Goldschmidt 2022 Abstract
https://doi.org/10.46427/gold2022.11786

A decade of daily oxygen isotope analysis from peninsular Thailand: Implications for the interpretation of speleothem records

LUDVIG LÖWEMARK[1], GEORGE KONTSEVICH[2], AKKANEEWUT CHABANGBORN[3], SAKONVAN CHAWCHAI[3], HELMUT DUERRAST[4], MAO-CHANG LIANG[5], MIDHUN MADHAVAN[6] AND CHUNG-HO WANG[5]

[1]Department of Geosciences, National Taiwan University
[2]National Taiwan University
[3]Faculty of Science, Chulalongkorn University
[4]Faculty of Science, Prince of Songkla University
[5]Academia Sinica
[6]Cochin University of Science and Technology
Presenting Author: ludvig@ntu.edu.tw

Stalagmites growing in caves provide exquisite paleorecords. The most commonly used proxy is variations in oxygen isotopes, which ideally directly reflect shifts and changes in the isotopic composition of the precipitation falling on top of the cave system. Although the large-scale processes that influence isotopes in rainwater are fairly well understood, the processes that govern the isotopic composition at a specific site are far more complex and difficult to constrain. Many studies therefore resort to basing their interpretations on general correlations between monthly, or even yearly, averages in precipitation amount and oxygen isotope composition. However, if the local, regional, and global components of the isotopic record can be fully disentangled, then a much stronger interpretation of the stalagmite record is possible.

Here we present a decade's worth of daily analysis of rainwater from Krabi in peninsular Thailand. Precipitation was collected daily at the Krabi International Airport and oxygen isotopes were then analyzed at Academia Sinica, Taiwan. The daily resolved record of rainfall and isotopic variations allowed local and regional processes influencing the isotopic variability to be assessed. Our results suggest that short-term variability during individual rain events is best explained by variations in local convection, while long-term variability is best explained by shifts in the relative intensity of the winter and summer monsoons. In contrast, processes such as amount effect, the Madden-Julian Oscillation, or El Nino-Southern Oscillation had little effect on the observed isotope values. This suggests that isotopic variations recorded in stalagmites should be interpreted as reflecting shifts in the relative importance of the summer and winter monsoons rather than changes in the absolute amount of precipitation.