

Interactive comment on “Constraints on Alpine Fault (New Zealand) Mylonitization Temperatures and Geothermal Gradient from Ti-in-quartz Thermobarometry” by Steven Kidder et al.

D. Grujic

dgrujic@dal.ca

Received and published: 17 April 2018

It was a pleasure to read your manuscript. It is very nicely and concisely written. The research is perfectly conceived and meticulously executed. Consequently, you left me very little space for comments. My principal comment is a question: Is there a reason you did not try to determine the activity of TiO_2 using the approach by Ashley and Law (2015)? Second comment is a suggestion for Conclusion (P 11, line 22): Could you instead of fluid circulation within the shear zone consider that the high temperatures exist(ed) at 8 km and bellow, higher than in a typical continental setting although with the low geothermal gradient, while the upper 8 km of the crust is a thermal boundary layer

Printer-friendly version

Discussion paper



caused by the uplift of relatively hotter rocks by the reverse component of the Alpine Fault? Overthrusting can in general induce a near-surface thermal boundary layer, the gradient in it being the function of thermal properties of rocks and rock exhumation rate.

Minor comments: 1. Please replace “Ti activity” with “activity of TiO₂ (aTiO₂)” 2. Please label consistently the temperature with symbol °C and put a space between the numeric value and the symbol. 3. Please use consistently the appropriate term “geothermal gradient” or “geotherm”. P3, line 1: replace “schist foliation” with schistosity P3, line 5: delete either contractional or shortening P 3, line 10: please put the Greek letter gamma in front of the value for the simple shear strain. P 3, line 13: All that indicates a general strain. Are there vorticity analyses for the mylonites from the Alpine fault? In addition, you first write flattening and at the end of the sentence stretch. What was the geometry of the strain: flattening, plane strain or constriction? P 3, line 35: Consider removing minus sign in front of 340 °C and changing the wording accordingly. P 3, line 37: I prefer not to use adjective “extensional” with “shear bands”. C’ are always dipping in direction of displacement, both in thrust- and normal fault-geometry shear zones (i.e., contractional and extensional settings). P 5, line 30: no need for quotation marks with CL P 5, line 33: why “apparent” rims? P 5, line 35: are garnets porphyroclasts or rather porphyroblasts? P 7, line 10: consider rewording to “wide temperature range from 360 °C to 500 °C” P 7, line 34: double check if 6 billion years is correct value and correct abbreviation. P 9, line 13: could such a difference in geothermal gradient, at relatively small distance, be steady over a geological time scale relevant to this study, unless the cause for it was active? P 10, line 22: in the previous sentence activity of TiO₂ of 0.1 was indicated, and with wording in this line it reads as if it were a high value. P 11, line 22: is there independent evidence for fluid (meteoric or metamorphic) during dynamic recrystallisation? Figure 12: consider flipping the vertical axis for the main part of the figure to be consistent with the insets (temperature decreases upward). In addition, is this rapid cooling or high geothermal gradient?

Interactive comment on Solid Earth Discuss., <https://doi.org/10.5194/se-2018-12>, 2018.

SED

Interactive
comment

Printer-friendly version

Discussion paper

