Dating of stalagmites from Kyusendo cave, Kumamoto, using U–Th and radiocarbon dating methods

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Recently, stalagmites are used as a good archive for paleoenvirnment. One of the advantages of using stalagmites is precise dating by U–Th methods. In Japan, however, there was no facility for U-Th dating. Although radiocarbon (^{14}C) age is easier to date than U–Th age, it has “dead carbon fraction (DCF)” problem. This means the fraction of ^{14}C–depleted carbon from the soil and host rock (Genty and Massault, 1999; Genty et al., 2001). Because of DCF, results of ^{14}C dating are older than their true age. There are little study about DCF variation in Japan and the driving factors of DCF remain less understood. For precise dating for stalagmites, it is important to solve each problem and combine U–Th and ^{14}C dating.
In this study, stalagmites KST4, 5 and 6 from Kyusendo cave in Kumamoto, Japan were used because U concentrations of the stalagmites were suitable for U–Th dating. Three stalagmites were dated using U–Th methods for the first time in Japan as follows; 41 ka–9 ka of KST4, 25 ka–1.3 ka of KST5, 45 ka–25 ka of KST6. ^{14}C age of stalagmites and drip water were also measured. From drip water, modern DCF was determined. ^{14}C age were corrected with modern DCF and the corrected age of the modern stalagmite showed good agreement with U–Th age.
Availability of U–Th dating methods in Japan would contribute to the activation of Japanese stalagmite research. In the future, by measuring stable isotopes of stalagmites, the paleoclimate system in the area of East Asian summer monsoon could be revealed. In addition, we are going to analyze trace elements and DCF fluctuation and examine the availability as environmental proxy.

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