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Determination of the source for prehistoric obsidian artifacts from the lower reaches of Kolyma River, Northeastern Siberia, Russia, and its wider implications

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ABSTRACT

Geochemical analysis of 102 obsidian artifacts from the lower reaches of the Kolyma River was performed to understand the provenance of the raw material; previously, there were no such studies in this region. Sites under investigation belong to the Arctic Neolithic, generally dated to ca. 6000–1500 BP. Based on the data for potential obsidian sources in Northeastern Siberia and neighboring territories, available to us, it was found that all obsidian artifacts originated from the Lake Krasnoe source in Chukotka, with a straight-line distance of ca. 800–1100 km from archaeological sites of the Kolyma River. This is a remarkable example of long-distance exchange/transport of obsidian in Northeastern Siberia during the Stone Age. The Lake Krasnoe locale was the primary obsidian source for prehistoric populations in this vast region, including Chukotka, the Kolyma River basin, and Okhotsk Sea coast; this obsidian was also identified at some Alaskan sites near the Bering Strait.

1. Introduction

Obsidian provenance studies have been carried out since the early 1960s (e.g., Cann and Renfrew, 1964), and have provided invaluable information on human contacts, migrations, and exchange/trade of raw materials worldwide (e.g., Williams-Thorpe, 1995; Shackley, 2005; Kuzmin, 2017). In eastern Russia, this kind of research has been conducted since the early 1990s (see review: Kuzmin, 2014). The work was initially concentrated in the southern part of the region, the Russian Far East (e.g., Kuzmin, 2012, 2017; Kuzmin and Glascock, 2014). Only in the 2000s, research began in the northern areas such as the Kamchatka Peninsula and Northeastern Siberia (Grebennikov and Kuzmin, 2017; Grebennikov et al., 2017).

Some issues related to the early human settlement of Northeastern Siberia as a source region for the peopling of the Americas and later migrations across the Bering Strait have not been solved due to ambiguities in terms of the association between the typology of lithic artifacts and pottery types on one hand, and ancient populations on the other hand (e.g., Alekseyev and Dyakonov, 2009; Kuzmin, 2013; Pitul'ko and Pavlova, 2016). Therefore, it is necessary to find independent evidence of prehistoric human contacts in the region, and the provenancing of obsidian seems to be the perfect choice for this kind of task.

Obsidian artifacts are widely distributed in Northeastern Siberia, mainly in the Chukotka region (Dikov, 1997, 2003; Kiryak, 2010),

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and in much smaller quantities in the Kolyma River basin and the Sea of Okhotsk coast (Orekhov, 2015; Yoshitani et al., 2013). Insufficient geological and geochemical data on the primary obsidian sources in Northeastern Siberia and Kamchatka Peninsula (e.g., Nasedkin, 1983; Cook, 1995) has hampered the reliable provenance determination of obsidian artifacts for decades, and only recently we were able to obtain this information (Kuzmin et al., 2008; Grebennikov et al., 2010, 2014, 2017; Popov et al., 2017). Using the data generated, it is now possible to find out the primary sources of obsidian artifacts in these regions.

The objective of this paper is to establish the primary (i.e., 'geological') source of the obsidian used for the manufacture of artifacts found in the lower course of the Kolyma River in the easternmost Yakutia (Fig. 1), in order to understand better the patterns of prehistoric human migrations and exchange/trade of valuable raw material in Northeastern Siberia and adjacent regions of the Russian Far East and North America (Alaska). Previously, the provenancing of archaeological obsidian in Northeastern Siberia was not conducted according to modern methodological standards (e.g., Glascock et al., 1998). The working hypothesis was that the Lake Krasnoe source in the Chukotka region is the most probable primary obsidian locality, from where people who occupied the lower part of the Kolyma River basin acquired the valuable and rare raw material for tool-making. In order to test this hypothesis, we generated geochemical data for 102 obsidian artifacts from the Kolyma River basin, and compared it to the geochemical signatures of major obsidian sources in Northeast Asia established by our team over the last 25 years (see Grebennikov et al., 2010, 2017; Kuzmin, 2014, 2017; Kuzmin and Glascock, 2014; Kuzmin et al., 2008; Popov et al., 2017).

2. Material and methods

In the lower part of the Kolyma River, there are several sites with obsidian artifacts which were selected for analysis: the Pomazkino, Kigilyakh, and Kamenka clusters; and Labuya 3 and Stadukhino (Fig. 1). Initial survey in this area was conducted in 1946 by Okladnikov (1947) who found obsidian bladelets near the town of Srednekolymsk, at the mouth of the Labuya [Lobuya] River; and downstream from Srednekolymsk, near Pomazkino Village. In the 1990s and 2000s, the 300 km stretch of Kolyma River around the Srednekolymsk was systematically surveyed and excavated under the leadership of Kashin (2013; see also Kashin and Kalinina, 1997). Throughout eight fieldwork campaigns, 37 archaeological sites were discovered (belong mainly to the Neolithic), and 15 sites with obsidian artifacts were excavated (Kashin, 2013); they constitute the factual basis of this study (see Tables 1 and 2; Fig. 1). Obsidian was also found at other sites in this region: Konzaboi, Starye Petushki, and Rodinka (Fedoseeva, 1980; Kistenev, 1980); we were, however, not able to acquire samples from these sites.

The sites under investigation belong to the Arctic Neolithic, and pottery is the main criterion to associate them with this period

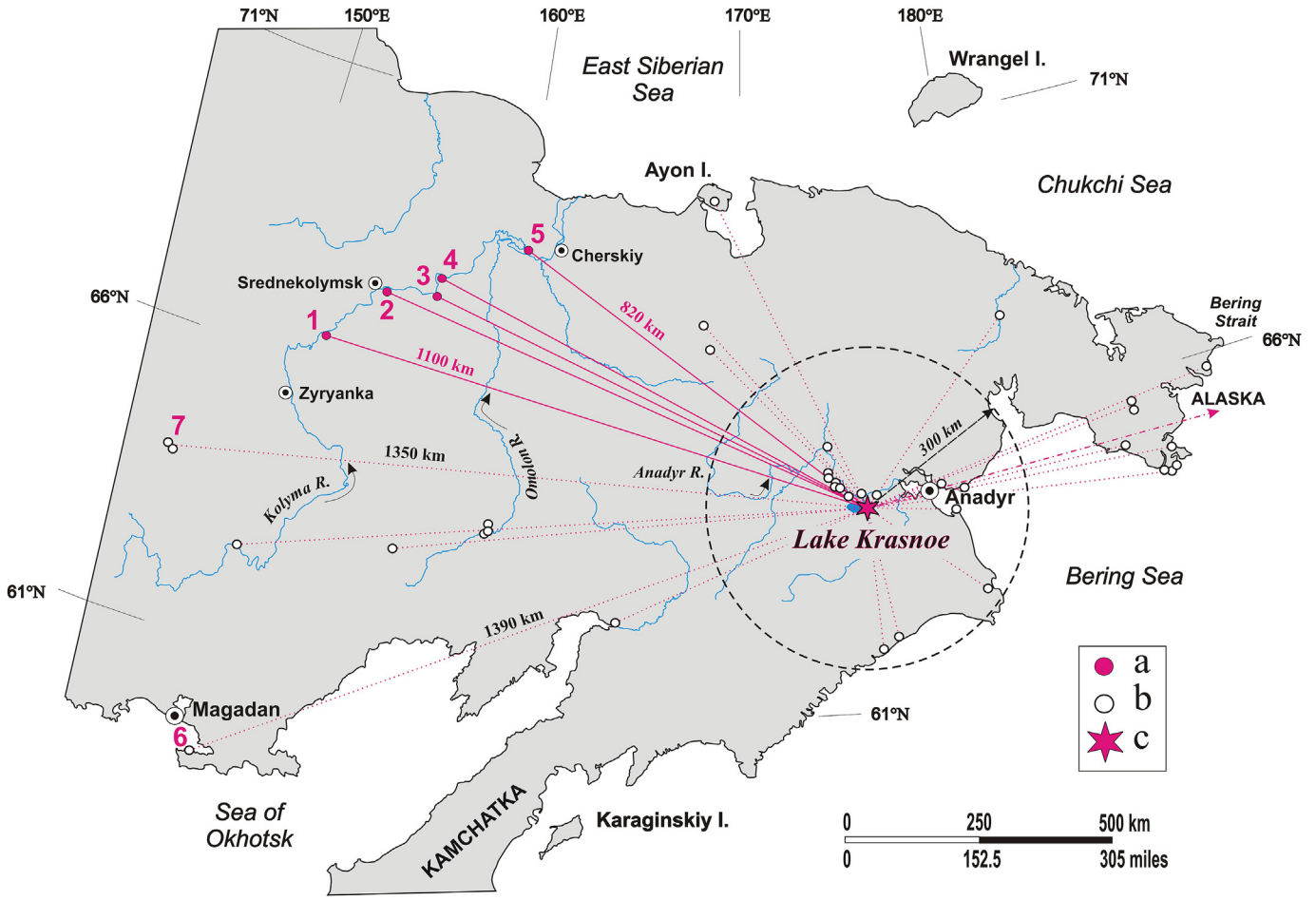

Fig. 1. Location of archaeological sites and other objects in Northeastern Siberia under study (after Grebennikov et al., 2017; Orekhov, 2015; Yoshitani et al., 2013; modified). Sites: a – from the current study; b – from previous studies (see text); c – obsidian source. Site numbers: 1 – Kamenka cluster; 2 – Labuya 3; 3 – Kigilyakh cluster; 4 – Pomazkino cluster; 5 – Stadukhino; 6–Cape Plosky; 7–Ui and Pridorozhnaya.

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