

Review report by Enrico Tavarnelli for manuscript n. se-2021-29 by Dario Zampieri, Paola Vannoli and Pierfrancesco Burrato titled: “*Geodynamic and seismotectonic model of a long-lived transverse structure: The Schio-Vicenza Fault System (NE Italy)*”, submitted to Solid Earth.

This paper provides a new and original documentation of the structural history and seismotectonic evolution of a long-lived transverse lineament, the Schio-Vicenza Fault System, that dissects the thrust front of the Southern Alps in the Veneto sector of the Adria foreland microplate in NE Italy. This is achieved through a detailed and genuinely multidisciplinary approach, that integrates field mapping, stratigraphic investigation, structural analysis, seismic profile interpretation, current and historical seismicity, coupled with a wealth of data from a wide literature in the region. The topic dealt with in the study is of great interest to anyone that has an interest in understanding the evolution of the Southern Alpine system and in constraining the seismotectonic potential of the area. Moreover, the study illustrates an example of applicability of universal concepts of fault reactivation and structural inheritance under a 3D view, with emphasis on the interaction of strike-slip systems at triple junctions. These topics have generated a lively debate, and the submitted manuscript sheds new light in this direction, providing a very well-documented case. The Authors’ interpretations are consistent with the data presented, and the original “zipper model” proposed to account for strike-slip reversals is very convincing.

The manuscript is well written and well organised, with English and presentation forms that are overall very good. The illustrations and tables are all clear, legible and very much informative (but see my separate comment to Fig. 2). The quality of the contribution, in all its parts, is overall high. Good credit is given to the existing literature, both methodological and regional. However, I believe that the manuscript would benefit from a slight extension of the reference list, with citation of a few papers that are listed separately in this review report. Unfortunately, part of the suggested missing references happen to arise from my own research, and in general I am quite reluctant to self-advertise my work amongst colleagues. But the submitted manuscript refers to topics where my collaborators and I have long worked and published; thus I believe that a slight extension of the reference list with inclusion of the mentioned contributions would be highly beneficial for the reader with field examples in thrust belts that laterally flank the South Alpine chain.

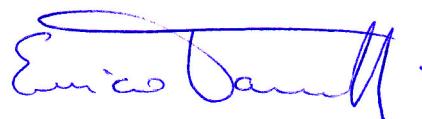
I found this an extremely stimulating contribution and believe that it will make a very interesting title for a genuinely international and multidisciplinary audience. It is my opinion that the manuscript may be accepted for publication almost as it stands, with only the incorporation of a few sentences (with related references listed below), and the insertion of minor alterations to the text for the sake of an improved legibility. Therefore, I recommend without reservations that this manuscript is accepted for publication on Solid Earth only pending on minor suggested revisions, that are listed separately.

I require no anonymity and wish that all my comments are forwarded to the Authors. I hope that my review is received as a constructive and supportive indication, that may assist the Authors to achieve an even more suitable and documentally supported paper, and the Editor in formulating a final, positive decision in the interest of Solid Earth and of its wide, international readership.

Siena, Italy, 24 May 2021

Sincerely,

Enrico Tavarnelli



A) LIST OF SUGGESTED ALTERATIONS:

Note – the parts outlined in red are suggested to be removed; the parts outlined in green are suggested to be inserted/incorporated; the parts outlined in yellow require the Authors' attention during their revision.

Page 2, Line 39: "... Carrillo et al., 2020), in the Northern-Central Apennines (Tavarnelli et al., 2001; Butler et al., 2006; Peacock et al., 2017), in the Southern Apennines foreland... ". NOTE: the reference to these papers are listed separately in the forthcoming B) section of my review report. 

Page 5, Line 100: "... in the Veneto Plain (Fig. 1), # was drawn... 

Page 7, Line 187: "... Southern Alps, which whose compressional deformation... ". 

Page 7, Line 188: "... Eastern Southern Alps, which whose deformation is still active." 

Page 10, Line 282: "... two of which we present are presented in Fig. 2 (IDs 6 and 8)... " 

Page 10, Line 282 – and also Page 9, Fig. 2 – Fig. 2, IDs 6, referred to in the text, is not indicated in the Figure. The following is stated in the Figure caption: "The IDs 4 and 6 can be found in the sheets 36 Schio (Braga et al., 1968) and 49 Verona (Bosellini et al., 1968) of the 1: 100,000 scale Geological Map of Italy. See also Table 2", but this indication is not straightforwards for the reader (al least, for this reader). It would be useful if the Authors could attempt at providing, or sketching, or summarizing, the missing information within the manuscript. Should this not be possible, the Authors should clearly indicate the missing documentation directly in the text, as they have already done in the Figure caption. 

Page 10, Line 303: "... are S-verging S-directed blind thrusts... ". The use of vergence is inappropriate here, since vergence is a property of folding, not faulting. The meaning of the sentence is still clear, but I would suggest to avoid the conceptually wrong term "S-vengent" and to replace it with the more correct "S-directed". 

Page 12, Line 351: "... from the SVFL, and not don't belong to it." 

Page 14, Line 379: "... with most of the events... " 

Page 16, Line 431: "... branchline... ". In general this is spelt with two separate words in structural accounts: branch line. I would suggest that this notation is used in the manuscript. 

Page 16, Line 438: "... Zampieri et al. (2003), in which work... ". I would change this sentence as follows: "... Zampieri et al. (2003), where the SVFS branch... ". 

Page 17, Line 461: "The study of... have been conducted by Fedorik et al. (2019) by means of... ". I would rephrase this sentence as follows: "The study of... has been carried out by Fedorik et al. (2019) by means of... ". 

Page 17, Line 476: "new thrust front of the Fig. 6c." 

Page 18, Line 497: "... moderate to large earthquakes (e.g. Tavarnelli et al., 2001; Butler et al., 2006; Di Bucci et al., 2010). 

Page 19, Line 503. I would add another important cross-lineament in the northern-central Apennines, (as a separate case.d) whose history was, similarly, characterized by a strike-slip reversal reactivation, from sinistral to dextral: this reversal occurred along the Ancona-Anzio Line (or Olevano Antrodoco Fault), as

described by Tavarnelli et al., 2001 and by Butler et al., 2006. Indeed, the following statement, already present in the text ("All these fault systems, during their long history, have seen different tectonic phases often characterised by opposite sense of shear (e.g. first right-lateral strike slip, then left-lateral strike-slip, or vice-versa"), perfectly apply to the history described by Tavarnelli et al. 2001 (see their Fig. 11a and 11b) and by Butler et al. 2006 (see their Fig. 10a and 10b). 

Page 19, Line 515: "... ~~and~~ and accommodated..." 

B) LIST OF SUGGESTED REFERENCES TO BE INCORPORATED AND ACKNOWLEDGED:

Tavarnelli E., Decandia F.A., Renda P., Tramutoli M., Gueguen E. & Alberti M. (2001) - *Repeated reactivation in the Apennine-Maghrebide system, Italy: a possible example of fault-zone weakening?* Geological Society of London Special Publication 186, "The Nature and Tectonic Significance of Fault Zone Weakening" (Holdsworth, R.E., Strachan, R.A., Magloughlin, J.F. & Knipe, R.J. , Eds.), 273-286.

Butler, R.W.H., Tavarnelli, E. & Grasso, M. (2006) – *Structural inheritance in mountain belts: an Alpine-Apennine perspective..* Journal of Structural Geology, 28, 1891-1892.

Peacock, D.C.P., Tavarnelli, E. & Anderson M. W. (2017) - *Interplay between stress permutations and overpressure to cause strike-slip faulting during tectonic inversion.* Terra Nova, 29, 61-70. doi: 10.1111/ter.12249

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