

Author's reply to RC#1

Referee Comment 1: the methods and the monitoring program are well described but a subsection addressing the analysis of the data and respective aims (which processes are investigated?) is missing. Please provide some information about how the data is processed and analyzed.

Author Response: The comment about data analysis is too general to follow. Regarding the processes investigated, we look in general at water/rock and water/atmosphere interactions, following the practices in this research field, which are detailed in the cited literature.

RC 2a. A quantification of the many relations between the observed variables is missing (drip rate variability vs climate, cave air CO₂ vs outside temperature, etc.). Please provide the strength and respective p-values of the correlations shown in the results.

AR: Our monitoring study of Ascunsă Cave is still, after four years, in its early stages as monitoring studies go. We had the fortune to study a period of important climate changes, as described in section 3.1. Nevertheless, these large fluctuations, followed by large changes in many of the parameters we recorded, hampered any attempt at quantifying the relationship between climate and these proxies.

Regarding the use of the p-value, it is controversial and we do not normally employ it.

RC 2b. The authors do not distinguish between results and discussion section. For that reason the results section is quite long as it includes already a lot of interpretations. For the sake of a better structure and more focus I recommend splitting this large section into separate results and discussion sections.

AR: We chose to merge the Results and Discussion sections in order to help the reader follow more closely the development of our work. If the two sections would have been split, it would have been more difficult to jump back and forth between them.

RC 2c. Generally, more focus and less unnecessary information are necessary. In some paragraphs, the authors just explain that they derive anything from the observed data. Such parts could be completely omitted.

AR: The comment is too general at this point. We addressed the comments made in the main text.

RC 3. Discussion should relate results and interpretations to other studies in the field more intensely. Even though the present results section is meant to include the discussion, I could not find much comparison between the results and interpretations of this study and the outcomes of the work of others. Please add this comparison to the newly created discussion section.

AR: The issue of not including comparisons to other studies was also raised by Referee #2. Indeed, we did not make use of many comparisons with similar case studies, unless really necessary (see for example the citations in connection with the winter CO₂ peak). This comes from the fact that, fundamentally, such studies are meant to describe local characteristics and are usually meant to be a tool for case-by-case paleoclimate proxy calibration. At this point, a comparison with more sites (from Europe or elsewhere) would probably expand the discussion without bringing an important contribution. We are aware that such an approach could be viewed as a disregard of the original works in the field, but we did not intend it as such.

RC Page 2, Line 30: Reference?

AR: References follow in the next sentences.

RC Page 2, Line 34: The main drainage channel of the karst system? Please specify.

AR: Modified in text as "...a set of parameters in both the water and the air at Ascunsă Cave and, for comparison, at Isverna Cave. The latter is the main hydrological collector of the karst system which includes Ascunsă Cave (Drăgușin et al., 2014)."

RC Page 3, Line 1: only mention if there is already a reference/DOI available

AR: The sentence is intended to explain that we do not plan to make a detailed analysis of the chemistry data here. As this message could have found its place in the Conclusions section as a future development, we preferred to write it here to explain from the beginning why we don't detail the elemental analysis.

RC Page 5, Line 22: This term is not completely clear to me

AR: The term "farmed calcite" is usual in cave monitoring studies and is analogous to "modern calcite". While modern calcite could be any calcite formed recently (sometimes scraped from the tips of active stalagmites, or broken from the tips of active straw stalactites), the farmed calcite is usually deposited on glass plates during well-documented periods of time.

RC Page 6, Line 13: The methods and the monitoring program are well described but a subsection addressing the analysis of the data and respective aims is missing.

AR: The referee does not detail which type of analysis is referred to. Further, the aims of the study are stated at the end of the Introduction.

RC Page 6, Line 29: please be clear about which temperatures you are speaking (cave, outside cave, etc)

AR: The whole paragraph is about air temperature at Drobeta meteo station.

RC Page 7, Line 20: can you quantify this relationship?

AR: The correlation coefficient between Drobeta temperature and POM Entr. CO₂ is 0.81. We added this figure to the text.

RC Page 8, Line 21: please quantify

AR: The correlation coefficient is 0. Our statement is based only on the visual analysis of the two graphs.

RC Page 11, Line 7: can you test this, e.g., by a sin function?

AR: There is a resemblance between the Mg data and Drobeta temperature (a natural sine), but our dataset is too short (ending in April 2016) and is disturbed during the autumn-winter of 2015. We chose not to make the analysis of Mg vs. temperature in this manuscript, but to present it in our forthcoming paper which will focus on the chemistry and will have an extra year of data.

RC Page 11, Line 15: If you cannot draw any conclusions from these observations, why mentioning them at all?

AR: Our statement recognizes and draws attention to the fact that it is difficult at this point to use the Sr/Ca and Mg/Ca to infer, for example, the extent of prior calcite precipitation, as some readers might be inclined to. We are still in the Results and Discussion section. Later, in the Summary, we mention only that the chemistry data indicate the existence of a homogenous reservoir.

RC Page 12, Line 7: how weak?

AR: We added the values of the correlation coefficient in text.

RC Page 12, Line 30: as before: quantify strength of correlation and provide p-value

AR: In this case the analysis of the correlation was made visually over the extent of the whole record, due to the small number of calcite samples (n=4).

RC Page 14, Line 2: Up to here, the conclusions are just a summary of the previous section. Please shorten and provide some concluding remarks that may include the usefulness of these findings for other studies, possible future directions, etc.

AR: We changed the title of this section from “Concluding remarks” to “Summary”, to reflect the fact that it is intended just as a summary of the information presented so far.

Regarding future developments, we changed the first paragraph of the section as follows: “We presented here the variability of a series of chemical and physical parameters recorded in air, water and modern calcite at Ascunsă and Isverna caves in SW Romania since 2012, as a basis for speleothem paleoclimate proxy calibration at Ascunsă Cave.”

In what concerns the usefulness for other studies, there are two paragraphs that indicate it:

- the second paragraph of the Summary shows that we brought new stable isotope data from a region that is not part of GNIP
- the fourth paragraph shows that the new method of measuring gases dissolved in drip water can be applied in other cave or karst monitoring studies (either for paleoclimate, tourism or other use), critically lowering the cost of such determinations. In our view, this should promote an important improvement in these research fields.