

A paleoclimatic reconstruction using Indonesian stalagmites: an overview

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An interdisciplinary, collaborative research project on the paleoclimate and paleoenvironment of the Asian equatorial regions was begun recently and has been promoted by the Kyoto University Active Geosphere Investigation program, which represents the 21st Century COE program of Kyoto University entitled Elucidation of the Active Geosphere from Asia and Oceania to the World. The first target of the project is to assess the reliability of stable isotopic ratios of stalagmites as climate proxies. For the object, we performed the first systematic comparison between temporal variation in precipitation and those in stable isotopic ratios of a speleothem, by taking the travel time of groundwater into account.

In this presentation, we will show the results described below. (1) Conduct surveys of Indonesian limestone caves and systematic sampling of stalagmites, drip waters and carbonate bedrocks. (2) Construct the age model for each stalagmite using (a) annual banding that can be viewed by transmitted/reflected light and/or by luminescence using ultraviolet-light stimulation and (b) high-resolution uranium series disequilibrium dating using MC-ICP-MS. (3) Analyze oxygen and carbon isotopes and other geochemical proxies for annual or sub-annual time scales. (4) The tritium/helium-3 dating of drip waters, which allows us to estimate the travel time of their percolation through overlying soil and bedrock units. (5) Compare the geochemical proxy data from actively-growing stalagmites with a meteorological data set, such as local precipitation since 1950.