

EGU21-790

<https://doi.org/10.5194/egusphere-egu21-790>

EGU General Assembly 2021

© Author(s) 2021. This work is distributed under the Creative Commons Attribution 4.0 License.



## Investigating cave responses to regional climate change: an approach to calibrate speleothem proxies in Madagascar

**Ny Riavo G. Voarintsoa**<sup>1,2</sup>, Antsa Lal'Aina J. Ratovonahary<sup>2,3</sup>, Avotriniaina Z. M. Rakotovao<sup>2,3</sup>, and Steven Bouillon<sup>1</sup>

<sup>1</sup>Katholieke Universiteit Leuven, Department of Earth and Environmental Sciences, Belgium

(voary.voarintsoa@kuleuven.be)

<sup>2</sup>Geological Society of Madagascar, Antananarivo, Madagascar

<sup>3</sup>Mention Bassins Sédimentaires Evolution Conservation, Faculté des Sciences, Université d'Antananarivo, Madagascar

Caves are an excellent natural laboratory for understanding the transfer processes of the region's environmental signals to speleothems. At least eight speleothems have produced high resolution paleoclimate and paleoenvironment records from Anjohibe Cave, NW Madagascar. However, due to the remote and difficult access to many caves in Madagascar, no studies have yet been done to understand the transfer of climate and environmental changes of the region to the cave. This is the first monitoring study to understand the linkage between regional climatology and various responses in Anjohibe Cave. We monitored (1) the drip water pH, TDS, EC, temperature,  $\delta^{13}\text{C}_{\text{DIC}}$ ,  $\delta^{18}\text{O}_{\text{w}}$ ,  $\delta^2\text{H}_{\text{w}}$ , and elemental (Ca, Mg, Sr) composition, and (2) the cave atmosphere  $p\text{CO}_2$ , relative humidity and temperature. Results show that air-to-air transfer is fast, and the internal parameters closely vary with the regional climatology. In contrast, rainfall to drip signal transfer is not immediate, and it can take few months to one season for the signals to be detected in the drip water due to the "epikarst storage effect". The deposition of  $\text{CaCO}_3$  is inferred to occur late in the dry austral winter season, during which prior carbonate precipitation was also detected. Since the growth of speleothems is influenced by numerous cave-specific factors, this study, although preliminary, indicates that Anjohibe Cave drip waters are capable of registering changes in its surrounding environment. A longer monitoring study is expected in the future to constrain the timing and the mode of transfer.