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Comment on cp-2021-20

Nick Scroxtton

Community comment on "The 4.2 ka event in East Asian monsoon region, precisely reconstructed by multi-proxies of stalagmite" by Chao-Jun Chen et al., *Clim. Past Discuss.*, <https://doi.org/10.5194/cp-2021-20-CC1>, 2021

We would like to draw the authors attention to our recent submission in discussion at *Climate of the Past* (manuscript: cp-2020-138) that may help with the interpretation of the trace element signal from YK1306. Both the unidirectional change in trace elements, and the wet-dry-wet/dry-wet-dry pattern of the stable isotope records have both been identified in our submission, which comprises an Indian Ocean wide regional compilation of high-resolution hydroclimate proxies.

In particular these patterns are seen in the first and second principal components of the compilation (figure 3 of cp-2020-138). Our PC1, which we interpret as variability in Indian Ocean summer rainfall dynamics matches the trace element PC1 signal of YK1306. The decrease in rainfall is timed to 3.97 kyr BP (standard error of 94 years) in our study using a rampfit function and taking into account full age model uncertainty of five independent stalagmite records. A shift in tropical hydroclimate at 4.0 kyr BP is well recognised in the literature (examples: Marchant and Hooghiemstra, 2004, de Boer et al., 2014; Denniston et al., 2013; Gagan et al., 2004; Giosan et al., 2018; Li et al., 2018; MacDonald, 2011; Toth et al., 2012), And although it is sometimes interpreted as being caused by the 4.2 kyr event, both the timing and the shape of the anomaly does not match.

Our PC2 (particularly for the third PCA shown in orange which includes additional records from the Arabian Sea) matches the $\delta^{18}O$ and $\delta^{13}C$ signals in YK1306. We interpret those signals as likely deriving from winter monsoon variability as dominated by westerly derived moisture and winds through western disturbances. The triple wet-dry-wet (or dry-wet-dry depending on the loading (figure 4 of cp-2020-138)) pattern is evident too. The timings are approximately 4.6-4.25, 4.25-3.9, 3.9-3.6 kyr BP in our study, in good agreement with YK1306. We therefore believe there is significant congruence between the data of our studies and a reasonable agreement on underlying climatic processes.

With this in mind, one could hypothesise that the trace element signal in YK1306 might therefore reflect some kind of tropical forced variability in rainfall in south-west China via the Indian Summer Monsoon component. Meanwhile the stable isotopes respond, as suggested by the authors, to more westerly dominated climatic processes. We believe that a full consideration of our study in the interpretation of YK1306 will help develop the trace element interpretation in the manuscript, and begin to deconvolve the complex multiple drivers of climate variability in south-west China, and the Indian Ocean. Should you wish to use our data prior to final publication of our work, please contact us.

We will leave the full process of peer review to the appointed reviewers, but we have one other minor point: please make the data from this work publicly available in an archive such as NOAA, and also via a submission to the SISAL database.

Thank-you,

Nick Scroxton

(on behalf of coauthors)