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Group migration and cultural change following the Akahoya volcanic ashfall: Identifying the pottery production centers at the beginning of the Early Jomon period of Japan

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ABSTRACT

Volcanic ash from the Akahoya volcano was deposited over almost all of the Japanese Archipelago after the eruption of the Kikai caldera in the southern part of Kyushu Island at around 7300 cal. BP, corresponding to the end of the Initial Jomon. The Akahoya ashfall had a crucial influence on the Jomon culture of the Tokai region of Honshu Island, more than 800 km away from the eruption source. The ash also accumulated in the Tokai region, resulting in a sudden decrease in the size of bivalves in shellmiddens, in a reduction in the number of middens and settlements, in the number of saddle-querns, grinding stones, and arrowheads of the lithic assemblages. The ashfall is presumed to have resulted also in a reduction of game animals. This caused serious damage to the vegetation and obstructed the routes for obsidian procurement. A new type of ceramic, the Kijima pottery, appeared in the western part of the Tokai region immediately after the ashfall, and it spread rapidly to eastern Tokai. Petrological and chemical analyses of pottery show that clay sources are located in western Tokai rather than in the eastern part of this region, pointing to some degree to population migration from west to east.

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1. Introduction

The Kikai caldera in the southern part of Kyushu Island had a major eruption approximately 7300 years ago. The pyroclastic flows brought devastating damage on the Jomon culture in southern Kyushu. The cultural impact of the ash-flow in Kyushu Island has been discussed by many geologists and archeologists (Machida and Arai, 1978, 1992; Machida, 1984, 2002; Shinto, 1978, 2006; Oda, 1993; Kuwahata, 2002, 2013). However, these studies mainly focused on the relationship between age of eruption and the chronological sequence of Jomon pottery, or the impact degree and extent of the flow. There were few studies that focused on emigration and the broad expansion of the Jomon pottery type.

The eruption also produced a large-scale ashfall (hereafter, referred as the “Akahoya ashfall”) which extended as far as the eastern Tokai region on Honshu Island, more than 800 km from the source (Fig. 1). In this paper, the impact of this ashfall on the Jomon

people in the western part of the Tokai region (hereafter, “western Tokai”) is examined.

Immediately after the Akahoya ashfall, the Kijima-type pottery which existed in western Tokai at the beginning of the Early Jomon expanded toward the eastern part of the Tokai region (hereafter, “eastern Tokai”; see Fig. 2). However, there has been no archaeological study that focuses on the production center of Kijima-type pottery. This paper reports the results of an X-ray fluorescence analysis conducted to determine whether the Kijima pottery found in eastern Tokai was produced in western Tokai and then transported to the former region, or if it was manufactured in eastern Tokai having been modeled on the Kijima type. Based on these results, the paper discusses the possibility of a Jomon group migration to eastern Tokai.

Finally, the paper suggests how the migrant groups adjusted to the new environment which had changed due to the natural disaster. This is based on the results of Jomon pottery analyses and on changes in prehistoric subsistence observed in eastern Tokai.

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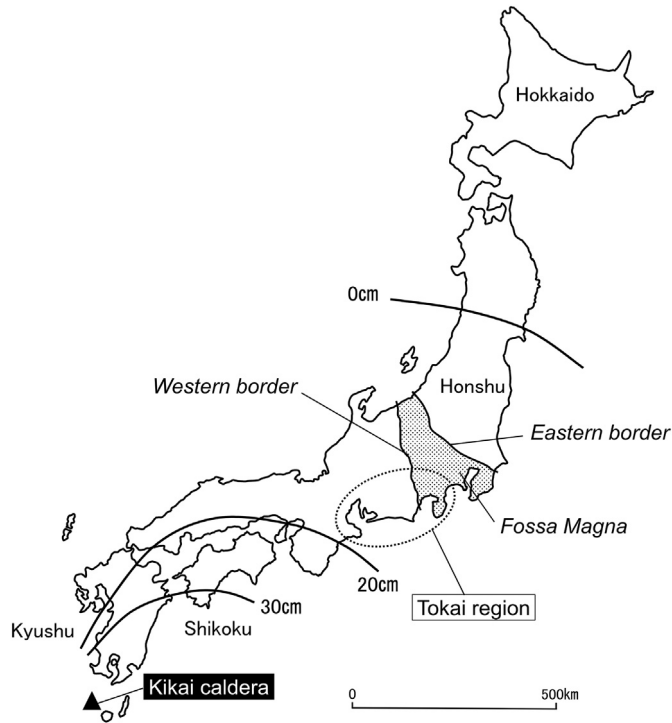


Fig. 1. Location of Kikai Caldera, distribution range and thickness of the Akahoya ashfall, and the Fossa Magna. (Distribution range and thickness of the Akahoya ashfall are based on the study of Machida and Arai (Machida and Arai, 1992, Figs. 2.1–2)).

2. Akahoya ashfall and eastward expansion of western Tokai pottery

2.1. The period of Akahoya ashfall

In the Shimizunokami shellmidden, situated in the Chita Peninsula of western Tokai (Fig. 3), the presence of 25–35 cm of nearly pure volcanic ash from Akahoya has been confirmed (Fig. 4; Layer I). The stratum directly above it, namely Layer H, contains Kijima pottery dating back to the beginning of the Early Jomon

(Yamashita, 1987, 1988). At the Tastunoguchi site of Izu Oshima (Sugihara et al., 1983), an island which lies off the Pacific coast and is part of eastern Tokai, three types of pottery, Okkoshi, Tenjinyama, and Kaminokidai, were excavated from the top of Layer O–40 which also contains Akahoya ash. Furthermore, at the Hiekawa site in Shimizu-ku, Shizuoka City, Akahoya ash was detected in the lower part of Layer VII which is above the layer from which Okkoshi and other types of pottery have been excavated.

These data imply that the Akahoya ashfall occurred in the last stage of the Initial Jomon. In terms of periodization of the Jomon pottery in western Tokai, this corresponds to the transition from Tenjinyama to Shioya pottery, and in the Kanto region of Honshu Island it corresponds to the time of the Kaminokidai and Shimoyoshii pottery types.

2.2. The impact of the Akahoya ashfall on western Tokai region

The Akahoya ash in the Shimizunokami shellmidden is considerably thicker than was assumed by Machida and Arai (1992: 56), denoting that the impact of ashfall on the ecosystems was much more serious than it was previously thought. Masuko (1981) argued that shell mound formation ceased at most of the sites in Mikawa Bay at the end of the Initial Jomon and these sites started to disappear from this period onwards.

In recent years, it was suggested that this environmental change was related to the Akahoya ashfall. Mikawa Bay has a narrow entrance and less than 100 m deep. It is, therefore, difficult for an ocean current (such as the Kuroshio) to enter the bay. The volcanic ash deposited inside the bay would have remained there for a considerable time, and so it must have had a catastrophic impact on the living creatures, especially those that inhabit the intertidal zone. It has been confirmed that the growth of shellfish was hindered at the end of the Initial Jomon and that shell mounds vanished around that time, to re-appear only at the end of the Late Jomon. This phenomenon was attributed to the above-described environment of Mikawa Bay, amplifying the impact of the Akahoya ashfall (Oda, 1993: 221).

2.3. The spatial distribution of Kijima pottery expansion from western to eastern Tokai region

At the end of the Initial Jomon, eastern Tokai was within the Kaminokidai pottery area centered in southern Kanto (Fig. 4). This

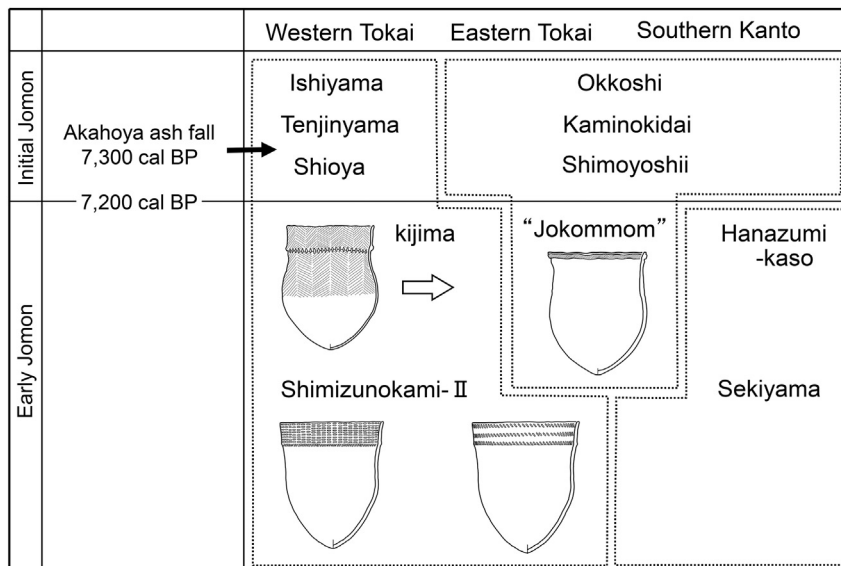


Fig. 2. Chronological relationship of pottery types from the end of Initial Jomon to the beginning of Early Jomon.

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