Solid Earth Discussions

Solid Earth Discuss., referee comment RC2
https://doi.org/10.5194/se-2021-19-RC2, 2021

Comment on se-2021-19

Christoph von Hagke (Referee)

Referee comment on "Neogene kinematics of the Giudicarie Belt and eastern Southern Alpine orogenic front (northern Italy)" by Vincent F. Verwater et al., Solid Earth Discuss., https://doi.org/10.5194/se-2021-19-RC2, 2021

This mansucript adresses the amount of shortening associated with the Giudicarie Belt, a key structure for understanding the Neogene evolution of the Alps. Using balanced cross sections, the authors find that most of the offest of the Periadriatic Fault can be linked to shortening in the Giudicarie Belt. They place their findings in the ongoing discussion on the deep structure of the Alps.

This manuscript is well written, and well structured. The constructed cross sections are sensible, and it is great to see that the authors published the full models as supplement. The study is an important contribution and can be published after some minor revisions.

General comments:

While the authors state that it is necessary to take into account strike slip movements during balancing, their modeling in fact is 2-D, and the respective error remains unknown. Second, I find it unfortunate that the forward modeling approach is discussed in the supplement only. Even though the manuscript would be longer, I find it important to show the approach and the uncertainties in the main text. These cross sections are the heart of the manuscript. Hypocenters of earhtquakes partly do not plot on faults (Fig. 6), and it would be important to explain that.

Revermann et al. 2012 provide AHe data from the Adamello showing exhumation increasing at 10-8 Ma, which is slightly younger than the Valsugana Phase. This should be included and discussed.

Figure 3 can be improved. 3a: show an uninterpreted version + the interpreted version including S0 and say what the stippled lines mean (fold axes). Image size should be enlarged. 3B: indicate S0 also for the Dolomia Principale. Also here a separate interpretation wold be good. 3d: a more oblique view on the plane would have been good to show more clearly the shear sense. Generally more field pictures with more extensive descriptions would have been appreciated.

Minor comments:

Line 39: this has been said earlier than in Scharf et al. 2013

Lines 68 ff: replace "chapter"

Line 120: Tonale Fault and Pusteria Fault are named Tonale line & Pusteria Gailtal Line in Fig. 1. Both is acceptable, but should be used consistently.

Line 144: references missing

Line 172: sth went wrong with this sentence (?)