Trace elements and oxygen isotopes in caves across Southern India

KAUSHAL, N.[1]*, HENDERSON, G. M.[1], YADAVA, M. G.[2] AND RAMESH, R.[2]

(*correspondence: nikitak@earth.ox.ac.uk)
[1]Department of Earth Sciences, University of Oxford, UK (gideonh@earth.ox.ac.uk)
[2]Physical Research Laboratory, Ahmedabad, India (myadava@prl.res.in) (rramesh@prl.res.in)

The Indian Monsoon is a major component of the global climate system. Stalagmites have a well proven ability to provide information about changes in such monsoon systems, with records from central China being particularly influential. Despite a number of published stalagmite records from peninsular India, however, no long records of change have yet been produced and stalagmite growth in this region appears limited to shorter periods in each cave. This makes interpretation of proxy data from stalagmites more challenging, but heightens the need to extract maximum information from available records. In this study, we measure trace-metal and oxygen-isotope records from caves across Southern India to seek deeper understanding of these proxies and, ultimately, improved understanding of the Indian Monsoon.

There are few patches of carbonate on the West coast of India but one decorated cave, Aklagavi, has yielded annual and subannual stable-isotope and trace-element measurements from an aragonitic stalagmite. These are the first trace element records from Indian speleothems and some of the few available from aragonitic speleothems.

The oxygen isotope record provides an assessment of changes in the composition of rainfall as monsoon moisture first transits onshore from the Arabian sea, providing important constraints for other sites further inland. Initial results show that the Aklagavi sample has significantly heavier $\delta^{18}O$ than speleothems situated downwind on the East coast, consistent with continued moisture loss from monsoon winds as they carry moisture from the Arabian Sea across peninsular India, and provides a working model for interpretation of new stalagmite records.

The $\delta^{18}O$ record from this Aklagavi stalagmite has been interpreted in terms of the amount effect [1]. We use our new trace-element data from the same stalagmite, coupled with drip-water data, to test and refine this interpretation and to derive a record of rainfall change for this site.

[1] Yadava, M.G., Ramesh, R., Pant, G.B. 2004, The Holocene, **14.4,** 517-524