

Reply to the comments of referee #2:

We would like to thank referee #2 for the well-thought-out comments and suggestions that will certainly help to further sharpen and clarify the manuscript. Most of the proposed changes are small and can easily be implemented in the revised version of the manuscript. In the following, each of the comments will specifically be addressed.

Referee comment 1: *Use “rainfall” instead of “precipitation”*

This is probably a good idea to avoid confusion. We will replace “precipitation” by rainfall throughout the paper.

Referee comment 2: *Insert references to other work that already raised the question about a paleoclimatic significance of the water content in speleothems fluid inclusions.*

To our knowledge this would be the Demény et al. (2012) paper and the dissertation of Y. Scheidegger (2011). Both references will be included in the Introduction.

Referee comment 3: *Give a short explanation of the “amount effect”.*

We will include in the Introduction: ... This effect was originally proposed by Dansgaard (1964) and is based on the observation that in tropical and subtropical monsoon regions, stronger (i.e. higher rates of) monsoon rainfall often exhibits more negative $\delta^{18}\text{O}$ signals than weaker monsoon rainfall, a feature that is best observed in arid regions (Clark and Fritz, 1997). As shown, e.g., by Fleitmann et al (2004) the $\delta^{18}\text{O}$ of the rainfall is generally reflected in that of the stalagmite calcite as long as no massive changes of other parameters occur that would influence $\delta^{18}\text{O}_{\text{calcite}}$, which can largely be excluded for the relevant time span on Socotra Island.

Referee comment 4: *... give numbers of reference to section 2.5.*

We will refer to section 2.5 and also table 2 now.

Referee comment 5: *...are the inclusions numerous and heterogeneous in size, shape, and distribution in general or only in some thin sections?*

Basically, this is the case for all thin sections we studied. However, these were only five, and we are reluctant to generalize from those. In the paper, we will specifically state “in the studied sections”.

Referee comment 6: *... values for P3-A and P3-B are identical within uncertainty.*

This is what we wanted to express by “slightly lower”, but we will re-phrase: ..shows a nominally lower fraction of inclusions, however, not outside the stated uncertainties (section 3.2).

Referee comment 7: *How does the amount of black pixels given in Figs. 4 and 5 relate to the volume fractions of fluid inclusions given in section 3.2?*

We implicitly assume that the actual “area fractions” of fluid inclusions in the sections can be transferred to the third dimension and thus also represent volume fractions. This will be clarified in section 3.2.

Referee comment 8: *Why are the numbers given with the figures different from those given in section 3.2?*

The % values given with figures 4 and 5 refer to the specific pictures shown in the figures. These values are different from the mean values given in section 3.2, which average over 8-16 individual pictures taken from the respective thin sections. This will be clarified now in section 3.2 and also in the figure captions of figures 4 and 5.

Referee comment 9: *...study differences in crystal growth going along with different drip water availability.*

We fully agree with this statement, but our study was never designed to answer questions about crystal growth mechanisms in response to drip water supply, which would represent a large project by itself, and was not the scope of the present paper.

We could however well imagine a future study using, e.g., optical and transmission electron microscopy for a combined water yield / crystal fabric study on a stalagmite carrying a clear “amount effect” signal in its $\delta^{18}\text{O}_{\text{calcite}}$ record to tackle the issue.

Referee comment 10: *...specify increased vs. continuous drip water supply.*

This is true. We implicitly assume that in arid/ semiarid areas increased drip water supply basically equals a more continuous supply, which is however not necessarily self-evident. We will specify this issue in section 5.

Referee comment 11: *Table 1 column labels...*

This got lost indeed. “c” is for concentration. It will be specified in the table headers. References to the papers presenting ages of the other two stalagmites are given in the text anyway, but will be repeated in the table captions.

Referee comment 12: *...add in the figure caption of Fig. 3 that 320°C samples are externally crushed to help understand why the water yields are lower for these samples.*

This will be mentioned not only in the figure captions but also in the text (section 2.4). The differences in water yields between 320 and 480 °C extraction is largely attributed to the different temperatures (and grain sizes) applied, but also the external crushing might have led to a certain loss of water. However, this loss should be minor, as stated by Scheidegger et al. (2010).