Author's reply to RC#2

Referee Comment: Manuscript reads well, although sometimes it is difficult to follow when numerous comparisons appear in the text while the figures are dispersed between main text and supplement.
Author Response: It was the editor's recommendation to reduce the number of figures in the main text and move some of them to Supplementary Materials. For the moment we took the decision to keep this structure.

RC: As for the figures, they are of appropriate quality, but the figure captions are uninformative throughout the whole text (figure caption should include enough information to enable the figure to be self-explanatory).
AR: We considered that some of the figure contents were explained in text. Nevertheless, we clarified some of the captions.

RC: A location map is essential in order to present the distances between the investigated sites, and their position in European context.
AR: We added a new figure in the Supplementary Materials.

RC: Although most of the references are the fundamental works in the field of speleothem science and hydrology, authors should include more case studies dealing with same topic and incorporate them into the Discussion section (from Hungary, Italy, Croatia, Germany, France, Belgium etc.).
AR: 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 CO_2 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 34: What do you mean by 'main collector'? Main discharge point?
AR: The phrase was changed for clarification, to indicate that Isverna Cave collects and discharges all the water from this karst system.

RC Page 3 Line 14: or "were equipped for monitoring..." ? At this point, you should inform us which properties have been monitored (temp, RH, drip intensity .....)
AR: We changed the text and we added details to the figure depicting monitoring sites.

RC Page 3 Line 24: And what about Isverna temp. logger? Where was its position?
AR: The location of the outside temperature logger at Isverna is detailed in a new figure.

RC Page 3 Line 27: What type of loggers did you use?
AR: Logger type is mentioned at the beginning of the paragraph.

RC Page 4 Line 3: Monthly composite samples or daily collected water? Try with: We measured 215 composite samples of monthly collected rain and drip water.....
AR: Text was modified for clarification.

RC Page 5 Line 18: How many equilibrators did you instal? Where? What type, A or B?
AR: Equilibrator placement is detailed in Fig. S1, Supp. Mat. We added a note in text.

RC Page 5 Line 24: In case of 'drought' like during Feb-Apr 2016, was there the same water in the equilibrator?
AR: The drought was recorded only outside. From the drip log we see that the drip did not ceased, it was only diminished. The water found in the equilibrators is continuously refreshed.

RC Page 5 Line 31: I believe these are not the same samples as mentioned in chapter 2.2. Again... composite monthly.. daily...?
AR: Subsection 2.5. is about cave water chemistry (elemental, not isotopic analysis). Regarding the sampling interval, we added that samples were taken "during each visit".

RC Page 6 Line 17: In case of snow cover measured temp. was probably higher than real outside temperature. And it could have lasted for days/weeks. I'm afraid these data are not very reliable.
AR: Indeed, this might be the case, as we sometimes find it covered in snow. We already stated that the logger was not placed following standard siting procedures. Nevertheless, the very good resemblance between this record and those from Isverna and Drobeta gives us confidence that the values reflect conditions at the surface/subsurface interface, as we already mentioned in Section 2.1.

RC Page 7 Line 7: This is based on the cave temperatures. So you discarded questionable values measured outside? Comment this, please.
AR: We do not consider our measurements to be "questionable". We modified the text and added that the logger was not placed following standard siting procedures. The very good resemblance between this record and that from Drobeta gives us confidence that the values reflect well the air temperature values and variability. The issue about having the same mean values as Drobeta might come from the local climate and it's beyond the aim of this paper to discuss this.
At the beginning of this paragraph we added the following sentence: "Cave air temperature usually reflects long term mean annual values of surface air (Wigley and Brown, 1976)." We therefore recognize the fact that cave temperature is a better estimate of long term outside means, thus making its use more suitable. We showed in text that over the last few years the temperature at Drobeta fluctuated, rising by 0.8 °C between 2014 and 2015, a period which is not fully covered by measurements at Isverna, thus hampering any long term comparisons of absolute values. Our study is continuing and we hope to have a better perspective with new data.
We brought the temperature time series up to date. We can see that the temperature inside Isverna Cave rose continuously by about 1°C since February 2016. This might be a reflection of increasing temperature at the cave location and might explain the lack of difference between Isverna and Drobeta.

RC Page 7 Line 16: If you were talking about dripping, then it would be discharge
AR: We discuss here the recharge of the karst system.

RC Page 8 Line 19: Is there a difference in CO_2 concentration due to the type of equilibrator
AR: We did not see any difference between equilibrator types. We are still testing them in two other caves, and there are no differences between type A and B at the same drip site.
We added a mention in section 2.2.: "At POM A we used a Type B equilibrator until November 2015, when we switched to Type A.". Another mention was added section 3.3.: "Supported by the resemblance between CO_2atm and CO_2ca at POM A, we can state that the change in equilibrator type at POM A in November 2015 did not seem to affect the measured values of CO_2ca."

RC Page 9 Line 8: (IAEA/WMO, 2016).
AR: This data were produced during this study. We added this information to section 2.2.: "Monthly composite rain water samples were collected at Isverna and Drobeta Turnu Severin meteorological station…"

RC Page 10 Line 14: Are those values measured from daily or monthly samples? Is that 2014? 17 Aug 2014 and 17 Sept 2014?
AR: These are spot samples. We modified section 2.2., adding the text: "Drip water was collected during each visit, at roughly 6-8 weeks intervals, using 2 ml glass vials." The dates are from 2014 and we added the full year, for disambiguation, for all figures.

RC Page 10 Line 23: In Isverna precipitation?
AR: The paragraph treats the cave drip waters. As stated, precipitation stable isotopes were measured from monthly samples.

RC Page 10 Line 26: It is the reaction of the aquifer. It is not the same water (as your analyses proved)
AR: The comment is unclear. We showed that the two rain events likely originated in a region with unusual isotopic values and these values acted as tracers for the infiltrating waters. The next sentence states that these rain events did not contribute much to aquifer recharge, but due to the low quantity of water in the karst system (seen as low drip rate), they were able to modify its isotopic value.

RC Page 10 Line 29: Summer drought would be associated with higher values?
AR: We are discussing here the drip rate variability, where drought leads to reduced recharge, thus low drip rates. We modified the text for clarification.

RC Page 11 Line 21: Can you provide a table in Suppl. with all data at one place, so we can observe the variation, number of samples, collection periods, water d18O values etc.?
AR: A table containing all the data was attached to the supplemental materials.

RC Page 11 Line 31: Not clear.
AR: The phrase was modified, for disambiguation.

RC Page 12 Line 1: How? Why? Very often slow steady drip sites produce speleothems under kinetic equilibrium
AR: At POM 2 the drip rate is not steady, it varies throughout the monitored period, on a generally decreasing trend. We modified the paragraph in order to clarify the interplay between PCO_2 and drip rate and their relation to calcite $\delta^{13}C$.

RC Page 13 Line 4: I wouldn't say that MAAT of 14.25 °C at 460 m asl and 14 °C at 77 m asl "fit". More convincing are cave temperatures reflecting outside MAAT (10.06 °C at 460 m).
AR: Please see the reply for **RC Page 7 Line 7.**

RC Page 20 Line 5: I think it would be useful if you put short explanation about what you have found out by this approach
AR: It is the journal policy to have concise figure captions. The results of the air mass trajectory modelling are presented in section 3.4.1.