

Solid Earth Discuss., author comment AC2
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Reply on RC2

Dario Zampieri et al.

Author comment on "Geodynamic and seismotectonic model of a long-lived transverse structure: The Schio-Vicenza Fault System (NE Italy)" by Dario Zampieri et al., Solid Earth Discuss., <https://doi.org/10.5194/se-2021-29-AC2>, 2021

We would like to thank Prof. Poli for her thorough review of the manuscript and for the stimulating questions.

We answered to all the points raised as it can be seen in the attached files.

There are three main points raised by the Reviewer.

The first one is related to the completeness of the historical seismic catalogue and has implications for our hypothesis that small magnitude earthquakes occurred along the SVFS in the past years.

There are two kinds of completeness that can be discussed: one regarding the earthquake list included in the catalogue, and the completeness of the macroseismic information related to the single earthquake. In both cases, completeness is related to the magnitude and age of the event, for lower magnitude earthquakes the threshold of completeness is closer to the present day than for higher magnitude. We think that further discussing this topic is beyond the scope of the paper.

In any case, our hypothesis derives from the following observations:

- 1) the earthquakes listed with only one macroseismic data point are real earthquakes, otherwise they would not have been listed in the catalogue (the authors of the catalogue found historical documents describing the event);
- 2) they may be low magnitude events because the two cities are very close to each other and high magnitude events could have been felt in both localities;
- 3) it is true that the macroseismic dataset for these events may be incomplete (lost historical sources or never written sources), but this is more probable to happen for low magnitude events producing small macroseismic effects, and also for the same reason they have been registered only in the main city of the area hit and consequently their true epicentral location is not really the city itself but they may be located somewhere nearby;
- 4) being very probably low energy local events occurred close to the main cities, our

hypothesis is that they may have been generated by the SVFS (the only mapped active fault system of the area);

5) finally, these historical events may have been similar to the 20 February 1956 earthquake.

The second main point raised is related to the focal mechanisms of the small magnitude earthquakes shown in Figure 4, and if they can be used to infer the kinematics of the active faults present in the area.

Most of the earthquakes shown with the focal mechanisms are small magnitude events most probably not located on the main faults forming the opening zipper. So they cannot be used to infer directly the kinematics of the faults. However, their focal mechanisms are in agreement with the regional stress regime that is the engine responsible for the kinematics of the different faults (that changes according to their orientation).

The same is true for the earthquakes #7 and 9, whose causative faults according to their magnitude are in the order of few hundreds of meters long and may be secondary structures located in the footwall block of the SVF.

Of all the events shown in Figure 4, the most reliable is the #4 that due to its magnitude is the better located and is compatible with the right-lateral kinematics of the northernmost section of the SVF.

The third and last main point raised by RC2 is related to the discussion about the geodynamic engine of the SVFS linked to the indentation and CCW rotation of Adria.

We note that we highlighted the connection of the complex kinematics of the SVFS with the geodynamic engine in different sections of the text and also for example in Figure 7.

In our interpretation, the SVFS is accommodating the indentation of the Adria plate. We did not consider the CCW rotation of Adria because it has no effects on the fault activity and kinematics (it explains the increasing shortening moving eastwards registered across the Southern Alps thrust fronts). However, we think that there is a little difference in respect to the interpretation given by the reviewer.

The Posina triple junction is located inside the thrust belt and not at the most external front, so we think that the opening zipper model is a result of the presence of the back-stop of the Giudicarie belt that interacted with the northward propagation of the SVFS. In this sense, the right-lateral motion of the SVFS north of Posina should not be related to the differential propagation of the ESA thrust fronts.

Best regards,

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Please also note the supplement to this comment:

<https://se.copernicus.org/preprints/se-2021-29/se-2021-29-AC2-supplement.zip>