

Interactive comment on “Mantle flow below the central and greater Alpine region: insights from SKS anisotropy analysis at AlpArray and permanent stations” by Laura Petrescu et al.

Anonymous Referee #2

Received and published: 20 April 2020

Comments to "Mantle flow below the central and greater Alpine region: insights from SKS anisotropy analysis at AlpArray and permanent stations" by L. Petrescu et al.:

The manuscript investigates the mantle anisotropy beneath the Alpine region with updated data set from the AlpArray stations. The new results provide comprehensive knowledge on the mantle flow in the study Region due to the interaction between the European and Adria plates. It is well organized, I have only minor comments.

Vertical resolution is the problem of SKS splitting. The authors calculated the Fresnel zone and concluded strong anisotropy in the asthenosphere. It is useful. Another method is to make quantitative comparison between delay times and lithospheric thick-

C1

nesses. If lithospheric anisotropy dominates, a strong positive correlation should be clear. Otherwise, asthenospheric anisotropy is required. In this case the delay times should be as accurate as possible, so the stacked averages are better because individual SC measurement usually overestimates the delay times.

If the circular patterns of fast polarizations are result of subduction-driven mantle flow, since the subducting slab is steep here, how to explain similar fast orientations in the high (slab) and low velocity regions at 100 and 200 km depths.

Line 124: Grid search method is used here. So it is necessary to clarify the steps for fast polarizations and delay time. A short description to the uncertainty estimation is also necessary.

Line 135: Describe or show the reference for standard circular means.

Line 190: 1.0 - 2.5 s

Line 194: 1.0 - 2.0 s

Line 254: I think Figure 6 is missing. So I cannot check it.

Figure 2: Label the epicentral distances in the inset. The study region does not seem to be in the center.

Figure 4d: Label the stations in the map above.

Figure 5: In the map view, there are many NE-SW fast orientations around (6E, 46N), but they are invisible in profile D. Why?

Figure 7: Here are comparison of seismic tomography at 100 and 200 km depths with seismic anisotropy at stations. Maybe you can try to project the SKS splitting to 100&200 km depths and calculated the regional averages respectively.

Interactive comment on Solid Earth Discuss., <https://doi.org/10.5194/se-2020-7>, 2020.

C2