

## ***Interactive comment on “Pacific climate reflected in Waipuna Cave dripwater hydrochemistry” by Cinthya Nava-Fernandez et al.***

**Anonymous Referee #1**

Received and published: 27 January 2020

This manuscript reports the results and interpretation of a multi-year cave monitoring study in an ENSO-sensitive region of New Zealand. With a few minor exceptions, largely relating to oddly used commas, the writing is clear and the paper is well organized. The figures are appropriate and nicely constructed. I list specific comments below, none of which should require much work to incorporate. As I mention a couple of times, it seems odd that barometric pressure data were not included. The authors reference a 2008 study of the same cave and I argue strongly that data from this study should be included here, even if they don't overlap with the years that CO<sub>2</sub> and drip-water were measured here.

With respect to the particular criteria of the journal:

1. Does the paper address relevant scientific questions within the scope of HESS?

C1

YES 2. Does the paper present novel concepts, ideas, tools, or data? A BIT 3. Are substantial conclusions reached? A BIT 4. Are the scientific methods and assumptions valid and clearly outlined? LARGELY 5. Are the results sufficient to support the interpretations and conclusions? LARGELY 6. Is the description of experiments and calculations sufficiently complete and precise to allow their reproduction by fellow scientists (traceability of results)? YES 7. Do the authors give proper credit to related work and clearly indicate their own new/original contribution? YES 8. Does the title clearly reflect the contents of the paper? YES 9. Does the abstract provide a concise and complete summary? YES 10. Is the overall presentation well structured and clear? YES 11. Is the language fluent and precise? YES 12. Are mathematical formulae, symbols, abbreviations, and units correctly defined and used? YES 13. Should any parts of the paper (text, formulae, figures, tables) be clarified, reduced, combined, or eliminated? A BIT 14. Are the number and quality of references appropriate? YES 15. Is the amount and quality of supplementary material appropriate? YES

Specific Comments Line 29 – and CO<sub>2</sub> concentration

35 – diffuse flow, fracture flow, and combined flow

37 – is buffering the right word? Perhaps homogenization?

49 – atmospheric-oceanic

55 – does eastern NZ refer only to the North Island? If not, then leave as is, but given that a lot of paleoclimate work (pollen, glaciers, speleothems, etc) has been done on the South Island, it is important to distinguish between N Island-only signals and those that impact all of NZ.

61 – short time span (beginning early 1800s).

61 – priority, both because

62 – I would add that we still don't really understand the nature of ENSO over the last few millennia and ENSO-sensitive sites capable of providing meaningful reconstruc-

C2

tions are highly valued.

68 – either write atmospheric-oceanic or atmosphere-ocean

70 – I don't understand this claim; can't one calibrate d18O in snow atop glaciers v temp? Coral geochemistry vs SST? Marine core top calibration is commonly done. Tree rings seem to be one of the few records truly complicated by modern calibration owing to (likely) CO2 fertilization effects.

77 – hydrology, and hydrochemistry is critical

78 – in speleothems because numerous studies have shown imperfect replication between coeval stalagmites or plate-grown calcite, as well as differences in dripwater chemistry.

85 – in my opinion, speleothem paleoclimate work is shifting toward an understanding that cave hydrology/dripwater geochemistry is a prerequisite for meaningful interpretation of speleothems. However, it is not enough. Speleothem records must also be replicated. I would like to see some mention of that here.

89 – please differentiate more fully between fracture flow and “iii) conduits with high flow rates”

99 – increasing PCP depending on their partition coefficients in calcium carbonate

104 – here you write “south-western”, but earlier you use SW. Be consistent, but don't hyphenate southwestern.

105 – not sure Borneo is the southwestern Pacific. It's equatorial to slightly NH.

118 – need a verb after iii)

130 – are you sure “typic orthic allophanic” is the appropriate way to describe these soils?

143.- and recorded

### C3

149 – 22 km is a pretty long distance. Why include this station? Why not just the one 13 km from the cave?

150 – please expand on the methods for monthly rainwater collection? What was used to minimize evaporation?

170 – was counted

174 – of variation (CV)

178 – of dripwater and stream water

233 – CV has already been defined

247 – I understand that the data are significant to three places, but it is distracting to include values in the hundredths place for delta values. It is easier to remember and no less significant to the story if you write “varied between -3.0 and -2.4‰. . . -5.9 and -5.2 for d18O. . .”

258-261 – why not include mean and standard deviation here? Much more informative than range alone.

266 – PCP has already been defined

267 – see my earlier comments regarding reporting the hundredths (or thousandth!) place

285 – this correlation deserves at least a little bit of explanation. Would have been nice if the cave monitoring had included barometric pressure. . .

288 – this is a long, but incomplete, sentence. “This work is aimed”

290 – physiochemical?

308 – I am not convinced the data “confirm” anything, but they do “suggest” or “argue for” fracture flow

### C4

329 – this discussion of amount effects in the rain data is too abbreviated. The origins of amount effects have been demonstrated to reflect any of a suite of drivers, including storm track, and these should be fleshed out here in more detail.

337 – why the open paren?

382 – again, it would have made a great deal of sense to have installed a barometric pressure logger within and outside the cave to address questions of ventilation.

385 – put references in parentheses

387 – Wood Cave, located # km (direction) from Waipuna Cave,

412 – Replot some of the data from Fernandez-Cortes et al., 2008 in this paper to illustrate the effects of air pressure.

428 – Is this section title, while poetic, a touch too flowery?

Figure 3 – please add to the figure itself the intervals for which no data are available. Don't rely solely on mentioning this in the caption.

---

Interactive comment on Hydrol. Earth Syst. Sci. Discuss., <https://doi.org/10.5194/hess-2019-647>, 2020.