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The patterns of obsidian exploitation in the late Upper Pleistocene of the Russian Far East and neighbouring Northeast Asia

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Abstract

An overview of obsidian provenance studies in the Russian Far East and adjacent Northeast Asia is given for the Upper Palaeolithic and Initial Neolithic cultural complexes (ca. 9,000–20,000 BP). Two main analytical techniques, Neutron Activation Analysis and X-ray Fluorescence Analysis, were employed to assemble information on the geochemistry of 'geological' and 'archaeological' obsidian from Primorye [Maritime] Province, the Amur River basin, Sakhalin Island, and Kamchatka Peninsula. Based on the data obtained, the main sources of obsidian were established. In Primorye, obsidian was used mainly from two sources, the Basaltic Plateau and Paektusan. In the Amur River basin, the Obluchie Plateau source supplied obsidian along with the Basaltic Plateau; a source called "Samarga" with an as yet unknown location was exploited to a limited extent only. On Sakhalin Island, the Shirataki source group was the main location for obsidian acquisition. In the Kamchatka Peninsula, obsidian from two-to-six sources was exploited at ca. 9,000–11,300 (14,300?) BP. Two of the most striking features revealed by obsidian provenance studies in the Russian Far East are: 1) the existence of long-distance (more than 300 km between source and utilisation sites) obsidian transportation and/or exchange networks in the Upper Palaeolithic, since at least ca. 19,000 BP; and 2) the use of multiple obsidian sources by Upper Palaeolithic populations, including 'remote' sources and despite the proximity of 'local' obsidian deposits. These peculiarities demonstrate diverse patterns of obsidian acquisition and use in the early prehistory of the region.

Keywords: obsidian, provenance, long-distance transport, Upper Palaeolithic, Initial Neolithic, Russian Far East, Northeast Asia

Introduction

The use of high quality volcanic glass (i. e., obsidian) as a raw material by prehistoric people in the Russian Far East (including Primorye [Maritime] Province, Amur River basin, Sakhalin Island, and Kamchatka Peninsula) was known to natural sciences' scholars in the second part of eighteenth century (e. g., Krasheninnikov 1972 [1755]) and the late nineteenth–early twentieth centuries (e. g., Polyakov 1884; Jochelson 1928). During the beginning of large-scale archaeological research in the 1950–60s, obsidian was found in the Upper Palaeolithic and Initial Neolithic contexts of the Primorye and Amur River basin (Ganeshin and Okladnikov 1956; Petrun 1956, 1959; Derevianko 1970). However, the scientific study of volcanic glass provenance from archaeological sites in the Russian Far East was virtually non-existent until two decades ago, with a brief mention only of obsidian presence in assemblages in the 1960–90s (e. g., Yoshizaki 1963; Andreyev 1964; Okladnikov 1965; Dikov 1968; Chard 1974, 94; Butyulina 1981; Kuznetsov 1996; Vasil'evskiy 1998). After the first attempts of obsidian analysis from Sakhalin, Primorye, and the Lower Amur River basin conducted in the 1980s, which were based on inconsistent methodology, speculations were drawn about the origins of obsidian artefacts (e. g., Vasil'evskiy 1998, 290; Vasil'evskiy *et al.* 1982, 96; Vasil'evskiy and Gladyshev 1989, 101–2; Golubev and Lavrov 1988, 128–9; see also Kuzmin and Popov 2000, 10–1). However, no reliable (by modern standards) data on the obsidian sources of

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prehistoric cultural complexes of the Russian Far East were generated prior to the early-mid 1990s (see Kuzmin 2010, 149).

In 1991–2, a research programme for the determination of sources for obsidian artefacts in the Russian Far East was initiated by the author in co-operation with colleagues from Russia, USA, Japan, and Republic of Korea (South Korea). After pilot studies, conducted on the basis of modern analytical standards in obsidian provenance (e. g., Williams-Thorpe 1995; Glascock *et al.* 1998) and completed in the mid-1990s (Shackley *et al.* 1996; Glascock *et al.* 1996; Popov and Shackley 1997), basic data on sources of archaeological obsidian in Primorye and Sakhalin Island were published in detail in the late 1990s–early 2000s (Kuzmin and Glascock 2001; Kuzmin and Popov 2000; Kuzmin *et al.* 1999, 2002a, 2002b). Later on, more information about particular regions of the Russian Far East and neighbouring Northeast Asia was released (Popov *et al.* 2005; Glascock *et al.* 2006; Kuzmin and Glascock 2007; Kuzmin *et al.* 2008). Now the main sources of archaeological volcanic glass in the Russian Far East are securely established (Figure 1).

In this review, the current situation with the sources of archaeological obsidian and patterns of its use in the Upper Palaeolithic and Initial Neolithic cultural complexes of the Russian Far East is presented. It is based on recent overviews (Kuzmin 2006a, 2010), with the addition of the latest information.

Material and Methods

In this summary, only archaeological sites belonging to the Upper Palaeolithic and Initial Neolithic complexes and dated to the late Upper Pleistocene, ca. 9,000–20,000 radiocarbon (^{14}C) years ago (hereafter－BP), are considered. They manifest the beginning of obsidian sources' exploitation for acquiring the high quality raw material and its transportation and/or exchange. In total, 34 sites were selected for the purpose of this paper (Tables 1–4).

Obsidian specimens from both archaeological sites and outcrops ('geological' objects) in the Russian Far East, Hokkaido Island of Japan, and Paektusan [Baitoushan] Volcano on the North Korean-Chinese border were systematically examined. Two analytical methods were employed, Neutron Activation Analysis (hereafter－NAA) and X-ray Fluorescence Analysis (henceforth－XRF). Because no reliable geochemical data for obsidian in the Russian Far East existed prior to our studies, it required the accumulation of primary information, the first essential step. For this purpose, the NAA was performed on both archaeological and geological samples, with the determination of 27 (sometimes 28) chemical elements (see Kuzmin and Popov 2000). The second step was the grouping of data according to the approach developed by Glascock *et al.* (1998). As a result, geochemical groups reflecting the primary ('geological') sources of obsidian were established (Kuzmin *et al.* 2002a, 2002b, 2008). The third step was to analyse more specimens, and both abridged NAA (with the detection of only 7 short-lived elements; see Kuzmin *et al.* 2008, 2182) and XRF (14 elements; see Kuzmin *et al.* 2002a) procedures were applied.

The total number of samples analysed for this study is 286 (160 specimens from archaeological contexts and 126 ones from primary sources). Overall, about 1200 pieces of obsidian from both archaeological and geological locales in the Russian Far East and neighbouring Northeast Asia were studied by our group since 1992 (see Kuzmin and Glascock 2010 and references therein).

As the main result of the study, geochemical source groups were established for the Russian Far East, Hokkaido, and Paektusan Volcano (Kuzmin and Glascock 2007; Kuzmin *et al.* 2002a, 2002b, 2008; Grebennikov *et al.* 2010), and they serve as references for the determination of primary sources of archaeological obsidian. The original numerical data on the chemical composition of obsidian artefacts and 'geological' samples were presented previously (Kuzmin and Popov 2000; Popov *et al.* 2006a, 2006b).

It is important to mention that almost all of the results presented here are based on the analytical data generated in a single facility (the University of Missouri Research Reactor, MURR), with the same standard and reference samples, and therefore these results are comparable with a high degree of confidence. This is different from other studies of prehistoric obsidian in the Russian Far East (e. g., Warashina *et al.* 1998) where analytical details (such as reference samples used and content of chemical elements in obsidian) are often not given, and it requires at least additional confirmation by running the same samples in another laboratory. Before this is done, the conclusions based on studies like

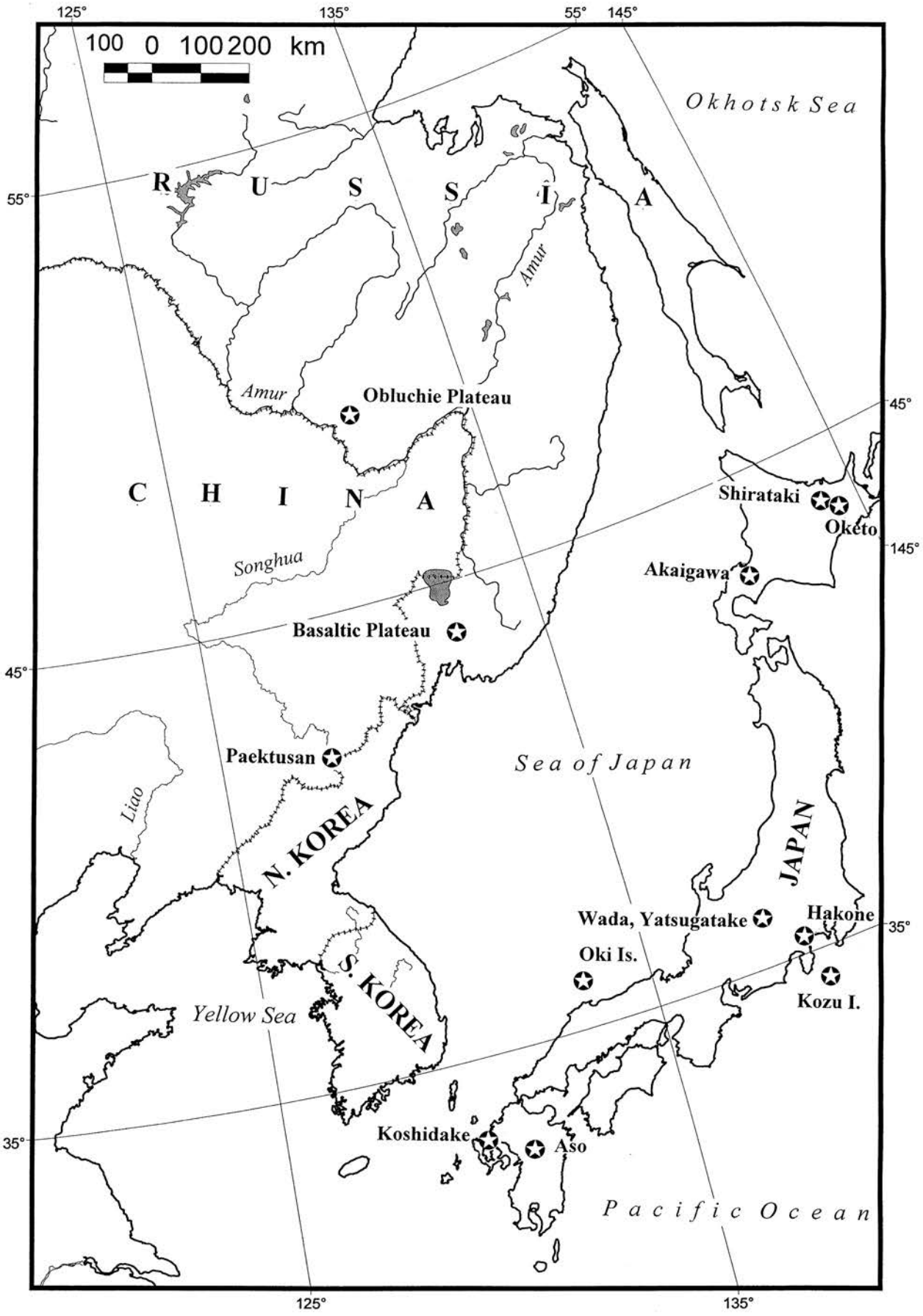

Figure 1 The main obsidian sources in Northeast Asia (after Kuzmin 2006a, modified).

Warashina *et al.* (1998) cannot be accepted at face value.

Archaeological sites used in this review belong to two cultural complexes, Upper (or Final) Palaeolithic and Initial (or The Earliest) Neolithic. The majority of sites corresponds to the Upper Palaeolithic (Tables 1, 3–4), while settlements from the Amur River basin (Table 2) represent the Osipovka and Gromatukha cultural complexes of the Initial Neolithic. The Ustinovka 3 site in Primorye is considered to be a transitional Palaeolithic–Neolithic assemblage (Derevianko and Tabarev 2006; Zhushchikhovskaya 2006).

Only some of the Upper Palaeolithic sites with obsidian artefacts are ^{14}C–dated. The Ustinovka 6 site in Primorye is dated to ca. 11,550–11,750 BP (Kuzmin 2006b). On Sakhalin Island, the Ogonki 5 site is dated to ca. 17,900–19,400 BP (Kuzmin 2006b). The 1.47 m depth level in the Ostantsevaya Cave where an obsidian point was found (Gorbunov 2002, 173) is sandwiched between ^{14}C dates of ca. 8,000 BP (depth of 0.30 m) and ca. 9,600 BP (depth of 4.20 m) (Kuzmin *et al.* 2005), with an age estimate of ca. 8,500 BP for the obsidian-bearing layer.

As for the Ushki site cluster on the Kamchatka Peninsula, the first ^{14}C dates for Layer 7 were in the range of ca. 13,600–14,300 BP (Dikov 1996, 2003 [1977]; see also Kuzmin 2000, 122). Later on, younger ^{14}C dates were obtained for this component: ca. 10,700–11,300 BP (Goebel *et al.* 2003). Recently, two sets of ^{14}C dates for Layer 7 were generated: ca. 11,200 BP (four values; Goebel *et al.* 2010); and ca. 11,100 BP (one value; Kuzmin *et al.* 2010). Layer 6 of the Ushki cluster is ^{14}C–dated to ca. 10,400–10,900 BP (see summary: Kuzmin 2000, 122), ca. 10,200–10,800 BP (Goebel *et al.* 2003), and ca. 10,200 BP (Kuzmin *et al.* 2010). The single ^{14}C date for Layer 5 of the Ushki cluster is ca. 8,800 BP (Dikov 2003). The second Upper Palaeolithic site from Kamchatka, Anavgai 2, yielded a ^{14}C date of ca. 10,900 BP for the cultural layer (Ptashinski 2009).

In the Initial Neolithic, the general range of ^{14}C dates for the Osipovka cultural complex of the Lower Amur River basin is ca. 9,900–13,300 BP (Kuzmin 2006b). The age of the Goncharka 1 site is ca. 9,900–12,500 BP (Kuzmin 2006b); and the ^{14}C date for the Osinovaya Rechka 10 site is ca. 10,800 BP (Shevkomud and Kuzmin 2009). The Gromatukha site of the same complex is ca. 12,100–12,300 BP old (Kuzmin 2006b; Nesterov *et al.* 2006). The Ustinovka 3 site in Primorye is ^{14}C–dated to ca. 9,300 BP (Kuzmin *et al.* 2003).

The determination of 'long-distance' obsidian transportation and/or exchange, the 'supply zone' of ca. 300 km from the source as established by Renfrew (1969; Renfrew and Dixon 1976; see also Renfrew and Bahn 2004, 379) can serve as the boundary between 'local' (less than ca. 300 km) and 'remote' sites or sources. Thus, if a utilisation site and an obsidian source are more than ca. 300 km apart in a straight line, one can use the term 'long-distance' with regard to the mean of raw material acquisition and prehistoric contacts and migrations.

Sources of Archaeological Obsidian in the Russian Far East

Primorye Province

Based on the results obtained (Kuzmin and Popov 2000; Kuzmin *et al.* 2002a; Popov *et al.* 2005, 2006a; Doelman *et al.* 2008), the main obsidian sources for the Upper Palaeolithic－Early Neolithic complexes in Primorye have been established (Table 1; Figures 2–3). The Basaltic Plateau in southern Primorye is the major location of high quality volcanic glass (Kuzmin and Popov 2000; Kuzmin *et al.* 2002a; Popov *et al.* 2009). It supplied Upper Palaeolithic sites in the vicinity (Table 1; Figure 2, Nos. 6–7, 9, 11–14) and about 230 km away from the source, in the Zerkalnaya [Tadushi] River basin where the Ustinovka cluster is located (Table 1; Figure 2, Nos. 1–3, 5). The largest distance (ca. 550 km) is between the source and two sites in the Amur River basin, Novotroitskoe 10 and Osinovaya Rechka 10 (Table 2; Figure 2, Nos. 20–21). The use of non-local obsidian in the Zerkalnaya River basin was suggested by Petrun (1959) and Vasil'evskiy and Gladyshev (1989), and later confirmed by our work (e. g., Kuzmin *et al.* 2002a).

The proportion of obsidian in general raw material composition is quite high near the source, from 96% in the immediate vicinity (Kluyev and Sleptsov 2007) to 34–39% at a distance of 20–50 km (Pantukhina 2007; see also Kuznetsov 1992, 1996). Further from the Basaltic Plateau, the amounts of obsidian tools and flakes decrease dramatically and there are single artifacts on 'remote' sites in the valleys of Zerkalnaya and Amur rivers (Vasil'evskiy and Gladyshev 1989; Djakov 2000).

The second important source of obsidian in

Table 1 The Upper Palaeolithic sites in Primorye with obsidian artefacts and their sources

Site No.*	Site Name (No. of Samples)	Obsidian Sources			
		Basaltic Plateau	Paektusan	Gladkaya River	Samarga
1	Ustinovka 1 (1)	+			
2	Ustinovka 3 (2)				+
3	Ustinovka 4 (18)	+			
4	Ustinovka 6 (14)**	+	+		
5	Suvorovo 3 (2)	+			
6	Gorelaya Sopka (5)	+	+		
7	Gadyuchya Sopka (5)	+			
8	Ivanovka (5)				
9	Osinovka (8)	+			
10	Razdolnoye (1)			+	
11	Borisovka (2)	+			
12	Timofeevka 1 (3)	+	+		
13	Ilistaya 1 (5)	+			
14	Firsanova Sopka (5)	+	+		
15	Kentsukhe (2)	+			
16	Lesozavodsk (2)	+			

* These Nos. in Tables 1–3 correspond to those in Figures 2–4.
** Data are from Warashina *et al.* (1998).

Table 2 The Initial Neolithic sites in the Amur River basin with obsidian artefacts and their sources

Site No.	Site Name (No. of Samples)	Obsidian Sources		
		Obluchie Plateau	Basaltic Plateau	Samarga
17	Gromatukha (1)	+		
18	Goncharka 1 (1)			+
19	Amur 2 (2)			+
20	Novotroitskoe 10 (2)		+	
21	Osinovaya Rechka 10 (1)		+	

Upper Palaeolithic assemblages of Primorye is Paektusan (Table 1; Figure 3, Nos. 4, 6, 12, and 14). The distances between this source and the utilisation sites are up to 630 km, thus demonstrating the long-distance movement of raw material. The use of Paektusan obsidian was initially suggested by Vasil'evskiy and Gladyshev (1989) based on limited geochemical data (see Kuzmin and Popov 2000, 158), and was subsequently firmly established by our group (Kuzmin *et al.* 2002a; Popov *et al.* 2005) based on modern methodological standards. Later on, Doelman *et al.* (2008) confirmed our conclusions.

Two other minor obsidian sources were detected in Primorye: Gladkaya River and Samarga (Table 1; Figure 2). The Gladkaya River source was identified by our group (Kuzmin and Popov 2000; Kuzmin *et al.* 2002a) and later studied by Doelman *et al.* (2008). It was used very rarely in the Upper Palaeolithic, and more commonly in the Neolithic. Obsidian from the Samarga source, which is still not precisely pinpointed, was initially identified in Primorye at four sites (Kuzmin *et al.* 2002a, 512) and later on at two sites in the Amur River basin, Goncharka 1 and Amur 2 (Popov *et al.* 2006b) (Table 2). Although its exact location is unknown, the limited use of this source in the Initial Neolithic is noteworthy, with three sites yielded Samarga obsidian (Tables 1–2; Figure 2, Nos. 2, 18–19).

Amur River basin

In this part of the Russian Far East, obsidian in the Stone Age assemblages is not numerous (see Popov *et al.* 2006a), and only some of them belong to the Initial Neolithic (Table 2; Figure 2, Nos. 17–21). The local source on the Obluchie Plateau was used by people at the Gromatukha site (distance of 350 km). Two other sources situated further away, Basaltic Plateau and Samarga, were also exploited (Table 2).

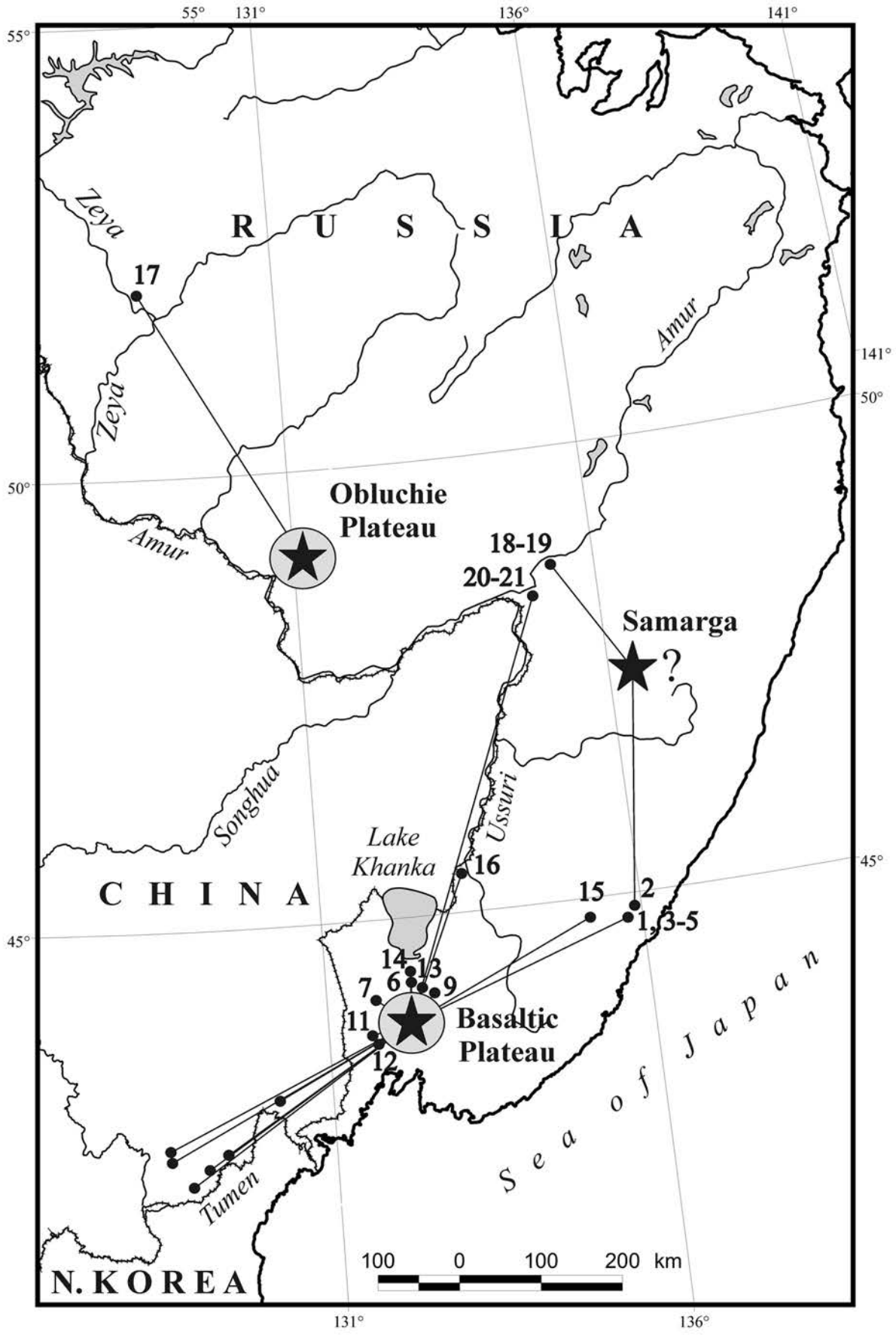

Figure 2 The Basaltic Plateau, Obluchie Plateau, and Samarga obsidian sources and Upper Palaeolithic–Initial Neolithic archaeological sites associated with them.

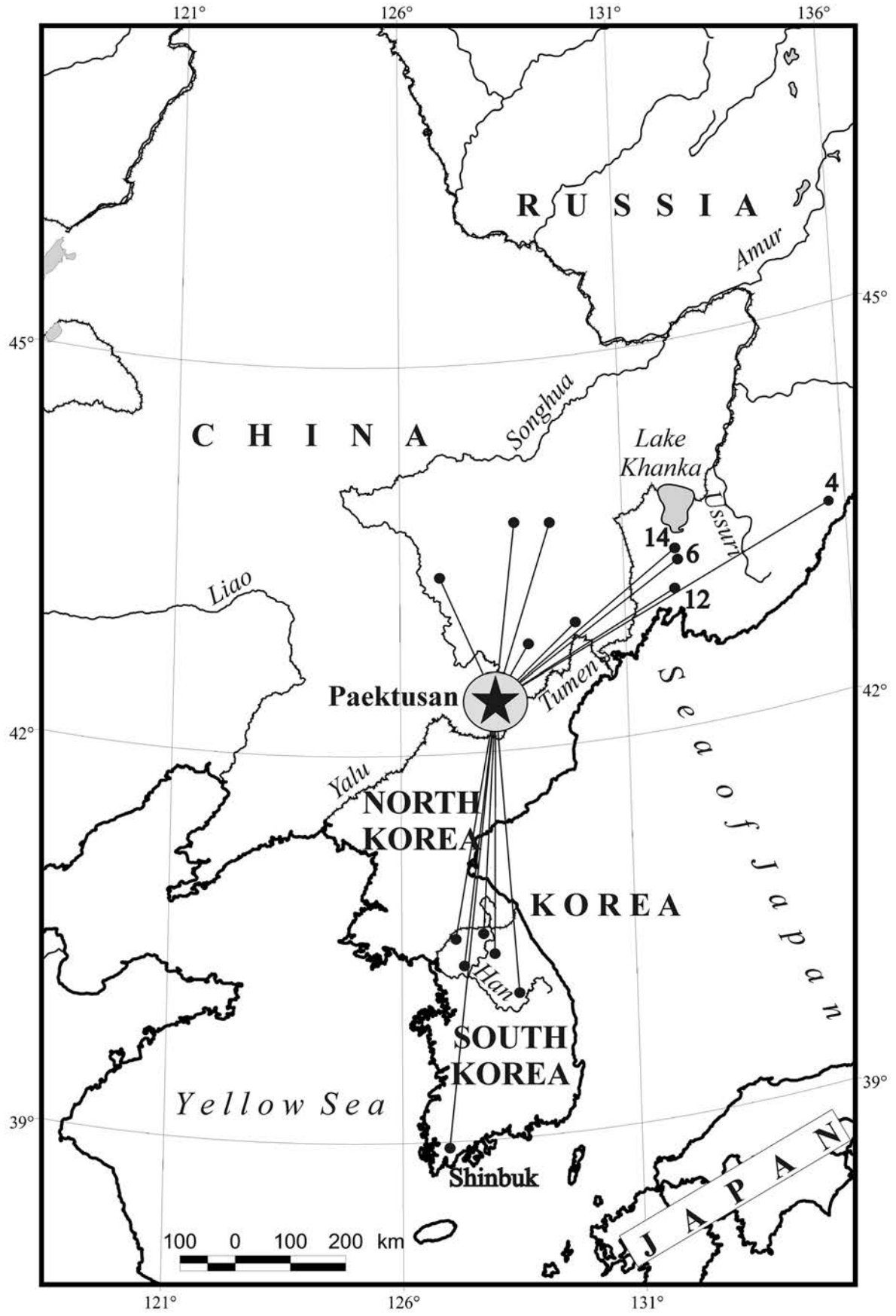

Figure 3 The Paektusan obsidian source and associated Upper Palaeolithic sites in Northeast Asia.

Table 3 The Upper Palaeolithic sites on Sakhalin Island with obsidian artefacts and their sources

Site No.	Site Name (No. of Samples)	Obsidian Sources	
		Shirataki-A	Shirataki-B
22	Bereznyaki 4 (2)	+	
23	Ogonki 5 (6)	+	+
24	Ogonki 6 (1)	+	
25	Ogonki 7 (3)	+	+
26	Olimpiya 1 (1)		+
27	Ostantsevaya Cave (1)	+	
28	Sennaya 2 (2)	+	
29	Sokol (8)	+	+
30	Starorusskoe 3 (1)		+
31	Starorusskoe 5 (4)		+

Table 4 The Upper Palaeolithic sites on Kamchatka Peninsula with obsidian artefacts and their sources

Site No.*	Site Name (No. of Samples)	Obsidian Sources					
		KAM-01	KAM-03*	KAM-05**	KAM-07***	KAM-10	KAM-15
32	Ushki, Layer 7 (19)	+	+	+	+	+	+
	Ushki, Layer 6 (14)			+	+	+	+
	Ushki, Layer 5 (4)			+	+	+	
33	Anavgai 2 (7)			+		+	

* Itkavayam source (Kuzmin *et al.* 2008).
** Payalpan source (Kuzmin *et al.* 2008).
*** Belogolovaya River source (Kuzmin *et al.* 2008).

Sakhalin Island

The Shirataki source group on Hokkaido Island served as the main supply of obsidian for prehistoric sites of Sakhalin Island (Table 3; Figure 4). This is in accord with the first research results based on limited geochemical data of archaeological obsidian from Sakhalin (e. g., Kimura 1995, 1998; Vasil'evskiy 1998, 290) which were never published in full form (including analytical data). Now the exploitation of Hokkaido obsidian sources used for manufacture of artefacts discovered on Sakhalin Island is well-documented (Kuzmin and Glascock 2007; Kuzmin *et al.* 2002b). The distance between source and utilisation sites in the Upper Palaeolithic was from ca. 350 km (Ogonki 5 site) to ca. 700 km (Ostantsevaya Cave site) (Figure 4, Nos. 23 and 27, respectively).

Kamchatka Peninsula

The first data on sources of archaeological obsidian from Kamchatka were obtained by our group in the mid-2000s (Speakman *et al.* 2005; Glascock *et al.* 2006). In a special study conducted for obsidian from the Ushki site cluster (Kuzmin *et al.* 2008) (Figure 5; Table 4, No. 32), it was found that obsidian from up to six sources was used, with distances up to 200–300 km between the sources and Ushki. Data for Anavgai 2 site (Table 4, No. 33) show that obsidian from two sources was acquired.

Obsidian Exploitation in the Upper Palaeolithic and Initial Neolithic: Major Patterns

Based on the results obtained, two main features in obsidian acquisition and use in the Russian Far East may be established. First of all, there were several long-distance exchange networks covering the entire region and adjacent Northeast Asia (Figures 2–5). The earliest sites with obsidian in the Russian Far East can be dated to ca. 12,000–19,000 BP. The range of obsidian transportation was up to 500–800 km in the Upper Palaeolithic, and up to 1000 km in the following Neolithic period (e. g., Kuzmin 2006a, 2010). This testifies in favour of extensive prehistoric contacts in the Russian Far East since the late Upper Palaeolithic.

The second important feature is the exploitation of multiple obsidian sources by prehistoric people in the Upper Palaeolithic and Initial Neolithic. In several cases, not only the 'local' source of excellent quality volcanic glass, such as pebbles in the channel

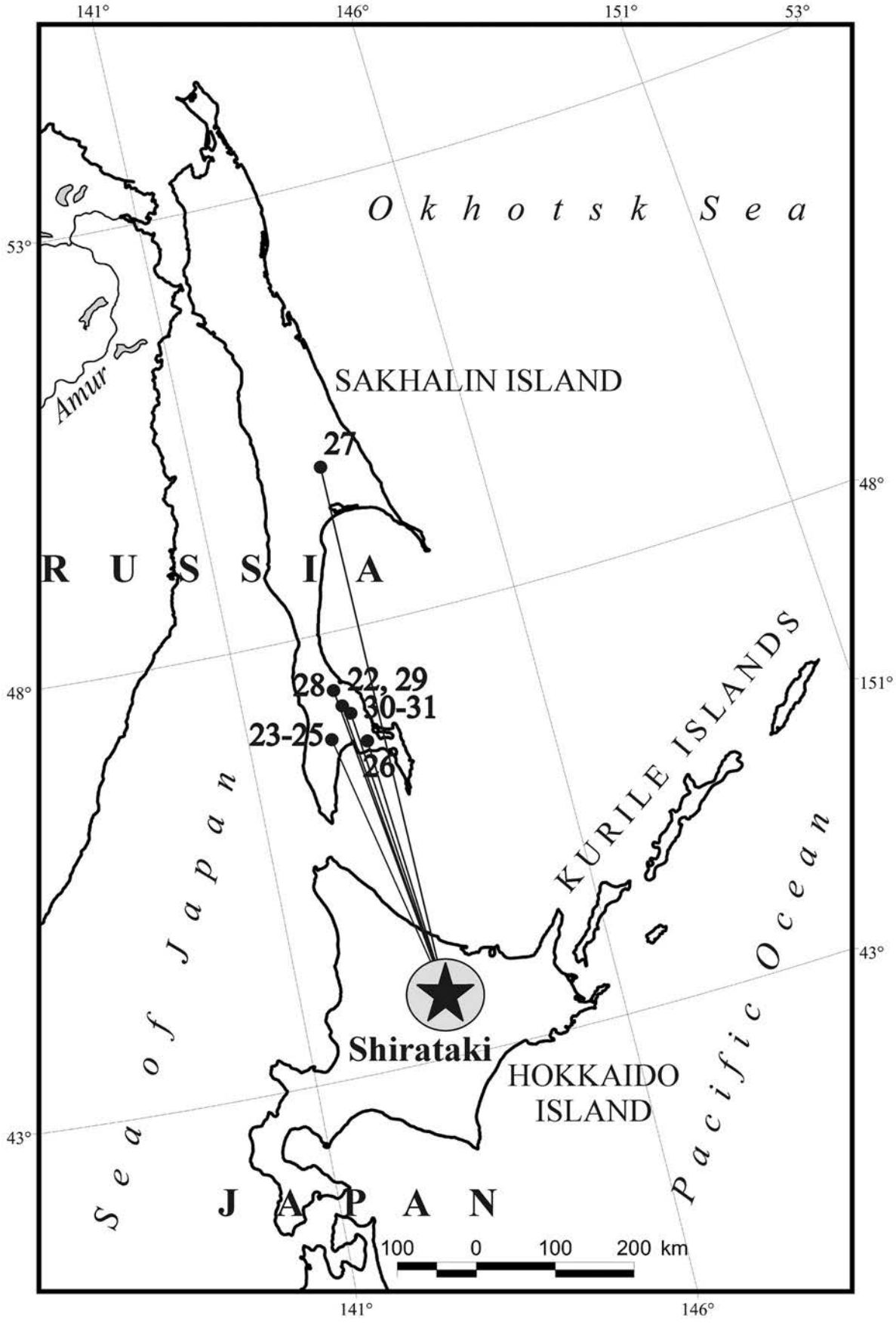

Figure 4 The Shirataki obsidian source and associated Upper Palaeolithic sites on Sakhalin Island.

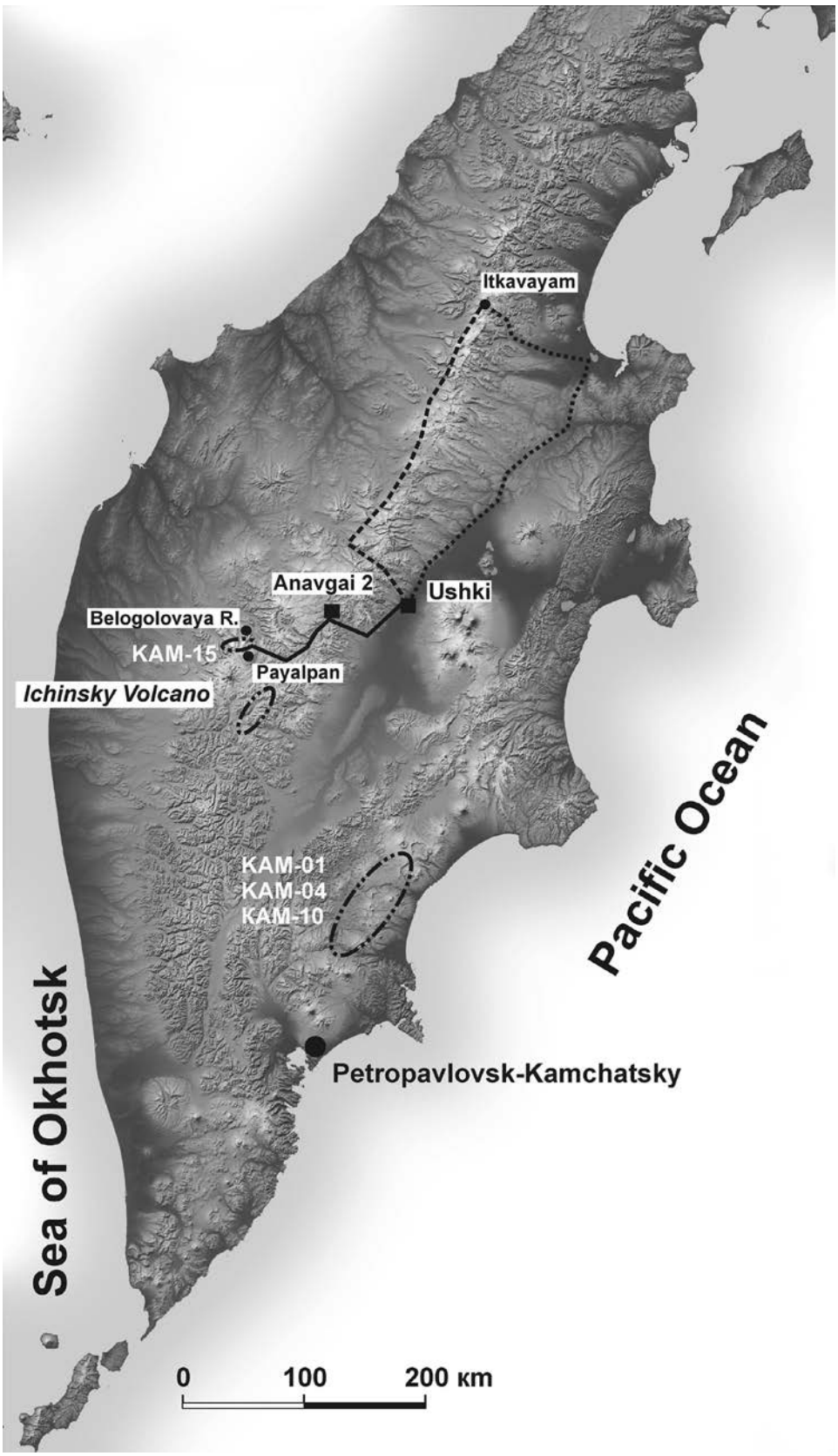

Figure 5 The Upper Palaeolithic sites on the Kamchatka Peninsula and their sources of obsidian (after Kuzmin *et al.* 2008, modified).

Black squares represent sites; black dots—obsidian sources; dashed ellipses—presumable position of unknown obsidian sources; black solid line—presumed movement from Ushki to Payalpan and Belogolovaya River sources; dotted line—presume movement to Itkavayam obsidian source by river valleys; and dashed line—presume movement to Itkavayam obsidian source by watershed.

of the Ilistaya [Lefu] River in southern Primorye (which are products of erosion of the Basaltic Plateau outcrops; see Doelman *et al.* 2008, 246–50) was used, but artefacts were also manufactured on obsidian from the 'remote' source of Paektusan at the same site (Figures 2–3; site Nos. 5, 12, and 14, see Table 1). This required either direct long-distance trips to the source or exchange via a chain of middlemen; in order to understand the mechanisms of obsidian transportation, more research is necessary. The use of several raw material localities is especially evident for Kamchatka where in the late Upper Palaeolithic obsidian from up to six sources was exploited (Figure 5; Table 4). These data show that the acquisition strategy of raw material in the prehistoric Russian Far East was quite complex from an early time, at least ca. 12,000 BP.

Brief Comparison with Neighbouring Northeast Asia

The Russian Far East and the Korean Peninsula were the "backyard" of obsidian provenance studies for many years compared to the Japanese Islands (see recent reviews: Izuho and Sato 2007; Tsutsumi 2010), and only in the last 10–15 years significant progress has been achieved in the identification of archaeological obsidian sources. The Paektusan Volcano was a very important locality for a vast region, including the Korean Peninsula, Primorye, and Northeast China (Manchuria) (Kuzmin *et al.* 2002a, Popov *et al.* 2005; Kim *et al.* 2007; Jia *et al.* 2010) (Figure 3). The range of obsidian spread in the Upper Palaeolithic was up to 800 km as testified by the identification of Paektusan obsidian at the Shinbuk [Sinbuk] site on the southern tip of Korea (Kim *et al.* 2007) (Figure 3), dated to ca. 18,500–25,500 BP (Seong 2007). The earliest sites with obsidian in the Russian Far East and Korea are associated with the microblade technology (Kuzmin *et al.* 2007).

Based on recent progress in obsidian provenance studies in Manchuria, the use of volcanic glass from the Basaltic Plateau source was detected (Jia *et al.* 2010) (Figure 2) while the main source of obsidian in this region was Paektusan (Figure 3). As in the Russian Far East, the acquisition of raw material from two sources was shown for Upper Palaeolithic sites around Paektusan (Jia *et al.* 2010).

The use of obsidian sources on Hokkaido Island by prehistoric people of Sakhalin Island is now well-established (e. g., Kuzmin and Glascock 2007; Figure 4). Recent progress in geochemical studies of Hokkaido obsidian (e. g., Hall and Kimura 2002; Kuzmin *et al.* 2002b; see review: Izuho and Sato 2007) allows a better understanding of the patterns of obsidian exchange in insular Northeast Asia in the near future. It seems that the Hokkaido sources in Upper Palaeolithic and Neolithic times supplied obsidian for a large region, including Hokkaido and Sakhalin islands, and the Kurile Islands (Phillips and Speakman 2009; Phillips 2010).

Conclusion

Significant progress has been achieved in the Russian Far East in obsidian provenance studies since 1992. Now all major sources of archaeological obsidian are securely established for Primorye, the Amur River basin, and Sakhalin Island on the basis of modern analytical standards. More work is required on the Kamchatka Peninsula where we have to contend with logistically difficult conditions and where a multitude of obsidian sources (up to 30) have so far been identified. The exploration of archaeological obsidian in other northeastern Siberian region of Chukotka has just begun. The existence of long-distance exchange/transport networks is a clear sign of the high demand for obsidian as a raw material in the Russian Far East and neighbouring regions, and also an indication of the wide range of prehistoric contacts and migrations in Northeast Asia since at least ca. 19,000 BP and perhaps much earlier.

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後期更新世後半のロシア極東
および近隣の北東アジアにおける黒曜石利用のパターン

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要　旨

後期旧石器時代と初期新石器時代の文化（約 20,000 年前～9,000 年前）に関するロシア極東と近隣の北東アジアにおける黒曜石原産地の研究を通覧した。沿海地方，アムール川盆地，サハリン，カムチャツカの地質学的・考古学的黒曜石の情報を総合するにあたり，主として中性子放射化分析と蛍光 X 線分析が用いられた。得られているデータによる限り，主要な黒曜石原産地は把握されたとみてよい。沿海地方では黒曜石は主に 2 か所，つまり玄武岩台地，と白頭山の黒曜石が使われた。アムール川盆地ではオブルチ台地の原産地が玄武岩台地とともに黒曜石を供給している。「サマルガ」とよばれるまだよく知られていない原産地の黒曜石の利用はごくわずかである。サハリンでは北海道白滝の産地群が黒曜石獲得の主要な場所であった。カムチャツカ半島では 2～6 か所の原産地黒曜石が，およそ 11,300（14,300？）年から 9,000 年前まで利用されていた。ロシア極東における黒曜石原産地研究の 2 つの最も特徴的な様相は，第 1 に，後期旧石器時代の少なくとも 19,000 年前から長距離（産地－消費地遺跡間で 300 km 以上）におよぶ黒曜石の運搬あるいは交易のネットワークが存在したこと，第 2 に，後期旧石器時代の人びとが，「ローカル」な近隣の黒曜石があるにもかかわらず，「遠隔」地の黒曜石をふくむ複数の黒曜石原産地を利用していることである。こうした特色は，当該地域の先史時代における黒曜石獲得の多様なパターンをしめしている。

キーワード：黒曜石，原産地推定，長距離運搬，後期旧石器時代，初期新石器時代，ロシア極東，北東アジア