

## ***Interactive comment on “Regional-scale paleofluid system across the Tuscan Nappe – Umbria Marche Arcuate Ridge (northern Apennines) as revealed by mesostructural and isotopic analyses of stylolite-vein networks” by Nicolas Beaudoin et al.***

### **Anonymous Referee #2**

Received and published: 9 June 2020

General Comments: This paper presents a multi-faceted approach to understanding the paleo-fluid history of the Tuscan Nappe region. A wide variety of data were used to fully evaluate the structural-fluid system, including: mineral vein petrography, oxygen and carbon stable isotopes, clumped isotopes, U-Pb dating of calcite veins, depth determination from stylolites, and Sr isotopes. The data appear to be good and the interpretations are generally supported by the data. All of the figures and tables are necessary. However, some of the data is not discussed in the text or presented in figures or tables.

C1

Specific Comments: However, the paper was very difficult to read due to several issues: 1) The English grammar of the paper needs to be addressed, and be more consistent throughout. Some sections were well done, while others need work. In the detailed comments below, I address some of these, but a much more thorough review is needed. Also, maybe it was just my copy of the paper, but there were commonly no spaces after semi-colons in the reference lists.

2) The authors have explicitly not followed the standard paper format of methods, followed by results, followed by discussion. Instead, they have a method, followed by a brief results section, followed by another method, then another results section, and so on. This is very distracting, and the reader has to refocus on the results after each method. Similarly, the results are not fully discussed in their respective sections, and some results are in the methods sections, as well as in the discussion. I highly suggest that the authors redo in a more conventional format.

Detailed comments (by no means complete): Line 40: ‘ubiquitous’ seems like an odd word to use here. Maybe ‘a variety’?

Line 47: instead of ‘make’, ‘allow’ or ‘facilitate’

Line 52: instead of ‘witness’, maybe ‘be influenced by’

Line 56: instead of ‘for instance’ use ‘for example’ as a lead off to the sentence.

Line 87: define ‘LPS’

Line 91: ‘is’ not ‘was’ also elsewhere tense agreement.

Line 92: ‘consider’ not ‘considered’ (as above)

Line 100: be careful about using ‘for the first time’. I suggest leaving it out.

Line 119: should be ‘piggy-back’

Line 120 and throughout: please use dates in addition to stage/age names

C2

Line 121: 'convexity' is awkward.

Line 128: what is meant by 'for long'? Line 134: maybe: 'Even if the interpretation of basement shortening is more accepted now'...

Line 138: 'In these last views' is awkward

Line 144: 'Nowadays' is awkward

Line 153-162: stage/age dates needed

Line 179-180: this is a result

Line 186: need parentheses around 'sigma 1'

Line 190: what is meant by 'regimes'?

Line 196: What are criteria for 'most representative fracture data'? and what about the other data?

Lines 210-212: the authors say that this set will not be discussed further, but it is covered later in lines 464-470.

Line 212: a better word than 'gathered' is needed

Line 255: give equation a number and take out of sentence.

Line 257: remove 'classic'

Line 284: instead of 'that filled up' use 'in'

Line 286: what are 'diagenetic states'?

Line 288: do not capitalize oxygen and carbon

Line 293: where were the host rock samples taken in proximity to the veins? Was there any vein-fluid host-rock interaction?

Line 298: how long were samples held at 90 degrees?

C3

Line 307 and throughout: please be careful about using VPDB consistently.

Line 324: what are Mg-samples??

Line 330: instead of 'spread on' maybe use 'distributed over'

Lines 333 to 340: be careful of the use of radiogenic. Not appropriate here. Lines 352-367: need some references here on the methods used.

Lines 390-399: difficult to read, maybe present these data in table form.

Line 403: do not capitalize calcite

Lines: 405 to 409: need more details on the method here

Line 425: define 'favorable'

Line 445: instead of 'witnessing' maybe 'experiencing'

Line 478: instead of 'propose' use 'will'

Line 483: do not capitalize west

Line 484: what is 'abnormal burial'?

Lines 493-494: wording of this sentence is awkward

Lines 509-511: this sentence not clear

Line 529: specify 'calcite twins'

Line 533: instead of 'history' use 'histories'

Line 534: better explain 'clearly exhibit a singular history'

Line 536: is there something missing at the beginning of this paragraph?

Line 537: it is not clear how this value was obtained.

Line 542: same as above

C4

Line 550: starting a sentence with 'That' is awkward

Line 554-570: this entire paragraph is very confusing and not clear. Please rewrite and also be consistent in VPDB.

Up to here, there has been no discussion of carbon values or the clumped isotopes.

Lines 574-577: careful of use of depleted, overprinted, 'very positive'

Lines 590-593: this is a very long sentence. Please break apart for clarity. Lines

594-595: this sentence is not clear. What is 'water table top difference in height'?

Line 650: remove 'unparalleled detail'

Comments of Figures and tables: Figure 3: should 'natural light' be 'plain polarized light'?

Figure 4 caption: what is meant by 'red color scale'?

Figure 6d: need 'VPDB'

Figure 7: placing formation seawater values on plot would be useful

Figure 8: contours are based on?

No figure or table with clumped isotope data.

VPDB is used throughout the paper, while V-PDB is used in the tables.

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Interactive comment on Solid Earth Discuss., <https://doi.org/10.5194/se-2020-64>, 2020.