A basic study for creating high-resolution age models based on annual bandings of Indonesian stalagmites

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Speleothems have several characters that they continuously grow up and can be accurately dated by U-Th disequilibrium dating. Accordingly, in recent years, speleothems attract attention of scientist as geological materials from which a paleoclimate is reconstructed. Our study area, the Asian equatorial region, derivers to climate phenomenon over the world occur (e.g. El Nino-Southern Oscillation). However, in the region, there are few paleoclimatological studies using speleothems.

On "Indonesian Speleothems Project", which is promoted by Division of Earth and Planetary Science, Graduate School of Science, Kyoto University, we surveyed several caves in Java, Indonesia, and collected many samples of speleothems in order to analyze an annual climate change in the Asian equatorial region. Prerious studies using the stalagmite CIAW15a, which is collected in West Java on the project, showed that the bandings of CIAW15a were dominantly annual, because U-Th disequilibrium age agreed with the bands counts in CIAW15a. However, in the study, there are few discussions about the precision of bands counting. Therefore, in this study, we tested the precision of bands counting by using CIAW15a. Based on the result of testing precision, we improved a method of bands counting and created a high-resolution age model by comparing the U-Th disequilibrium age with the counts of the bandings in the stalagmite BRI10a, which was collected in East Java, Indonesia.

We tested precision on the 3 points (repeatability, difference among individuals, and reproducibility). The results show that there are high repeatability and no difference among individuals on bands counting.

U-Th disequilibrium age the stalagmite BRI10a, which was collected from the Bribin Cave, East Java was 0.398+/-0.044 ka. The result of bands counting of BRI10a was 392+/-22 layers at the top of the dated section and 442+/-20 layers at the base of the dated section. The mean value of two count corresponds with the U-Th disequilibrium age within error. This suggests that individual bandings in BRI10a annual.

In this study, we present that the bandings of the stalagmite collected from East Java were annual. Accordingly, in future studies, we can perform the paleoclimatological studies in East Java. If paleoclimatology with a high-resolution age model in East Java has advanced based on this study, the paleoclimatological data in East Java will be compared with that in West Java.

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