

An overview of the paleoclimate study of equatorial region

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An interdisciplinary, collaborative research project on the paleoclimate and paleoenvironment of the Asian equatorial regions was newly born and has been promoted by the Kyoto University Active Geosphere Investigation (KAGI) program. The first target of the project is to reconstruct past climate variations in Indonesia by using oxygen and carbon isotopes and other geochemical proxies recorded in stalagmites that likely represent local precipitation. We are particularly curious to decode the precipitation anomalies that reflect the El Niño Southern Oscillation (ENSO). The research team consists of scientists having a variety of disciplines, such as cave geology, geochemistry, geochronology, hydrogeology, geography, meteorology, climatology, etc, as a result of collaboration between Kyoto University and Institute Teknologi Bandung (ITB).

The research is being conducted along the course summarized below.

- (1) 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 and reflected light and 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) Compare the proxy data from actively-growing stalagmites with meteorological data set, such as local precipitation, in the past 50 years. The tritium-³He dating of drip waters allows us to estimate the travel time of their percolation through overlying soil and bedrock units.
- (5) Reconstruct the past climate and environments using the tested proxy data and try to detect local and global events near the surface of the earth, such as ancient ENSOs.

The first sampling trip was held from February 28 to March 10, 2006. Several actively-growing speleothems were sampled from Buniayu caves (Cipicung, Ciawitali, Antik caves), Sukabumi area, western Java. It was followed by two more trips: one back to the same area for sampling of drip waters and more speleothems, whereas the other to the Karangbolong area, central Java, where we visited four caves and sampled more than thirty speleothems and drip waters. Analyses of collected samples are going on and the preliminary data will be presented at the conference.