Strontium three isotope analysis of archaeological human bones: the effect of diagenetic alteration

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Hydroxyapatite, a main inorganic component in bones, contains Sr at high concentration up to the order of several hundreds of ppm. Radiogenic strontium isotope ratio ($^{87}Sr/^{86}Sr$) of bone hydroxyapatites has been used to study residential mobility of ancient humans and mammals in archeological fields. Strontium in human body is derived from the background geological system via foods such as plants and animals. Therefore, $^{87}Sr/^{86}Sr$ value of bone hydroxyapatite directly reflects $^{87}Sr/^{86}Sr$ value of the bedrocks in the region where the foods came from.

Archeological human remains have been buried in soils for hundreds of years or more. There is a strong possibility that the buried human bones have been affected by diagenetic process and the original $^{87}Sr/^{86}Sr$ values of the bone hydroxyapatites have been changed by such secondary alteration. Although evaluation of the effect of possible diagenetic alteration is essential in reconstructing the residential mobility of ancient humans from the bone hydroxyapatite $^{87}Sr/^{86}Sr$ data, reactivity of bone hydroxyapatite during diagenetic processes is not well understood.

In this study, we attempt to make a quantitative evaluation of secondary alteration effect on the bone hydroxyapatite $^{87}Sr/^{86}Sr$ during diagenesis. Hydroxyapatite fractions were extracted from a cremated human remain of a Buddhist priest Jokei (AD1155-1213) and three different cremated bodies excavated from Middle age sites in Binman-ji, Shiga, Japan. Bulk soil samples from the excavation sites as well as exchangeable phases of these soils were also prepared. Both the radiogenic ($^{87}Sr/^{86}Sr$) and stable ($\delta^{88}Sr/^{86}Sr$) isotope ratios were analyzed for these samples. The results will be discussed in the presentation.

Keywords: Sr isotope ratio, archaeological sciences, diagenetic alteration, apatite, cremated human bones

