ARCHAEOLOGY IN THE KURIL ISLANDS: ADVANCES IN THE STUDY OF HUMAN PALEOBIOGEOGRAPHY AND NORTHWEST PACIFIC PREHISTORY

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Abstract. The Kuril Islands are a relatively poorly known region of the North Pacific Rim between Hokkaido and Kamchatka. This article presents new information on the settlement history and human biogeography of the central and northern Kuril Islands resulting from a three-week, international survey and testing project in the summer of 2000. The paper introduces the Kuril chain (little known outside of Japan and Russia), presents a chronology of settlement based on new AMS radiocarbon dates, and examines the role of volcanic and tectonic forces on human prehistory and site preservation. The research results presented here add significantly to the record of Kuril archaeology and offer conclusions of broader applicability to the prehistory of the North Pacific and the archaeology of island chains.

Introduction

Islands and island chains provide unique comparative contexts for the study of colonization processes, human-environmental interactions, the limits of human adaptive flexibility to both catastrophic and gradual environmental change, the dynamics of trade networks, and other topics (e.g., Burney 1997; Cherry 1984, 1992; Fitzhugh 1997; Fitzhugh and Hunt 1997; Kaplan 1976; Kirch and Hunt 1997; Terrell 1977, 1997). Two of the world's most substantial island chains are located around the North Pacific Rim. These are the Aleutian and Kuril island chains, long strings of islands collectively spanning 3,500 km and covering almost half of the North Pacific Rim, defined here as the Pacific coast falling north of the 40° north parallel. While the archaeological record of the continental half of the North Pacific Rim is now fairly well-known, the prehistory of the Aleutians and Kurils, and their possible roles in regional and transcontinental prehistory is only beginning to receive comprehensive attention. While

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the Aleutians have received more investigation in the past decade, the Kurils present significant lacuna in our understanding of North Pacific prehistory and the processes that have enervated it.

This article presents new information on the settlement history and human biogeography of the central and northern Kuril Islands resulting from a three-week, international survey and testing project in the summer of 2000. This paper introduces the Kuril chain (little known outside of Japan and Russia), presents a chronology of settlement based on new AMS radiocarbon dates, and examines the role of volcanic and tectonic forces on human prehistory and site preservation. The research results presented here, while preliminary in many respects, add significantly to the record of Kuril archaeology and also offer conclusions of broader applicability to the prehistory of the North Pacific and the archaeology of island chains.

Prior to this research, little systematic attention had been paid to examining the Kuril Islands in a geographically comprehensive fashion. While archaeological research has been conducted in the Kurils for over 100 years, most of these studies have been exclusively typological in nature and focused on the larger islands closest to Kamchatka and Hokkaido (Chubarova 1960; Golubev 1972; Knorozov et al. 1989; Murata and Honda 1967; Shubin 1977, 1990a, 1990b, 1990c, 1990d, 1994; Stashenko and Gladyshev 1977; Ushiro 1996, Ushiro and Tezuka 1992; Yamada 1999). Western archaeologists have been interested in the Kurils for at least 40 years, because of the possible roles they have played in circum-North Pacific and Beringian prehistory (Befu and Chard 1964; Chard, 1960a, 1960b, 1963; 1960 [ed]), but these strategically sensitive islands remained inaccessible to American researchers until after the end of the Cold War.

Geological and Biogeographical Background

The Kurils are a string of volcanic islands bordering the Northwest Pacific Ocean, enclosing the Sea of Okhotsk, and linking northern Japan and the Kamchatka Peninsula (Fig. 1). The archipelago includes an older inactive arc (the Lesser Kuril Ridge) and a

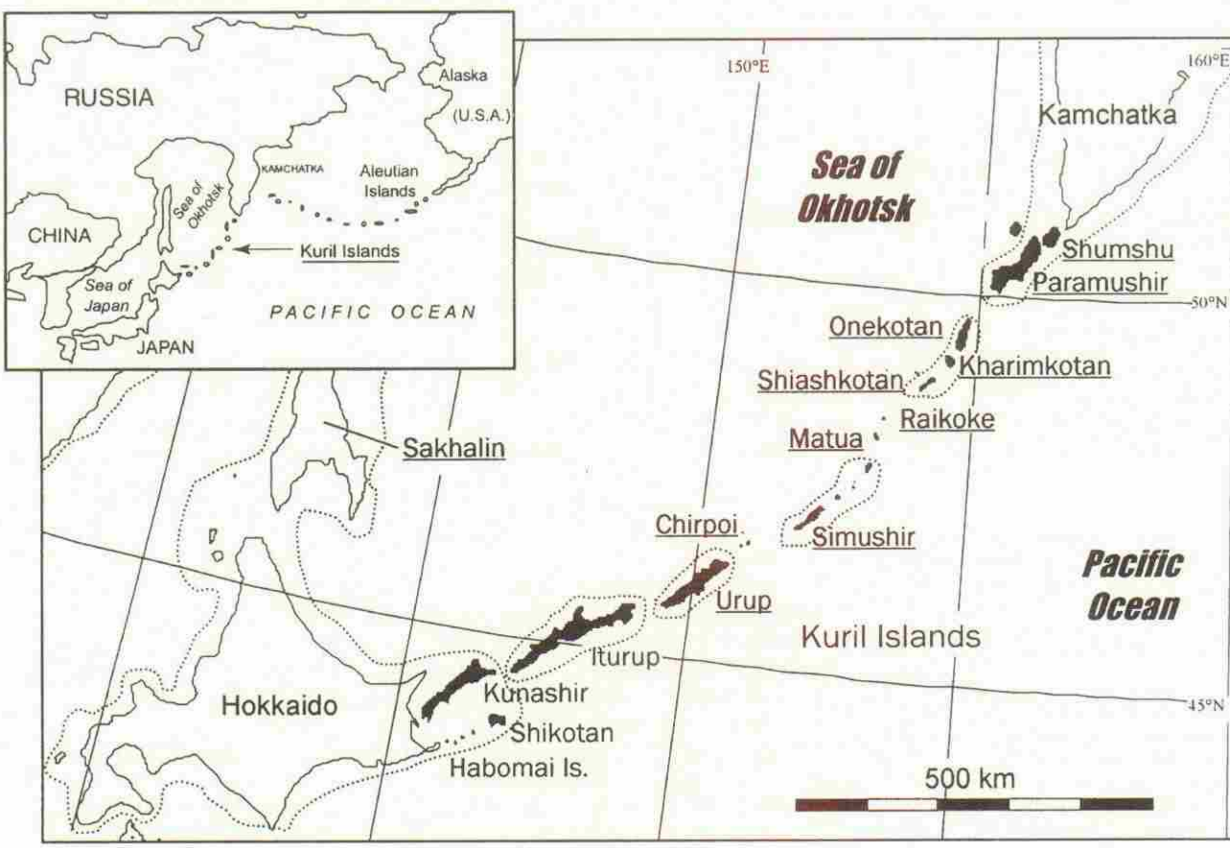

Figure 1. Map of the Kuril Archipelago and its position in the North Western Pacific. Underlined names represent islands visited for archaeological survey during the year 2000 season. Dashed line approximates Late Glacial Maximum coastlines.

younger volcanically active arc (the Greater Kuril Ridge). The latter extends for 1,200 km from Cape Lopatka on Kamchatka to the Nemuro Peninsula on Hokkiado (Gorshkov 1970; Nemoto and Sasa 1960). The research reported here focuses on the Greater Kuril Ridge, which derives from submarine volcanic activity beginning in the Miocene. Deep channels divide the islands in the Greater Kuril Ridge (hereafter, simply the Kuril Islands) into three parts: north, central, and south. The northern and southern islands tend to be larger than those in the central region (Matua to Simushir). The Kuril Islands contain 160 terrestrial volcanoes and 89 submarine volcanoes of Quaternary age (Gorshkov 1970). Thirty-two have erupted in the past 300 years (Ishizuka 2001; Ishizuka, Fitzhugh, and Nakagawa 2001).

The Kurils comprise 32 islands varying in size from 5 to 3,200 km^2 and ranging in degree of isolation. Today, the northern and central islands are tundra-covered and largely impoverished of fauna. The climate is distinctly subarctic and maritime. To the south, the islands support mixed forest (spruce, larch) and grasses and are more temperate (Ushiro and Tezuka 1992; Yamada 1999). Throughout, winters are dominated by high winds and frequent storms that draw cold continental air across the Sea of Ohkotsk from northern China and Siberia (Hacker 1951). Heavy snow and extensive sea ice is common from November to March (Rostov et al. 2001). Summers are characterized by dense fog, mild southerly winds, and fewer storms than in winter.

Estimates of post-glacial sea-level rise (Lambeck and Chappell 2001), indicate land connections between the island of Kunashir to the Hokkaido mainland, and Shumshu and Paramushir to the Kamchatka mainland (Fig. 1; Ono 1999) were severed by 9000–8000 B.P. when sea level broached the −20 to −15 m level. As a result of this isolation, few land mammals are found in the Kurils, and most are concentrated today on the larger islands, close to mainland (although not exclusively on the once connected "land-bridge" island). Bear, fox, land otter, marten, sable, hare, and squirrel are found in abundance in the southern group as far north as Urup Island (Hacker 1951). Of the terrestrial mammals, only the fox is common throughout the archipelago and it was probably introduced in recent centuries (Hacker 1951:505–506). Marine mammals and birds are common throughout the islands. Sea otter, seal, northern fur seal, and sea lion frequent the shores and bays. Sea otters and fur seals were more abundant prior to intensive hunting in the nineteenth century (Snow 1910). Birds, especially ground-breeding varieties (puffin, auk, guillemot), are common in spring to fall with their greatest density on the small islands in the central group, which lack land mammals. Gulls and petrels are abundant throughout the chain and migratory waterfowl migrate through annually. Anadromous fish spawn in rivers on the islands in summer. Herring and bottom-feeding fish are found in the shallow shelf waters of the northern and southern island groups (Hacker 1951). Kuril vegetation is divided between a subarctic tundra cover from Urup Island north and a northern temperate forest cover south of Urup Island (Yamada 1999; Yamada and Tezuka 1992).

Kuril Cultural Chronology

Previous research in the Kurils has identified three general periods of prehistoric occupation: Jomon/Epi-Jomon, Okhotsk, and Ainu (Table 1). Each of these archaeological cultures is better represented on the islands of Hokkaido and Sakhalin, whence they are thought to have come (Baba 1940; Imamura 1996; Yamaura 1998). Kamchatka and the northern Sea of Okhotsk could also have contributed populations to the Kurils throughout prehistory (see Chard 1963; Dikova 1983; Lebedintsev 1990, 1998; Powers 1996), although no direct evidence of this has yet appeared. The available evidence suggests the following adaptive changes with implications for how humans may have utilized the relatively isolated islands of the Kuril chain at different times through the late Pleistocene and Holocene.

Paleolithic

A Paleolithic occupation of the Kurils, while not currently in evidence, is possible. To the south, Pa-

Table 1. Culture history relevant to human occupation in the Kurils.

Period designation	Dates (years B.P.)	Locations observed
20th Century (Japanese/Russian)	95–0	Kurils
Russian-American	300–100	Kurils/Kamchatka
Ainu/Kamchadal	700–55	Kurils/Hokkaido/Kamchatka
Okhotsk/Itelmen	1300–800	Hokkaido-Kurils/S. Kamchatka
Epi-Jomon/Ancient Koryak	2000–1300	Northern Hokkaido, Southern Kurils
Jomon/Neolithic	12,000–2000	Hokkaido– S. Kurils/Kamchatka
Upper Paleolithic	20,000–12,000/15,000–12,000	Hokkaido/Kamchatka

leolithic occupations have been found throughout Japan (around 5,000 sites: Imamura 1996:19). Several sites found in Hokkaido date from at least 20,000 B.P. (Kuzmin et al. 1998), and many of these are located in northern Hokkaido. At the last glacial maximum, Kunashir was an extension of northeast Hokkaido and could have been colonized by terrestrial hunter-gatherers (Dikov 1996). Similarly, to the north, a terminal Paleolithic occupation is known from central Kamchatka at Ushki Lakes dating perhaps as old as 14,300 ± 200 B.P.[1], Powers (1996)[2] has proposed that the earliest occupation at Ushki may have a historical relationship to similar industries in Japan and Alaska, suggesting the possibility of a Late Pleistocene route through the Kurils.

We can infer that small and highly mobile groups predominated in the Paleolithic of Far East Asia and Japan based on current evidence of small sites with small lithic assemblages. These groups could have moved into and out of the land-bridge islands of Kunashir and Shumshu as conditions mandated. Archaeological industries in adjacent areas are limited to the stone tool assemblages of hunter-gatherers: core and blade technology, bifacial points, scrapers, geometric microliths, etc. (Imamura 1996; Kikuchi 1999; Kimura 1999). Some evidence suggests at least occasional exploitation of fish and shellfish (H. Okada 1998; Dikov 1996).

Jomon/Neolithic

The Jomon period in Japan spans the terminal Pleistocene through mid-Holocene. Its inception is traced to the beginning of pottery production around 16,000 years ago (13,780 ± 170 B.P.; Junko Habu, personal communication 2002; Habu and Hall 1999) and continues until the arrival of rice agriculture in the first millennium B.C. (Imamura 1996). The oldest Jomon date in Hokkaido is 10,300 ± 160 B.P. (N2512, Hakodate-kukoh-Nakano B; Kuzmin et al. 1998: Table 5). In northeast Hokkaido, closest to the Kurils, the oldest date is 8940 ± 160 B.P. (GaK2208, Nitapporo, Layer Ta-d; Kuzmin et al. 1998:Table 5). Although significant changes occur throughout the extensive Jomon period, the Jomon appear to have lived in pit houses and were relatively sedentary compared to Paleolithic occupants (A. Okada 1998; H. Okada 1998; Yamaura and Ushiro 1999). In Hokkaido deer, fish, and shellfish were important resources, with marine mammal hunting (whale, seal, sea lion) appearing by about 6000–5000 B.P. Sea mammals became particularly important at coastal sites between about 5000–3000 B.P. (Niimi 1994: Yamaura 1998). A maritime focused "Epi-Jomon" people moved into the southern Kurils some time before 2000 B.P. (Kikuchi 1999; Yamaura and Ushiro 1999). On the mainland to the north of the Kurils, Mesolithic and Neolithic cultures of the northern Okhotsk Sea coast focused on terrestrial reindeer hunting and river fishing with a shift to a mixed continental/maritime economy (shellfish, marine fish, and eventually sea mammals) by at least 2000 B.P. (Lebedintsev 1990, 1998; Vasil'evskii 1969a, 1969b).

"Iron Age"

Around A.D. 400–500, an intensively marine-oriented Okhotsk culture developed on Sakhalin Island and in the Amur River basin. This culture expanded into northern Hokkaido and into the Kurils at about A.D. 600–700 (Yamaura and Ushiro 1999:43; but see Kikuchi, for a slightly later Okhotsk expansion). Okhotsk people built large pentagonal pit dwellings (15–20 m across), lived in large aggregated settlements (some with over 100 dwellings), constructed defensive fortifications, hunted sea mammals, fished, and raised pigs. Okhotsk people are known to have colonized the full length of the Kurils perhaps into southern Kamchatka (Otaishi 1994), where they may have secured reindeer products (antler, bone) from the southern Kamchatkan population known as Itelmen (Yamaura and Ushiro 1999:44). While Okhotsk people occupied the northern coast, in southern Hokkaido another cultural group known as the Satsumon emerged from Jomon antecedents. The Satsumon practiced millet and wheat agriculture and appear to have engaged in intensive trade with the expanding Japanese state to the south in Honshu. Satsumon culture appears to have absorbed Okhotsk culture in northeastern Hokkiado by about A.D. 1000 (Yamaura and Ushiro 1999:44). At about A.D. 1200, Satsumon sites disappeared from Hokkaido and were replaced by Ainu settlements (Yamaura and Ushiro 1999; A. Okada 1998).

The cultural and genetic relationship among the Okhotsk, Satsumon, and Ainu remains a matter of some speculation (see Fitzhugh 1999). The Kuril Islands may have played an important role in the dynamics of ethnic change played out in the period between A.D. 1000 and 1200. Some authors believe that Satsumon culture was the primary ancestral culture of the Ainu (e.g., Kikuchi 1999; Kono and Fitzhugh 1999:120), while others see a stronger link between the Okhotsk and Ainu (see Watanabe 1972; Yamaura and Ushiro 1999:45). To support the latter interpretation, the Okhotsk culture must have survived somewhere, more or less intact, even while being replaced or assimilated in Hokkaido. A relic population of Okhotsk hunter-gatherers could have survived in the remote Kurils. Interestingly, the archaeological evidence presented below provides some support for an Okhotsk refugium in the Kurils between A.D. 1000 and 1300. Nevertheless, very little has been written about the development or expansion of Ainu culture into the Kurils. Kikuchi (1999:50) suggests that the Ainu would have moved into the Kurils from Hokkaido some time in the fourteenth to fifteenth centuries A.D. The possibility of in situ cultural development in the Kurils is never addressed.

The Modern Age

Once in place, the Kuril Ainu lived throughout the island chain, occupying relatively large pit house villages on the larger islands in winter and expanding to temporary camps on smaller islands for foraging during the summer (Fitzhugh 1999:10). Ethnohistoric accounts suggest that the Kuril Ainu had developed a unique dialect and recognized themselves as divided into northern, central, and southern ethnic groups (Kono and Fitzhugh 1999:120; Tamura 1999:59). In general, they practiced maritime hunting, fishing, and gathering (Ölshleger 1999:211), while engaging in vigorous trade with neighbors to the north and south, including Hokkaido and Sakhalin Ainu, Japanese merchants, Kamchadals/Itelmen, and probably also Aleuts (Fitzhugh 1999:10; S. Sasaki 1999; Tezuka 1998). In the late nineteenth century, the Japanese state relocated the northern Kuril Ainu to Shikotan Island in the southern (Habomai) group. The remaining Kuril Ainu from the central and southern Kurils (as well as the Sakhalin Ainu) were relocated to Hokkaido following World War II (Fitzhugh 1999; Stephan 1974; Vysokov 1996).

Japanese historic documents indicate interaction with Ainu from the southern Kuril Islands prior to the rise of the Tokugawa Shogunate in A.D. 1603 (McClain 2002:66–67). Russians first explored the Kurils in the early eighteenth century during a 200-year colonial expansion (Slezkine 1994). In the nineteenth century, the Russian-American Company settled the Kurils with transplanted Alaskan and Siberian native sea otter hunters (Shubin 1994; Tezuka 1993).

First the Japanese military and later the Russian military occupied the Kurils throughout the twentieth century. World War II saw the most devastating occupation in the form of large numbers of military troops, installations, and land modifications, as well as battles. Three small Russian cities are currently situated on the southern and northern ends of the chain. With the exception of a few remaining military outposts, the remainder of the Kurils are now uninhabited.

The International Kuril Island Project: Goals and Procedures

Between 1994 and 2000, the International Kuril Island Project (IKIP) conducted a thorough and extensive biotic survey and inventory of the Kuril chain (see http:artedi.fish.washington.edu/okhotskia/index.htm). Biologists from Russia, Japan, and the United States collected and catalogued plants, insects, spiders, fresh and marine fishes, shellfish, small mammals, and other taxa where possible (e.g., Gage 1996; Pietsch et al. 2001; Prozorova 1996; Takahashi et al. 1997). This research sought to document the contemporary biodiversity of this remote biotic reserve before further development significantly alters the region's ecology. In 1996, the biologists encountered archaeological evidence of past human activity in the remote Kurils, and a preliminary archaeological survey component was added to the project in 1999 and 2000 to identify the potential for more extensive research. The following is a list of the goals of the project.

1. To identify the earliest human colonization of this maritime region
2. To assess the scale and periodicity of human occupation on islands of different geographical position, size, and environment as a function of island biogeography
3. To track the relationship between human paleo-economy and changing biodiversity in the Kuril Archipelago
4. To reconstruct late Quaternary paleoecology and climate change
5. To identify records of catastrophic events in the late Quaternary geological histories as they have facilitated, altered, and obscured archaeological deposits and as they have impacted prehistoric island ecology (human and non-human)
6. To investigate the question of Ainu ancestry and archaeological identity in the Kurils

In 1999, the IKIP biologists were joined by Tim Allen, a graduate student and archaeologist from the University of Washington, who gathered basic data on archaeological sites at several points throughout the archipelago. In 2000, a team of Russian, Japanese, and American archaeologists and geologists joined the IKIP biologists. During this season the archaeological research design was given priority and the archaeologists were able to investigate a number of locations of high archaeological potential. The field season was limited to three weeks, and the survey was constrained to brief visits (usually less than one day each) to 14 landing spots on 11 islands from Shumshu to Urup. Approximate landings and site locations in the 1999 and 2000 seasons are indicated on Figure 1. During both years, reconnaissance survey was based from a large research ship provided by the Russian Academy of Sciences Far East Branch (Vladivostok). In addition to transportation, the ship-based operation allowed the researchers to maintain a processing lab during the 2000 expedition and to complete most preliminary artifact documentation prior to the end of the field season. Following the 2000 expedition to the Kurils, the American archaeology team spent several days investigating previously discovered archaeological sites on southern Sakhalin Island, and testing five of these sites in order to compare technology, subsistence economy, and paleo-biogeography between Sakhalin and the Kurils, as described below.

Archaeological Findings of the International Kuril Island Project

The Northern Kurils

The northern islands stretch from Shumshu south to Shiashkotan, and, in the eighteenth century, were the gravitational center of the North Kuril Ainu ("Kushi"; Krasheninnikov 1972). These were the first of the Kuril Islands to be brought under Russian administrative control. The large northern islands of Paramushir and Shumshu support a limited mezzo-fauna such as brown bear, but the contact era Kuril Ainu, here as farther south, were primarily oriented towards the hunting of marine mammals, fish, and birds (Krasheninnikov 1972). Previous research by Osamu Baba in the 1930s established the presence of a prehistoric Okhotsk period occupation on Shumshu, as well as later Ainu settlements (Baba 1934, 1937, 1960). Our team tested sites on Shumshu, southern Paramushir, Onekotan, and Shiashkotan. Significant prehistoric populations are inferred from the archaeological deposits on Shumshu and Paramushir (Fig. 2).

Onekotan's Nemo Bay is notable for its enigmatic ringed structures that provided the initial impetus for an archaeological component on the IKIP team (Figs. 3 and 4). These structures are roughly

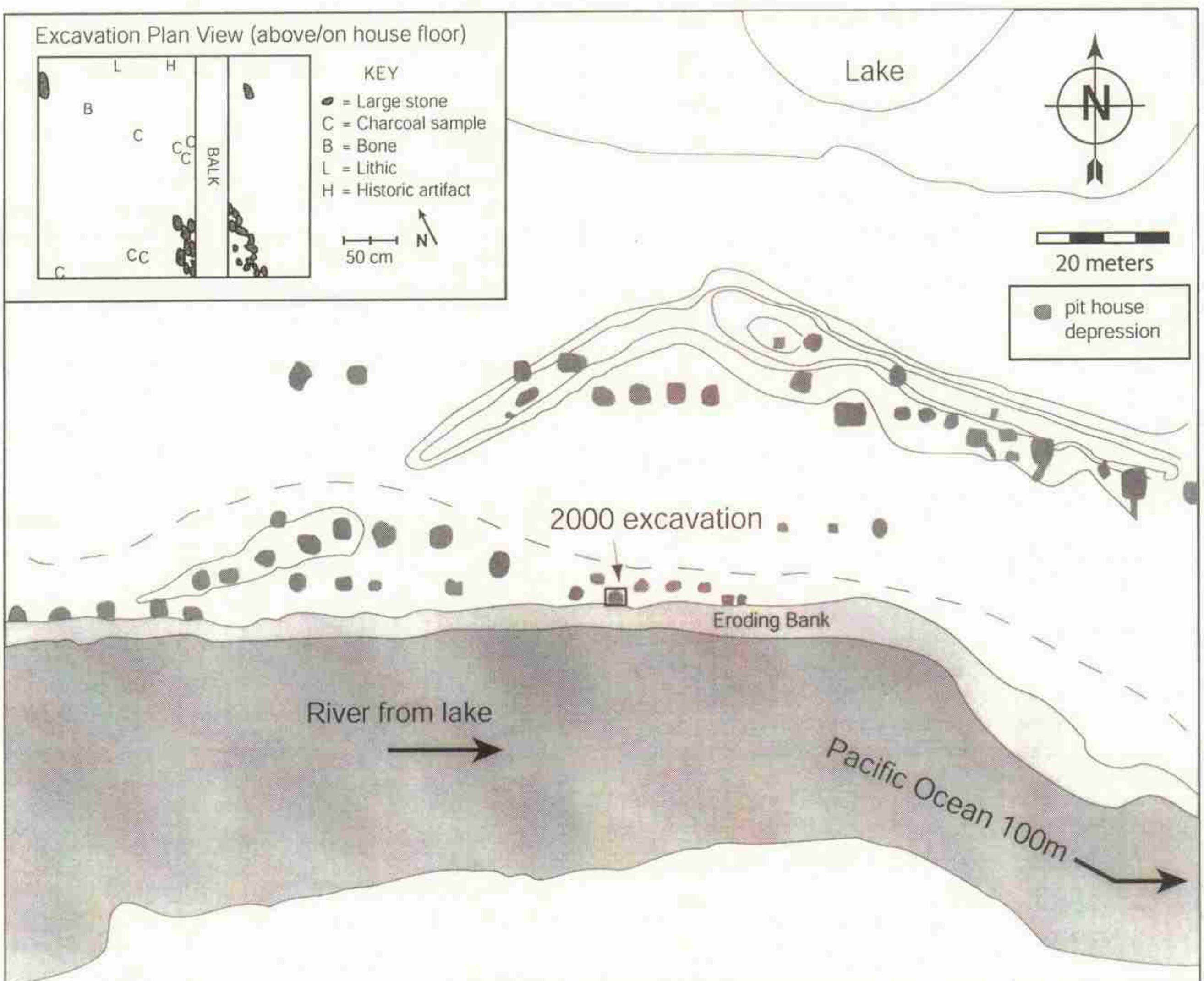

Figure 2. Surface map of cultural features at Zerkalnaya 1, southern Paramushir Island.

Figure 3. Circular structures at Nemo Bay, Onekotan Island (Photo by C. Mandryk).

15 m in diameter, with mounded sand walls about 50–100 cm high and ditches around the outside of the walls. These rings may have been Ainu structures (Tezuka 2001). Krasheninnikov (1972:61) reports that there was a "rather large" population of Ainu living on Onekotan in the eighteenth century, and Nemo Bay has one of the more accessible beaches for landings. On the other hand, the circular ring features may be World War II relics of covered (single or double) gun positions, open revetted gun emplacements, revetted conical tents, or battery commander positions (CINCPAC/CINCPOA 1945). Gun emplacements were not always covered, but they were always revetted with a barricade or barrier, commonly built of sand bags, to provide shelter, protection, and support (Howard 1997). Tent revetments improved warmth retention and wind resistance. On Shumshu (Shimushiru) Island, six conical tents were reported "on the western spit guarding the entrance to Buroton Wan," indicating that it was not unusual for tents to be positioned to guard a landing area (NorPac 1944:2). U.S. Military reports and maps from World War II indicate that there were gun emplacements in the area surrounding Nemo Bay and elsewhere around Onekotan Island in 1945 (NorPac 1945, n.d.1, n.d.2). IKIP archaeologists observed some of these around the rim of the Nemo Bay valley. Archaeological tests in and around the structures failed to produce artifacts, but historical debris (coal, glass, iron) was recovered in the stream cut-bank several meters away. Remains of a prehistoric industry, composed of a microcore and several flakes, was found at the mouth of the stream.

The Central Kurils

The central islands tend to be smaller and farther spaced from one another than the northern and southern islands. No significant land mammals are to be found here, with the exception of foxes introduced during the Russian occupation (Hacker 1951).

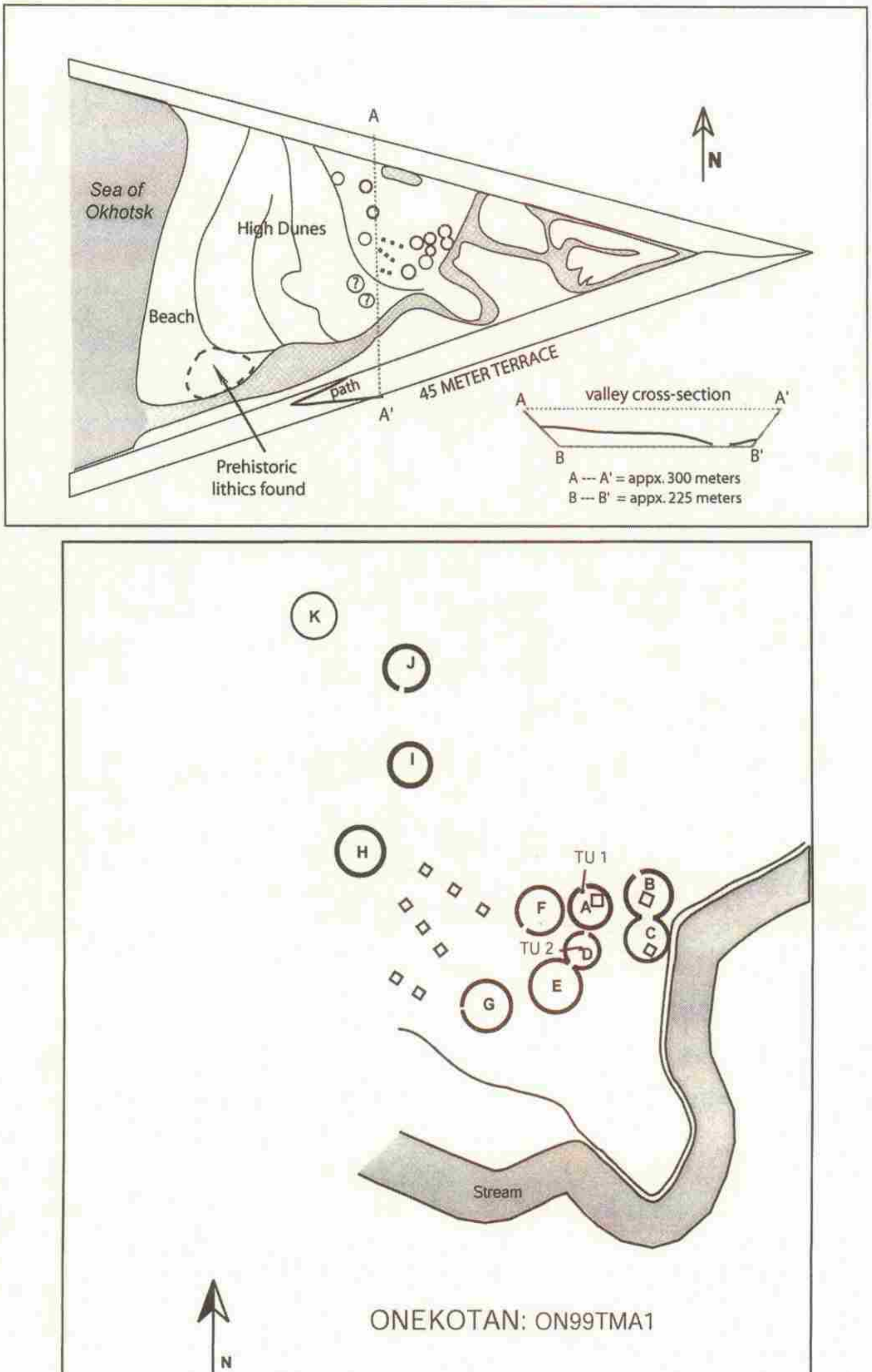

Figure 4. Surface map of Nemo Bay archaeological features. Note the presence of two categories of feature: mounded ringed structures and rectangular pits. Prehistoric lithic debris was found only in the stream outlet.

Successful occupation of this region from either direction would have necessitated developed maritime hunting, fishing, and gathering, and probably frequent travel and exchange with neighboring populations at either end of the chain. In protohistoric times, several of these islands were inhabited, and residents made their livelihoods through a combination of foraging and trade (Krasheninnikov 1972). Archaeological deposits on Matua Island and northern Simushir were mapped and tested. On Matua, two sites were identified in Ainu Bay. The first, Ainu Bay 1 dated to 1604 ± 36 B.P. (AA-40942). The second site, Ainu Bay 2, yielded a cord-marked fragment of pottery typologically affiliated with terminal Jomon to Epi-Jomon periods. This find is noteworthy because it represents the greatest northeast extension of Jomon or Epi-Jomon material culture yet identified. Prior to this expedition, no cord-marked ceramics had been reported in stratigraphic context north of Chirpoi Island. The charcoal date of 2345 ± 37 B.P. (AA-40943), from the stratigraphic layer that produced this sherd (Fig 5), confirms the terminal Jomon character of the piece. This is the oldest date yet returned for any Jomon deposit north of Iturup. The location of this deposit, 100 cm below a stratified tephra sequence including 10 discrete tephra lenses, is indicative of the logistical problems in recovering yet older traces of human occupation in these volcanic islands.

IKIP archaeologists tested two sites at Brotona Bay in northern Simushir. One was badly disturbed (Brotona Bay 1). The second site was in better condition with several house depressions and occupations surfaces exposed in a long eroding bank. The earliest dates of 1695 ± 36 B.P. (AA-40944) and 1732 ± 43 B.P. (AA-44264) correspond with an Epi-Jomon phase occupation. A later series of dates indicates renewed occupation between 1121 ± 38 B.P. (AA-44259) and 897 ± 38 B.P. (AA-44265), in the Okhotsk phase. According to Krasheninnikov (1972: 62), the relatively large central island of Simushir supported "quite a few inhabitants" in the mid eighteenth century.

The Southern Kurils

According to ethnohistoric accounts, the southern Kurils were occupied at contact by a people calling themselves "Kykh Kurils" (or "Kykh Kushi"; Krasheninnikov 1972) and otherwise known as the "Menashikuri Ainu" who also occupied eastern Hokkaido. This group was ethnically and linguistically distinct, despite core similarities, from the inhabitants of the northern and central Kurils (Kono and Fitzhugh 1999). At one time, this population was engaged in vigorous trade with its northern neighbors. Moving south into Urup and the more southerly islands of Iterup and Kunashir, one is faced with a dramatic change in vegetation from the herbaceous tundra of the north into increasingly forested and brush covered landscapes. A kind of low bamboo (*Sasa* sp) is encountered almost everywhere, making pedestrian survey and testing difficult. The subarctic character of the islands turns temperate in the southernmost islands, and ecological comparisons with the Aleutians fail south of Urup Island. The survey focused on the relatively more isolated islands of Chirpoi and Urup, the northernmost of the southern Kurils. Investigation at the Chirpoi site was more extensive than at the others, and is reported here in some detail, as it provides unique insights into Kuril occupation.

Peschanaya Bay 1, Chirpoi Island

The Peschanaya Bay site is located at the foot of a high hill on the eastern end of Chirpoi Island. A tombolo, 5 m in height and covered in vegetation, connects the hill (a remnant piece of an ancient caldera rim and formerly an island) to the Chirpoi mainland. The site is located on the tombolo, on an associated dune that is 10 m in height and vegetated, and on a 5 m high vegetated swale located between the dune and the hill. The western edge of the dune is actively eroding and reveals a series of cultural and natural strata at least 5 m deep. More than 40 pit house features are distributed across the site. The Peschanaya Bay site was first sketched and tested by Valery Shubin in the late 1970s, and visited in 1999 by Tim Allen, who collected several artifacts from the eroding bluff. In 2000, IKIP archaeologists created a technical plan of the site surface (Fig. 6), excavated a semi-subterranean house feature (House 31; Fig. 7), and profiled and sampled the bluff erosion face (called the "Camp Profile"; Fig. 8). Lithics and ceramics were surface collected from the debris slope at the base of the Camp Profile.

The House 31 excavation exposed a shallow pit house floor approximately 4 m in diameter. The cultural deposit was approximately 20 cm below modern ground surface and was covered by more than 10 cm of gray-blue volcanic ash. Evidence that the house was occupied during the colonial Russian period (1700s) was found in the form of a section of a rusted gun and fragments of the type of muscovite mica that was imported for windowpanes by the eighteenth century Russians. Nevertheless, the predominant artifacts recovered were stone tools and flakes, as well as large pieces of decomposed bone (probably sea mammal). A hearth deposit was found toward the northern side of the house. It included burned bone, charcoal, and burned earth/ash. A single radiocarbon date from the hearth feature establishes an occupation at 162 ± 40 B.P. (AA-40945) or sometime between A.D. 1655 and 1951, calibrated. The material evidence from the house itself indicates an early colonial (eighteenth or early nineteenth century) occupation.

The most intriguing discoveries of the House 31 excavation are two sets of paired sea lion crania

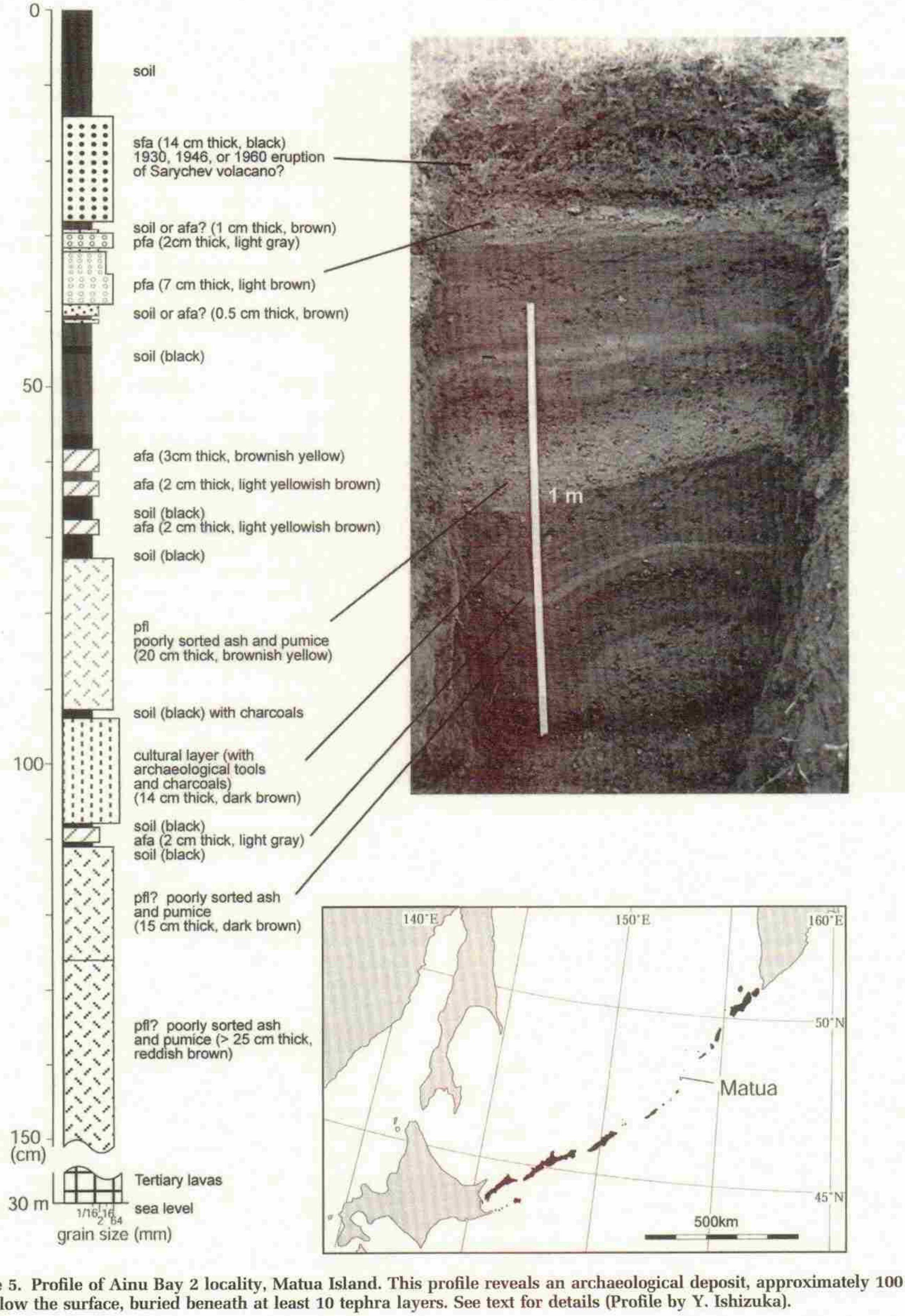

Figure 5. Profile of Ainu Bay 2 locality, Matua Island. This profile reveals an archaeological deposit, approximately 100 cm below the surface, buried beneath at least 10 tephra layers. See text for details (Profile by Y. Ishizuka).

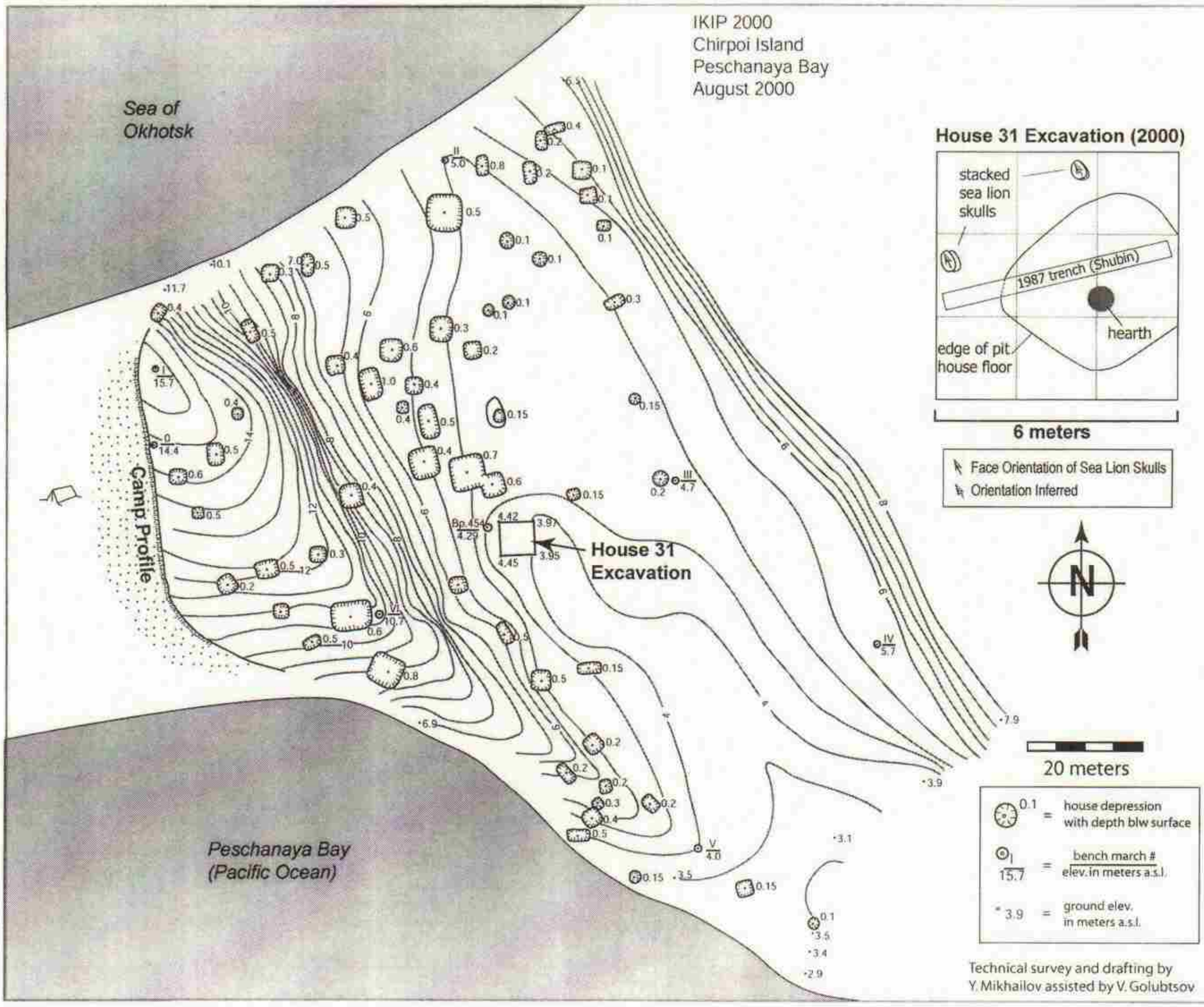

Figure 6. Technical surface map of Peschanaya 1, Chirpoi Island. This site contains over 40 intact cultural house features. House 31 was excavated by IKIP during our visit in 2000. The Camp Section is shown on the left side of the plan.

placed just outside the house walls at the northern and western corners (Fig. 9). Each set included two crania, one stacked on top of the other. The mandibles were missing in all cases and each skull had been broken open, as if for brain extraction. Both features originated on the base of the cultural level, a contact horizon that appears to coincide with the establishment of House 31. The pair of skulls on the west was much better preserved than the northern set, but the placement outside the house walls also suggests that the skulls were associated with the house. A radiocarbon date from a fragment of one of the western crania returned a date of 825 ± 36 B.P. (AA-40946). With reservoir correction, this date calibrates to approximately A.D. 1650 to 1950 and is consistent with the charcoal date from the hearth.[3]

These sea mammal features are evocative of ritual traditions that have been documented both archaeologically and ethnographically in the southern Okhotsk Sea region. Archaeological evidence from Hokkaido suggests that people of the Okhotsk phase sometimes ritually interred bear and sea mammal cranial remains in association with their houses (Yamaura and Ushiro 1999:44). Historically, the Ainu frequently included animals and animal remains in their rituals. The most famous Hokkaido and Sakhalin Ainu ritual is the bear ceremony, which culminated in a sacrifice of a bear raised in captivity to young adulthood. After the sacrifice, the bear remains were placed in a ritual area just outside of the house. This ceremony and similar "spirit sending" rituals for other animals were intended to secure future prosperity (Akino 1999), and we speculate that the House 31 sea lion skulls were deposited in a Kuril Ainu version of this tradition. Indeed, T. Sasaki (1999) has noted that the bear cer-

Figure 7. IKIP crews excavating House 31 at the Peschanaya 1 site, Chirpoi Island. Most excavators are working inside the house depression. The better-preserved set of sea lion skulls is being cleaned in the right foreground (Photo by B. Fitzhugh).

emony was not held by Kuril Ainu and instead, Kuril Ainu cosmology emphasized a strong spiritual connection with sea lions.

Mapping and sampling of the Camp Profile revealed a minimum of ten cultural layers, interspersed with layers of dune sands and tephras (Fig. 8). Based on the ceramic data, at least two cultural components can be recognized in this profile. The lower levels appear to represent Jomon or Epi-Jomon occupations. They contained cord-marked earthenware with appliqued ornamentation on the external rim. The lowest layer was dated to 2290 ± 43 B.P. (AA-42205). Above the Epi-Jomon layers, and 10 cm below the 3 cm thick yellow pumice lens (CHR2–5) 300 cm below the top of the profile, we discovered ceramics characteristic of the Okhotsk culture period.

All but one of the dates from the erosion profile cluster between 2500 and 1800 B.P. (764 B.C. to A.D. 321, calibrated), indicating repeated use of the site during the Epi-Jomon phase. A single Okhotsk phase date came from a pocket of midden located near the southern end of the dune cut, 13 m south of the profile face illustrated in Figure 8. The oldest date of 2435 ± 43 B.P. (AA-42208) is recorded as having come from the upper hearth and is out of sequence with the other dates from this profile.[4]

These data indicate that this site was consistently popular from the Epi-Jomon phase into the Russian colonial phase. This popularity is unexpected for such a small island with no permanent sources of fresh water. Krasheninnikov (1972:62) claims that the island was uninhabited in the early eighteenth century, but notes that Ainu visited it from both Simushir and Urup to hunt birds and collect roots. We assume that people could only live in this location between winter and late spring, when snow and snow melt would have supplied drinking water. The attraction to this particular spot may have been the proximity to sea mammal rookeries or a convenient link between the southern islands (Urup, Iturup, and Kunashir) and the central and northern islands.

Urup Island Investigations

On Urup Island, we tested and mapped three more site locations. Aleutka Bay on the Pacific coast has been the scene of excavations by the Sakhalin Re-

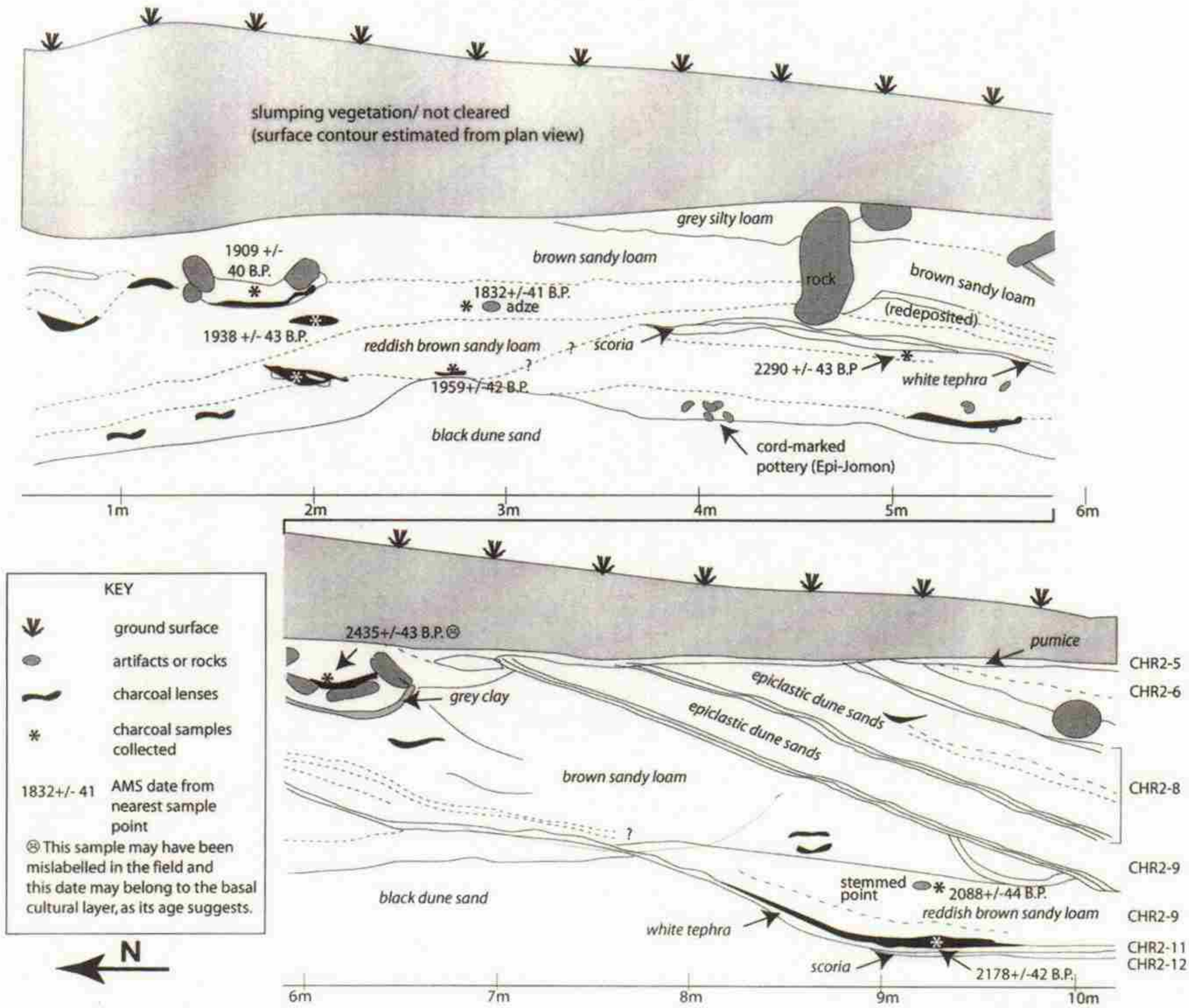

Figure 8. Profile of the Camp Section showing tephra lenses and charcoal-dense occupation layers with ceramics, lithics, and hearths separated by layers of dune sand.

gional Museum since 1978 (Shubin 1994). The site has been occupied throughout the prehistoric sequence at least from the Epi-Jomon period. Our investigations at this site in 2000 were limited to cleaning, mapping, and sampling the northern profile of Shubin's 1978 excavation in order to better date the Pre-Russian cultural sequence. We dated the stratigraphically lowest cultural deposit to 2255 ± 44 B.P. (AA-44266). The profile also contains the cross-section of a semi-subterranean house pit, which presumably post-dates the lowest deposit. Numerous fragments of chipped stone were recovered from the wall cleaning.

At the mouth of the Kama River on the southwest end of Urup, we mapped a large village site with numerous pit house depressions. Cleaned profiles revealed a cultural sequence spanning the last 2200 radiocarbon years. Ceramic and radiocarbon data confirm the presence of both Epi-Jomon and Okhotsk groups. Importantly, there is no evidence to suggest that this site was occupied any earlier than sites farther north, as we would expect if these results actually dated the initial expansion of population from the larger southern islands into the more isolated smaller central islands. The Kama River is known to support anadromous salmon runs in the historic period, and this may have been an attraction in prehistoric times as well. On the last day of field survey in the Kurils, a small site of two to three house pits was found on a narrow shelf or hanging valley 21 m above Chernoburka Bay on the eastern side of Urup Island at its southern end. No tests or maps were made at this location due to insufficient time on shore.

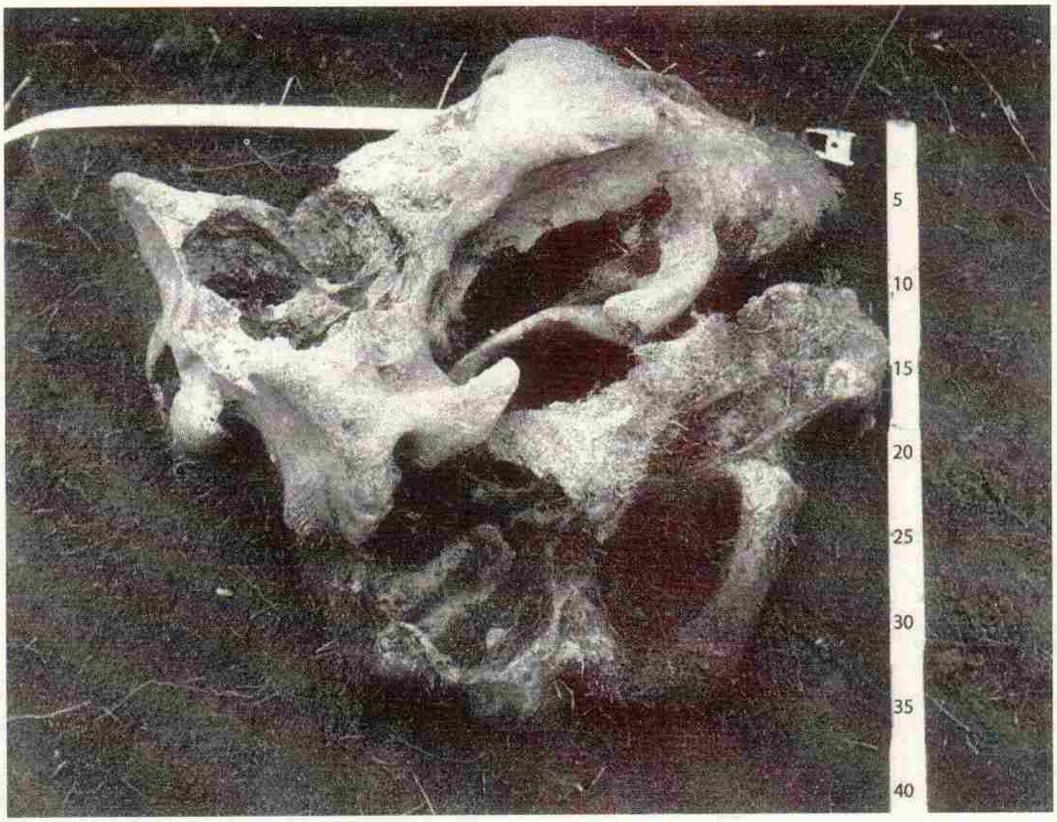

Figure 9. Superimposed sea lion (E. *Jubata*) crania found just outside the western corner of House 31. The tops of these skulls were crushed, presumably for access to brain tissue, and mandibles were missing. The top skull is 40 cm in maximum length (maxilla to foramen magnum). Two additional, less well-preserved stacked skulls were found just outside of the northern corner of House 31. Excavations did not extend to comparable locations beyond the east and south corners (Photo by B. Fitzhugh).

Synthetic Results

Chronology and Settlement

As described above, the IKIP 2000 survey documented 11 archaeological sites in the Kurils north of Iturup. The oldest deposits date from at least 2500 years ago. By comparison, evidence from the large southern island Iturup summarized by Zaitseva et al. (1993) indicates definitive occupation back to about 4800 cal B.P. (4220 ± 160 B.P. and younger), with one date between 7935–7634 cal B.P. (6980 ± 50 B.P.). New dates from the IKIP project are listed in Table 2.

Table 2. AMS radiocarbon dates from the International Kuril Island Project (IKIP 2000).

Island	Site	Recovery context	FS #	Lab #	^{14}C Age	Material[1]	Calibrated range at 2σ (int.)[2]
Shumshu	Baikova 1	Test pit 1, midden	67	AA-40941	975 ± 35	CH	A.D. 997 (1026) 1160
Paramushir	Zerkalnaya	Center of pit house test	29	AA-41556	99 ± 33	CH	A.D. 1677 (1711, 1717, 1886, 1911, 1950) 1954
		Center of pit house test	29	AA-44257	206 ± 35	CH	A.D. 1643 (1666, 1783, 1792) 1948
		Erosion profile, 36 cm b.s., just below lower sand lens	31	AA-40940	892 ± 35	CH	A.D. 1030 (1161) 1221
		erosion profile, above sands	19	AA-40939	935 ± 38	CH	A.D. 1019 (1041, 1094, 1118, 1141, 1153) 1211
Shaiskotan	Zakatnaya 1	Test Pit 1, fauna near surface	117	AA-44273	983 ± 34	MMBN	A.D. 1318 (1397) 1436
Matua	Ainu Bay 1	TP 2 cultural level	129	AA-40942	1604 ± 36	CH	A.D. 387 (429) 541
	Ainu Bay 2	Level 14 of Y. Ishizuka's geological column	113	AA-40943	2345 ± 37	CH	B.C. 481 (399) 379
	Ikeda Bay 1	Cliff profile, 45–46 cm b.s	141	AA-42201	66 ± 38	CH	A.D. 1684 (1952) 1955

Table 2. Continued

Island	Site	Recovery context	FS #	Lab #	^{14}C Age	Material[1]	Calibrated range at 2σ (int.)[2]
Simushir	Brotona Bay 2	Profile 2, between upper and lower layers	155	AA-44265	897 ± 38	CH	A.D. 1025 (1160) 1222
		Profile 2, upper charcoal layer	152	AA-44263	935 ± 42	CH	A.D. 1018 (1041, 1094, 1118, 1141, 1153) 1214
		Erosion face, sample #1	147	AA-44258	1003 ± 43	CH	A.D. 978 (1021) 1158
		Erosion face, sample #4	150	AA-44261	1011 ± 40	CH	A.D. 978 (1020) 1155
		Erosion face, sample #2	148	AA-44259	1121 ± 38	CH	A.D. 782 (899, 920, 957) 1000
		Erosion face, sample #3	149	AA-44260	1,164 ± 44	CH	A.D. 725 (889) 983
		Profile 2, lower charcoal layer	153	AA-40944	1695 ± 36	CH)	A.D. 245 (357, 368, 381) 426
		Profile 2, post mold	154	AA-44264	1732 ± 43	CH	A.D. 219 (261, 279, 294, 295, 324) 417
		Erosion face, sample #5	151	AA-44262	1818 ± 43	CH	A.D. 82 (224) 337
Chirpoi	Peschanaya	H31, Unit B2 (SE), hearth fill	215	AA-40945	162 ± 40	CH	A.D. 1655 (1678, 1742, 1749, 1758, 1804, 1936, 1946) 1951
		(outside) H-31, B3	217	AA-40946	825 ± 36	MMBN	A.D. 1441 (1483) 1535
		Camp Profile, south midden	263	AA-42203	1272 ± 58	CH	A.D. 656 (695, 696, 719, 746, 767) 891
		Camp Profile, near Adze	289	AA-42207	1832 ± 41	CH	A.D. 79 (180, 189, 214) 321
		Camp profile, hearth #1	295	AA-42211	1909 ± 40	CH	A.D. 4 (82) 222
		Camp Profile, hearth #2	282	AA-42204	1938 ± 43	CH	B.C. 40 (A.D. 70 A.D. 165
		Camp Profile, north hearth, 3-5 cm above black sand	284	AA-42206	1959 ± 42	CH	B.C. 44 (A.D. 32, 38, 53) A.D. 129
		Camp Profile, Stratum E, hearth	288	AA-40947	2080 ± 57	CH	B.C. 349 (91, 74, 61) A.D. 52
		Camp Profile, near debitage, stemmed point layer	293	AA-42210	2088 ± 44	CH	B.C. 343 (93) A.D. 17
		Camp Profile, fr. white tephra-43 meters from north end of profile	292	AA-42209	2178 ± 42	CH	B.C. 379 (337, 325, 202) 94
		Camp Profile, scoria layer, 61-63 cm b.s.	283	AA-42205	2290 ± 43	CH	B.C. 404 (387) 206
		Camp Profile, upper hearth	291	AA-42208	2435 ± 43	CH	B.C. 764 (516, 462, 451, 439, 429, 420, 414) 399
Urup	Kama 1	Profile 1, CZ 1 (post bomb age)	316	AA-41558	0	CH	post A.D. 1950
		Profile 1, CZ 2	313	AA-44269	916 ± 38	CH	A.D. 1022 (1066, 1083, 1124, 1137, 1157) 1217
		Profile 1, CZ 6	315	AA-40949	1016 ± 38	CH	A.D. 977 (1019) 1153
		Profile 1, burnt layer 1	312	AA-44268	1205 ± 38	CH	A.D. 691 (781, 791, 808) 956
		Profile 1, level 3A	314	AA-41557	1345 ± 40	CH	A.D. 640 (664) 771
		Profile 1, level 3B	311	AA-44267	1364 ± 37	CH	A.D. 619 (661) 760
		Profile 1, CZ 6	315	AA-44270	1621 ± 37	CH	A.D. 343 (425) 538
		Profile 2, CZ 3 floor 2 hearth	330	AA-41562	1731 ± 47	CH	A.D. 181 (261, 278, 295, 295, 324, 333, 335) 421
		Profile 2, highest lamina (sample 3)	328	AA-44271	1855 ± 38	CH	A.D. 72 (132) 244
		Profile 2, CZ 3 (sample 4)	329	AA-41561	1967 ± 48	CH	B.C. 85 (A.D. 29, 40, 51) A.D. 130
		Profile 1, CZ 5	317	AA-41559	2002 ± 34	CH	B.C. 88 (15, 15, A.D. 2) A.D. 75
		Profile 2, CZ 3 floor 3	331	AA-44272	2039 ± 39	CH	B.C. 167 (43, 6, 4) A.D. 54
		Profile 2, CZ 4 (sample 2)	327	AA-41560	2122 ± 43	CH	B.C. 352 (168) 3
		Profile 2, lowest lamina (sample #1)	326	AA-40950	2157 ± 37	CH	B.C. 358 (198, 187, 181) 61
	Aleutka Bay	1978 tranch- N Profile, lowest CZ, 14C#1	304	AA-44266	2255 ± 44	CH	B.C. 399 (375, 373, 364,268, 263) 185

[1] CH = wood charcoal; MMBN = marine mammal bone (calibrated with marine calibration curve—100% marine carbon (ΔR = 0, uncorrected, see Footnote #2)).
[2] Reference: Stuiver, Reimer, and Braziunas 1998; Stuiver et al., 1998.

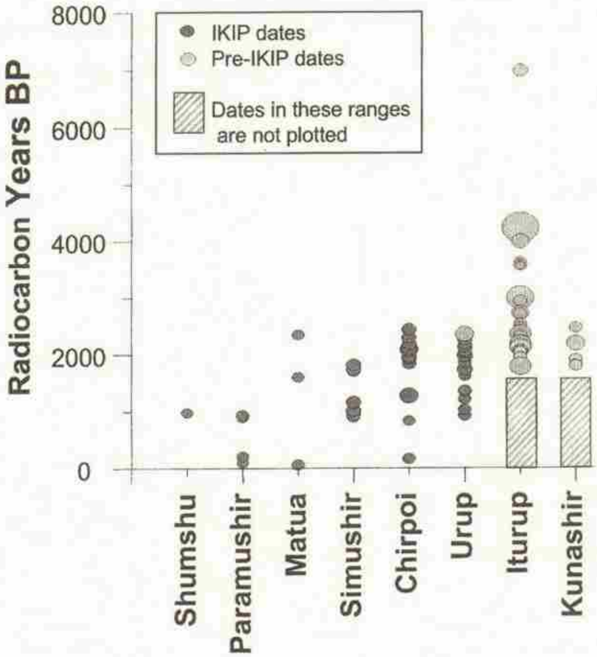

Figure 10. Conventional radiocarbon dates from the Kurils and Sakhalin showing new IKIP dates (dark grey) plus the earliest published dates (Neolithic) for the Kurils (published dates reported in Kuzmin et al. 1998).

All published Neolithic dates from the Kurils plus the new IKIP dates are presented by island in Figure 10. This figure shows an apparent disparity between the antiquity of human occupations from the southern and north/central regions. We assume that the smaller, more isolated, higher latitude (central and northern) islands would have been less attractive for sustained settlement in the Early and mid-Holocene, but we also have reason to believe that sites earlier than 2500 B.P. remain to be found there. The southern islands have been surveyed and excavated more intensively than the northern and central islands, and we suspect that the pattern currently observed is at least partly a result of the disparity in research history. It is also possible that the smaller islands of the central chain have been more heavily affected by Holocene geological events and processes (volcanic eruptions, pyroclastic and lava flows, deep ash deposits, and relative sea level fluctuation) that make locating older sites more difficult. For this reason, we are working with volcanologists and paleoseismologists to reconstruct the geological history of the chain as it relates to archaeological recovery and to gain a better understanding of the hazards of occupation in this remote region.

Table 2 reports 44 new radiocarbon dates recovered from six sites on the Kurils. The Kuril dates indicate more or less continuous occupation of the central and northern islands (or some members) from 2400 B.P. to about 800 B.P. and again in the past 100 years. Ethnohistoric evidence documents occupation during the intervening 700 years (A.D. 1200–1900), missed by the initial sample (Kreshenninnikov 1972). Nevertheless, it is possible that these islands were more sparsely occupied during this interval than in the preceding millennium, for which there is chronometric representation. Assuming these dates are representative of occupation intensity, they suggest regular occupation from 2400 to about 1200 B.P. (ca. 1 date per 60 years) during the Epi-Jomon period and intense occupation between 1200 and 800 B.P. (1 date per 30 years) during the Okhotsk period. Calibrated ranges for the new dates are presented by island in Figure 11.

Most of the sites in the sample contained evidence of multiple pit houses, possibly indicating settlements that supported several families. Most were located on larger islands with regular fresh water supply, but one of the largest (on the very small island of Chirpoi) has no running streams (only seasonal snow pack).

Ceramic Culture History

Discoveries of the International Kuril Island Project extend the range of early Epi-Jomon pottery (Shimodanosawa type) northeast in the Kurils to Matua Island. The extent of Kohoku type pottery, chronologically assigned to the latter half of Epi-Jomon period, so far appears to be restricted to Hokkaido and southern Kuril Islands. In all likelihood, this pattern will change with further Kuril research because radiocarbon dates from the central islands indicate more or less continuous occupation from early Epi-Jomon into the Okhotsk periods. Evidence that the northern islands (Shumshu to Shaishkotan) were occupied more than 1,000 years ago has yet to be found. This may support a predominantly southern origin for earlier occupations of the southern and central Kurils, in which case one would expect the appropriate dates from the central islands to correspond to later Epi-Jomon culture. With additional research, it will be possible to develop a dated chronology of ceramic traditions for comparison throughout the islands and into Hokkaido. If the islands were occupied by relatively isolated populations (as opposed to seasonal colonists from Hokkaido), one might expect the Kuril sequence to become desynchronized from the Hokkaido sequence due to delays of style transmission through the chain and perhaps some degree of stylistic divergence as the Kuril populations developed their own traditions.

Geology

The geological history of the Kurils is critical to an understanding of human prehistory, as it relates to the frequency, intensity, and specific histories of

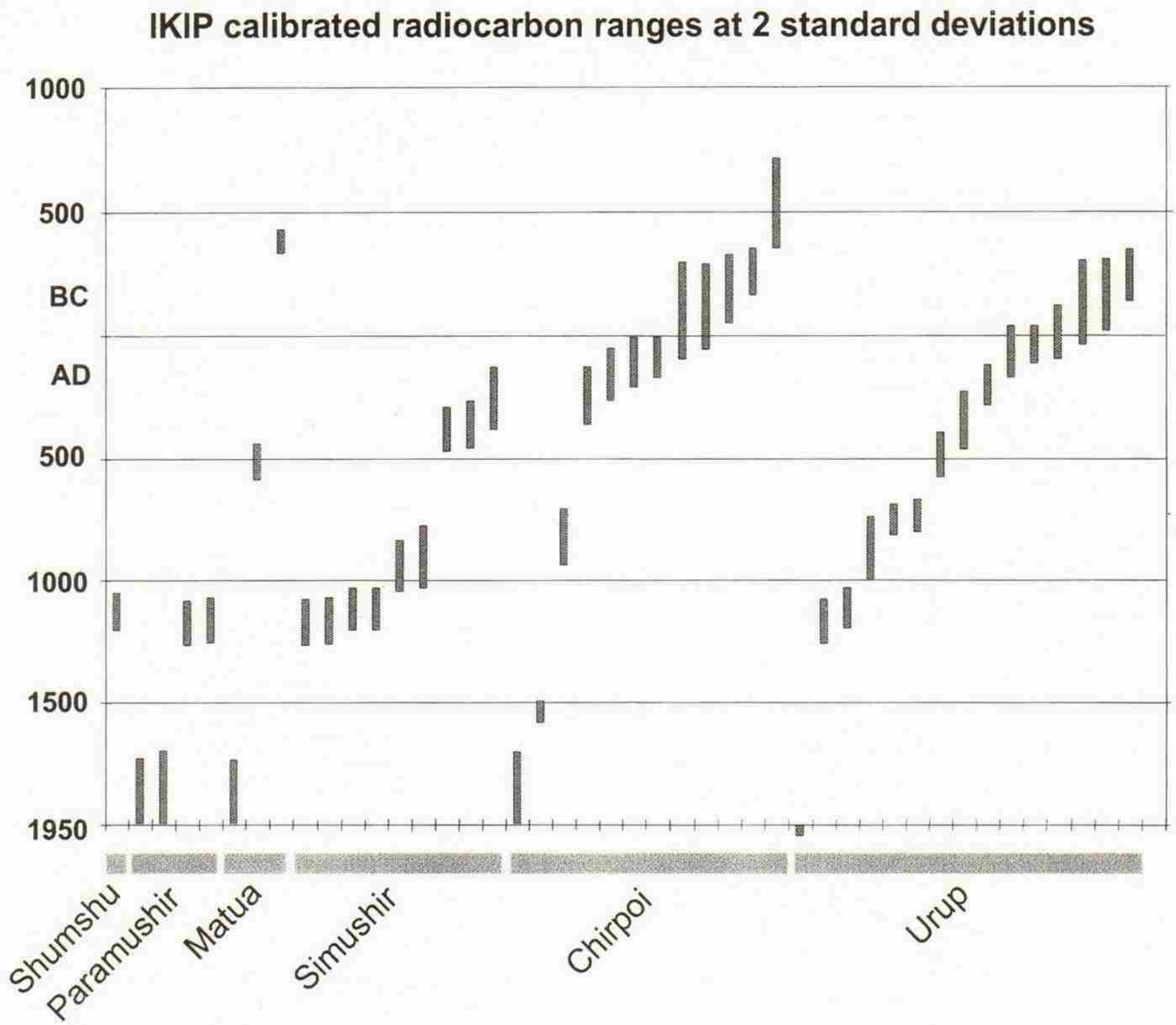

Figure 11. Calibrated AMS radiocarbon dates from the IKIP 2000 (2 sigma). Islands run north to south from left to right. See Table 2 for details.

catastrophic events and to the taphonomic history of archaeological sites. Future research is planned to include a larger team of volcanologists and paleoseismologists (studying tsunami and shoreline history). Based on the the 2000 expedition, several significant findings can be reported.

Tephras derived from large explosive eruptions are good key marker layers not only for constructing volcanic histories but also for estimating ages of archaeological deposits. While many key marker-tephras related to the large explosive eruptions have been thoroughly investigated in Japan and Kamchatka (e.g. Machida and Arai 1992; Braitseva et al. 1997), few tephras have been identified in the Kuril Islands that can be linked with the Japan and Kamchatka data.

Explosive eruptions of Volcanic Explosivity Index (VEI) over 3 (eruptive volume over 0.01 km^3), that are defined on the basis of their eruptive volumes (Simkin and Siebert, 1994), have been recorded on 30 volcanoes of the Kuril Islands during the Holocene. Very large explosive eruptions (VEI of 6) with a total volume of ejecta of 10 to 100 km^3 formed three calderas: Tao-Rusyr Caldera on Onekotan Island, Ushishir Caldera on Ushishir Island, and Lvinaya-Past Caldera on Iturup Island, which have been dated to radiocarbon ages of 9400 B.P., 9400 B.P., and 7500 B.P., respectively (Gorshkov 1970; Braitseva et al., 1995). Since the eighteenth century, ten large explosive eruptions of VEI over four have been recorded on composite volcanoes. These include the 1790 and 1981 eruptions of Alaid volcano, the 1853 and 1986 eruptions of Chikurachki volcano on Paramushir Island, the 1872 eruption on Shaishkotan Island, the 1778 and 1924 eruptions on Raikoke Island, the 1946 eruption on Matua Island, the 1712 eruption on Chirpoi Island, and the 1973 eruption of Tyatya volcano in Kunashir Island. These explosive eruptions could have generated tephra deposits across wide regions of the Kuril Islands.

Tephrochronological studies focus on soil-tephra sequences, representing a history of explosive volcanic eruptions. Tephras consist of all pyroclastic materials ejected from a volcano. Stratigraphically they can be separated by soil, eolian sandy loams, or peats. One sheet of tephra refers to the pyroclastic materials of one eruption without large-scale interruptions.

During IKIP 2000, soil-pyroclastic sequences were investigated at locations close to boat landings determined by the research needs of biologists and archaeologists. Cross sections roughly 2 m deep and 1 m wide were made at the coast or near coastal cliffs. The locations of the cross sections were chosen at the relative heights and planes to include terraces and bluffs at different elevations. Features of stratigraphic relationship, color, thickness, sorting, and maximum diameters of essential ejecta of each individual tephra were described at each section. The tephras were divided into two genetic types, pyroclastic flow deposits and pyroclastic fall deposits according to their sorting. The pyroclastic fall deposits were further subdivided into three types—ash, pumice, and scoria fall deposits—in terms of their grain size and color.

During IKIP 2000, at least 70 tephra layers were found on the 11 Kuril Islands visited. These tephras consist mainly of ash fall deposits with lesser pumice and scoria fall deposits and pyroclastic flow deposits. On Shumshu Island, three tephra layers of ash fall deposits may be compared with the tephras derived from volcanoes of southern Kamchatka that erupted between 8,000 and 1,000 years ago. Several tephra deposits were identified in archaeological strata on Matua and Chirpoi islands. The ages of these layers can be estimated by using the radiocarbon dates of the charcoals and relative age of the earthenware. For example, four tephras found in the Camp Profile section of the Peschanaya Bay site on Chirpoi Island (Fig. 8) can now be dated to approximately 2290 B.P. (tephra sample CHR 2–12), 2178 B.P. (CHR2–11), between 1832 and 1272 B.P. (CHR2–8; CHR2–9), and soon after 1272 B.P. (CHR 2–5). Research is ongoing to characterize unique tephras found on each island based on their grain sizes, colors, mineral assemblages, and glass types as well as the chemical compositions of glass shards.

Sedimentological study of tephra sequences from Shumshu to Urup suggest that these islands have been subjected to both local eruptions and the fall-out of eruptions from as far away as Kamchatka, Hokkaido, and possibly even Korea (Ishizuka, Fitzhugh, and Nakagawa 2001). Archaeological sites younger than 2,500 years can be buried beneath 10 or more discrete tephra layers (Fig. 5). Historical records and geological studies have dated many significant eruptions throughout the Kurils, but many eruptions are also certainly unknown. If archaeological research is to confirm human occupation of the northern and central islands prior to 2500 B.P. and of the southern islands prior to 4500 B.P., it is imperative that researchers refine the understanding of local volcanic and tectonic events, their effects on landscape sedimentation and catastrophic erosion, and their impacts on relative sea level histories.

In the Aleutian Islands, pyroclastic flow and tephra deposits cap archaeological deposits at a number of sites suggesting catastrophic destruction or rapid abandonment of local populations. While many Aleutian and Kuril eruptions would have been minimally disruptive (Dumond 1979; Workman 1979), e.g., at the Peschanaya Bay site in the Kurils the epi-Jomon occupation resumes within 100 years or less after deposition of scoria and ash deposits, others were probably fatal. In some cases, sites, islands, or even island groups could have been abandoned following major eruptions. The biogeographical and cultural consequences could have been quite significant. The Hog Island sites in Unalaska Bay, dating to just before 8000 B.P. are buried directly beneath a pyroclastic flow deposit of the same age from the Makushin volcano, directly to the west (Dumond and Knecht 2001:27). Sites in the vicinity of Umnak have several thick tephra deposits below and above archaeological deposits. The well-known Anangula Blade site may have been abandoned as a consequence of the Ash III deposition roughly 8000 B.P. (McCartney and Turner 1966; McCartney and Veltre 1996:446). The lack of archaeological components between 8000 and 6000 B.P. in the eastern Aleutians may relate to local extinction and slow recolonization (presumably from the mainland) despite evidence of continuity in technological features. In the more remote Andreanov Islands of the central Aleutians, the Korovinski site on Atka Island appears to have been abandoned approximately 560 B.P. at the time of a major tephra fall. It was not reoccupied for 400 years (Veltre 2001). Similar evidence is likely to emerge at other locations as more excavation data are reported.

As already noted, in the Kurils we identified several tephra deposits in archaeological strata.

Those of pyroclastic origin represent catastrophic events that could easily have terminated occupations that they superimpose. While devastating to any occupants in the direct path of pyroclastic flows wherever they occur, such events would have their greatest effect on subsequent culture history in more remote, smaller, and more distantly spaced islands.

Other geological processes are of great interest. Tectonic activity and tsunamis could have had local to regional effects on human settlers, directly or indirectly through modification of nearshore ecology. Tsunamis often redeposit coastal sediment inland. At the Zerkalnaya site on southern Paramushir, we observed two sand lenses, interpreted as tsunami deposits, bracketed by cultural bands rich in charcoal. Historical records indicate major tsunamis hit this part of the archipelago in A.D. 1737, A.D. 1742, and A.D. 1952 (Krasheninnikov 1972:60; Zayakin and Luchinina 1987). Radiocarbon dates of 935 ± 38 B.P. (AA-40939) and 893 ± 35 B.P. (AA-40940), from the cultural layers suggest that the lower sand, at least, was deposited much earlier (sometime around cal A.D. 1150). More research is needed to determine if this event had a significant impact on the occupation history of the northern Kurils.

The rate and direction of relative sea level change would also have important implications for local near-shore ecosystems and for site preservation and recovery. While global eustatic sea levels changed relatively little after about 6000 B.P. (Bard et al. 1996; Fairbanks 1989), subsequent tectonic and volcanogenic factors likely led to local coastal emergence or submergence and resulting changes in relative sea level. Ancient marine terraces are known throughout the Kurils suggesting mid to late Holocene emergence of these coasts (Gorshkov 1970; Joanne Bourgeois, personal communication 2000). Not only does amount of uplift or subsidence vary between islands, individual islands experienced differential uplift in response to tectonic events. On Onekotan, the southern bluff of the Nemo Bay valley is 5 m higher than the northern bluff, indicating the presence of faulting that would have affected relative sea levels. We have little data on the antiquity of this activity, except that it must not post-date the mid Holocene.[6] The sand formation that makes up the Vasil'yeva Peninsula on southern Paramushir must be a relatively recent deposit, postdating sea level stabilization and the presumed high stand of approximately 6000–5000 B.P. (Imamura 1996:67–73). Shifting sands, exposure to storm wash, and stream shifts are expected to have affected the placement and preservation of archaeological deposits here. Indeed, most of the Kuril archaeological sites investigated are set in more or less stabilized dune features. A goal of future geomorphological and geoarchaeological research is establishing the processes responsible for creating these features and their antiquity.

Discussion and Conclusions

The research reported here contributes significantly to an improved understanding of Kuril prehistory that we hope is only a beginning of international efforts towards a systematic and interdisciplinary approach to the region. For the first time, we have a comprehensive chronology of occupation for cultural deposits throughout the Kurils (not just at the southern end). We now know that people established significant settlements even in the small and isolated central islands, sometimes even on islands lacking permanent sources of fresh water (Chirpoi). We are able to argue that Epi-Jomon hunter-gatherers colonized at least as far north as Matua Island, at least as early as 500 B.C., though we also suspect that earlier occupations remain to be found once geological dynamics are better understood.

Following the Epi-Jomon, and perhaps after a short hiatus between A.D. 500 and 750 (see Fig. 11), Okhotsk populations expanded throughout the chain establishing more numerous and larger settlements. Radiocarbon date frequencies and site sizes in the Kurils, as well as evidence from Sakhalin and Hokkaido, suggest that the Okhotsk people maintained substantial population densities for 400 or more years. Significantly, the calibrated dates from the Kurils (Fig. 11) show that the north and central islands were most heavily occupied during the centuries of transition from Okhotsk/Satsumon to Ainu in Hokkaido (A.D. 1000–1250). This fits into the "curious gap" often noted in the Hokkaido sequence (Fitzhugh 1999:18). It is reasonable to see the Kurils as having contributed directly to Ainu ethnogenesis, given hints of continuity between Okhotsk and Ainu spirit-sending ceremonies (Yamaura and Ushiro 1999) and the persistence of pit house dwellings among Kuril and Sakhalin Ainu (but not Hokkaido; Hitchcock 1891). Kuril insularity is probably the main reason for Okhotsk persistence there.

Occupation in the last 800 years or so appears to have been sparse in comparison with what came before, although we know from historic documentation that populations of Ainu were resident on most of the larger islands into the nineteenth century (Krasheninnikov 1972). Climate change caused by the onset of the Little Ice Age may have played a role in the decline in populations and the relative abandonment of the Kurils during the Ainu phase, expressed in our chronological data after A.D. 1250. The ethnohistoric evidence may reflect relatively recent expansion of Ainu populations through the chain, driven in large measure by the increased demand on trade products from the north, and especially with the arrival of Russian trade goods in the early eighteenth century (Fitzhugh 1999:10; S. Sasaki 1999). However they lived, the Kuril Ainu maintained and adapted their cultural identity, even practicing what appear to be animal-based rituals with sea lion skulls.

In considering the relevance of the Kuril Islands to larger issues of North Pacific prehistory, it is instructive to compare the IKIP findings with those emerging from various efforts in the Aleutian Islands. Archaeological research in the Aleutians goes back more than 100 years, like the Kurils, but has recently witnessed a higher intensity of research, including extension into the more remote islands. It is becoming possible to synthesize comprehensive survey and excavation data from the Fox Islands in the east to the Near Islands in the west (Corbett, Lefèvre, and Siegel-Causey 1997; Corbett, Lefèvre, and Corbett 1997; Corbett, West, and Lefèvre 2001; Dumond 2001; Dumond and Bland 1995; Knecht and Davis 2001; Lefèvre et al. 1997, Lefèvre, West, and Corbett 2001; West et al. 1999; Veltre 1998). The first feature of similarity in the records between the Kurils and Aleutians is the predominance of a single point of entry for colonization. In the Kurils, several lines of evidence (reported here and in a companion publication currently being written) suggest most cultural features and probably most populations originated to the south and west of the chain. In the Aleutians, all evidence so far points to an eastern entry by way of the Fox Islands, despite the proximity of the Near and Komodorsky Islands to Kamchatka.

A second similarity is in the earliest evidence of occupation. For the Kurils, the southern islands appear to have been colonized by 7000 B.P., with a subsequent gap in data until about 4300 B.P., after which, we can infer fairly regular occupation. In the eastern Aleutians, Anangula and the Hog Island sites were occupied before 8000 B.P., after which we see no direct evidence of occupation until 6000 B.P. Moving to the north (in the Kurils) and west (in the Aleutians), the earliest dated archaeological deposits are considerably later. In the Kurils 2500 B.P. is the earliest occupation date north of Iturup (although we expect older sites exist). In the Aleutians, the oldest cultural dates grow progressively younger, from 8000 B.P. in the Fox Islands, to 5000 B.P. in the Alexander Islands, to 3500 B.P. in the Rat Islands, and ultimately 2200 B.P. in the Near Islands (Dumond 2001:301–302). The orderly progression of dates moving west along the Aleutian chain suggests that we are looking at a pattern of population expansion into the more remote islands over time. In contrast, the pattern for the northern and central Kurils, with parallel oldest dates on Urup, Chirpoi, and Matua, suggests that we do not yet have a good record of colonial expansion (or one much more rapid than the Aleutians). Archaeological sites on the eastern coast of Kamchatka are also surprisingly recent, and we consider it possible that the relatively young base dates in the northern Kurils, the Kamchatka coast, and the western Aleutians relate to a regional geophysical event that has reduced the visibility of sites earlier than 2000–2500 B.P.

The IKIP 1999 and 2000 expedition results help to chart a more direct course towards answering questions concerning the timing, nature, and direction of colonization of the Kurils. Future research is geared to address questions concerning evolution of maritime adaptations, processes of island colonization by hunting and gathering peoples, human-environmental dynamics on relatively small isolated islands, the role of catastrophic change (volcanoes, earthquakes, tsunamis, shoreline dynamics, climate fluctuations) on insular human settlement history, and perhaps even the maritime hypothesis for the "peopling" of the Americas (see Mandryk et al. 2001; Powers 1996).

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End Notes

1. Recent redating of several hearths at the lowest levels of the site suggests the 14,300 ± 200 B.P. date may be 3000 years too old (Goebel, Waters, and Dikova 2002).

2. All B.P. dates reported in this article are cited in uncalibrated radiocarbon years unless otherwise

noted. Calendar year ages are reported as years B.C. and A.D.

3. Significant changes in reservoir offsets are recorded from the southern Kurils south into Hokkaido, making it difficult to assess either accuracy or precision for dates from migratory sea mammals (see also Dumond and Griffin 2002 for discussion of this problem in the eastern Bering Sea). If we assume that the charcoal from the House 31 hearth and the sea lion bone are in fact of the same age (i.e. true radiocarbon age of 162 ± 40 B.P), using INTCAL98 (Stuiver et al. 1998), we can extrapolate (backwards from the normal procedure) to an expected ΔR value (offset from the global marine calibration curve, Stuiver, Reimer, and Braziunas 1998) that would correct the marine sample date to the terrestrial sample value and then compare this with known reservoir offset values for the Kurils (based on dated marine shells of known age, including those paired with terrestrial samples). By this method, the ΔR values for this marine sample that match the terrestrial date should be approximately 375, 275, or 215 years (Stuiver and Braziunas 1993: Fig. 15A). Given larger estimated ΔR values of 400–600 years for the Kurils (representing reservoir 14C age offsets [R] 700–1000 years older than true ages: Yoneda et al. 2000; also Kuzmin, Burr, and Jull 2001; J. Southon, personal communication 2002), three alternative interpretations are suggested. First, the estimates so far produced may be insufficient to capture the range of ΔR variation in the Kurils. Perhaps the ΔR range should be closer to 200–600 years. Second, the sea mammal under analysis may have spent a significant part of its life in locations where R is lower (such as around Hokkaido: Yoneda et al. 2000). And third, the sea lion bone might be younger than the hearth in House 31. The first alternative is possible as relatively little study has been made of the reservoir effect variation in the Kuril region. On the other hand, the data that are available suggest a fairly consistent pattern of increasing reservoir offset as one moves north from Hokkaido, where waters from the shallow and well mixed Sea of Japan dominate, to Kamchatka and into the Aleutians (Southon, personal communication 2002; Yoneda et al. 2000), where upwelling systems and ancient deep sea carbons are more prevalent. The third option seems unlikely given that the hearth date is already truncated by the younger limit of radiocarbon dating (i.e. 1950 A.D.) and the historic record that suggests depopulation of the central islands by the mid to late nineteenth century. We conclude that the second alternative is most reasonable and that this bone was deposited contemporaneously to the House 31 hearth. In this case, the sea lion must have been migratory, living part of the year around Hokkaido or elsewhere with lower reservoir correction values. The less-than-novel methodological point drawn from this analysis is that marine mammal bones are exceedingly unreliable as independent chronometers. This method of extrapolation is merely suggestive and would be unhelpful for much older/unbounded samples.

4. It is possible that this out-of-sequence sample received the incorrect provenience label in the field. Carol Mandryk, who prepared the profile and collected the samples, believes that this sample actually comes from the base of the cultural sequence, as the date suggests. Clearing up this uncertainty will have to await the future collection of additional samples from the base of this profile.

5. The lowest set of notches indicating marine transgressive events are found at the same elevation on both sides of the valley. This suggests no faulting in the last 5,000 or so years.

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