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Comment on egusphere-2022-386

Anonymous Referee #2

Referee comment on "The 8.2□ka event in northern Spain: timing, structure and climatic impact from a multi-proxy speleothem record" by Hege Kilhavn et al., EGUsphere, https://doi.org/10.5194/egusphere-2022-386-RC2, 2022

Review "The 8.2 ka event in northern Spain: timing, structure and climatic impact from a multi-proxy speleothem record" by Kilhawn et al.

This manuscript presents a speleothem record from northern Spain (El Soplao cave) that covers the 8.2 ka event with a well-stablished chronology. The record was presented in a previous paper focused on other time period (Rossi et al., 2018) and the chronology has now been improved. The main highlight is the combination of proxies to really infer the climate signal in this region as response to the 8.2 ka, combining growth rate, stable isotopes and trace elements with adequate resolution. There is a nice discussion to interpret the proxies and an excellent comparison with other speleothem records from W Mediterranean. The authors conclude that this event was synchronous in Greenland and S European records, with similar structure. I just have few comments that can be easily solved in a new version of the manuscript, previously to its acceptance.

- The influence of temperature and amount of precipitation in the rainfall isotopic composition (i.e. $d^{18}O$) is not easy to determine in this region. I like the approach of separating both influences as it is presented in Fig. S2 (lines 112-115 in the main text) but I think that, from the graphs, an acceptable correlation with temperature can be inferred, excepting for samples with very high precipitation. I think those samples may correspond to heavy summer storms that can provide very negative values although temperature is high. The authors may want to check it. Therefore, this figure and the obtained correlations need a more detailed consideration and probably giving a more important role to temperature variation.
- Besides, in line 465, it is considered a $d^{18}O$ – temperature gradient between 0.24 – 0.34 ‰/°C, following GNIP results presented in (Domínguez-Villar et al., 2008), values that can be higher in other areas in northern Spain (please, check Moreno et al., 2021 for information at event-scale). If those values are higher, they won't be counterbalanced by the temperature dependence of water-calcite isotope fractionation in the cave. Thus, I would not exclude so rapidly temperature as an important influence on $d^{18}O$ record. I think that temperature influence can be higher than 0.11 ‰/°C as pointed the authors in line 468. Still, I agree with the authors that very likely, the

effective recharge was a more important factor on $d^{18}O$ values.

- Although I agree that other records such as lake or marine sediments lack the adequate resolution (in the sampling and in the chronology) to provide information about the timing of the 8.2 ka, I don't agree about neglecting the information they can offer on the impact of that event. I think that information can be of importance to get the regional picture and try to stablish the forcing mechanisms. It is important to include some lacustrine records and archaeological sites in the discussion section 5.2.3 since they are indicating, in general, a dry period during the 8.2 ka event, contrarily to what is observed in the speleothem records. I would recommend checking the Basa de la Mora record (a well-dated Holocene record from a lake in the Central Pyrenees) (Pérez-Sanz et al., 2013); the pollen record from marine core MD952043 and references therein (Fletcher et al., 2013) and a compilation of archaeological sites from the Ebro valley that were abandoned during the 8.2 ka due to dry conditions (González-Sampériz et al., 2009). There is also a recent paper on this topic (García-Escárzaya et al., 2022). I think all these records will enrich the discussion and may allow to define different regions in Iberia with distinct responses to the 8.2 ka event.

Minor comments:

- I miss the age model figure for SIR-1
- I am surprised that generating a new chronology for the presented records provides such differences in timing comparing with the previous ones (more than 200 years of temporal shift in some cases). This is important to me since considering one or the other way of generating the age model makes the 8.2 ka event to be synchronous or not. I wonder if the authors considered to improve the chronologies with more dates, not only with a different modelling approach to get a more robust approach here.
- Line 691: the reference Zielhofer et al., 2019 does not correspond to SW Europe (it may be better to talk about W Mediterranean).

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