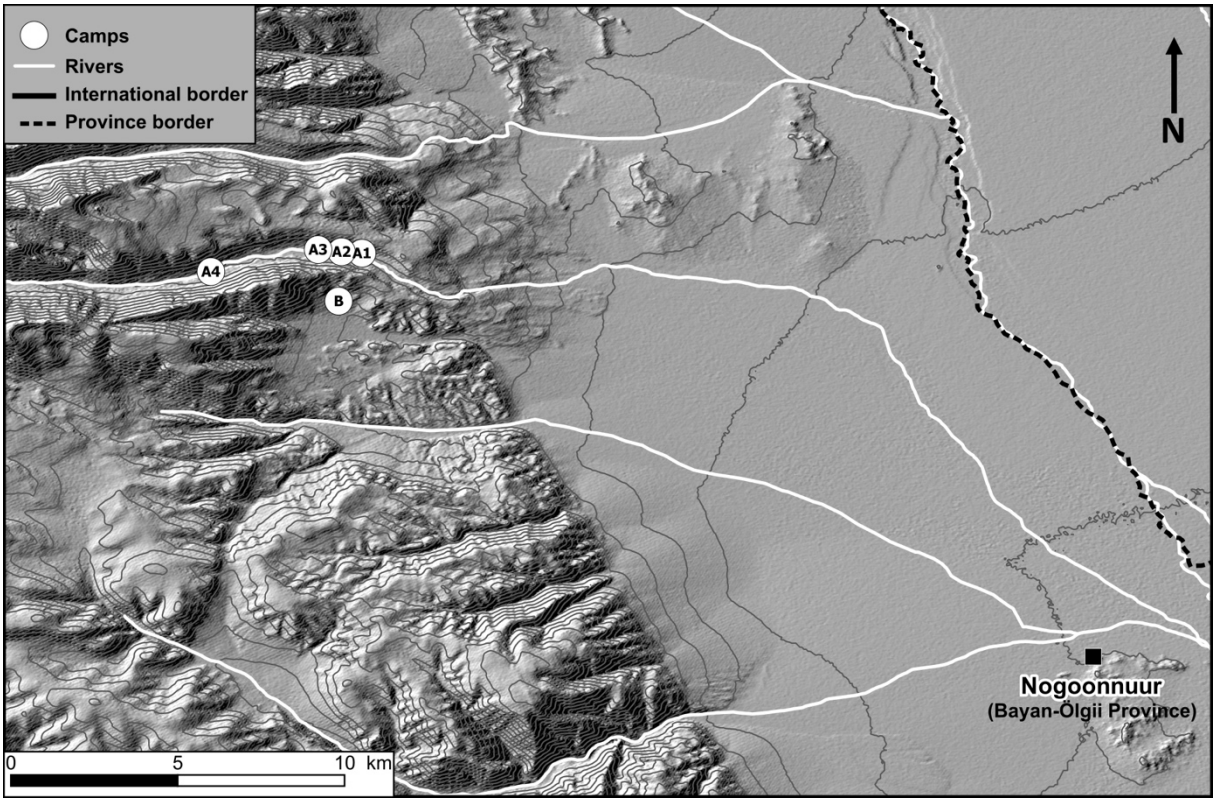


Figure 5. Nomadisation calendar of one goat and one sheep belonging to Amanbek



Map 6. Location of Janbolat's campsites

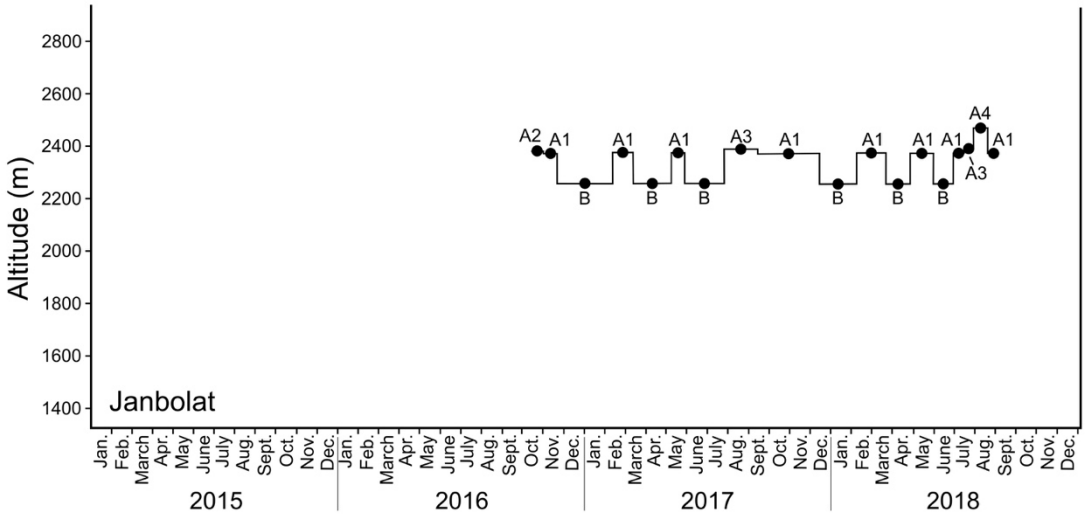


Figure 6. Janbolat's nomadisation calendar

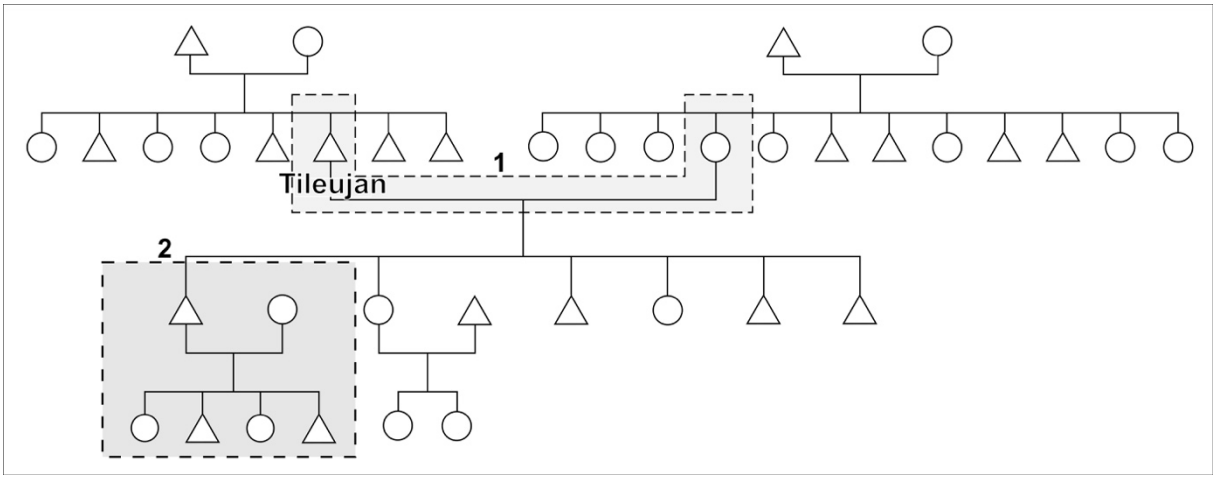


Figure 7. Tileujan's kinship diagram

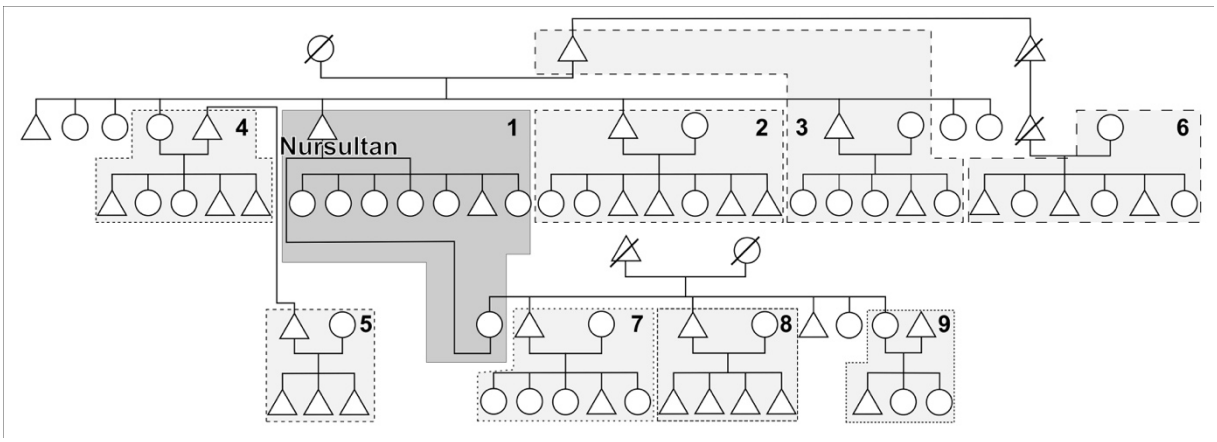


Figure 8. Nursultan's kinship diagram

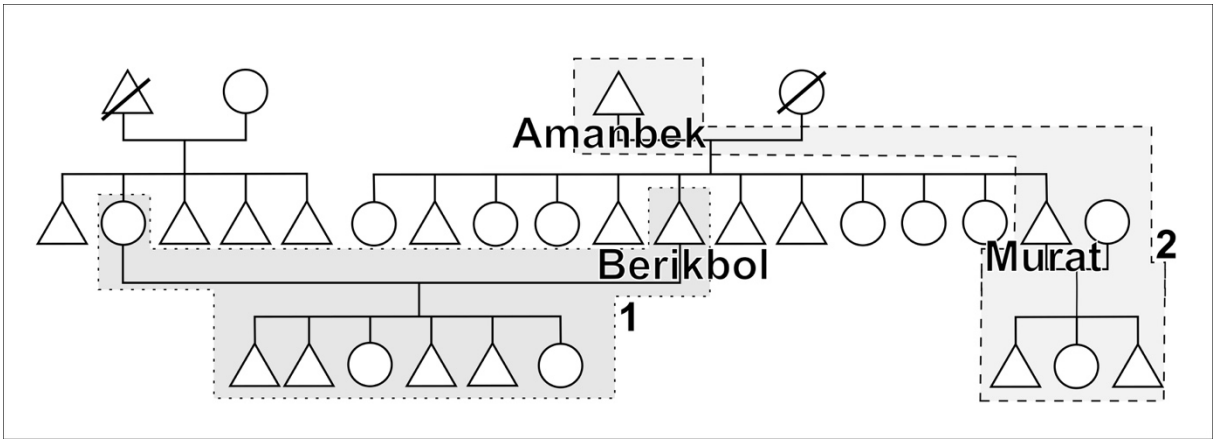


Figure 9. Berikbol’s kinship diagram

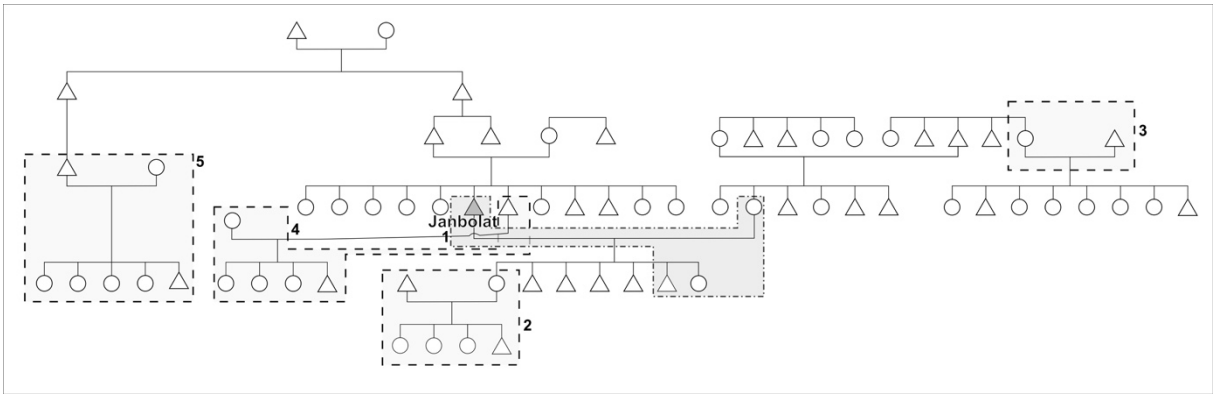
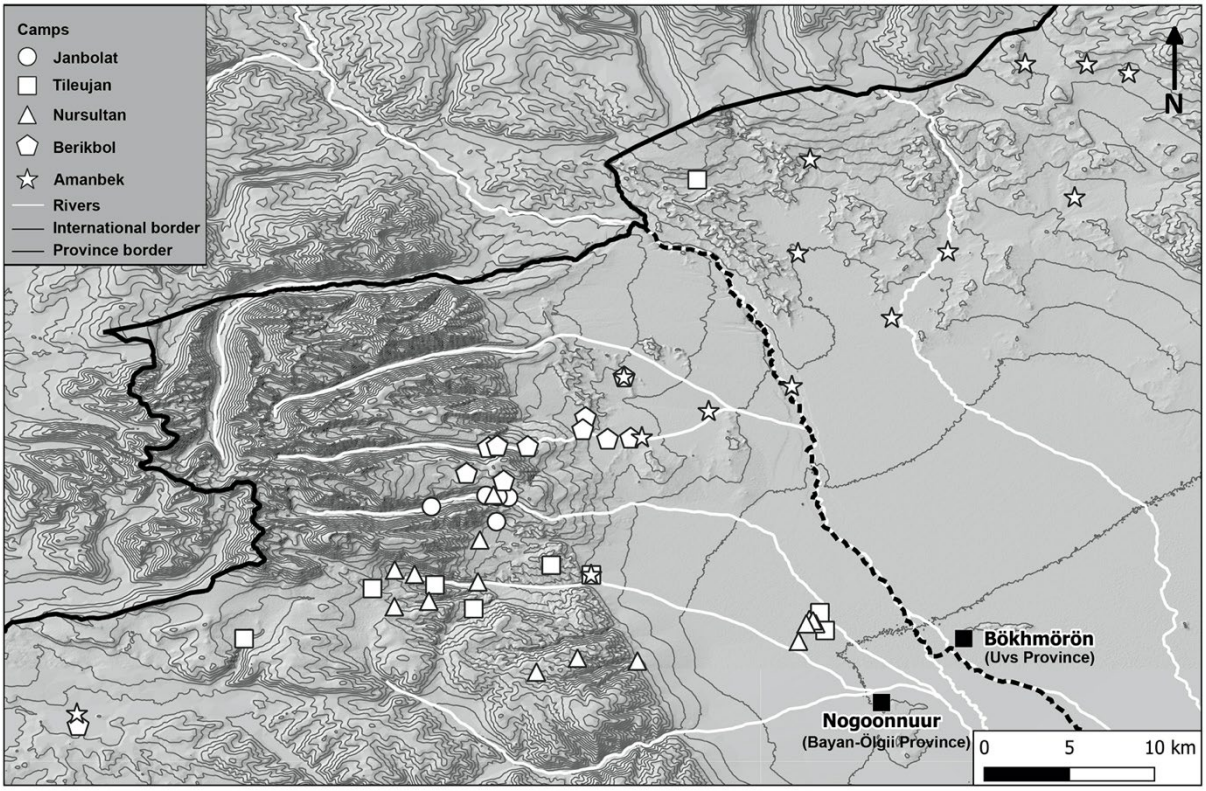


Figure 10. Janbolat’s kinship diagram



Map 7. Location of the five herders' campsites.

Herder	TILEUJAN			NURSULTAN		
Period	06/2015 - 06/2016	06/2016 - 06/2017	06/2017 - 06/2018	06/2015 - 06/2016	06/2016 - 06/2017	06/2017 - 06/2018
N camps	7	6	7	6	6	7
N nomadisation	14	12	14	9	7	14
N days max	59	59	75	178	149	88
N days min	6	7	4	15	9	3
N km travelled	198	181	274	127	99	158
N km max	44	34	33	32	40	41
N km min	2	4	11	1	2	5

Herder	JANBOLAT		AMANBEK		BERIKBOL		
Period	09/2016 - 11/2017	11/2017 - 07/2018	09/2016 - 09/2017	09/2016 - 09/2017	06/2015 - 06/2016	06/2016 - 06/2017	06/2017 - 06/2018
N camps	4	4	5	7	7	8	7
N nomadisation	9	10	7	9	11	8	10
N days max	90	102	168	143	78	175	74
N days min	18	14	13	7	20	19	10
N km travelled	31	42	194	250	201	63	114
N km max	7	7	73	73	62	13	15
N km min	1	1	8	12	1	3	4
			Goat	Sheep			

Table 1. Synthesis of the nomadic movements of the five herders