

Solid Earth Discuss., referee comment RC2
<https://doi.org/10.5194/se-2021-67-RC2>, 2021
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Comment on se-2021-67

Giuliana Rossi (Referee)

Referee comment on "1-D velocity structure modelling of the Earth's Crust in the NW Dinarides" by Gregor Rajh et al., Solid Earth Discuss.,
<https://doi.org/10.5194/se-2021-67-RC2>, 2021

Review of the paper "1-D velocity structure modeling of the Earth's Crust in the NW Dinarides" by Gregor Rajh et al.

The paper investigated the crustal velocity structure of NW Dinarides with 1-D simultaneous hypocenter-velocity inversion using routinely picked P wave arrival times. The authors evaluated the inversion results with hypocenter shift tests, high- and low-velocity tests, and relocations. Based on these tests, the region is subdivided into three sub-regions, giving insights into the crustal structure and helping a fast routine earthquake location.

The paper is well organized, and the tests on the validity of the results are accurate. It is an interesting contribution to a future more profound knowledge of this region's crustal properties and structure, located at the triple junction of the Alpine, Adria, and Pannonian domains. It needs, however, some moderate revision before being accepted.

The first thing is to include S waves in the analysis since S-wave phases add significant additional constraints on hypocenter locations; they can also be inverted separately, providing insights into the V_p/V_s ratio, here already shortly discussed.

The other main point on which to think about is the lack of seismicity above 8 km depth in the NW part of the region (line 457). This result also puzzles me, since it contrasts with other authors' s results, that, however, entered in the construction of the Magrin and Rossi's model, that are compared with the present results with apparently a good fit.

Regarding partially to this, there is an extensive literature cited, but I think that some seminal papers about the Adria microplate are lacking: e.g., Anderson and Jackson, 1987; Fodor et al., 1998; Battaglia et al., 2004 (in the initial part of the tectonic setting chapter). In the following paragraph, ending at line 127, add also reference to Weber et al., 2010; Grenerczy et al., 2005; Metois et al., 2015. In addition, the paper of Magrin and Rossi, 2020, used in the discussion, has to be cited before when other models are presented (probably in the same paragraph ending with line 127), explaining that their model is not the result of an inversion, but it is built by critically choosing and integrating all available information about the depth of the primary interfaces and the physical properties of the crust. Moreover, some essential references are lacking about the LET performed in part of the study area (NW) (Bressan et al., 2009; 2012).

With kind regards

Giuliana Rossi

More detailed comments:

Line 12: "mainly" substitute with "the most important of which are"

Line 52: add "the" before transition

Line 64: substitute deeper with "at a higher depth"

Line 141: GEOFON 2021: one searches in the references...

Line 143: add here ARSO and not in line 145, where you can simply use it.

Line 154: maybe you could also name this earthquake and cite the references of some of the studies about it (is it the 2004 July 12th one?).

Lines 162-163: maybe you can cite Bragato et al., 2021, describing the north-eastern Italy network.

Line 169: you can also cite the agreements behind this.

Line 212: "all the way" ??

Line 213: add "its velocity" after usually.

Line 257: add "a" before separate

Line 269: substitute "Iteration" with "The iterative process"

Line 365: "An" even better...

Line 367: "did not shift by much": write it better

Line 420: substitute "these parts" with "this region"

Line 421: delete "in these parts"

Figure 11: it is interesting but not very clear. We don't know the depth of the ARSO routine locations: maybe you could plot the relocated earthquakes above the grey ones so that one can better appreciate the depth color scale. However, maybe you could think to plot the differences in depth or location instead of the absolute values.

Line 454: add "the" before models.

Line 502: substitute "indicating" with "related to"

Line 527: substitute "seem" with "appear".

Lines 530-535: the agreement between the NAC model and the Brueckl et al.'s results is because the latter fed the former.

Lines 537-539: Not clear: rewrite the sentence about the discrepancy above 6 km

Line 546: deeper with respect to ? How deep is the Moho?

Line 580: Substitute "In the east" with "In the eastern part of the study area"

Line 614: Di, E, And: not capital letters

Line 617: the same

Line 623: Fur, Und not capital

References: apart what was written before, Ivancic al. 2018 not cited; Markusic, 2008: not cited; Pavlis and Booker,. 1983: not cited; Poljak et al., 2000: not cited