

1 **(1) comments from referees is written in bold type.**

2 (2) authors' response is written in normal type.

3 *(3) authors' changes in the manuscript is written in italic red type.*

4

5 Reply to Referee Comment (RC)

6 Thank you for reading our revised paper again. Thanks to the comments, we
7 have been able to improve the quality of our papers. We appreciate your time
8 and effort in reviewing processes.

9 We have considered the comments and taken action accordingly. We have
10 made changes to address the majority of the issues raised by the reviewer.

11

12 **Comment in pdf**

13 **Line 286: Why citation in the middle? Also line below**

14 We thank the reviewer for this comment. We have amended the sentence to try to help
15 improve clarity of the text. Constituent minerals are also changed (it is referred to in the
16 later part of this reply).

17 *"Psammitic schist and pelitic schist consist mainly of quartz, calcite, albite, phengite
18 (Radvanec et al., 1994), chlorite, and graphite. Quartz schist consists mainly of quartz,
19 phengite (Radvanec et al., 1994), albite, piemontite, garnet, ilmenite, and rutile." (Line 285 to
20 287 in the previous revised preprint)*

21 *⇒ "Psammitic schist and pelitic schist consist mainly of quartz, calcite, albite, phengite,
22 chlorite, hematite, graphite, and pyrite. Quartz schist consists mainly of quartz, phengite,
23 albite, piemontite, garnet, hematite, epidote, and rutile. The phengitic composition of white
24 mica was reported in earlier studies (e.g. Radvanec et al., 1994)." (Line 293 to 296 in marked-
25 up manuscript version)*

26

27

28 **Line 446: I do not understand this sentence, please improve clarity**

29 Thank you for pointing this out. We have amended the sentence to try to help improve
30 clarity of the text.

31 *“However, dynamically recrystallized grains in the quartz vein and fringe are considered to*
32 *have been formed by the recrystallization of quartz fibre grains that are elongated parallel to*
33 *the stretching lineation (Fig. 6b; Fig. 7a). These fibre grains are formed associated with the*
34 *opening of the vein and the formation of the veins contributes to the strain of the rock.” (Line*
35 *445 to 447 in the previous revised preprint)*

36 ⇒ *“However, dynamically recrystallized grains in the quartz vein and fringe are considered*
37 *to have been formed by the recrystallization of larger quartz fibre grains (Fig. 6b; Fig. 7a).*
38 *These fibre grains are elongate parallel to the stretching lineation and grew associated with*
39 *the opening of the vein. The formation of such veins contributes to the strain of the rock.”*
40 *(Line 461 to 465 in marked-up manuscript version)*

41

42 **Line 464: This is a very long sentence. Please, split in two for clarity.**

43 Thank you for pointing this out. We have made the correction as follows.

44 *“Trepmann and Seybold (2019) observed quartz veins that formed and developed*
45 *simultaneously with ductile deformation and documented microstructures indicating*
46 *dislocation glide and recrystallization associated with rapid stress loading from the*
47 *seismogenic zone and subsequent stress relaxation, as well as the pressure solution creep of*
48 *surrounding rock and opening and sealing of the veins (crack-seal veins) associated with*
49 *gradual internal stress loading and subsequent stress relaxation.” (Line 461 to 464 in the*
50 *previous revised preprint)*

51 ⇒ *“Trepmann and Seybold (2019) observed quartz veins that formed and developed*
52 *simultaneously with ductile deformation and documented microstructures indicating*
53 *dislocation glide and recrystallization associated with rapid stress loading (assumed to be*
54 *from the seismogenic zone) and subsequent stress relaxation. They also observed the pressure*
55 *solution creep of surrounding rock and opening and sealing of the veins (crack-seal veins)*
56 *associated with gradual internal stress loading and subsequent stress relaxation.” (Line 483*
57 *to 487 in marked-up manuscript version)*

58

59 **Line 492: I would add also a few other relevant references here**

60 Thank you for pointing this out. *We added two citations (Handy, 1994 and Platt, 2015) in*
61 *line 514 to 515 in marked-up manuscript version. We also added a new reference in line 938*
62 *to 939 in marked-up manuscript version.*

63

64 **Line 495: in?**

65 **Line 519: Here you need to be in the previous paragraph, as it is related**

66 **Line 584: Giuntoli not Giuntoil. Please correct in the manuscript and the reference**

67 **Line 592: delete .0 here and the next result**

68 **Line 603: or better equilibrated/deformed**

69 **Line 618: Again why to break the paragraph?**

70 Thank you for pointing this out. We have made the correction.

71

72 **Line 630: This is a big assumption, maybe state that it is.**

73 We appreciate the reviewer's comment. The text has been amended as follows.

74 *"These quartz-rich rocks have characteristics of quartz-dominant deformation, and quartz*
75 *veins and fringes are expected to have the same strength as surrounding rocks, suggesting*
76 *that the estimated stresses are roughly representative for the subduction interface."* (Line 629
77 *to 631 in the previous revised preprint)*

78 *⇒ "These quartz-rich rocks have characteristics of quartz-dominant deformation, and quartz*
79 *veins and fringes consisting almost entirely of quartz can be expected to have a strength*
80 *comparable to the surrounding rocks, suggesting that the estimated stresses are roughly*
81 *representative for the subduction interface."* (Line 665 to 667 in marked-up manuscript
82 *version)*

83

84 **Line 635: I would avoid it, as you said it before**

85 **Line 641: comma**

86 Thank you for pointing this out. We have made the correction.

87

88 **Fig. 12: in the fig. you write 2 sigma for all. Please correct what is wrong**

89 **Fig. 14: Same comment as in Fig. 12**

90 **Line 622: But these results overlap within error. Please, discuss this point**

91 **Line 636: slight (it is within error, right?)**

92 Thank you very much for providing important comment. We have reviewed our error
93 calculations again and determined that the following points require correction.

94 1. Our calculation had an error in the variance-covariance matrix of regression
95 coefficients in the Piezometer of Cross et al. (2017), where the covariance was
96 overestimated, resulting in an error overestimation.

97 2. The relative error due to the variance of regression coefficients was large and the
98 calculation from the error propagation using the approximate formula was inaccurate.

99 Considering these factors, a new variance-covariance matrix was calculated and 95%
100 confidence intervals for the stresses were calculated using Monte Carlo simulations.
101 *Appendix C, Fig. 12 and Fig. 14 were also modified accordingly.* As a result, the errors were
102 significantly reduced and a significant difference in stresses was identified in Fig. 14.

103 *The RMS grain sizes listed in Table 1 do not show a normal distribution, which makes*
104 *statistical treatment difficult. Therefore, the square of grain size, which shows a normal*
105 *distribution and is easy to treat statistically, is shown instead. (Table 1 in marked-up*
106 *manuscript version)*

107 *The stress estimation results in Table 2 and in the text have been revised in accordance with*
108 *the change in the stress calculation method. The changes are negligible and do not affect the*
109 *discussion.*

110

111 **Other Changes (not commented by referee):**

112 The following amendments were made to improve the accuracy of the text

113

114 *“(Sect. 2.5)” ⇒ “(Sect. 3.3)” (Line 250 in marked-up manuscript version)*

115

116 *“Five samples were collected at four locations to obtain...”*

117 *⇒ “Six samples were collected at five locations to obtain...” (Line 288 in marked-up manuscript*
118 *version)*

119

120 *In Table 4,*

121 *“0.339 (vein)” ⇒ “0.339 (vein, fringe)”*

122 *“10.170 (fringe)” ⇒ “10.170 (microlithon)”*

123 *“10–20 (vein)” ⇒ “10–20 (microlithon)”*

124 *“20–35 (fringe)” ⇒ “20–35 (vein, fringe)”*

125

126 *“5 Conclusions” ⇒ “6 Conclusions” (Line 662 in marked-up manuscript version)*

127

128 *$\frac{4}{\sqrt{3}}$ ⇒ $\sqrt{3}$ (Line 741 in marked-up manuscript version)*

129

130 One reference cited in the text was forgotten in the reference list and has been added.

131 *(Platt et al., 2018: Lines 941 to 942 in marked-up manuscript version)*

132

133 We used the polarising microscope and the Raman microscope to identify the
134 constituent minerals in more detail. As a result, we found minerals not described in this
135 paper. In addition, a mineral that was thought to be Ilmenite turned out to be Hematite.

136 *Therefore, the following text was added to lines 206-207 in the marked-up manuscript version,*
137 *and corrections were also made to Table 1.*

138 *"Constituent minerals were identified using a polarising microscope and a DXR3 Raman*
139 *Microscope (Thermo Fisher Scientific) with a DXR 532 nm laser at The University of Tokyo."*

140

141 The text in Line 271-273 was incorrect because a new c-axis fabric pattern was added in
142 the previous revision. It has been corrected as follows.

143 *"Analytical conditions were the same as for the grain size determination, except the step size*
144 *which was 5 μm for microstructures formed by SGR or SGR+GBM and 1 μm for*
145 *microstructures formed by BLG."*

146 \Rightarrow *"Analytical conditions were the same as for the grain size determination, except the step*
147 *size which was 5 μm for sample ASM2-4 and 1 μm for samples ASM1b and 5. "(Line 273 to*
148 *275 in marked-up manuscript version)*

149

150 On a closer reading of the paper we recognized that our previous summary of Takeshita
151 (2021) needs some revision. We have made the following changes.

152 1. The following text has been deleted.

153 *"A second possible explanation for the discrepancy of the results presented here and those of*
154 *Takeshita (2021) concerns the selection of microstructure for analysis. In Takeshita (2021),*
155 *especially in samples from higher metamorphic grade zone, some grain size data whose value*
156 *is small is considered "overprinting", and excluded from stress estimation (Fig. 3 in Takeshita,*
157 *2021). It is possible that quartz microstructures like our samples were excluded, and*
158 *microstructures with relatively large grain size were selected to stress estimation, resulting in*
159 *a decreasing stress trend." (Line 558 to 562 in the previous revised preprint)*

160 2. The following text has been amended as follows.

161 *"Even taking these effects into account, the obtained stress values in this study are greater*
162 *than those of Takeshita (2021). This may be due to the fact that the EBSD-based grain*
163 *boundary estimation method makes it possible to consider smaller grains." (Line 563 to 564*
164 *in the previous revised preprint)*

165 \Rightarrow *"The obtained stress values in Fig. 13 are greater than those of Takeshita (2021). This*
166 *may be due to the fact that the EBSD-based grain boundary estimation method makes it*
167 *possible to consider smaller grains." (Line 584 to 586 in marked-up manuscript version)*

168

169 To improve readability and accuracy, the layout of Figs. 1a (*font and map quality were*
170 *modified*), 2 (*"89 to 88" \rightarrow "89-88", "89 to 85" \rightarrow "89-85"*), 4 (*enlarged text on the scale bar*), 5a
171 (*"Crystallographic orientations" \Rightarrow "Quartz c-axes", enlarged text*), 5b (*the text "Schmidt net"*
172 *were deleted*), 6 (*positioning, legibility, and accuracy of text and arrows were corrected*), 7
173 (*unified scale bar size, "Quartz (BLG)" \Rightarrow "Quartz (BLG, SGR)"*), 8 (*positioning and legibility of*

174 *text were corrected*), and 12–14 (*space inserted between ±*) have been changed.

175

176 *Corrections were made to some plots in Fig. 9* as revised data were not reflected. This is
177 only little modification and it does not affect the discussion.

178

179 The caption was also amended.

180 *(Fig. 1a) Citation (Hara et al., 2018) added.*

181 *(Fig. 5a) "Crystallographic orientations..." ⇒ "Quartz crystallographic orientations..."*

182 *(Fig. 5a) the text "Colourbar scale is an indication of measured intensity" has been added.*

183 *(Fig. 5b) "Definition of OA." ⇒ "Definition of OA (opening angle)."*

184 *(Fig. 6a) the text "Hammer for scale has a 33 cm long." has been added.*

185 *(Fig. 6b) "Large fibrous quartz grains that are elongated parallel to lineation and small
186 recrystallized quartz grains were observed." ⇒ "Large fibrous quartz grains elongate parallel
187 to the stretching lineation have locally undergone dynamic recrystallization with the
188 development of small recrystallized grains."*

189

190 *We updated new code on Github and got doi as a new version (v1.2.0).*

191

192 *A new person was included in the acknowledgements.*

193

194 *Minor grammatical and expressive corrections were made in several other places.*

195

196 Once again, we sincerely appreciate the opportunity to address your comments and
197 concerns. If you have any further comments or queries, please do not hesitate to contact
198 us.

199

200 **References**

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