Archaeological characterization of ancient pottery from Izu Islands (Tokyo, Japan) by chemical compositions obtained from XRF
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Ancient pottery sherds from Izu Islands (Tokyo, Japan) were assayed by XRF with glass beads. The pottery provenance was identified by geochemical data of each island and multivariate statistics using the chemical compositions.

The pottery samples analyzed in this study came from Oshima and Hachijojima Islands, parts of the Izu Island chain. These islands are far from the main island of Japan: about 50 km for Oshima Island and 200 km for Hachijojima Island. The 41 sherds were excavated from Shimotakabora site in Oshima: 39 of them belong to Jomon period (14000–300BC) and the others come from Yayoi period (300BC–250AD). The 47 sherds were sampled at Hachijojim: 36 sherds from Kurawa site and 5 sherds from Yuhama site belong to Jomon period and 6 sherds from Yaene site originated in Kofun period (250–538 AD).

Each pottery sample was finely ground; and then, glass bead (35 mm diameter) was prepared by mixing and melting 0.400 g of the powdered sample and 4.000 g of anhydrous lithium tetraborate as an alkali flux. The sample preparation (e.g., pulverization and melting conditions) was reported in detail elsewhere.[1] Fluorescence from 22 elements (Na, Mg, Al, Si, P, K, Ca, Ti, V, Cr, Mn, Fe, Ni, Cu, Zn, Rb, Sr, Y, Zr, Nb, Ba, and Pb) were measured by a wavelength-dispersive XRF spectrometer (RIX3100, Rigaku Corp.). Calibration curves were drawn by measurement of synthetic standards which were prepared by mixing and melting alkali flux and chemical reagents, instead of commercial references.

Multivariate statistics was used to identify the pottery provenance. Cluster analyses were performed using XRF data based on the Ward’s method and squared Euclidean distance. As the results, 41 sherds from Oshima and 47 sherds from Hachijojima were pointed to two compositional groups, respectively. The classifications agreed with provenance estimation by two-dimensional scatter diagrams[2] using XRF results and geochemical data of the islands, which imply that almost pottery sherds had been brought to each island from outside.