

## Exploitation of obsidian sources in the Central Highlands and the earliest obsidian use

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A number of Upper Palaeolithic (UP) and Jomon occupation sites remain in an obsidian source area of Kirigamine and Yatsugatake, Nagano Prefecture. The site distribution pattern attributed to both periods is in stark contrast in the area. While the UP sites tend to be concentrated in a high altitudinal zone above 1500 m particularly close to the sources, the Jomon sites tend to be distributed in hillslopes apart from sources in a lower altitudinal zone below 1500 m. This fact reflects historical changes of procurement technologies, landscape use, organization of groups, and the circulation systems. Obsidian from the Central Highlands is a non-local lithic raw material transported and distributed extensively in central Japan. Here, non-local means that transportation of lithic raw material is more than 80 km to a residential area.

**PROCUREMENT TECHNOLOGY:** obsidian used in the UP is collected from the ground surface of either outcrops or other procuring spots. No evidence asserting the existence of mining activities of the UP has been found. The earliest use of obsidian from the Central Highlands dates back to ca. 38 ka cal yr BP. In contrast, large-sized Jomon mining sites in which underground obsidian nodules were dug out from numerous pits have been discovered. The existence of digging technology features in Jomon procurement activities. The earliest mining pit dates back to the late phase of the incipient Jomon.

**LANDSCAPE USE:** UP obsidian procurement tended to be connected with primary nodule processing, stone tool production, and short-term encampment probably with hunting activities. In addition, large-sized lithic workshops adjacent to the sources occurred as a result of the recurrent landscape use. This is the reason why concentrated distribution of the UP occupations occurred in places close to the sources. While primary processing of obsidian took place in the vicinity of mining pits by the time of the incipient Jomon, subsequent mining activities were not associated with lithic workshops. No semi-sedentary Jomon settlement, except small-sized temporary sites have been discovered above 1500 m. Specialization in mining and carrying out unprocessed obsidian nodules, and rarity of other subsistence activities close to the sources are features of the Jomon obsidian procurement.

**ORGANIZATION AND CIRCULATION SYSTEM:** three types of procurement patterns are recognized in the UP. First, the procurement is originally embedded in an extensive territory of local groups. Second, small parties dispatched by a local group obtain and transport obsidian. Third, a local group near the source area supplies obsidian to the other local groups. The first and the second patterns had occurred since the Early Upper Palaeolithic (38 - 28 ka cal yr BP), and the third one emerged in the Late Upper Palaeolithic (28 - 16 ka cal yr BP). For the Jomon obsidian mining, the existence of specialized task groups which engaged in mining activity is assumed. Jomon pottery and hearth features packed between layers of abandoned soil resulted from digging indicate the existence of encampment matched the period of work. The Jomon settlements and the mines are completely distinguished from each other. A large amount of obsidian artifacts, and obsidian storage often found from the former sites located in the zone below 1500 m show them to be relay stations for obsidian circulation. The tendency for specific obsidian from a given source to be transported and distributed in a specific consumption area and time reflects either the emergence of a local group which controlled the obsidian circulation, or of highly sophisticated social relations among the local groups, or both.

The oral presentation also refers to the earliest obsidian use of the UP peoples in the Kanto Plain, and its relationship with the dispersal of modern humans into the Japanese Archipelago.

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