

Interactive comment on “Cenozoic deformation in the Tauern Window (Eastern Alps, Austria) constrained by in-situ Th-Pb dating of fissure monazite” by Emmanuelle Ricchi et al.

Urs Klötzli (Referee)

urs.kloetzli@univie.ac.at

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General comments: The manuscript of Ricchi et al. provides a substantial number of new SIMS monazite spot ages from fault zone-related hydrothermal fissure monazites from the Tauern Window in the Eastern Alps substantially complementing available thermochronological data sets from the same region.

Three major periods of monazite growth are recorded between 22 – 19 Ma, 19 – 15 Ma and 13 – 8 Ma. The ages are interpreted to be related to N-S shortening in association with E-W extension, the beginning of strike-slip movements, and reactivation of strike-slip faulting in the Tauern Window. These findings very nicely support the interpretation

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of former ^{40}Ar - ^{39}Ar mica and zircon, apatite fission track ages.

I find a slight weakness in the formulation of the interpretation of the monazite SIMS dates: The monazite dates do not date tectonic activity in the sense of tectonic movements, as stated in the manuscript. They merely date fluid activity which may be indirectly related to tectonic movements. This is a slight but important difference and should be correctly stressed in the text.

Specific comments: There are a number of issues concerning BSE imaging, SIMS data reduction and interpretation which have to be addressed. Most importantly the authors use two different common Pb correction schemes which are not necessarily comparable. Therefore I have some doubts whether or not the two data sets are directly comparable, inasmuch as very small age differences (1-2 Ma) are interpreted to be significant. I would very much like to see both raw data sets reduced with the same common Pb correction scheme.

The authors interpret the BSE signal intensity, aka zonation, as representing growth domains/zones. This is not quite correct. What one sees in the BSE images is the chemical zonation and/or chemically \pm homogeneous domains. That such domains are characteristic for growth domains is an (over-)interpretation. I therefore suggest to be more objective in interpreting the monazite BSE images.

There are a number of rather vaguely formulated statements which I find should be stated more precise and stringent. For instance line 239: ‘... bring the MSWD within acceptable values...’. What such acceptable values should be remains for the reader to find out by himself. I suggest that all such formulations are avoided.

Technical comments: I find the English to be very fine and have only found a few typos. So from this point of view the manuscript is easily acceptable.

I suggest to move some statements concerning tectonism from the ‘Results’ section to the ‘Geologic settings’ section.

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Some of the figures show too small labelling. Probably this ought to be changed.

The SIMS data tables are not complete. They do not provide all necessary data for the reader. This has to be corrected.

I have given a number of specific comments directly in the manuscript.

Please also note the supplement to this comment:

<https://www.solid-earth-discuss.net/se-2019-162/se-2019-162-RC1-supplement.pdf>

Interactive comment on Solid Earth Discuss., <https://doi.org/10.5194/se-2019-162>, 2019.