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New insights from analyses of geophysical data in the Northern Apennine buried structures for evaluation of their geothermal potential

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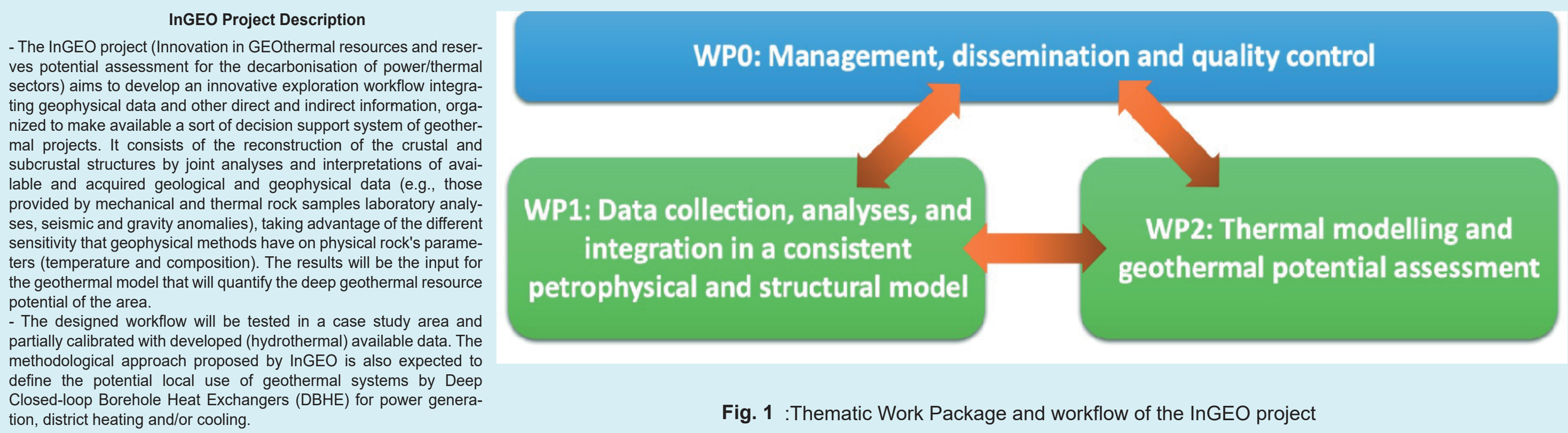


Fig. 1 :Thematic Work Package and workflow of the InGEO project

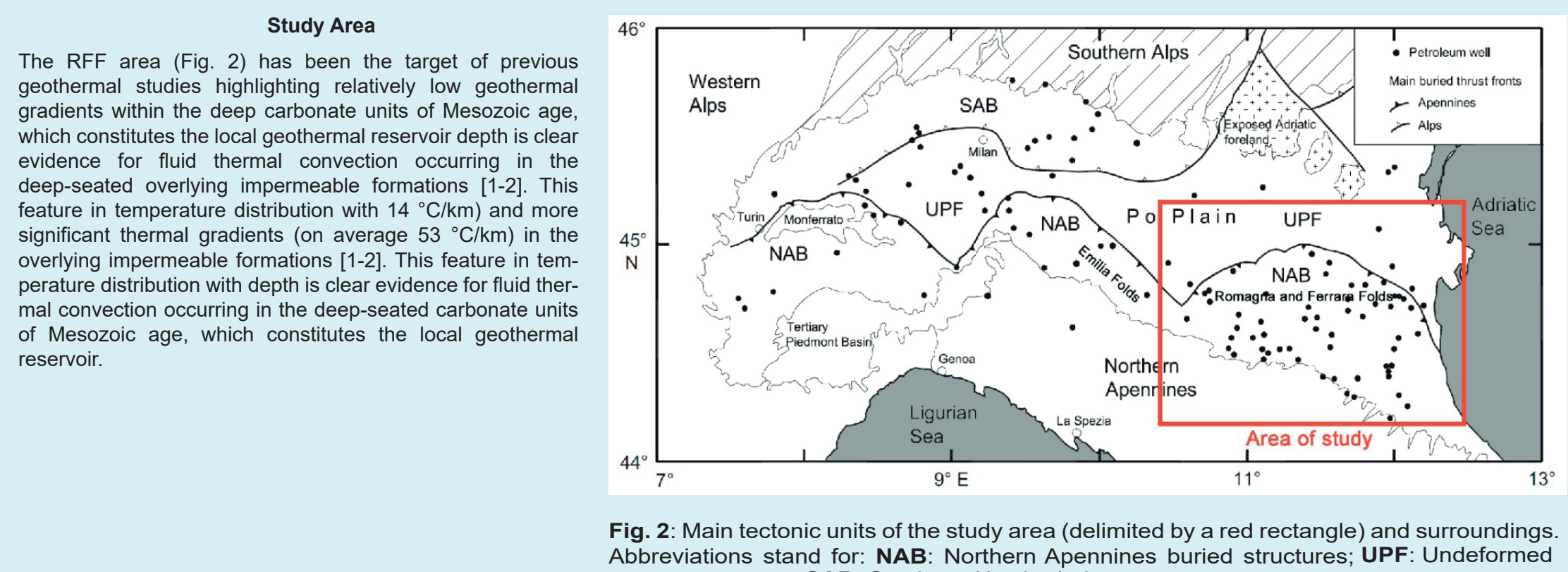


Fig. 2: Main tectonic units of the study area (delimited by a red rectangle) and surroundings. Abbreviations stand for: NAB: Northern Apennines buried structures; UPF: Undeformed Padan foredeep; SAB: Southern Alps buried structures.

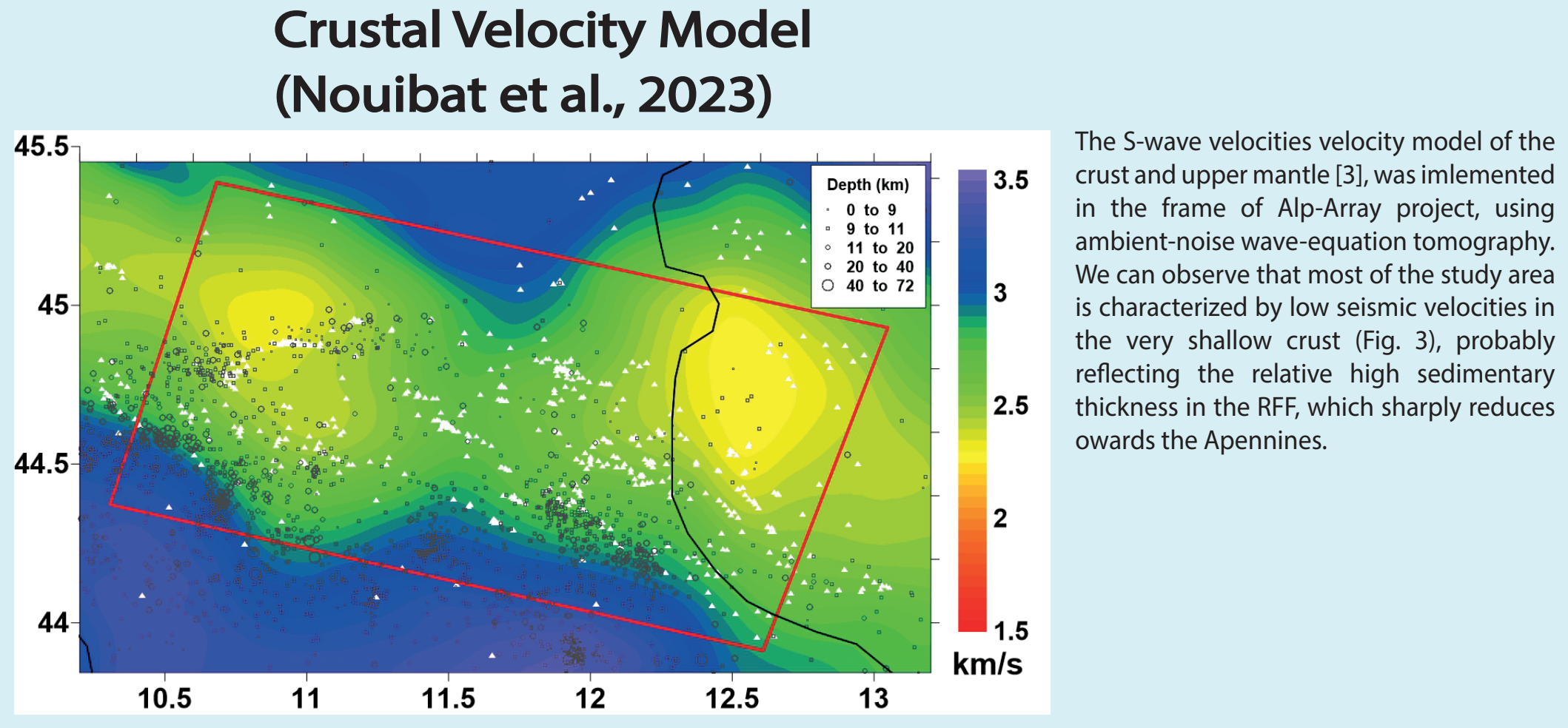


Fig. 3: S-waves velocities at a depth of 2 km [3]. Red rectangle delimits the study area. White triangles show the wells location from Videpi database. Grey circles show the earthquakes (1909-2024) location from the NEIC catalogue, with Mw > 2.5.

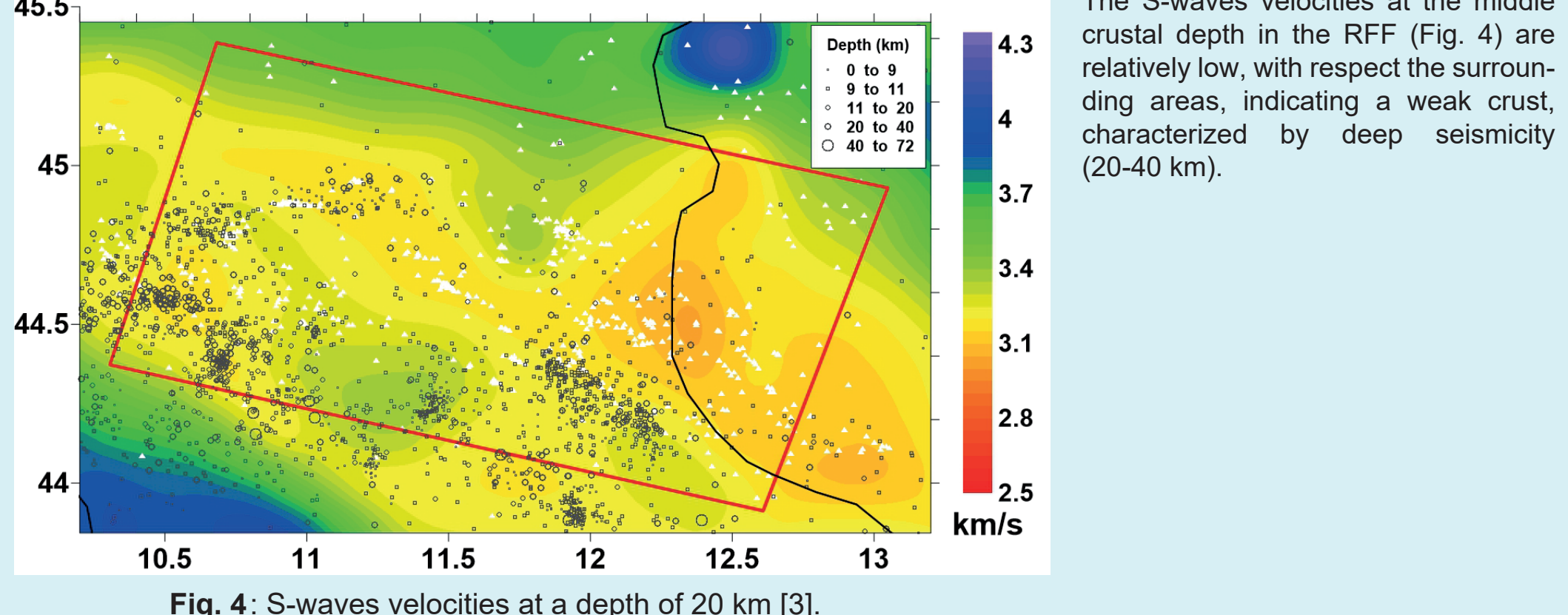


Fig. 4: S-waves velocities at a depth of 20 km [3].

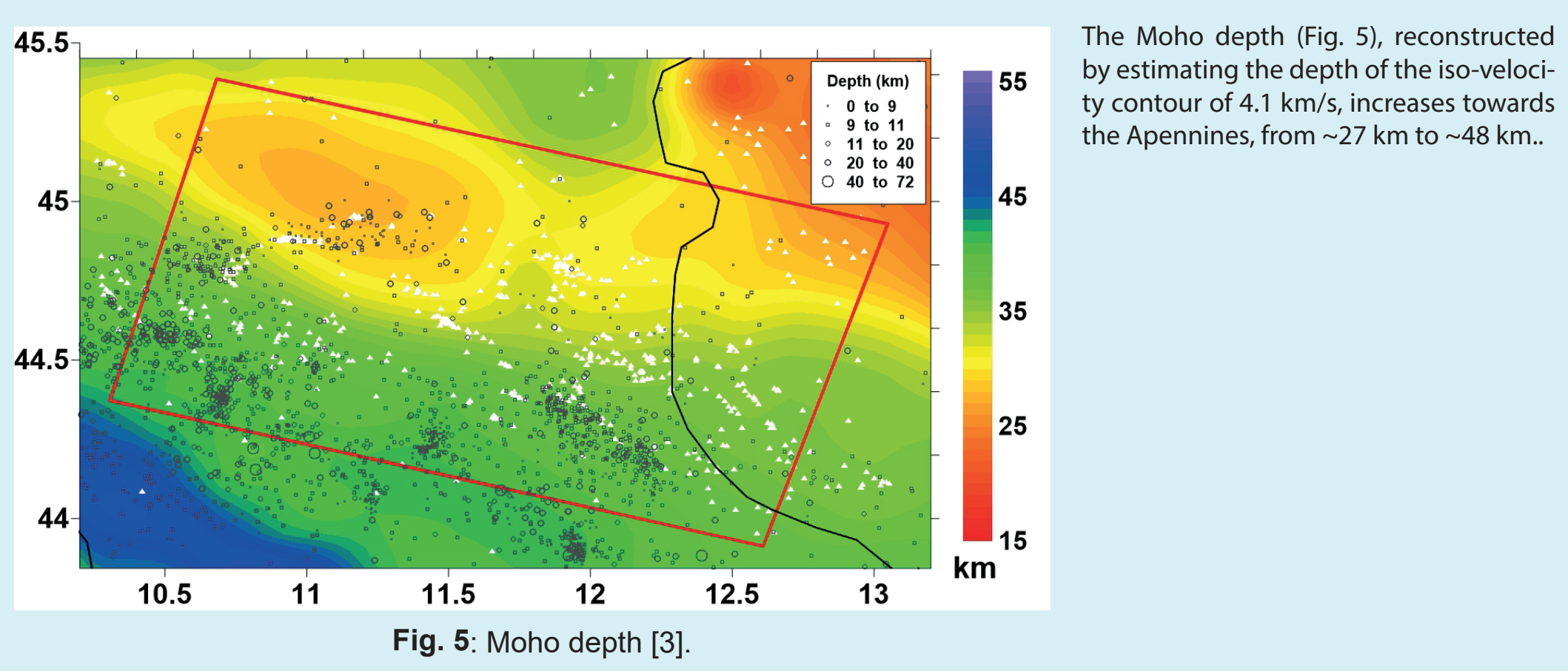


Fig. 5: Moho depth [3].

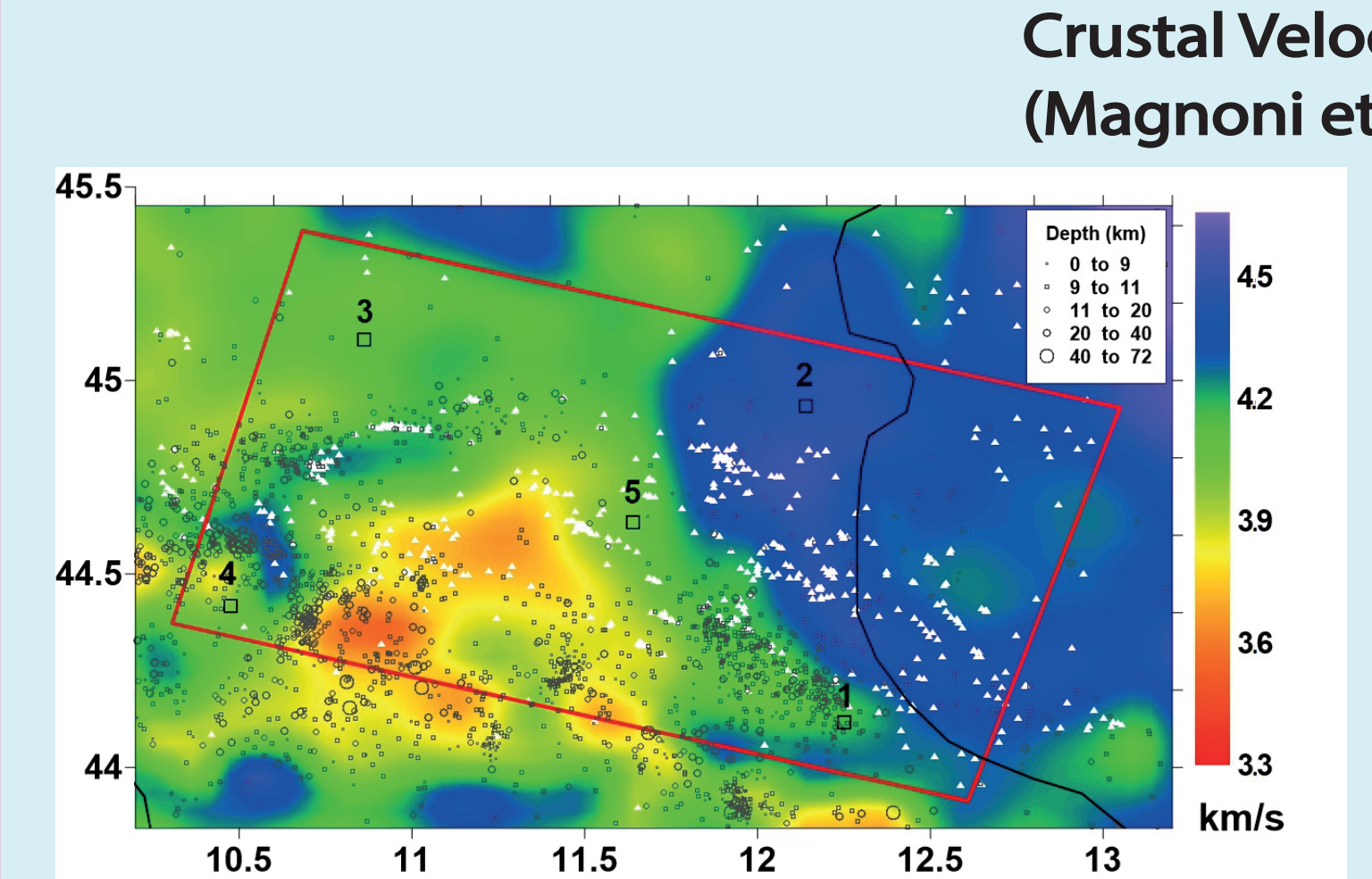


Fig. 6: P-waves velocities at a depth of 2 km [4]. Black squares with numbers show the location of the velocity distribution curves displayed in Fig. 10. The other features are as in Fig. 3.

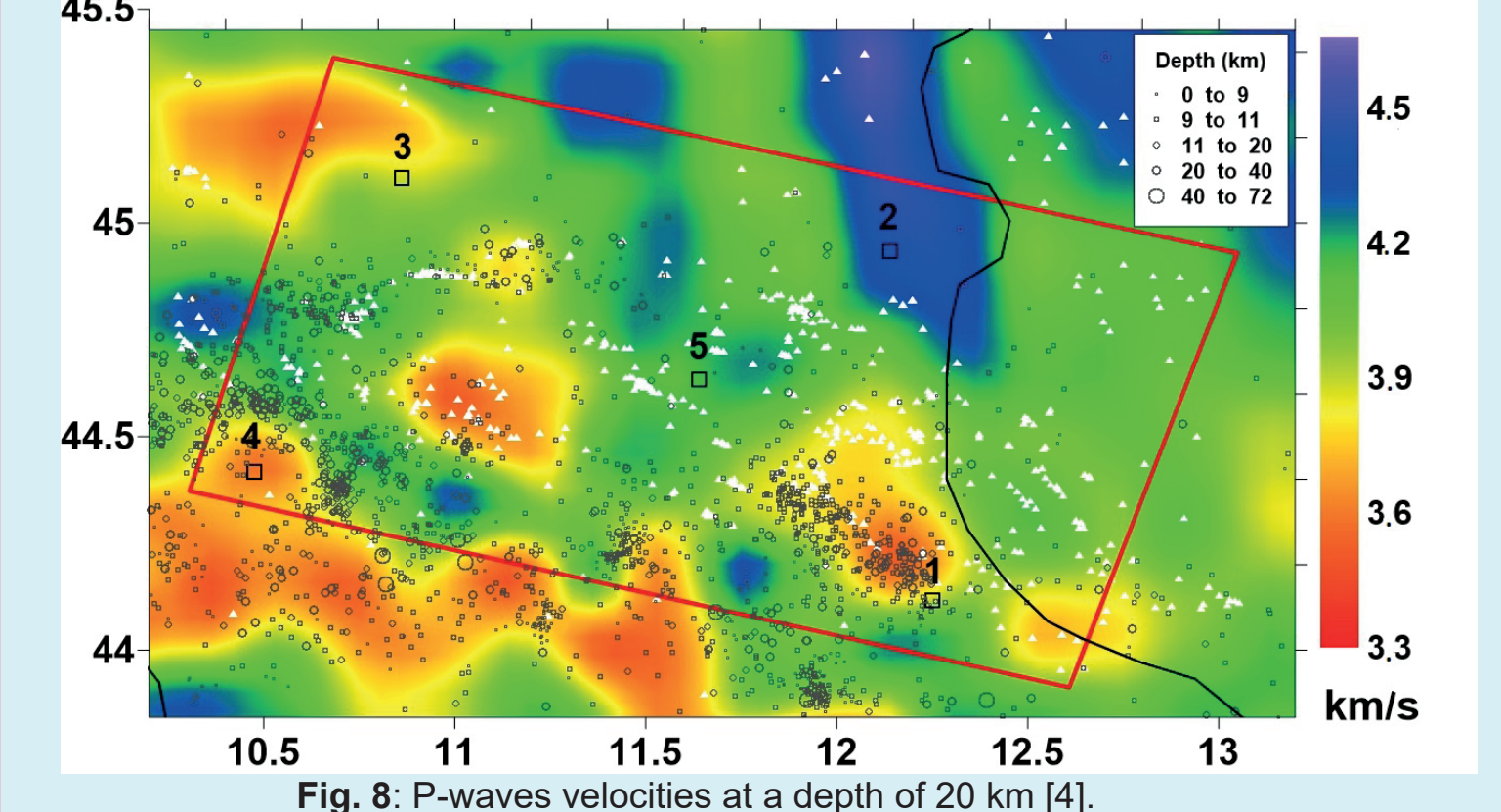


Fig. 8: P-waves velocities at a depth of 20 km [4].

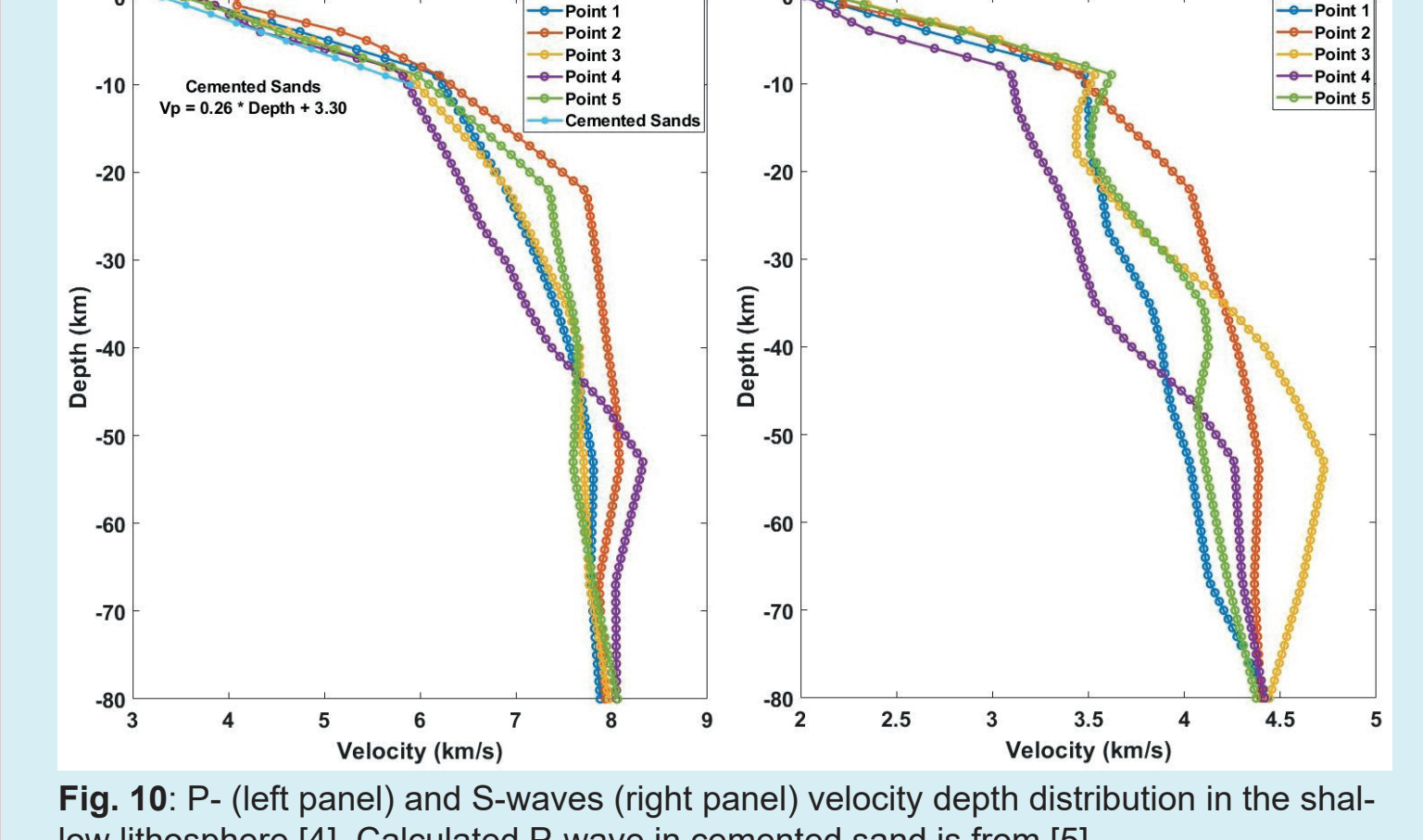


Fig. 10: P- (left panel) and S-waves (right panel) velocity depth distribution in the shallow lithosphere [4]. Calculated P-wave in cemented sand is from [5].

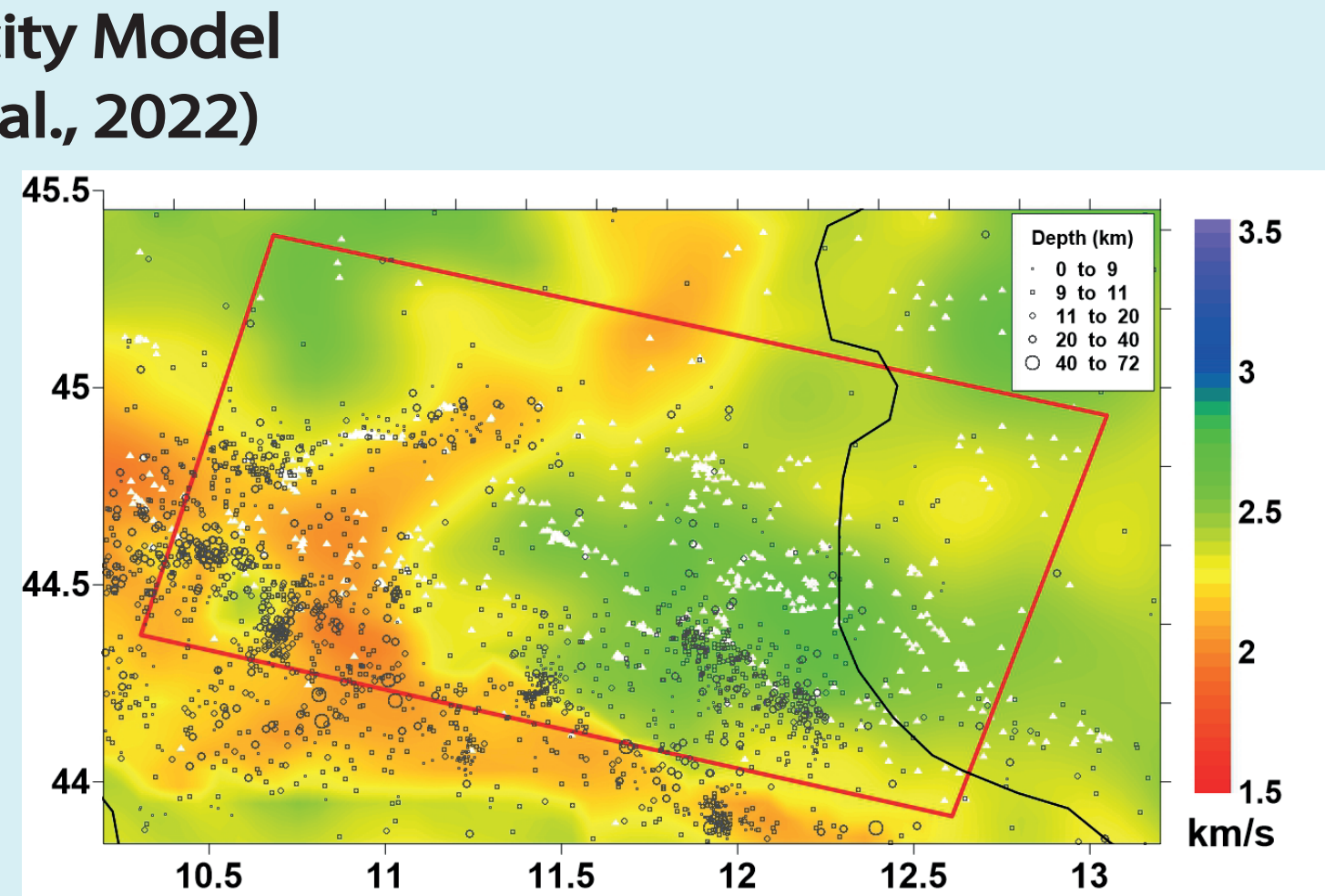


Fig. 7: S-waves velocities at a depth of 2 km [4].

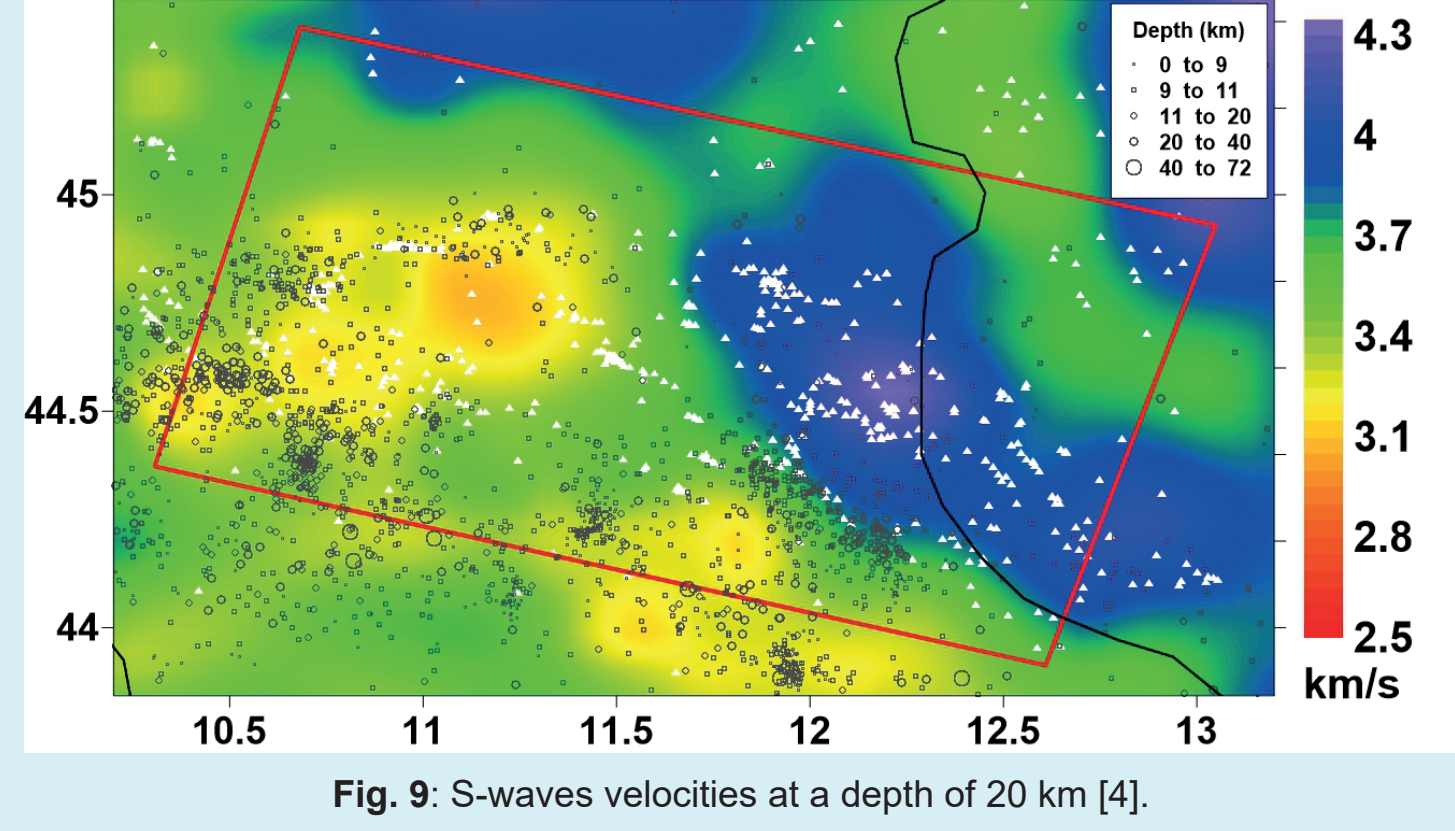


Fig. 9: S-waves velocities at a depth of 20 km [4].

A very recent seismic tomography model of the Italian lithosphere based on ground motion recordings has been implemented [4]. The comparison between the Vp and Vs-depth distribution in our study area help identify both the main crustal layers and areas of crustal thickening. (Figs. 6-9). We notice a general velocity trend decrease from the northeastern to the southwestern part of the study area (Figs. 8-9), supposing an increase of the crustal thickness in the same direction.

We also observe that the P-wave velocity in the shallow crust (< 10 km) is consistent with that obtained from the linear regression between the sonic velocity and depth for the cemented sand (Fig.10). The last one was obtained using the empirical linear relationship proposed in [5].

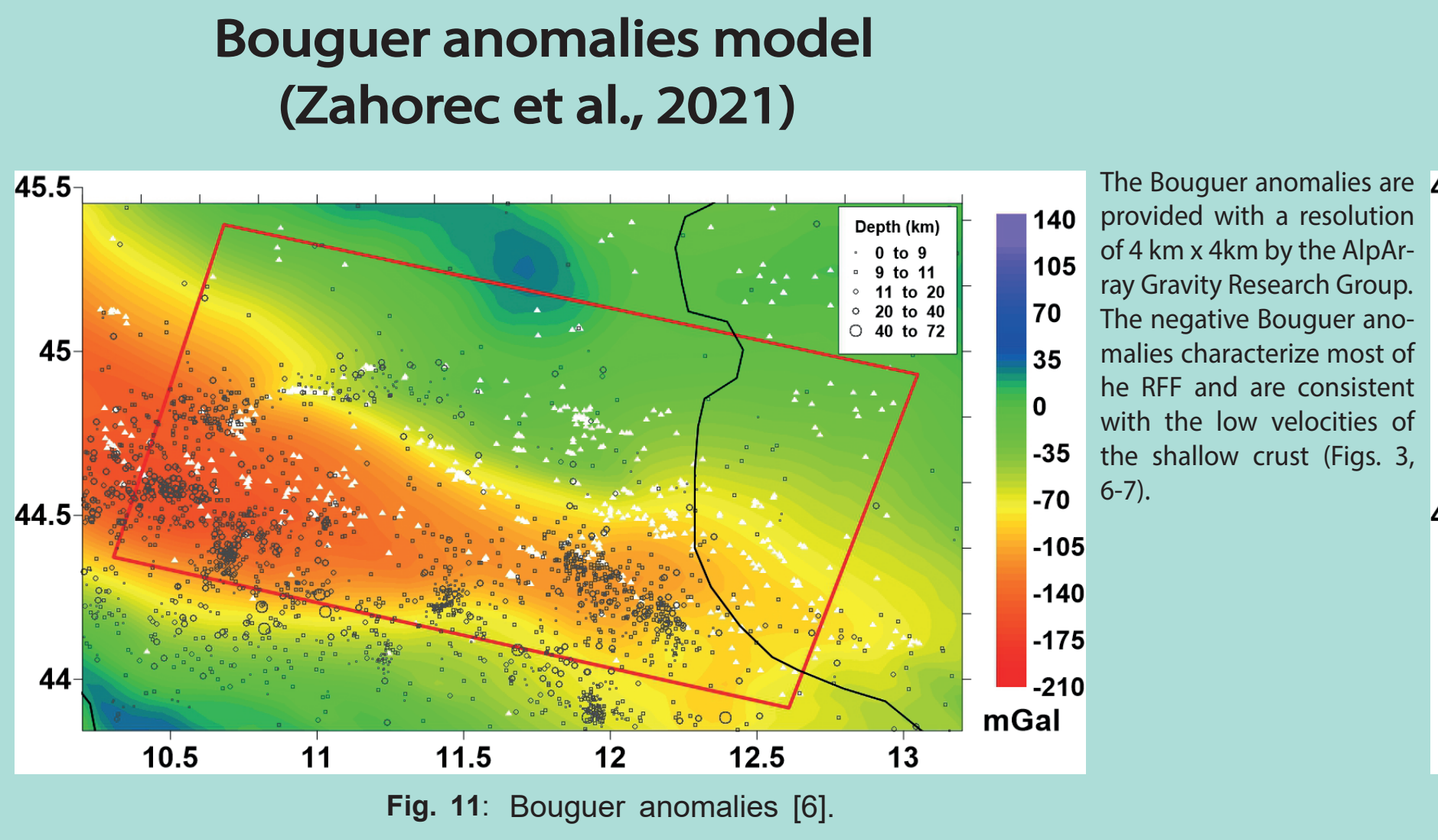


Fig. 11: Bouguer anomalies [6].

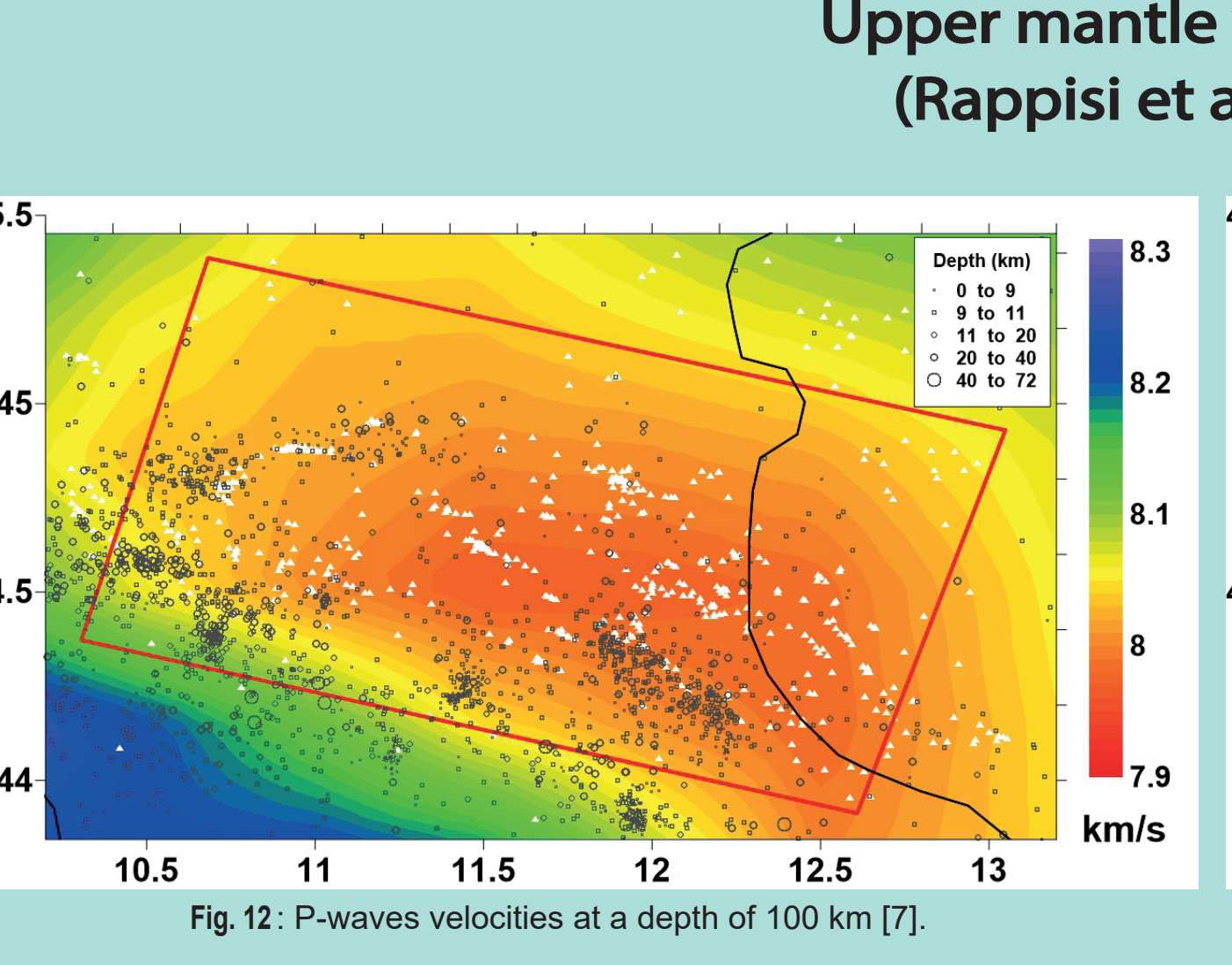


Fig. 12: P-waves velocities at a depth of 100 km [7].

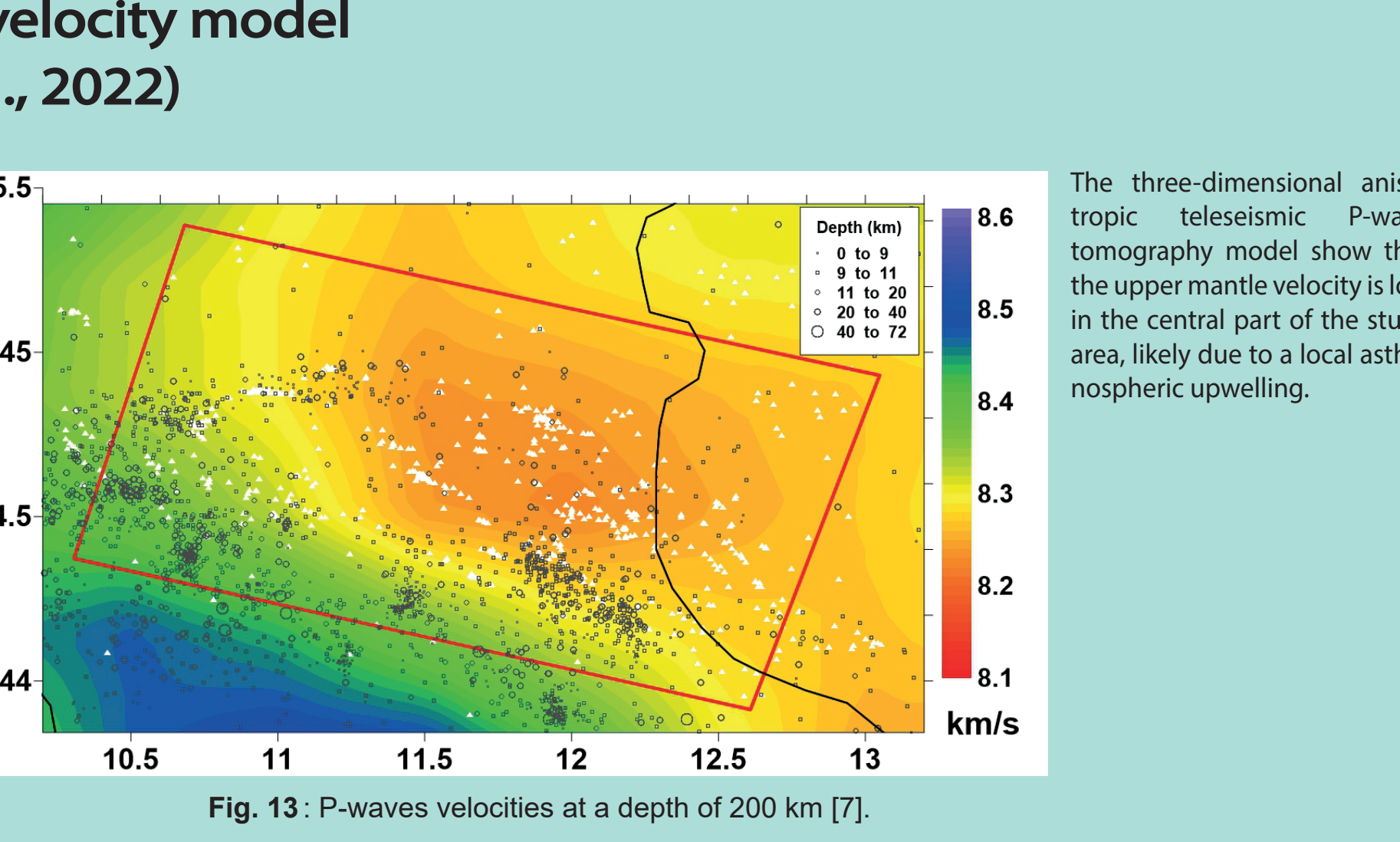


Fig. 13: P-waves velocities at a depth of 200 km [7].

References

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