



KEYWORDS: *Rock art – Bronze Age – Iron Age – Scythian art – Dating – Xinjiang – China*

# THE BRONZE AND IRON AGE ROCK ART OF ALTAY PREFECTURE, XINJIANG: A SYNTHESIS

Rebecca O'Sullivan and Huiqiu Shao

**Abstract.** Xinjiang's Altay Prefecture sits at a key position in central Asia, encompassing the southern Altai mountains, which also straddle Kazakhstan, Mongolia and Russia. For various reasons, such as publication bias and language barriers, this region's rock art is poorly understood outside of China. This article presents an overview of the history of rock art research in Altay Prefecture, as well as a list of sites with coordinates and a critique of current dating theories. In doing so, it contextualises the Bronze and Iron Age rock art in relation to international scholarly debates and introduces the reader to key themes in Chinese rock art studies.

新疆阿勒泰地区青铜时代和铁器时代的岩画综述  
苏蓓, 邵会秋

摘要: 新疆阿勒泰地区在中亚占据着非常重要的地位, 其北部的阿尔泰山横跨哈萨克斯坦、蒙古、俄罗斯和中国四个国家, 是东西方文化交流的关键区域。但由于学术界关注较少和语言限制等各种原因, 该地区岩画的相关研究很少。本文将从欧亚草原的视角, 全面梳理阿勒泰地区岩画遗存, 对岩画的分布和断代等问题进行综合讨论, 为国际岩画研究提供重要的参考。

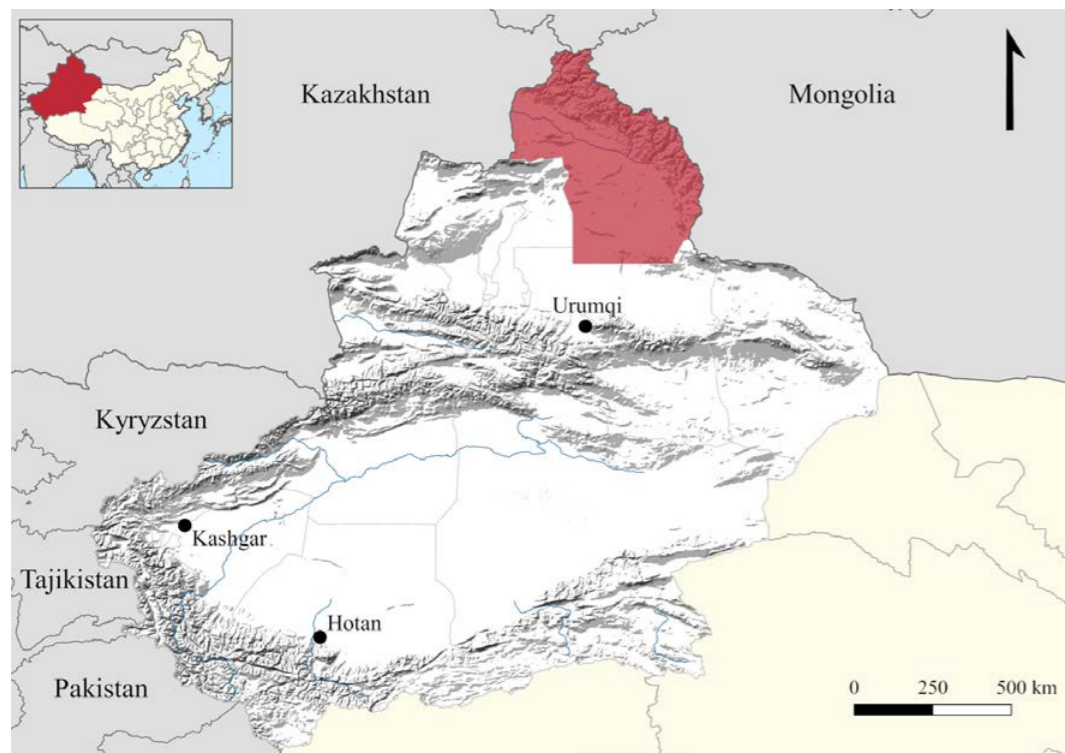
## Introduction

The vast majority of rock art in the north-west of the People's Republic of China (hereafter China) are images pounded or incised into the rock surface, known as petroglyphs. This is particularly the case for the Altai mountains, which straddle the modern China, Kazakhstan, Mongolia and Russia. On the Chinese side, the mountains fall within Altay Prefecture in the far north of Xinjiang Uyghur Autonomous Region (Fig. 1). Painted rock art also appears here, mainly made from mineral pigments, specifically iron oxides, and there are notably more paintings in the Altai than the Tianshan range, which forms the southern edge of the Junggar Basin (Su 1994: 399).

Current knowledge of the rock art record in Altay Prefecture's in Anglophone literature is limited to a few works that concentrate on painted rock art (Wang 2005; Tang et al. 2018), and a comprehensive overview of the region's rock art including petroglyphs is lacking. In China, the most recent site list was compiled during the Third National Survey of Cultural Relics (Di-san ci quanguo wenwu pucha 第三次全国文物普查), completed in 2011, when all known sites were revisited by the Xinjiang Cultural Relics Bureau and new sites registered. The survey results were published over a set of volumes organised by both administrative region and artefact type, meaning that the Altay Prefecture volume lists all finds in this region (XWZW

2011a). However, the Altay Prefecture volume lists markedly fewer rock art sites than are recorded for the region in the dedicated rock art volumes (XWZW 2011b; 2011c), which may have been a deliberate choice by the editors to avoid unnecessary repetition across publications. In 2015, the Cultural Relics Bureau of Xinjiang Uyghur Autonomous Region published the Non-Portable Cultural Heritage series, including the results of more recent surveys, though the data on rock art sites in Altay Prefecture were taken from the 2011 survey (XWZW 2015a; 2015b). Despite the scale of detail that these surveys and their publications offer, however, they have generally been overlooked in English-language summaries of past rock art research (e.g. Taçon et al. 2016: 19).

To address this gap in Anglophone rock art studies, this article brings together vital aspects in Chinese rock art research to introduce the reader to the rock art of Altay Prefecture, including past research, a current list of sites and their distribution, and a guide to theories of dates. Also, the article, in addition to making Chinese-language research accessible to English speakers, situates the rock art of Altay Prefecture within the context of Bronze Age and Iron Age (c. 2nd to 1st millennium BCE) rock art from the Altai mountains, as opposed to other parts of Xinjiang or China. To achieve this, the article draws on a large quantity of Russian-language research, in addition to Kazakh and



**Figure 1.** Location of Altay Prefecture in Xinjiang Uygur Autonomous Region, People's Republic of China. Administrative boundaries were generated using GADM data (<https://gadm.org/>). Map by R. O'Sullivan.

Mongolian resources, that are used to improve common dating frameworks for petroglyphs and expand the discussion of links between sites that are geographically close, though divided by country borders.

#### History of rock art research in Altay Prefecture

The earliest records of rock art (as opposed to sculptures) that can be confirmed to refer to specific places within Xinjiang mainly concern sites in the foothills of the Tianshan, such as a late 18th-century mention of paintings in a cave near Kashgar (Ji 1796: 38) and a report of paintings near Bogda mountain (Yuan 1911). In 1928, the Bogda 'paintings' were investigated and found to actually be petroglyphs (Wang 2004a: 47–48). Later in the 1940s, members of the Sino-Swedish expedition created the earliest record of a Xinjiang rock art site that most closely resembles modern archaeological recording by describing and photographing a panel in the Kuruq-tagh (Bergman 1939).

Publications of archaeological survey results appeared from 1960, and these were continuously released until 1962 (e.g. Qeyum 1962), after which there was a gap of almost 20 years before new material was published (Cheng and Zhang 1984; Zhou 1993a: 2). This was most likely due to the social upheaval caused by the Cultural Revolution, which brought archaeological research to a halt in most of Xinjiang (Ren 2012). As a result, even though the earliest survey of rock art in Altay Prefecture was reportedly conducted in 1965 by Wang Binghua, Wang Mingzhe and Yi Manbai, the photographs and records were never published and subsequently lost (Wang 2004b: 48).

Due to the interest sparked by Gai Shanlin's publication on rock art in the Yinshan area (Gai 1986; Demattè 2004), Xinjiang's rock art likewise saw an explosion of interest during the 1980s, with various researchers attempting to establish the number of sites. Zhao Yangfeng recorded more than 40 sites in Altay Prefecture (Zhao 1987), and Wang Bo also led a survey team to the region, recording 66 sites, including several rockshelters with painted rock art (Wang 2004b: 8), though the report has never been published. Publications throughout the 1990s, however, predominantly covered Xinjiang as a whole, such as *Rock arts of the Silk Road* (Zhou 1993b) and *Rock arts of China* (Ben 1993). The vast geographic breadth covered by these volumes means that the site lists are not the most comprehensive, with the latter mapping only 33 'points of interest' throughout Xinjiang. Alternatively, Su Beihai conducted surveys throughout the 1980s and early 1990s, listing a total of 44 sites in Altay Prefecture. His monograph was first published in 1994 and reprinted in 2013 with an alternative title (Su 1994; 2013). By the early 2000s, it was believed that there were close to 80 sites in Altay Prefecture, though the exact estimate differed between researchers (Wang 2004a: 48, Note 12). In these cases, it is difficult to assess the size of one 'site', as maps are rarely included, and compositions are organised by theme, not location.

In the 21st century, comprehensive surveys of rock art have been conducted in Altay Prefecture and Xinjiang more broadly as part of large-scale national projects intended to record archaeological remains throughout China's territory. The most recent survey,

the Third National Survey of Cultural Relics, was completed in 2011, and the Altay Prefecture volume was published later the same year (XWZW 2011a). Significantly, whilst the Altay Prefecture volume lists key archaeological sites and finds, it mentions only 50 rock art sites, with the remaining 65 sites published in a two-volume set dedicated to rock art alone, titled the *Rock art of Xinjiang* (XWZW 2011b; 2011c). Splitting the survey's results thematically and geographically has had the presumably unintended consequence of non-Chinese researchers using the site list from the Altay Prefecture volume (e.g. O'Sullivan 2019). Meanwhile, the vast majority of Chinese studies continue to cite Su Beihai's monograph as the authority on this region (e.g. Zhang 2012; 2013; Ren and Wang 2013; Shi 2018), though its 2013 reprint was not updated to reflect the results of the Third National Survey.

The most recent catalogue of rock art sites in Altay Prefecture was compiled in 2015 as part of the Non-Portable Cultural Heritage series, edited by the Bureau of Cultural Relics of the Xinjiang Uygur Autonomous Region. The volume essentially contains information gathered during the Third National Survey but represents a more thorough publication. The total number of sites is only 10 more than the 115 listed in the 2011 *Rock art of Xinjiang*, which can be attributed to groups of images that were previously considered as one site being divided into smaller sites. This serves to form sites from groups of sites located quite some distance from each other. For instance, Bulate 2-hao (102; site numbers refer to Appendix 1) covers an area c. 220 m<sup>2</sup> and lies 1.8 km from Bulate 1-hao (101), but the two were subsumed under the same entry in the *Rock Art of Xinjiang* (XWZW 2011b). Overall, although the number of photographs is low and the editors thus favour visually exciting motifs, this volume provides notably more information on each site, including maps of exact locations and even GPS coordinates in a few cases. Consequently, this article predominantly uses the information published in *Non-portable cultural heritage: Altay Prefecture*.

#### Chronological studies

As early as the 1980s, Zhao (1986) highlighted the promise of scientific dating methods for rock art in Altay Prefecture, suggesting that analysis of fungal spores and diatom fossils in the pigments of the Cangyuan rock paintings on Guangxi's Zuo River could similarly be used to date rock paintings in the Altai (Lei et al. 1985). Despite this, the vast majority of theories on dates are based on relational chronologies of motifs and styles.

Although stylistic features and overlay are generally the main features used to infer dates (Wang 2006), dating has often relied on prescriptive frameworks of linear social development (Zhou 1993b) or technological development (Wang 2004a). Dating by stages of technical development relies wholly on the assumptions that: (1) techniques only become more complex

over time; and (2) people stick to one technique exclusively during any one time:

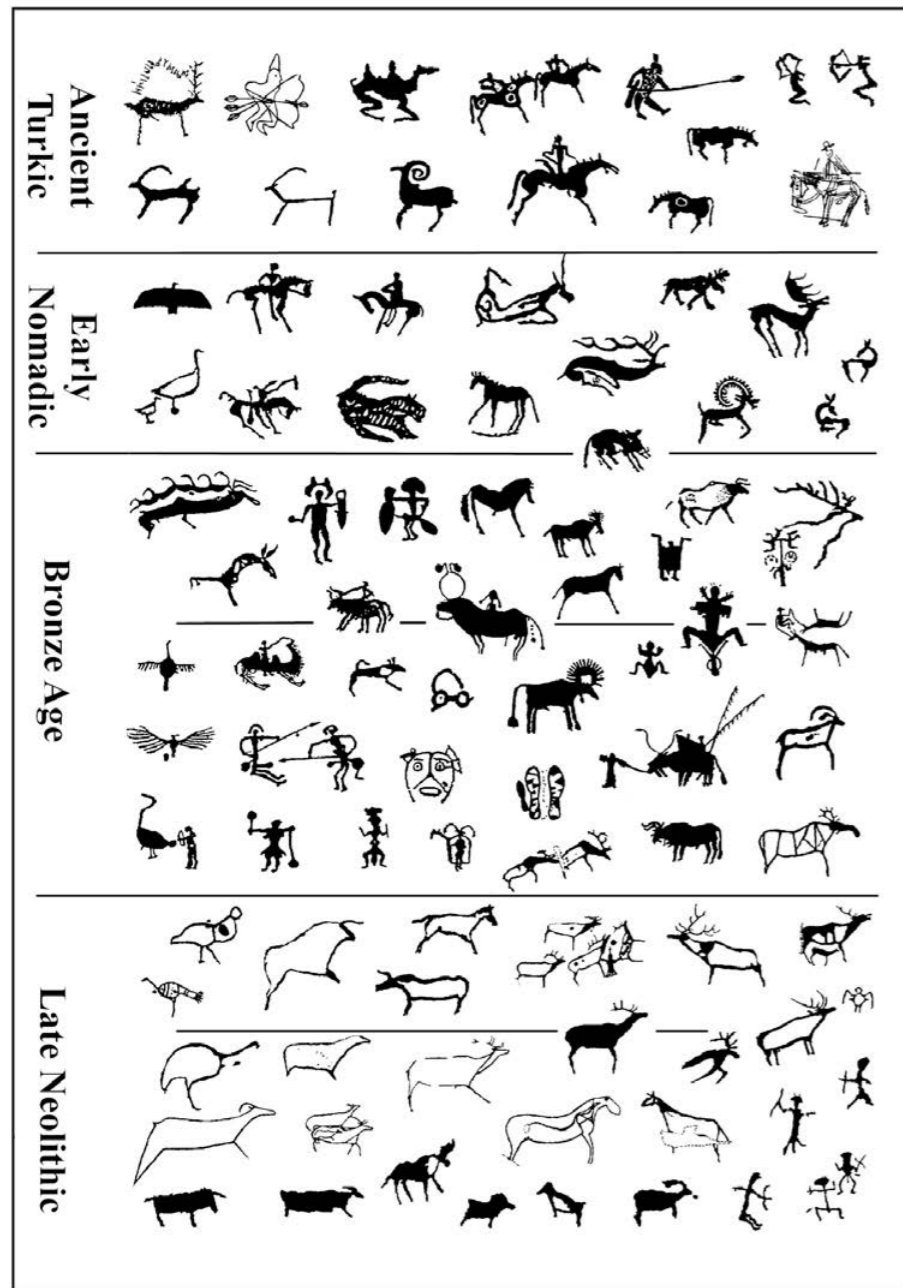
Examined from the perspective of production techniques: percussion is comparatively primitive and crude, so the period should be relatively early; grinding after percussion is a development and advancement compared to pure percussion; and the tools and technical requirements for figures made using abrasion are even greater, so the period should be even later. It seems that analysing the relative dates of rock art from the production techniques can still be considered to provide a reliable foundation (Wang 2004a: 52).

This reasoning is similar when subjects are identified to fit with rigid, pre-existing developmental stages. An example of this is where supposed representations of genitalia are taken as evidence for the 'worship' of either male or female reproductive capabilities (Wang 2005), which, by extension, supposedly reflects the existence of a matriarchal or a patriarchal society (Su 2013: 420). There are many problems with assuming that all human societies began as matriarchal and changed to patriarchal (Shelach 2004). However, an explicit one is that the majority of these so-called 'genitalia' are also simple geometric or open shapes — as seen at Aketasi (27) and letasi dongku (116) — that can be interpreted variably depending on the viewer's perspective (Zhang 2015).

More recently, Ren Meng (2014) in particular has emphasised a holistic approach towards dating, arguing elsewhere that rock art made in 'different periods and [by] different authors' will be dissimilar in terms of production technique, content, mode of expression, style and spatial organisation, so all of this must be taken into consideration when creating relational chronologies (Ren and Wang 2013). Despite this, preconceived theories of social development continue to dictate rock art chronologies in the Altai region (Su 2013: 21–26). An example of this is the claim that painted rock art was first made in Altay Prefecture during the late Palaeolithic (i.e. pre-8000 BCE) (Su 2013: 4). The reasoning behind this is that rock art is treated as a global phenomenon in China (Zhu 2013), so chronologies are thought to be similarly global. This logic means that cave paintings in the Altai are considered of equivalent or similar date to well-known ones in western Europe and Africa (XWZW 2011c: 522–523). Shi Xiaoming (2018) suggests that there are currently two main groups in Chinese rock art research: (1) those who assume (and hope) that the Altai's rock paintings are Palaeolithic; (2) and those who suggest that they were made in the Neolithic at the earliest.

In addition to this, petroglyphs are treated separately, and the Third National Survey of Cultural Relics considers them as dating from the Bronze Age at the earliest (XWZW 2011c: 523). However, the only study to explore and develop a chronology for petroglyphs in the Altai specifically argues that all rock art in Xinjiang was made after 2000 BCE:

This is because, before 2000 BCE, there are no clear features of autochthonous Neolithic cultures in each



**Figure 2.** Chronology of rock art motifs in the Mongolian Altai after Kubarev et al. (2005: 16). The period names follow those given by Kubarev and correspond approximately to the following numerical dates: Ancient Turkic denotes the period c. 500–1000 CE; Early Nomadic c. 1000 BCE–500 CE; Bronze Age c. 2000–1000 BCE; and Late Neolithic c. 3000–2000 BCE.

of Xinjiang's regions; or, to put it another way, there are presently no discoveries or remains related to autochthonous Neolithic cultures (Wei 2014: 181).

The same study suggests that the Altai's petroglyphs were all made later than 922 BCE, as some of these have parallels in painted imagery on vessels from Phases 2 and 3 at the Yanbulak cemetery (c. 1100–565 BCE), which is near Hami (Kumul) in the eastern Tianshan. An issue with the above is that current lack of evidence for local cultures does not necessarily mean they did not exist, and there is substantial archaeological evidence from people active in Xinjiang

rich, well-studied and published in multiple languages.

The wealth of information from the non-Chinese Altai is essential to refining the chronology for rock art in Xinjiang's Altai, particularly in light of the findings of a Chinese–international team, which in 2015 surveyed painted figures in Xinjiang with the aim of dating them scientifically. Based on the presence of oxalate crusts below the paintings, some members of the project concluded that those at Dundebulake (7) were painted after 3300 BCE (Taçon et al. 2016), a conclusion supported by the appearance of similar red ochre designs at nearby Bronze Age sites. It should be

during the 3rd millennium BCE (Shao 2018: Ch. 2). Second, the cross-border cultural phenomenon Chemurchek (c. 2500–1800 BCE), remains of which are found in China and Mongolia, was named after its type-site in the Xinjiang Altai (Kovalev 2015; Shao 2018); however, it seems to have been discounted as evidence for a local culture.

It thus seems that 'autochthonous' in Wei's (2014) terminology means 'within modern China's borders', which is further evident in her use of archaeological remains several hundred kilometres away in the Tianshan over much closer ones in parts of the Altai outside China's borders. This is problematic as it implies that the Xinjiang Altai is separate from the Altai in other countries, despite the existence of a major mountain pass north-northwest of Altay City (Kovalev 2015: 158; O'Sullivan 2019). Additionally, the rock art in neighbouring Mongolia (Dorzh and Novgorodova 1975; Jacobson et al. 2001a; Kubarev et al. 2005; Jacobson-Tepfer et al. 2006; Kubarev 2009; Omirbek et al. 2009; Jacobson-Tepfer and Meacham 2010; Omirbek 2013; Tserendagva and Tseveendorj 2016; Jacobson-Tepfer 2019), Kazakhstan (Marsadolov and Samashev 2000; Erofeeva et al. 2011; Samashev et al. 2011; Shvets 2012; Novozhenov 2020; Jacobson-Tepfer and Novozhenov 2020) and Russia (Okladnikova 1984; Kubarev and Matochkin 1992; Kubarev 2011; Devlet and Jang 2014) is very

noted that at least one Chinese project member has rejected this date and has claimed that the international participants all agree the paintings are at least 10000 years old (Shi 2018, supplementary note 1).

The *terminus post quem* of 3300 BCE puts the Dundebulake (7) paintings in the late Neolithic at the very earliest, and the images were probably made later in the Bronze Age (Taçon et al. 2016). There are also many similarities in form, structure, and content between the Dundebulake paintings, other rock art in Xinjiang's Altai, and rock art in the Mongolian Altai, the latter being dated to the Late Neolithic and Bronze Age (Fig. 2; Kubarev et al. 2005). The suggested dates for painted rock art in Xinjiang thus coincide well with chronologies developed for the Kazakh, Mongolian and Russian Altai. Crucially, the similarities between paintings and petroglyphs also demonstrate that both forms were being made around the same time. Though the sheer quantity of petroglyphs indicates that cultural tradition favoured this form (*sensu* Domingo Sanz 2012), this does not preclude the same people from also having used pigment if the situation called for it.

#### Site list

The site list provided in *Non-portable cultural heritage: Altay Prefecture* is the most up-to-date, though it includes remains other than rock art that are made from stone, including cliff carvings (*moya shike* 摩崖石刻), stone stelae (*shi ren* 石人) and deer stones (*lu shi* 鹿石). These are excluded from the list presented in Appendix 1, along with sites dated to periods later than the Han dynasty (202 BCE–220 CE), which this article attributes to the Historic era. When written in the main text, each site is followed by its number listed in Appendix 1. All sites are transliterated from the Chinese characters and given in the accepted romanisation format (pinyin), though it is worth noting that the Chinese names are themselves transliterations of names from various Turkic and Mongolic languages, including Kazakh and Mongolian.

In Chinese archaeology, it is typical to use periodisation from Central Plain dynastic history, even for places within (and often without) modern China that these dynasties had no control over. In *Non-portable cultural heritage: Altay Prefecture*, therefore, several rock art sites are attributed to dynastic periods, though the equivalent period in the regional chronology is the Bronze or Iron Age. This includes the sites of Jia'er-bulede (71) and Yaze hu (77), which are attributed to the 'Warring States, Qin and Han', a period corresponding to c. 475 BCE–220 CE. Historical accounts from this period for Xinjiang and much of central Asia were written by neighbouring sedentary societies (Golden 1992: Ch. 2; Geng 2005: Ch. 2), but even when the highly bureaucratic Han dynasty expanded its territory westward through military campaigns, it had no direct control over the Junggar Basin (Yi 2017). Rock art sites dated by the volume's editors to all dynasties up to the Han in Altay Prefecture are consequently

included in this article.

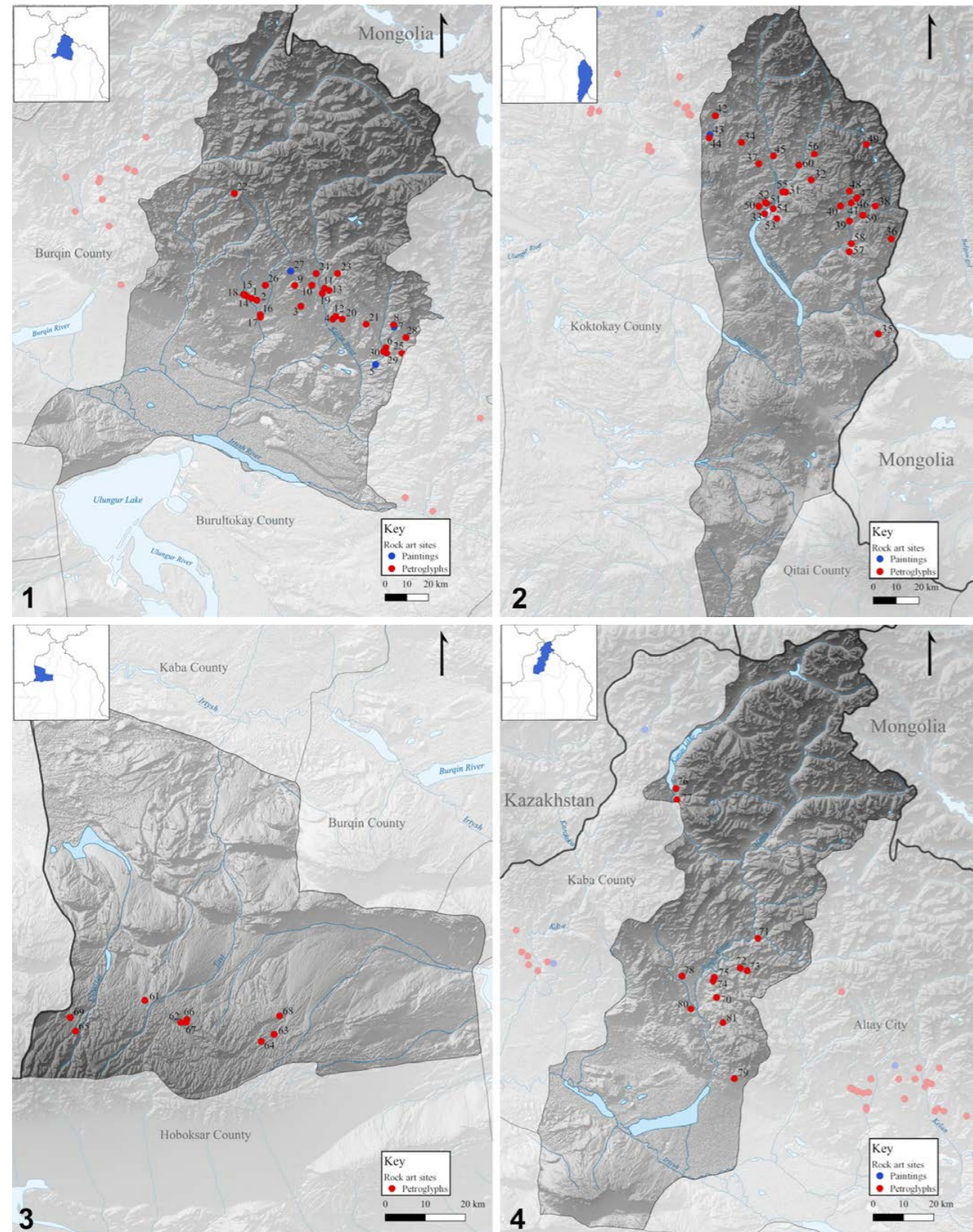
The vast majority of sites listed in *Non-portable cultural heritage: Altay Prefecture* are marked as 'dates pending' (*shidai daiding* 时代待定), with only some assigned concrete periods. Though some sites feature Tibetan script, which provides a *terminus post quem* for the entire panel, this does not clarify the dates of earlier images. From other publications, including the 2011 national survey, it is clear that the majority of rock art in the Altai is expected to date to the Bronze and Iron Ages, and even the Late Palaeolithic (see overview in 'Chronological studies' above). Consequently, all sites classed as 'dates pending' are included.

#### Site distribution

Overviews of site distributions are generally included in most Chinese publications but tend to be in the form of textual descriptions (e.g. Su 2013: 12–15). Maps, when provided, often lack detail to allow reliable localisation, and coordinates are rarely included. When coordinates are provided, they often do not align with the location shown on the map (e.g. the Koktokay County sites in XWZW 2015b). Existing distribution maps of rock art in Altay Prefecture typically present all Xinjiang sites, meaning that the resolution is low, and site names are either not marked or masked by other features (XWZW 2011b; Zhang 2015). All these factors have made it difficult for researchers to recreate their own distribution maps.

Whilst it does not include coordinates, *Non-portable cultural heritage: Altay Prefecture* provides a location map for each site showing topography and nearby towns, allowing sites to be localised more effectively than previously possible. Coordinates are provided for several sites in Koktokay County, but they presumably use a Chinese geographic coordinate system — either GCJ-02 or BD-09 (Kang et al. 2018). As it is unclear which system was used, the coordinates provided in Appendix 1 were generated manually in Google Maps using the location maps in *Non-portable cultural heritage*. Google Maps was chosen because its terrain layer shows natural topography and contour lines in detail. In areas where towns and infrastructure are sparse, such as Altay Prefecture, the terrain is often the only distinguishing feature on a location map. As Google uses the GCJ-02 coordinate system for map view (not satellite view) within China's borders (Fuentes 2019), the Appendix 1 coordinates are GCJ-02 coordinates, which require conversion to be used with international WGS-84 projections (Wang and Zhang 2019: 18). Figures 3 and 4 are presented in the order the counties are listed by Non-Portable Cultural Heritage, with site numbers corresponding to the relevant entry in Appendix 1.

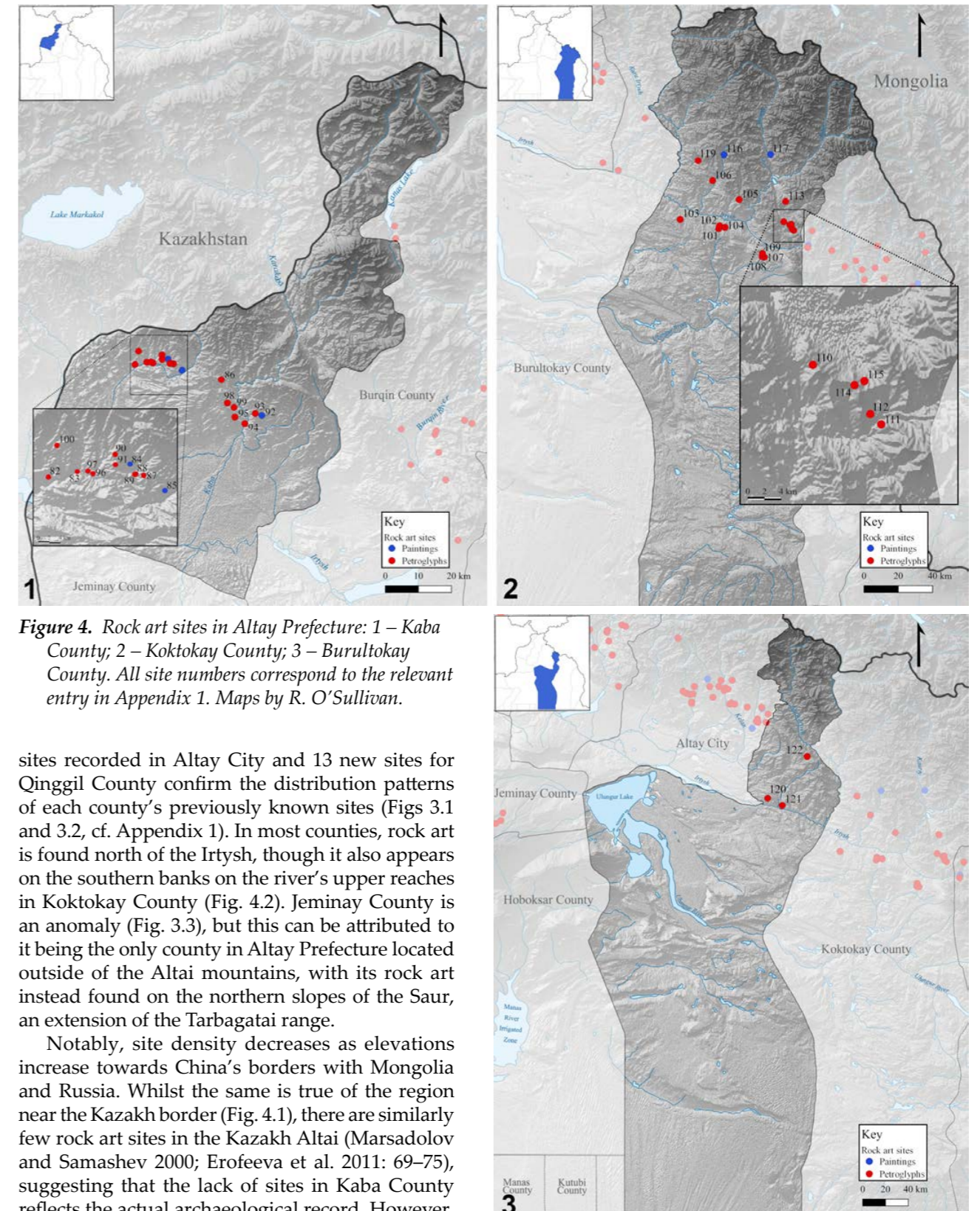
Prior to the Third National Archaeological Survey, rock art was described as mainly concentrated in the southern foothills of the Altai mountains at higher elevations where annual precipitation exceeds 600 mm (Wang 2004a: 48). The addition of the survey's new sites



**Figure 3.** Rock art sites located in Altay Prefecture: 1 – Altay City; 2 – Qinggil County; 3 – Jeminay County; 4 – Burqin County. All site numbers correspond to the relevant entry in Appendix 1. Maps by R. O'Sullivan.

does not change this pattern (Figs 3 and 4), as rock art is still mainly found in the Altai mountains' southern foothills where the semi-desert environment changes to montane forests, and the distribution generally

follows the mountains' north-west–south-east orientation. The rock in the Chinese Altai is predominantly granite and slate (Wang 2016), with most petroglyphs made on surfaces of granite. For instance, the 11 new



**Figure 4.** Rock art sites in Altay Prefecture: 1 – Kaba County; 2 – Koktokay County; 3 – Burultokay County. All site numbers correspond to the relevant entry in Appendix 1. Maps by R. O'Sullivan.

sites recorded in Altay City and 13 new sites for Qinggil County confirm the distribution patterns of each county's previously known sites (Figs 3.1 and 3.2, cf. Appendix 1). In most counties, rock art is found north of the Irtysh, though it also appears on the southern banks on the river's upper reaches in Koktokay County (Fig. 4.2). Jeminay County is an anomaly (Fig. 3.3), but this can be attributed to it being the only county in Altay Prefecture located outside of the Altai mountains, with its rock art instead found on the northern slopes of the Saur, an extension of the Tarbagatai range.

Notably, site density decreases as elevations increase towards China's borders with Mongolia and Russia. Whilst the same is true of the region near the Kazakh border (Fig. 4.1), there are similarly few rock art sites in the Kazakh Altai (Marsadolov and Samashev 2000; Erofeeva et al. 2011: 69–75), suggesting that the lack of sites in Kaba County reflects the actual archaeological record. However, the Mongolian Altai has rock art sites extremely close to the border with China (see Jacobson-Tepfer and Meacham 2009). Elevation in the Xinjiang Altai increases rapidly over a small distance, whereas the increase in the Mongolian Altai is more gradual, making it tempting to attribute the lack of sites on the Chinese side to severe terrain impeding movement. However, there are several major passes

through the mountains, including the Irmegtiin davaa directly on the border north-east of Altay City, which leads to Dayan nuur and has been demonstrated repeatedly to have been used in the Bronze Age (Kovalev and Munkhbayar 2015: Fig. 1; O'Sullivan 2019). Also, despite government resettlement programs, Kazakh pastoralists continue to take livestock to summer pastures, some of



Figure 5. Common petroglyph motifs at Dulate (21) in Altay Prefecture. (1) Two 'caprids'; (2) One 'deer', with the head of a 'caprid' visible in the lower left corner. Photos taken July 2015 by RO'S.

which are above 3000 m asl (Chen 2017; Dai et al. 2020).

Survey or reporting bias may explain the lack of rock art sites to some extent, as the majority have been found where development and construction have been most intensive, such as near major towns or mines. For instance, the two most northern sites in Burqin County, just south of Kanas Lake (Fig. 3.4), coincide with an area that has seen extensive development in the last few decades for tourism, whereas this kind of activity has not targeted nearby regions along the Hemu River. Thus, people involved with infrastructure development, mining, construction etc. may be more likely to report rock art finds to the authorities than pastoralists, though more research is necessary to confirm and explore the reasons for this.

Overall, if the present rock art distribution is taken as accurate, it seems that rock art was generally made in lower to middle elevations. The larger site concentrations are generally found near towns or where construction and development have been intensive. However, it is also notable that many of these areas correspond to the winter pastures used by modern Kazakh herders (see Dai et al. 2020: Fig. 1.C), suggesting that — if many of these images were made by pastoralists following similar mobility patterns — the creation of rock art had a seasonal component. Regarding sites with painted imagery, they are found throughout the region alongside petroglyph sites and do not cluster in one particular area. This is similar to the distribution of painted and pounded imagery in the Kazakh and Mongolian Altai regions.

#### Diagnostic motifs

This section presents key motifs that have been highlighted as significant by researchers working in other regions of the Altai mountains. The motifs chosen here are all visually distinctive, as this makes it easier to identify parallels more securely. As noted in the overview of chronological research, dating rock art in this part of the world has relied heavily on stylistic parallels in archaeologically excavated material, overlay and

relative chronologies. As detailed relative chronologies are currently lacking for Altay Prefecture and the sheer quantity of rock art means that constructing them will require many years of targeted research, this section utilises the extensive literature from the Altai mountains in Mongolia, Kazakhstan and Russia to highlight diagnostic motifs that parallel material that has either been dated as part of a robust relative chronology or comes from a context with absolute dates. It is difficult to produce general statistics for the numbers of different types of rock art figures in Altay Prefecture, due to the state of published material and the region's scale. However, the majority of petroglyphs in this region show a preoccupation with animal subjects, such as 'caprids' and 'deer' (Fig. 5), that are not particularly distinctive in style, as noted for neighbouring parts of central Asia and southern Siberia (Samashev et al. 2011: 42). For instance, among the 92 figures recorded across the 12 panels at Mayimatuobie (89), there is one distinctive 'deer' motif and one anthropomorph in a 'sexual' position of the types described below, whereas 67 (72%) are 'caprids' that are not sufficiently distinctive to link to motifs on other archaeological remains (see Wei 2014: 40–48). This indicates that whilst these distinctive motifs are interesting, they reflect only a small part of the region's rock art, but more comprehensive publication will be necessary to appreciate this fully.

#### Bronze Age

There are several motifs in the rock art of Altay Prefecture with parallels in the Mongolian Altai that are considered to date to the Late Bronze Age (c. 1300–1000 BCE). The site of letasisayi (82) in Kaba County features two such motifs: one is of two anthropomorphs that face each other with one arm extended and the other bent back as if fighting (Fig. 6.1). The anthropomorph on the right also has a line extending from their hip, possibly representing a penis. Another distinctive motif is that of two anthropomorphs apparently copulating (Fig. 6.2). The two figures are depicted 'lying on their backs with raised legs' and are connected by a single

line between their 'legs'.

Both motifs are well-attested in the rich rock art dataset of the Mongolian Altai, specifically at the large site of Tsagaan Salaa-Baga Oigor (Jacobson et al. 2001b). The motif of two anthropomorphs 'fighting' has been suggested to represent combat between males for sport (Tsakhilgaan and Tsagaan 2016: 48–49) or, when only one figure appears to have a penis, as an (apparently equally-matched) fight between a male and a female (Derevyanko et al. 2008: 26). This motif type has a wide distribution, having been found throughout the Altai and as far east as Inner Mongolia's Sonid Left Banner, where examples dating later into the 1st millennium BCE have been found (Dalen Gurib 2000: 187). The presumed copulation scenes are similarly common, though overlay relations between figures have allowed it to be dated more specifically to the later Bronze Age in the Mongolian Altai (Jacobson et al. 2001b: 187, 394).

Another motif seen in Altay Prefecture's rock art that sees parallels in the Mongolian Altai depicts anthropomorphs with bent knees. An anthropomorph at Kalatasi shankou shuidianzhan (94) is 'leading' or 'dragging' a 'cow' using a 'rope' (Fig. 7). The two seem close in date, as they have weathered to similar extents; however, the 'rope' between them has been scratched into the rock surface and contrasts with the deep percussive marks used to create the two figures, so it could easily have been added to the composition at a later date. Despite this, the bent knees on the anthropomorph are typical of representations of people engaged in various activities, including archery, close-range combat, hunting, or even just single figures apparently doing nothing. Although in many cases, the figures have prominent 'headdresses', such as the Bronze Age examples highlighted by Kubarev at Shiveet Khaikhan (Fig. 2), simple figures with no clothing also appear. These occur throughout the Mongolian Altai (Jacobson et al. 2001b; Kubarev et al. 2005; Kubarev 2009) and mainly in the south-central part of the Russian Altai (Kubarev and Matochkin 1992; Kubarev 2011).

Finally, a wheeled vehicle petroglyph at Haiyina'er (2) is stylistically similar to other Bronze Age examples throughout the Altai and into the Sayan mountains (XWZW 2011a: 8). The components of the vehicle are depicted as if the viewer is looking at them from a variety of perspectives: the two wheels are viewed from the side; the axle, shaft and a possible yoke are viewed from above; and the small carriage is depicted as if the viewer is looking at it from the front or back. Although the photograph provided in XWZW (2011a: 8) is not particularly clear, there also appear to be figures (or simply lines?) on either side of the shaft in the positions most often occupied by the horses or cattle drawing the vehicle in similar depictions at other sites. Although the overall composition is quite simple, the features bear a strong resemblance to wheeled vehicle (or chariot) motifs at other sites, including Tsagaan Salaa-Baga Oigor in Mongolia (Jacobson et al. 2001b: Fig. 191), the Elangash River valley in the Russian Altai

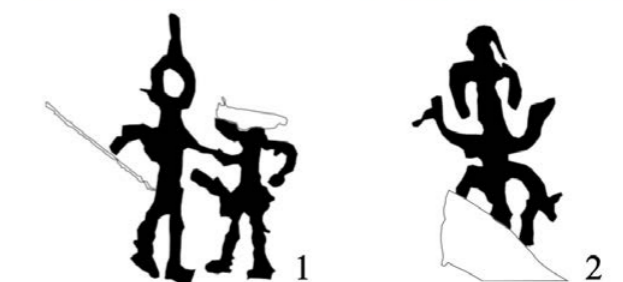
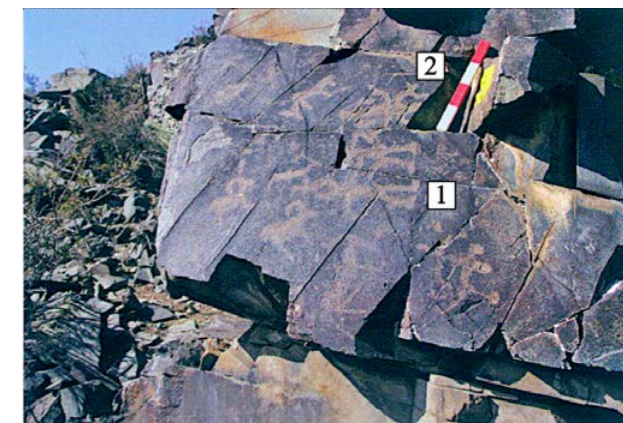


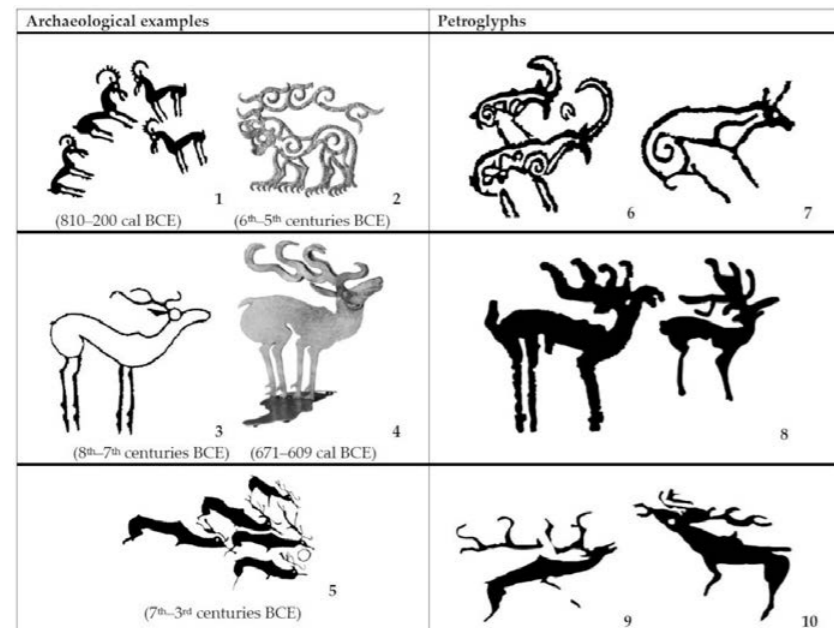
Figure 6. Panel of petroglyphs at Tangbaletasisayi (82), Kaba County (after XWZW 2011a: 115). (1) 'Anthropomorphs in combat' without weapons. The figure on the left seems to wear a type of headgear, and the one on the right appears to have an erect phallus. (2) Two 'anthropomorphs copulating'.



Figure 7. Petroglyph of a quadruped connected to an anthropomorph with bent knees (after XWZW 2011a: 145). The line connecting them may have been made by someone different to those who made the two figures, but the overall effect is that the 'person' appears to be leading the zoomorph.

(Novozhenov 2012: Fig. 20) and Mugur Sargol in the Tuva Republic (Esin et al. in prep.: Fig. 4.2c).

Compared to Altay Prefecture, the chronology for rock art in other parts of the Altai has been built on well-published datasets refined over long periods, involving detailed analyses of petroglyphs and the relationships between them to create relative chronologies. For example, rock art in the Mongolian Altai,



**Figure 8.** Examples of stylistically distinct motifs and designs in archaeological finds dated to the Iron Age and parallels in the petroglyphs of Altay Prefecture, Xinjiang.

Archaeological examples: (1) 'Ibex' motifs on a stone panel excavated from Arzhan 2 (grave 13B), Tuva Republic, Russia (810–200 cal. BCE) (after Chugunov et al. 2010); (2) Iron appliqué in the shape of a tiger with deer antlers and swirl designs, Tuekta (barrow No. 1), Altai Republic, Russia (6th–5th centuries BCE) (after photography by the State Hermitage Museum); (3) One of five 'deer' motifs on a bronze mirror found in the Bukhtarma River valley, East Kazakhstan Region, Kazakhstan (c. 8th–7th centuries BCE) (after Marsadolov 2011); (4) Hat or headdress ornament in the shape of a deer standing on the tips of its hooves, Arzhan 2 (grave 5) (671–609 cal. BCE) (after Chugunov et al. 2010); (5) Group of 'deer' on a deer stone at Wulukendabate (31), Altay Prefecture, Xinjiang (7th–3rd centuries BCE) (after Wang 1995: Fig. 6.1; dates per Pan 2008: 331). Petroglyphs: (6) Two 'ibex' with swirl designs and one petroglyph that could be a horse hoofprint, Arekebai (104); (7) 'doe' with swirl design. The site is listed in XWZW (2011b: 65, 57) as both Arekebai (104) and Bulate 1-hao (101). (8) One 'elk' and a deer(?), Yimashikuolasi (69); (9) 'deer', Duogate (88); (10) 'deer', Akebasitaojjiale (73).

specifically Bayan Ulgii aimag, has been the subject of a large Russo-Mongol-American project conducted over ten years in addition to prominent Mongolian projects (Derevyanko et al. 2008: 13). Although rock art research has been conducted in Xinjiang's Altai for a similarly impressive amount of time (e.g. Zhao 1986; 1987; Su 1994), these are overviews, either of rock art in the whole of Xinjiang or its north. To our knowledge, no monographs dedicated to a single large site, such as Dulate (21), similar to those for Kalbak-Tash and Tsagaan Salaa-Baga Oigor exist for Altay Prefecture. Despite this, this section has highlighted several motifs in the Altay Prefecture rock art corpus that bear strong resemblances to the material of other parts of the Altai, which might demonstrate the region's connections and flags promising avenues of enquiry for future dating research.

animal motifs have been found most notably at sites such as Arzhan 2 (mid-7th century BCE) in the Tuva Republic and Tuekta (mid-6th century BCE) in the Altai Republic. One example is cervids depicted with slightly arched backs, raised heads and unbent limbs, standing on the very tips of their hooves (Figs 8.3–8.4), something that also appears at Yimashikuolasi (69) (Fig. 8.8).

Dating to approximately the same period, motifs of quadrupeds with straight limbs stretched forwards, and animals — both predators and herbivores — decorated with spirals on their shoulders and hindquarters have been found in both archaeological (Figs 8.1–8.2) and rock art contexts (Figs 8.6–8.7).

#### Historic

Among the rock art sites listed in Appendix 1, sev-

#### Iron Age

Many motifs found in the rock art of Xinjiang's Altai appear as motifs depicted in metal and stone from archaeological sites in other parts of the Altai, southern Siberia and central Asia. An example is the deer motifs found on 'deer stones' (c. 1200–700 BCE) distributed across Mongolia, the Altai and southern Siberia. These deer are often depicted in profile with beak-like muzzles and antlers that appear to flow along their backs (Fig. 8.5). Though the majority of so-called 'deer stones' in the Altai have no deer motifs, the ones that do, including those in Xinjiang's Altay Prefecture, are considered to be later in date (c. 7th–3rd centuries BCE) than their Mongolian counterparts based on the simplification of the motif (Pan 2008: 331). These deer appear at the rock art sites of Duogate (88) and Akebasitaojjiale (73) in Altay Prefecture (Figs 8.9–8.10). Similar to their counterparts found on stelae, they are rougher or simplified versions of the motif found in Mongolia, though this may to an extent reflect the materials used to make them. There are also instances of these motifs being copied, as at Quangou (13), where a deer with the characteristic pronounced shoulders but no antlers was incised into a rock panel with a very fine metal tool, then decorated with novel diagonal stripes.

Slightly later than the deer stone phenomenon, a highly distinctive style of representing animal subjects flourished, often referred to as part of a 'Scythian' 'animal style' (Perevodchikova 2011; Esin 2015). These

eral — Talate gou (32), Aobaote (33), Kalagaite (46) — feature petroglyphs overlaid by later Tibetan inscriptions, which cannot date earlier than the invention of the script in c. 600 CE, though some were undoubtedly made more recently than this. Other recent petroglyphs found on pre-Historic panels include modern names and dates in Kazakh, Uyghur and Chinese. Many of these transect earlier images, such as at Heishantou (20), Dulate (21), Meiyi'ermandalasi (49), Qialege'er 2-hao (111) and Tuoputielieke 2-hao (115).

Also, as has been noted by previous studies (Bednarik 2015), the painted panel at Duogate dongxue (84) exhibits several motifs that are undoubtedly modern in origin. While some of the panel's content may date to earlier periods, there appears to be at least one aeroplane and potentially a boat, which date to the modern era.

#### Summary

The rock art of Xinjiang's Altay Prefecture has been the subject of extensive survey and study since the early twentieth century. Although Chinese-language research tends to compare it to the rock art of Europe and Africa to emphasise its antiquity, or the well-known rock art sites of Ningxia and Inner Mongolia, this paper outlines the distinctive quality of rock art in Altay Prefecture, situating it within existing theories of central Asian rock art posited by Kazakh, Mongolian and Russian researchers.

Sites are predominantly located in the foothills of the Altai mountains north of the Irtysh, where the aridity of the Junggar Basin's semi-desert environment is mitigated by lush valleys in forested mountains fed by glacial meltwaters. Despite Kazakh pastoralists' continued presence in Altay Prefecture's highest altitudes on a seasonal basis, very few rock art sites have been recorded in these areas. This may reflect either survey/reporting bias or the seasonal nature of rock art creation, as the areas where rock art is found corresponds to modern winter pastures, though this would only apply if those who made the images practised similar forms of vertical transhumance.

A 2015 team attempted to date painted images at Dundebulake (7) using scientific methods, and based on oxalate crusts beneath the images, they suggested they were made after 3300 BCE. Other dating has been conducted through reference to rock art in other regions, which has generally resulted in chronological extremes that put the rock art of Altay Prefecture in the late Palaeolithic or the mid-1st millennium BCE. Through reference to rock art and archaeologically excavated finds in the Kazakh, Mongolian and Russian Altai regions, however, this article highlights strong links to motifs and styles in the Xinjiang Altai's rock art corpus. Diagnostic motifs from these neighbouring regions indicate that many images in Altay Prefecture were made throughout the 1st millennium BCE. Others parallel material dated tentatively to the Bronze Age, such as anthropomorphs in 'combat', anthropomorphs

with bent knees and wheeled vehicles. Both scientific dating methods and targeted study of regional rock art chronology — as opposed a pan-Xinjiang chronology — are necessary to clarify Altay Prefecture's rock art age.

This article serves as an introduction to rock art in Altay Prefecture, and it aims to provide a foundation for researchers outside of China to comprehend the state of research more thoroughly. By highlighting relevant links with neighbouring parts of the Altai, it is hoped that the article will prove useful, from the perspectives of data and theory to future projects looking to incorporate the rock art of Altay Prefecture into reconstructions of central Asian and Altaian archaeology.

#### Acknowledgments

Rebecca O'Sullivan is funded by the Early Postdoctoral Funding of Jilin University (No. 801201040402), and much of the work for this article was conducted during her DPhil as part of the Leverhulme Trust-funded 'China and Inner Asia' project at the University of Oxford. Both authors would like to thank their five anonymous RAR reviewers and Courtney Nimura, whose feedback greatly improved the article.

Dr Rebecca O'Sullivan and Professor Huiqiu Shao (Corresponding Author)

School of Archaeology  
Jilin University  
Changchun 130012  
PR China

中国130012长春市吉林大学考古学院  
shaohq@jlu.edu.cn

#### REFERENCES

- Abbreviation: XWZW - Xinjiang weiwu'er zizhiqu wenwuju 新疆维吾尔自治区文物局
- BEDNARIK, R. G. 2015. Dating rock art in Xinjiang Province, China. *AURA Newsletter* 32(1): 6–8.
- BEN S. 本社 ed. 1993. *Zhongguo yanhua* 中国岩画 [Rock arts of China]. Wenwu Chubanshe, Beijing.
- BERGMAN, F. 1939. *Archaeological researches in Sinkiang*. Bokforlags Aktiebolaget Thule, Stockholm.
- CHEN X. 陈祥军 2017. Caoyuan muqu zaihai de renleixue yanjiu — Xinjiang Aletai Hasake shehui de tianye diaocha 草原牧区灾害的人类学研究 — 新疆阿勒泰哈萨克社会的田野调查 [An anthropological study of disasters in grassland pastures: Kazakh society of Altay region in Xinjiang]. *Qinghai minzu yanjiu* 28(3): 49–54; <https://dx.doi.org/10.15899/j.cnki.1005-5681.2017.03.009>.
- CHENG Z. 成振国 and ZHANG Y. 张玉忠 1984. Xinjiang Tianshan yi bei yanhua shulüe 新疆天山以北岩画的述略 [An outline of rock-art north of Xinjiang's Tianshan]. *Wenwu* 1984(2): 77–79.
- CHUGUNOV, K. V., H. PARZINGER and A. NAGLER 2010. *Der Skythenzeitliche Fürstentum Arzhan 2 in Tuva*. Archäologie in Eurasien 26. Philipp Von Zabern, Mainz.
- DAI X.-H., B. LI Z.-L. WU B. NAN, Z. REN, Y. FAN and X.-D. ZHANG 2020. Pastoral livelihood transition via divergent pathways: a case study in northern Xinjiang, China. *Journal of Arid Environments* 174: 10403; <https://doi.org/10.1016/j.jaridenv.2019.104083>.

- DALEN GURIB, N. 2000. *Inner Mongolia's art of rock carvings/ Öbör Monggol-un khadan jirug-un uralig/ Neimenggu yanhua yishu* 内蒙古岩画艺术. Neimenggu Wenhua Chubanshe, Hulunbuir.
- DEMATTÈ, P. 2004. Beyond shamanism: landscape and self-expression in the petroglyphs of Inner Mongolia and Ningxia (China). *Cambridge Archaeological Journal* 14: 1–20; <https://doi.org/10.1017/S0959774304000010>.
- DEREVYANKO, A. P., V. T. PETRIN, D. TSEVEENDORZH and V. P. MYL'NIKOV 2008. *Svyatlishchye s naskal'nymi risunkami Bayanlig khad v Mongolii*. V. I. Molodin (ed.). Izdatel'stvo Instituta arkheologii i etnografii SO RAN. Novosibirsk.
- DEVLET, E. and S.-H. JANG 2014. *Kamennaya letopis' Altaya/The stone chronicle of Altai*. IA RAN, Moscow.
- DOMINGO SANZ, I. 2012. A theoretical approach to style in Levantine rock art. In J. McDonald and P. Veth (eds), *A companion to rock art*, pp. 306–321. Blackwell Companions to Anthropology, Wiley-Blackwell, Chichester.
- DORZH, D. and E. A. NOVGORODOVA 1975. *Petroglify Mongolii*. Izdatel'stvo AN MNR, Ulaanbaatar.
- EROFEEVA, I. V., B. T. ZHANAEV, L. E. MASANOVA, A. E. ROGOZHINSKIY and E. KH. KHOROSH (eds) 2011. *Altaydan Kaspiyge deyin. Qazaqstanniñ tabiǵı, tarixı jáne eskertkişteri men körnekti orındarınıñ atlası/Ot Altaya do Kaspiya. Atlas pamyatnikov i dostoprimechatel'nostey prirody, istorii i kul'tury Kazakhstana*. Kazakhskiy nauchno-issledovatel'skiy institut po problemam kul'tornogo naslediya nomadov, Almaty; available at <http://lib.yessenovfoundation.org/atlas-tom-1/files/assets/basic-html/page3.html> [accessed 7 August 2020].
- ESIN, YU. N. 2015. Miniaturnye izobrazheniya iz roga Okunevskogo mogil'nika Itkol'-II v kontekste iskusstva Skifo-Sakskogo kruga. In *Arkheologiya Zapadnoy Sibiri i Altaya: Opyt Mezhdistsiplinarnykh Issledovaniy*, pp. 386–391. Izdatel'stvo Altayskiy gosudarstvennyy universitet, Barnaul.
- ESIN, YU. N., J. MAGAIL, J. GANTULGA and C. YERUUL-ERDENE in prep. Chariots in the Bronze Age of central Mongolia based on the materials from the Khoid Tamir river valley.
- FUENTES, E. 2019. Why GPS coordinates look wrong on maps of China. *Service Objects*. Available at <https://www.serviceobjects.com/blog/why-gps-coordinates-look-wrong-on-maps-of-china/> [accessed 2 December 2020].
- GAI S. 盖山林 1986. *Yinshan yanhua* 阴山岩画 [Petroglyphs of the Yin mountains]. Wenwu Chubanshe, Beijing.
- GENG S. 耿世民 2005. *Gudai Tujue wen beiming yanjiu* 古代突厥文碑铭研究 [Study of ancient Turkic stone inscriptions]. Zhongyang minzu daxue chubanshe, Beijing.
- GOLDEN, P. B. 1992. *An introduction to the history of the Turkic peoples: ethnogenesis and state-formation in medieval and early modern Eurasia and the Middle East*. Harrassowitz, Wiesbaden.
- JACOBSON-TEPPER, E. 2019. *The life of two valleys in the Bronze Age: rock art in the Altai Mountains of Mongolia*. Luminaire Press, Eugene, OR.
- JACOBSON, E., V. D. KUBAREV and D. TSEEVENDORJ 2001a. *Mongolie du nord-ouest: Tsagaan Salaa-Baga Oigor. Répertoire des pétroglyphes d'Asie centrale*, Fascicule No. 6, Vol. 1. De Boccard, Paris.
- JACOBSON, E., V. D. KUBAREV and D. TSEEVENDORJ 2001b. *Mongolie du nord-ouest: Tsagaan Salaa-Baga Oigor. Répertoire des pétroglyphes d'Asie centrale*, Fascicule No. 6, Vol. 2. De Boccard, Paris.
- JACOBSON-TEPPER, E., V. D. KUBAREV and D. TSEEVENDORJ 2006. *Mongolie du nord-ouest, Haut Tsagaan Gol. Répertoire des pétroglyphes d'Asie centrale*, Fascicule No. 7. De Boccard,

- Paris.
- JACOBSON-TEPPER, E. and J. E. MEACHAM 2009. *Map. Archaeology and landscape in the Altai Mountains of Mongolia*. Available at <https://mongolianaltai.uoregon.edu/index.php> [accessed 3 December 2020].
- JACOBSON-TEPPER, E. and J. E. MEACHAM 2010. *Archaeology and landscape in the Mongolian Altai: an atlas*. ESRI Press, Redlands, CA.
- JACOBSON-TEPPER, E. and V. A. NOVOZHENOV (eds) 2020. *Rock art chronicles of golden steppe: from Karatau to Altai*. Centre for the Rapprochement of Cultures, Almaty.
- Ji Y. 紀昀 1796. Huai xi zazhi san 槐西杂志三 [Huai xi miscellaneous records, No. 3]. In *Yue wei caotang biji* 閱微艸堂筆記 [Notes on a minutely observed thatched hut], unknown publisher, available at <https://ctext.org/library.pl?if=gb&res=3429> [accessed 4 November 2020].
- KANG L. 康路, YAN H. 闫浩文 and ZHANG L. 张黎明 2018. Dianzi ditujian de shishi zuobiao zhuanhuan xitong 电子地图间的实时坐标转换系统 [Coordinate conversion system among various electronic maps]. *Yaogan Xinxi* 33(2): 122–126; <https://dx.doi.org/10.3969/j.issn.1000-3177.2018.02.019>.
- KOVALEV, A. A. (ed.) 2015. *Drevneyshiye yevropeytsy v serdtse Azii: Chemyrcheskiy kul'turniy fenomen. Chast' II. Resultaty issledovaniy v tsentral'noy chasti mongol'skogo Altaya i v istokakh Kobdo; pamyatniki Sin'zyana i ukrainnikh zemel'*. MISR, St Petersburg.
- KOVALEV, A. A. and CH. MUNKHBAYAR 2015. Chemurchekskiy ritual'nyy kompleks Khar chuluut 1 v istokakh reki Khovd (Kobdo) (predvaritel'noye soobshcheniye). In A. A. Kovalev (ed.), *Drevneyshiye yevropeytsy v serdtse Azii: Chemyrcheskiy kul'turniy fenomen. Chast' II. Resultaty issledovaniy v tsentral'noy chasti mongol'skogo Altaya i v istokakh Kobdo; pamyatniki Sin'zyana i ukrainnikh zemel'*, pp. 155–214. MISR, St Petersburg.
- KUBAREV, V. D. 2009. *Petroglify Shiveet-Khairkhana (Mongol'skiy Altay)*. Izdatel'stvo Instituta arkheologii i etnografii SO RAN, Novosibirsk.
- KUBAREV, V. D. 2011. *Petroglify Kalbak-Tasha I (Rossiyskiy Altay)*. Izdatel'stvo Instituta arkheologii i etnografii SO RAN, Novosibirsk.
- KUBAREV, V. D. and E. P. MATOCHKIN 1992. *Petroglify Altaya*. Rossiyskaya akademiya nauk, Novosibirsk; available at <http://kronk.spb.ru/library/kubarev-matochkin-1992.htm> [accessed 1 May 2015].
- KUBAREV, V. D., D. TSEVEENDORZH and E. YAKOBSON 2005. *Petroglify Tsagaan-salaa i Baga-Oygura (Mongol'skiy Altay)*. Izdatel'stvo Instituta arkheologii i etnografii SO RAN, Novosibirsk.
- LEI Z. 雷作淇, SHI P. 史普南 and WU X. 吴学明 1985. Genju Cangyuan yanhua yanliao zhong de baofen he guizao huashi tuilun Yunnan Cangyuan diqu gurenlei shenghuo shiqi de ziran huanjing 根据沧源崖画颜料中的孢粉和硅藻化石推论云南沧源地区古人类生活时期的自然环境 [The natural environment during the lives of ancient people in Yunnan's Cangyuan region according to fungal spores and fossilised diatoms in the pigment of the Cangyuan Rock Paintings]. *Shiqian Yanjiu* 1985(2): 90–94, 110 and plates.
- MARSADOLOV, L. S. 2011. Drevniy Kazakhstan na velikom stepnom puti Evrazii v I tys. do n.e. In B. Ä. Baytanaev and A. Z. Beysenov (eds), *Qazaqstan Respublikası täwelsizdiginiñ 20 jıldıǵına jáne Ä. X. Marǵulan atındaǵı arxeologiya institutınıñ 20 jıldıǵı mereytoyma arnalǵan 'Täwelsizdik kezeñindegi Qazaqstan arxeologiyası: qortındıları men keleǵei': attı xalıqaralıq ǵılım konferenciya materialdarı,*

- 12–15 jelloqsan 2011 jil, Almatı q./ Materialy mezhdunarodnoy nauchnoy konferentsii 'Archaeologiya Kazakhstana v epokhu nezavisimosti: itogi, perspektivy': posvyashchennoy 20-letiyu Nezavisimosti Respubliki Kazakhstan i 20-letiyu Instituta arkheologii im. A.KH. Margulana, II, pp. 50–58. Almaty.
- MARSADOLOV, L. S. and Z. S. SAMASHEV 2000. *Izuchenie arkheologicheskikh pamyatnikov Zapadnogo Altaya*. Gosudarstvennyy ermitazh, St Petersburg.
- NOVOZHENOV, V. A. 2012. *Chudo kommunikatsii i drevneyshiy kolyosnyy transport Evrazii*, E. E. Kuz'mina (ed.). TAUS, Moscow.
- NOVOZHENOV, V. A. 2020. *Rock art chronicles of golden steppe: model of communication in antiquity and early Middle Ages*. UNESCO Centre for the Rapprochement of Cultures, Almaty.
- OKLADNIKOVA, E. A. 1984. *Petroglify sredney Katuni*. NAUKA, Novosibirsk.
- OMIRBEK, B. 2013. Khoid khölsöötin khadny zurgiin sudalgaa. Unpubl. PhD thesis, Mongolian State University of Education, Ulaanbaatar.
- OMIRBEK, B., G. ZOLBAYAR and A. ANSAGAN 2009. *Bayan-Ölgiy aymgiyn nutag devsger dahı tuuh soyolin dursgaluud*. Sorhon Tsagaan, Ulaanbaatar.
- O'SULLIVAN, R. 2019. Movement across a 'mountain barrier': mapping accessibility with rock-art and GIS in the Altai Mountains, eastern Eurasia. *Journal of Archaeological Science: Reports* 27: 101979; <https://dx.doi.org/10.1016/j.jasrep.2019.101979>.
- PAN L. 潘玲 2008. Lun lushi de niandai ji xiangguan wenti 论鹿石的年代及相关问题 [On the date of deer stones and related problems]. *Kaogu xuebao* 2008(3): 311–336.
- PEREVODCHIKOVA, E. V. 2011. Skifskiy zvernnyy stil' Evrazii i Kitay: nekotoryye osobennosti dialoga. *Teoriya i praktika arkheologicheskikh issledovaniy* 2011(6): 137–142.
- QEYUM (Keyoumu 克由木) 1962. Xinjiang beibu de yanhua 新疆北部的岩画 [Rock art of northern Xinjiang]. *Wenwu* 1962(C2): 112–114.
- REN M. 任萌 2012. Gongyuanqian yiqian ji dong Tianshan diqu kaoguxue wenhua yicun yanjiu 公元前一千纪东天山地区考古学文化遗存研究 [Study on the remains of archaeological cultures in the eastern Tianshan region during the 1st millennium BCE]. Unpubl. PhD thesis, Northwest University, Xi'an.
- REN M. 任萌 2014. Ya'ou dacaooyuan de yishu jiejing—Xinjiang yanhua 亚欧大草原的艺术结晶—新疆岩画 [The crystallisation of art on the Asian-European prairie: Rock-art of Xinjiang]. *Dazhong Kaogu* 2014(1): 80–88.
- REN M. 任萌 and WANG J. 王建新 2013. Yanhua yanjiu de kaoguxue fangfa 岩画研究的考古学方法 [Archaeological methods in rock art research]. *Wenwu* 2013(13): 67–73.
- SAMASHEV, Z. S., S.-H. JANG, N. BOKOVENKO and S. MURGABAEV 2011. *K'ajahüsüt'an-üi Pawi Kürim/ Rock art of Kazakhstan/ Naskal'noe Iskusstvo Kazakhstana*. Tongbuga Yöksa Chaedan, K'ajahüsüt'an Kyoyuk Kwahakpu Kogohak Yöng'uso, Seoul.
- SHAO H. 邵会秋 2018. *Xinjiang shiqian shiqi wenhua geju de yanjin ji qi zhoulin wenhua de guanxi* 新疆史前时期文化格局的演进及其与周邻文化的关系 [Evolution of the structure of pre-Historic cultures in Xinjiang and their relations with neighbouring cultures]. *Kexue chubanshe*, Beijing.
- SHELACH, G. 2004. Marxist and post-Marxist paradigms for the Neolithic. In K. M. Linduff and Y. Sun (eds), *Gender and Chinese archaeology. Gender and archaeology*, pp. 11–27. AltaMira Press, Walnut Creek, CA.
- SHI X. 史晓明 2018. Shilun Aletaihan qu dongxue caihui yanhua de zuozhe laiuyan—yi jiyin xinxi wei jidian 试论岩画 de zuozhe laiuyan—yi jiyin xinxi wei jidian 试论

- 阿勒泰山区洞穴彩绘岩画的作者来源—以基因信息为基点 [A preliminary discussion on the origins of the author of cave paintings in the Altai: using gene data as the central point]. *Xinjiang yushu (Han wen)* 2018(5): 4–10.
- SHVETS, I. 2012. Studien zur Felsbildkunst Kasachstans. Philipp Von Zabern, Darmstadt.
- SU B. 苏北海 1994. *Xinjiang yanhua* 新疆岩画 [Rock art in Xinjiang]. Xinjiang meishu sheying chubanshe, Urumqi.
- SU B. 苏北海 2013. *Xinjiang yankehua* 新疆岩刻画 [Petroglyphs of Xinjiang]. Xinjiang meishu sheying chubanshe, Urumqi.
- TAÇON, P. S. C., TANG H. and M. AUBERT 2016. Naturalistic animals and hand stencils in the rock art of Xinjiang Uyghur Autonomous Region, north-west China. *Rock Art Research* 33(1): 19–31.
- TANG, H., G. KUMAR, JIN, A., WU J., LIU W. and R. G. BEDNARIK 2018. The 2015 rock art missions in China. *Rock Art Research* 35(1): 25–34.
- TSAKHILGAAN, D. and P. TSAGAAN (eds) 2016. *Mongol Altain chuluun shastir/ Mongol Altai rock art*. Rock Art Research Center, Ulaanbaatar.
- TSERENDAGVA, Ya. and D. TSEVEENDORJ 2016. *Dalan Türgeniy Hos Tolgoyn hadny zurag*. Mongol Ulsyn ShUA-iyn Tüükh, arkhyeologiyn khüreele, Ulaanbaatar.
- WANG BINGHUA 王炳华 2004a. Xinjiang yanhua de faxian, fenbu yu gongyi, caihui—Xinjiang yanhua gaiguan zhi yi 新疆岩画的发现、分布与工艺、彩绘—新疆岩画概观之 [The discovery, distribution, technology and coloured drawing of rock art in Xinjiang: an overview of rock art in Xinjiang (I)]. *Xinjiang Shifan Daxue Xuebao (Zhaxue Shehui Kexue Ban)* 25(2): 47–53.
- WANG BINGHUA 王炳华 2004b. Xinjiang yanhua de neirong ji qi wenhua hanyi—Xinjiang yanhua gaiguan zhi er 新疆文化的内容及其文化涵义—新疆岩画概观之二 [The content of rock art in Xinjiang and its cultural meaning: an overview of rock art in Xinjiang (II)]. *Xinjiang Shifan Daxue Xuebao (Zhaxue Shehui Kexue Ban)* 25(3): 62–67.
- WANG BINGHUA 王炳华 2005. The polychrome rock paintings in the Altay Mountains. *The Silk Road* 3(1): 16–23.
- WANG BO 王博 1995. Xinjiang lushi zongshu 新疆鹿石综述 [General overview of Xinjiang's deer stone]. In *Kaoguxue jikan* 考古学集刊 [Papers on Chinese Archaeology], Vol. 9, pp. 239–60. Kexue chubanshe, Beijing.
- WANG BO 王博 2006. Kehua gao xian shibi caihui yinju yanpeng—Xinjiang yanhua zongshu 刻畫高顯石壁彩繪隱居岩棚—新疆岩畫綜述 [Engravings visible high up on stone cliffs, paintings living in seclusion in rockshelters: an overview of rock art in Xinjiang]. In *Xibu yanhua (er) xibu yanhua (er)* 西部岩畫 (二) [Rock art of the west (Two)]. *Zhongguo yanhua quanji* 中國岩畫全集 *Complete collection of Chinese rock art*, pp. 1–9. Liaoning meishu chubanshe, Shenyang.
- WANG X. and R. ZHANG 2019. AR navigation application based on iOS platform. In *2019 2nd International Conference on Information Systems and Computer Aided Education (ICIS-CAE)*, Dalian, China, pp. 14–19. IEEE, Piscataway, NJ; <https://dx.doi.org/10.1109/ICISCAE48440.2019.221579>.
- WANG Y. 王贇 2016. Qianlun Xinjiang Aletai diqu dizhi gouzao gaikuang 浅论新疆阿勒泰地区地质构造概况 [Brief summary of the geological composition of Altai Prefecture, Xinjiang]. *Diqiu* 2016(6): 46.
- WEI J. 魏佳 2014. Xinjiang A'ertaishan he Tianshan diqu yanhua diaocha yu yanjiu 新疆阿尔泰山和天山地区调查与研究 [Survey and study of rock art in the Altai and Tianshan regions of Xinjiang]. Unpubl. PhD thesis, Xibeidaxue, Xi'an.
- XWZW (ed.) 2011a. *Xinjiang weiwu'er zizhiqu di-san ci quanguo*

- wenwu pucha chengguo jicheng: Aletai diqu juan* 新疆维吾尔自治区第三次全国文物普查成果集成: 阿勒泰地区卷 [Collection of general survey results from Xinjiang Uygur Autonomous Region for the Third National Survey of Cultural Relics: The Altay prefecture volume]. Kexue chubanshe, Beijing.
- XWZW (ed.) 2011b. *Xinjiang yanhua shang* 新疆岩画上 [Rock art of Xinjiang: upper volume]. Kexue chubanshe, Beijing.
- XWZW (ed.) 2011c. *Xinjiang yanhua xia* 新疆岩画下 [Rock art of Xinjiang: lower volume]. Kexue chubanshe, Beijing.
- XWZW 2015a. *Bu ke yidong de wenwu: Aletai diqu juan* 不可移动的文物: 阿勒泰地区卷 [Non-portable cultural heritage: Altay Prefecture volume], Vol. 1. Xinjiang Meishu Sheying Chubanshe, Urumqi.
- XWZW 2015b. *Bu ke yidong de wenwu: Aletai diqu juan* 不可移动的文物: 阿勒泰地区卷 [Non-portable cultural heritage: Altay Prefecture volume], Vol. 2. Xinjiang Meishu Sheying Chubanshe, Urumqi.
- YI G. 易国才 2017. Handai Xinjiang Sichou zhi Lu beidao luxian kaobian 汉代新疆丝绸之路北道路线考辨 [On the north route of the Han Dynasty Silk Road in Xinjiang]. *Lianyungang shifan gaodeng zhuanke xuexiao xuebao* 2017(1): 90-94.
- YUAN D. 袁大化 1911. Jinshi yi (wu) 金石一 (五) [Metal and stone, No. 1(5)]. In *Xuantong Xinjiang tuzhi* 宣统新疆图志 [The Xuantong illustrated gazetteer of Xinjiang], Unknown publisher, available at <https://ctext.org/library.pl?if=gb&res=2104&remap=gb> [accessed 5 November 2020].
- ZHANG F. 张芳 2015. Xinjiang A'ertaishan xi yanhua de zongjiao xiangzhengxing chutan 新疆阿尔泰山系岩画的宗教象征性初探 [Basic exploration of religious symbolism in the Xinjiang Altai rock art system]. Unpubl. MA thesis, Xinjiang Normal University, Urumqi.
- ZHANG W. 张文静 2012. Zhongguo beifang didai yanhua fenbu de tezhen fenxi 中国北方地带岩画分布的特征分析 [Analysis of the characteristics of rock art distribution in Northern China]. *Zhongyuan Wenwu* 2012(6): 13-16 and 35.
- ZHANG W. 张文静 2013. Zhongguo yanhua de quyu fenbu jitedian bijiao 中国岩画的区域分布及特点比较 [Regional distributions of Chinese rock art and comparison of their characteristics]. *Neimenggu Shehui Kexue (hanwen ban)* 34(3): 59-62; <https://dx.doi.org/10.14137/j.cnki.issn1003-5281.2013.03.005>.
- ZHAO Y. 赵养峰 1986. A'ertaishan yanhua diaocha ji 阿尔泰山崖画调查记 [Notes on investigation of the rock paintings of the Altai mountains]. *Kaogu yu Wenwu* 1986(5): 59-67.
- ZHAO Y. 赵养峰 1987. Zhongguo Aletaishan yanhua 中国阿勒泰山岩画 [Rock art of the Altai mountains, China]. Shanxi renmin meishu chubanshe, Xi'an.
- ZHOU J. 周菁葆 1993a. Qianyan 前言 [Foreword]. In Zhou J. 周菁葆 (ed.) *Sizhou zhi lu yanhua yishu* 丝绸之路岩画艺术 [Rock-carving painting arts on the Silk Road], pp. 1-3. Xinjiang Renmin Chubanshe, Urumqi.
- ZHOU J. 周菁葆 (ed.) 1993b. *Sichou zhi lu yanhua yishu* 丝绸之路岩画艺术 [Rock-carving painting arts on the Silk Road]. Xinjiang Renmin Chubanshe, Urumqi.
- ZHU Y. 朱媛 2013. Zhongguo yanhua de shenmei zhi wei 中国岩画的审美之维 [The aesthetic dimension of Chinese rock art]. Shanghai Renmin Chubanshe, Shanghai.