

Interactive comment on “Last Interglacial (sensu lato, ~130 to 75 ka) sea level history from cave deposits: a global standardized database” by Oana A. Dumitru et al.

Vanessa Johnston (Referee)

General comments:

The dataset compiles chronologically constrained, paleo relative sea-level based on previously published proxy records from cave deposits. The dataset has been compiled using a standardized format as part of a wider project to collate worldwide paleo sea-level data. In this way, the data are presented in a format that is easily usable by researchers who are not necessarily experts in cave deposits. This unique dataset, focusing on cave deposits, is an important addition to the database of more commonly used sea-level proxies, such as corals. The data, extracted from the original publications, appear to be inserted in a thorough and complete manner.

The manuscript accompanying the dataset is informative and well written. It states clearly how these deposits form and their significance to reconstructing paleo sea-level, with the use of simple diagrams, enabling researchers from other fields to understand the formation processes of these unique cave deposits. Moreover, it discusses the limitations of these deposits for assessing the paleo sea-level, both temporally and spatially, and outlines the uncertainties on these values with respect to the data in the dataset. The discussion presents the data in simple graphical forms and remarks on the significance of these data for paleo relative sea-level, glacial isostatic adjustment, and tectonic uplift. As would be expected from a manuscript accompanying a dataset, the authors have made no attempt to analyze the data in terms of paleoclimate/tectonics but have outlined some of the conclusions from the original publications and identified research directions to improve and expand the dataset.

*A: We appreciate your positive feedback and your suggestions. Below we address your comments point by point interspersing the review (in black) with our response (in green italics).*

Specific comments:

The POS are said to form in the brackish waters of the seawater–meteoric water mixing zone (line 61). In general, thermodynamic models of the mixing between seawater and calcite-saturated meteoric water produce aqueous solutions that are under-saturated with respect to calcite, and thus, promote calcite dissolution. The authors later note that the POS only form with the fluctuating water table, which is a key concept from a geochemical perspective and could be easily overlooked. I feel that this explanation of POS formation should be slightly expanded to overcome problems that may arise when a reader might expect calcite under-saturation in this zone, rather than the carbonate precipitation that is evident from the formation of these cave deposits.

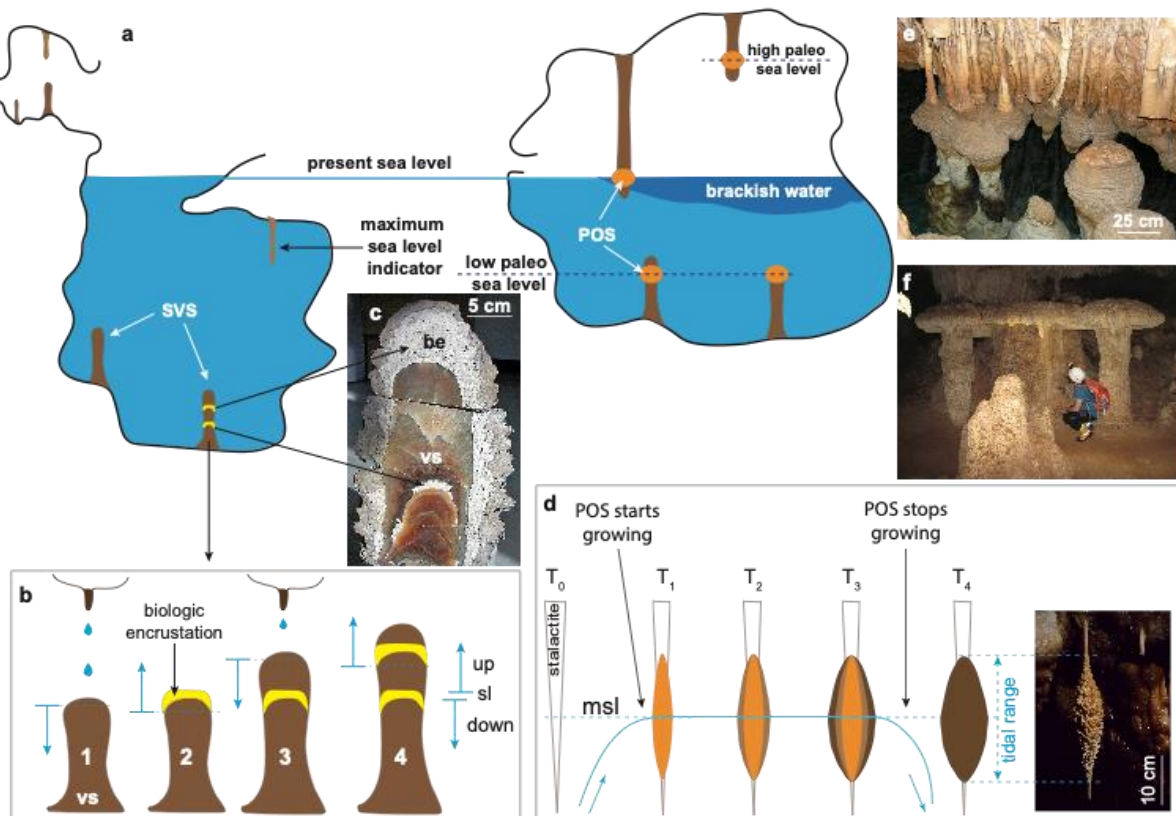
*A: To address your concern regarding the POS precipitation and to clarify this process for the reader we added the following text (63-74):*

*“POS form on submerged cave walls and pre-existing vadose speleothems at and just below the water table (Ginés et al., 2012), when seawater mixes with meteoric water inside caves that are located in the close proximity to the coastline (within 300 m). The pre-existing vadose speleothems become partly submerged in the resulting brackish water. Previous petrographic investigations of these deposits suggested that the major control on carbonate precipitation is the ability of CO<sub>2</sub> to degas across the air-water interface (Pomar et al., 1976; Csoma et al.,*

2006). These findings are supported by present-day observations that indicate the upper 40 cm of the water column being supersaturated with respect to calcium carbonate allowing for POS to form (Boop et al., 2014). While meteoric-marine mixing zones are mostly referred as sites of extensive dissolution, aragonite or calcite precipitation occurs when a high concentration gradient between  $pCO_2$  of the cave water and atmosphere exists. Therefore, faster degassing is expected to happen in caves with low  $pCO_2$  in their atmosphere. Corrosion of carbonate minerals was noticed in some Mallorcan caves, particularly when approaching the halocline; however, both calcite and aragonite are presently precipitating at the water table in the mixing zone, where numerical model predicts dissolution (Csoma et al., 2006).”

Figure 1: This figure provides a good overview of the formation of POS and SVS deposits. However, I find that part b should have a better explanation to explain more clearly what the arrows are showing. In part c, the graph is very small and difficult to read in comparison with the other parts of the figure. Furthermore, it is a conceptual model but there are values on the y-axis; are these values referring to a specific case? Perhaps the x-axis also requires an arrow indicating “time”. As a suggestion, the size of the orange oval (POS deposit) could be increased over time through points T1–T3 to show that it is growing. The inset photo in part c should probably include a scale and location information. Part d requires a scale.

A: Thank you for your suggestions. Figure 1 has been updated accordingly.



Technical comments:

Ln 13 and throughout: Please check consistency of text between “sea level” and “sea- level”.

*A: We checked and used consistently “sea level” when used as noun and “sea-level” when used as an adjective.*

Ln 32: Remove the word “former” as it is not needed because you have “paleo” in the sentence. Also, sea-level should perhaps be plural since the sentence ends with “them”.

*A: We updated the text accordingly.*

Ln 36: Please add the word “period” after “the last interglacial”.

*A: Added.*

Ln 40: Consider adding “partial”, or similar, before the word “analog”, as it is not a strict analog due to a different orbital configuration.

*A: Added.*

Ln 49: Please add the word “level” after the word “sea”. Consider converting “still stand” to “stillstand” and, throughout the text, also consider the usage of “high stand or highstand”, and be consistent.

*A: We updated the text accordingly.*

Ln 52: The letter “L” in the word “AnaLysis” should probably be capitalized following the SISAL acronym.

*A: Corrected.*

Ln 61: Consider changing “sea water” to “seawater” and check consistency throughout the manuscript.

*A: Changed and used consistently throughout the manuscript.*

Ln 119: Please add the word “period” after “the last interglacial”.

*A: Added.*

Ln 133: Perhaps quote “xls” as “Microsoft Excel .xls” (or indeed .xlsx), or similar.

*A: Done.*

Ln 135: Please change the word “which” to “that” (because “which” should almost always be preceded by a comma).

*A: We updated the text accordingly.*

Table 1: This table is a bit difficult to follow since the locations/deposit types have been placed central to the row to which they refer. Please format in a different way.

*A: We agree and we formatted the table such that it is now easier for the reader to follow.*

Fig. 2 caption: Please change “modelled” to “modeled” as you are using American English.

*A: Changed.*

Ln 207: Please remove the word “times”.

*A: We removed this word.*

Ln 262: Please consider changing the word “high” to “large” [uncertainties].

*A: Done.*

Ln 265: It is unclear to what the word “respectively” is referring to.

*A: The word “respectively” is not needed in this sentence and so, we deleted it.*

Fig. 3 caption: Remove the full stop after the word “Figure”.

*A: Removed.*

Ln 284: Please insert parentheses around the “e.g.,” clause. For example (e.g., your text here).

*A: Done.*

Ln 294: The dates quoted here require a citation in this sentence.

*A: We added the reference: Wainer et al., 2017.*

Ln 316: Please change the hyphen to an en-dash between “Atlantic” and “Caribbean”.

*A: Done.*

Ln 318: Please remove the space between “5” and “c”.

*A: Removed.*

Ln 319: Perhaps it would be clearer to write “reaching above –11 m, but not as high as –4.9 m” as “between –11 m and –4.9 m”.

*A: We agree and we changed the text accordingly.*

Fig. 4: Change Harmon citation date from 1878 to 1978!

*A: Changed.*

Ln 347: The word “authors” should be authors’ (add apostrophe) because it is a possessive meaning being used.

*A: Done.*

Ln 348: Please remove the words “the former”.

*A: We removed this word.*

Ln 363: Please use an en-dash between the “5c” and “a” (i.e., 5c–a).

*A: Done.*

Ln 385: Please change “refining” to “to refine”.

*A: Done.*

Ln 401: It is unclear to which island you are referring (Mallorca or Sardinia).

*A: We clarified in the manuscript and added Mallorca.*

Ln 402: Please remove spaces either side of the en-dash.

*A: Done.*

Ln 403: Please use an en-dash, rather than a hyphen, between the words “Pleistocene” and “Holocene”.

*A: Done.*

Ln 407: Please use an en-dash between the values 600 and 400 ka.

*A: Done.*

Ln 408: Please change hyphen for an en-dash and remove spaces before and after to become “MIS 11–MIS 5e”.

*A: Done.*

Ln 415: Please add the word “period” after “the last interglacial”.

*A: Added.*

Ln 424: Please consider removing the “etc.” and changing the sentence to a phrase, such as “... benefit research related to other disciplines, such as, water resources availability, sea-level rise, and saltwater intrusions.”

*A: Done.*

Ln 430: This line states “elevations much lower than present in caves”, I presume you are referring to present sea-level, please then add the word “sea-level” into this phrase.

*A: Added.*