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Constructing high-resolution age model based on annual bandings of Indonesian stalagmites for paleoclimatology

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Speleothems have the features that they continuously grow up and can be accurately dated by U-Th disequilibrium equilibrium. Accordingly, in recent years, speleothems attract attention of scientist as geological materials from which a paleoclimate is reconstructed. Climatic phenomena of the Asian equatorial region affect climates all over the world (e.g. El Nino-Southern Oscillation). However, there are only a few paleoclimatological studies using speleothems in the region.

In order to reconstruct paleoclimate using stalagmites, our group takes three following steps:
1. Construction of age model by comparing the U-Th disequilibrium ages with the counts of the bandings in a stalagmite.
2. Stable isotope (C, O) analysis along a growth axis of a gotten age model and comparison stable isotope time series with instrumental precipitation data, in order to assess the reliability of stable isotopic ratios of a stalagmite as a climate proxy.
3. Reconstruction of precipitation in the past when there is no instrumental precipitation data.

In this study, we constructed a high-resolution age model by comparing the U-Th disequilibrium age with the counts of the bandings in the stalagmite BRI09a, which was collected in Bribin Cave, East Java, Indonesia at 2007. U-Th disequilibrium age the stalagmite BRI09a was 1038+/-52yrs. The result of bands counting of BRI09a was 879+/-10 layers at the top of the dated section and 1018+/-38 layers at the base of the dated section. These results suggest that the growth layers of BRI09a are dominantly annual.

We also constructed a high-resolution age model in the stalagmite BRI10a, which was collected in the same cave at the same time, and reported in B-PT014 poster session, Japan Geoscience Union Meeting 2010 (Fukunaga et al., 2010). We have two stalagmites with high-resolution age models in the same cave. Thus, we can reconstruct two paleo-precipitations severally from two stalagmites in same cave and compare two reconstruction. This comparison will make advance of the climate proxies on Indonesian stalagmites.

Keywords: speleothem, age-model, dating