



Prehistoric Transport of Obsidian



Photo by Jess Peterson

Archeologist Chris Houlette records information about a prehistoric site near Kurupa Lake, Gates of the Arctic National Park and Preserve, where chert artifacts were found in 2009 (orange flags indicate locations). Obsidian artifacts were found at Kurupa Lake during excavations in the 1970s, but not in 2009.

A blade made from obsidian can be sharper than a modern surgical steel scalpel.

Evidence of stone tool manufacture and use is common in the prehistoric archeology of the central Brooks Range; in contrast, arctic and sub-arctic conditions have largely prevented the preservation of organic materials, such as bone or wood. To study the behaviors of the region's past inhabitants, archeologists often turn to the analysis of *lithic* artifacts (items made of stone), such as obsidian tools.

Tools made from obsidian—a naturally occurring volcanic glass—can be extremely sharp. Obsidian artifacts, including sharp-edged projectile points or knives, are frequently found in archeological sites in Gates of the Arctic National Park and Preserve.

In 2009, as part of a larger study known as the Alaska Archeological Obsidian Database Project, Chris Houlette—an archeologist with the University of Alaska Museum of the North—hoped to address two questions related to obsidian sources and artifacts at Gates of the Arctic archeological sites: (1) What obsidian source materials were used by past inhabitants of Gates of the Arctic? and (2) How were these materials transported through the region?

Obsidian sources

Obsidian is restricted to areas of past volcanic activity where geologic events have created outcrops of volcanic glass. Each outcrop tends to have a

unique geochemical signature (chemical element makeup) that is consistent to that source. Thus, when an obsidian artifact is found in an archeological site, it can be chemically analyzed to determine the original geologic source, a technique known as *sourcing*. Through sourcing, archeologists can track or reconstruct certain prehistoric behaviors, namely people's movements and/or their interactions (through trade and exchange) with other people.

Batza Tena obsidian—source and transport

Although there are no known geologic obsidian sources in Gates of the Arctic, the primary obsidian source in prehistoric Alaska lies only 56 miles (90 km) south of the park. The Batza Tena source (which means “obsidian trail” in the local Koyukon Athabaskan dialect) is located near Indian River, a tributary of the Koyukuk River.

Ethno-historic accounts from the past two centuries describe how interactions between Eskimo and Athabaskan populations in the region vacillated between peaceful trade and hostile warfare. Batza Tena lies within Athabaskan territory, yet obsidian artifacts sourced to Batza Tena are found throughout Gates of the Arctic, well into Eskimo territory. Batza Tena obsidian was clearly a valued material, but was it willingly shared and traded, or perhaps guarded as a restricted resource?



Photo by Chris Houlette



Photo by Jeff Rasic

Field work gathered more obsidian artifacts from pre-historic sites, like this one near the North Fork of the Koyukuk.

Chris Houlette analyzes the geochemical signature of an obsidian artifact.

Study methods

Previous efforts had sourced 252 obsidian artifacts from Gates of the Arctic. In 2009, park archeologists sourced 476 more obsidian artifacts from 38 different sites—some discovered during field work, others borrowed from museum collections. The increased sample size improved the ability to analyze obsidian sites spatially, and increased the chances to identify rare obsidian sources.

Houlette mapped the distribution of obsidian artifact sites throughout the Gates of the Arctic landscape for further analysis using Geographic Information System (GIS) technology. Ethno-historic accounts describe how travel in the region differed by seasons: in summer people followed open ground and ridgelines avoiding open water and heavy brush, while in winter frozen rivers acted as highways. Using this information, along with environmental data such as elevation, slope, presence of ground water, and vegetation cover, Houlette modeled possible summer and winter overland routes between the Batza Tena source and the sites. He then compared these hypothetical models to the routes known from accounts of trade between Eskimo and Athabaskan populations during the 19th century. He predicted that the prehistoric and historic populations traveled similarly over the landscape.

Batza Tena sites and seasonal travel routes

Given the proximity of Batza Tena to the park, it is no surprise that, from the 130 sites analyzed, 718 of the obsidian artifacts (red dots on map below) matched the signature for Batza Tena. However, 11 artifacts from nine park sites had obsidian signatures that are known archeologically, but do not match any known geological source (black dots).

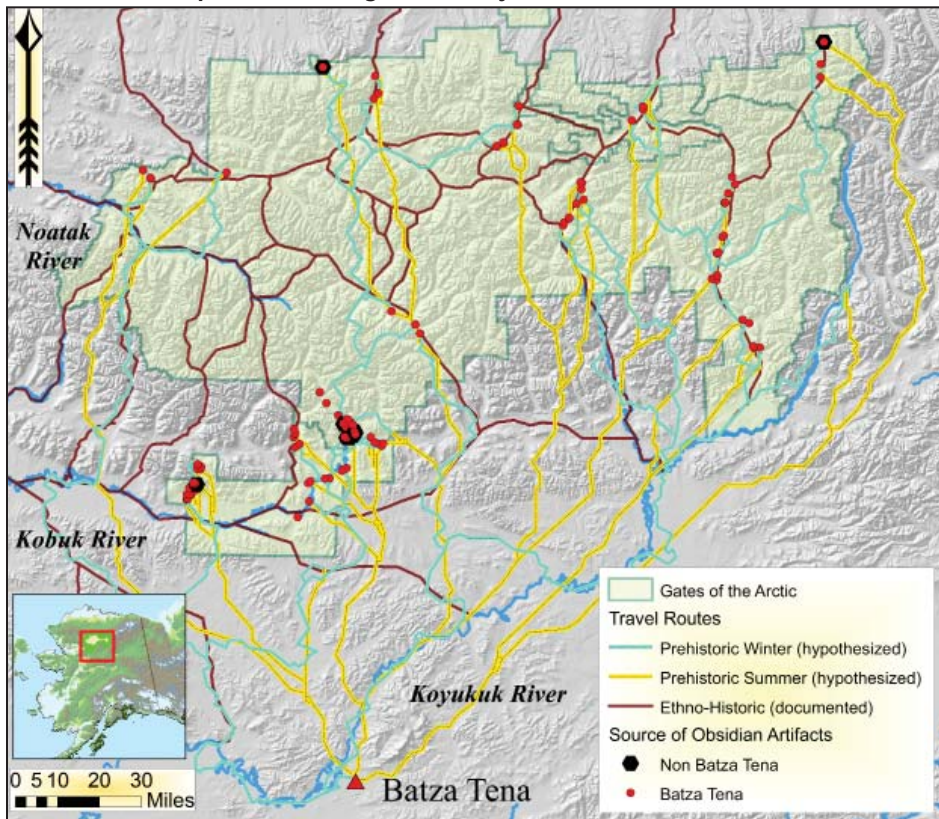
The presence of obsidian from unknown sources suggests that past occupants knew more about the resources of the Gates of the Arctic region than even modern geologists and archaeologists do. Hopefully, additional obsidian data will better define the distribution of the artifacts, which may help identify the geological source.



Photo by Chris Houlette

A variety of new obsidian artifacts were found in the Kobuk River region during field work in 2009. The projectile point at far left is 2" (5 cm) long.

Archeological sites with obsidian artifacts in Gates of the Arctic region, in relation to hypothesized summer (yellow) and winter (turquoise) travel routes that prehistoric peoples may have used for transporting obsidian. Known ethno-historic routes are shown in red. Gaps in sites along routes may direct future searches for sites.



While these preliminary results cannot truly answer questions of prehistoric trade and interaction, in general, the sites with sourced obsidian artifacts are located along the ethno-historical travel routes (red lines on map), supporting the hypothesis that people have used the landscape in similar ways for travel and resource use during the past several thousand years. Radiocarbon dating of a few sites in this study show use of Batza Tena obsidian as early as 7000 years ago. Indeed, the prehistoric peoples of the Gates of the Arctic region, who transported obsidian and made tools, may have used the same routes for considerably longer than had previously been considered.

Additional sites, future obsidian analyses, and more radiocarbon dates can help archeologists continue to address these questions of prehistoric landscape use and transport of obsidian.

Acknowledgments

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