



## The Indian Summer Monsoon from a Speleothem $\delta^{18}\text{O}$ Perspective – A Review

Nikita Kaushal (1), Sebastian F.M. Breitenbach (2), Franziska A. Lechleitner (3), Ashish Sinha (4), Vinod C. Tewari (5), Syed M. Ahmad (6), Max Berkelhammer (7), Shraddha Band (8), Madhusudan Yadava (8), Rengaswamy Ramesh (8), and Gideon M. Henderson (3)

(1) Nanyang Technological University, Asian School of the Environment, Singapore, Singapore (nikitageologist@gmail.com), (2) Institute for Geology, Mineralogy and Geophysics, Ruhr University Bochum, 44801 Bochum, Germany, (3) Department of Earth Sciences, University of Oxford, Oxford OX1 3AN, UK, (4) Department of Earth Sciences, California State University, Dominguez Hills, Carson, CA 90747, USA, (5) Department of Geology, Sikkim University, Sikkim 737102, India, (6) Department of Geography, Faculty of Natural Sciences, Jamia Millia Islamia, New Delhi 110025, India, (7) Department of Earth and Environmental Sciences, University of Illinois, Chicago, IL 60607, USA, (8) Faculty of Geoscience, Physical Research Laboratory, Gujarat 380009, India

As one of the most prominent seasonally recurring atmospheric circulation patterns, the Asian summer monsoon (ASM) plays a vital role for the life and livelihood of about one-third of the global population. Changes in the strength and seasonality of the ASM significantly affect the ASM region, yet the drivers of change and the varied regional responses of the ASM are not well understood. In the last two decades, there were a number of studies reconstructing the ASM using stalagmite-based proxies such as oxygen isotopes ( $\delta^{18}\text{O}$ ). Such reconstructions allow examination of ASM drivers and responses, increasing monsoon predictability. In a review study [1], we focus on stalagmite  $\delta^{18}\text{O}$  records from India at the proximal end of the larger ASM region. Stalagmite-based time series are available from a number of caves in northern, northeastern and south Indian caves, as well as from the Andaman Islands. Despite widespread occurrence of carbonate rocks, data is lacking for Central and western India (the Vindhayans and Thar Desert), and Pakistan. We examine Indian stalagmite records collated in the Speleothem Isotope Synthesis and AnaLysis version 1 database [1] and support the database with a summary of record quality and regional climatic interpretations of the  $\delta^{18}\text{O}$  record during different climate states. Indian stalagmite  $\delta^{18}\text{O}$  records show well-dated, high-amplitude changes in response to the dominant drivers of the ASM on orbital to multi-centennial timescales, and indicate the magnitude of monsoon variability in response to these drivers. We suggest the most useful time periods (climatic events) and locations for further work using tools such as data-model comparisons, spectral analysis methods, multi-proxy investigations, and monitoring.

References [1] Kaushal, N., Breitenbach, S.F.M., Lechleitner, F.A., Sinha, A., Tewari, V.C., Ahmad, S.M., Berkelhammer, M., Band, S., Yadava, M., Ramesh, R. and Henderson, G.M.: The Indian Summer Monsoon from a Speleothem  $\delta^{18}\text{O}$  Perspective – A Review. *Quaternary*, 1, 29, <https://doi.org/10.3390/quat1030029>, 2018.

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