Dipartimento di Scienze dell'Ambiente e della Terra

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Manuscript no. egusphere-2023-126

Dear Editor,

please find attached the R2 revised version of our manuscript:

"**Kinematics and time-resolved evolution of the main thrust-sense shear zone in the Eo-Alpine orogenic wedge (the Vinschgau Shear Zone, Eastern Alps)**"

authored by

Chiara Montemagni, Stefano Zanchetta, Martina Rocca, Igor M. Villa, Corrado Morelli, Volkmar Mair and Andrea Zanchi

We wish to thank the reviewer Franz Neubauer and the topic editor Yang Chu for their careful suggestions and corrections.

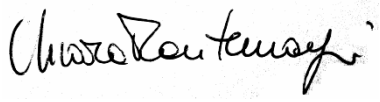
In the following notes we account and answer to all the reviewer and editor comments, which have been accepted and incorporated in the text. All changes made to the text are highlighted in the "tracked changes" version of the manuscript together with the R1 changes.

We also modified the figure 1 in order to satisfy reviewer and editor requests.

We hope that the revised manuscript will be judged improved and will be suitable for publication in Egusphere: Solid Earth.

Sincerely yours

Chiara Montemagni, on behalf of all co-authors



Milano, 26 April 2023

Changes to figures

Figure 1 has been modified according to reviewer and editor suggestions. In Fig. 1a in the legend we amended "Permian-Jurassic covers" with "Permian-Jurassic cover"; in Fig. 1c we moved the arrow pointing at the VSZ to avoid misunderstanding.

Figure 2 has been replaced as it was a typo in the previous version: we corrected "Vermoi Spitze(2923 m)" to "Vermoi Spitze (2923 m)".

Reviewer Franz Neubauer

The manuscript is dealing with the eo-Alpine ductile Vinschgau shear zone, a thrust, and proposed a well-developed state-of-the art combination of structural work and Ar-Ar geochronology associated with detailed and extensive electron microprobe work. The work could represent a model for future work on ductile shear zones.
During revision, the authors followed all comments and suggestions of the reviewer and explained all details, so that the reader can easily follow their arguments.
I recommend publication as it is, and the few typos etc. could be solved during proof-reading.

***Reviewer**: L. 67: use plural for „zone": „Large scale thrust- or normal-sense shear zones …."*
Reply: done

Reviewer: L. 71: „features from shallow depths conditions": „depth": use singular
Reply: done

***Reviewer**: L. 149-150: Make clear that the age of 450 Ma is for the Partschinser orthogneiss.*
Reply: done

***Reviewer**: L. 232-233: „VSZ studied transects": better: studied VSZ transects*
Reply: done

***Reviewer**: L. 239: „basing": better: „based"*
Reply: done

***Reviewer**: L. 277: „Correct to „Phyllosilicate domains"*
Reply: done

***Reviewer**: L. 278: „The abundance of calcite increases" (not increase)*
Reply: done

***Reviewer**: L. 347: You mean here Fig. 6a? (Fig. Xa)*
Reply: Yes, we amended it.

***Reviewer**: L. 518-519: „Meliata-Hallstatt Ocean": Potentially omit Hallstatt. The Hallstatt facies is now generally seen as outer shelf facies/upper continental slope facies.*
Reply: done

***Reviewer**: L. 525: „at least 7-8 Ma before the pressure peak recorded by the Texel eclogites": This open the question, whether the shear zone operated, at the Schlanders section, as thrust shear zone or as ductile normal normal fault at 97 Ma, when the eclogite-bearing Texel was down-doing to mantle depths. Potentially, these distinct processes are superposed on each other. However, this is a task for*

future work when more data are created for the Texel unit allowing a more detailed burial and exhumation history of the Texel unit.
Reply: we agree with the reviewer that the current data set does not allow to recognize if the first stage of activation of the VSZ around 95 Ma occurred in an extensional or contractional deformation regime. More geochronological and structural data about the P-T-t evolution of the Texel and Schneeberg units are mandatory to disentangle this problem.

***Reviewer**: L. 616: Correct to Franz (not Frantz)*
Reply: done, we are sorry for this mistake.

***Reviewer**: L. 822: Sample (upper case).*
Reply: done

Topic editor Yang Chu

This manuscript has been carefully revised and is almost ready for publication. As suggested by one reviewer, there are still some flaws to be fixed. I also give some suggestions below for minor revisions.

***Editor:** Line 19: Replace age by timing.*
Reply: done

***Editor:** Line 20: Dip is not clear here. Dip angle can increase, but I do not know how dip increases from W to E.*
Reply: done

***Editor:** Line 23: Top to the W equals to W-directed.*
Reply: done

***Editor:**Line 29: Delete direction.*
Reply: done

***Editor:** Figure 1c: The valley pointed by VSZ is Schnals, nor Vinschgau.*
Reply: done

***Editor:** Line 79: I do not know why discussing this topic, unless there are some sentences on how large shear zones develop in collisional belts.*
Reply: we modified "large" with "regional" as "large" could generate misunderstanding: the VSZ is one of the main regional scale shear zone in the Alps for its continuity of exposure both along strike and across the entire shear zone.

***Editor:** Line 445: This sentence is ambiguous. The largest shear zone in Alps is only tens of kilometers long?*
Reply: At lines 57-62 we have reported other important shear zones in the Alps: the VSZ in one of the largest and important shear zone in the Alps as it exhumed Eo-Alpine Austroalpine wedge over the Pre-Alpine tectonometamorphic units, so it is a major tectonic and metamorphic boundary. Anyway we modified a little the sentence.