

# Unraveling the collisional history of the Western Carpathians through deep geophysical sounding

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The Alpine-Carpathian-Pannonian (ALCAPA) block is one of the terranes involved in the Alpine-Tethys suture along with the North European Plate. In the Western Carpathians, this suture is supposed to be represented by the

Pieniny Klippen Belt (PKB) which is a few kilometres wide and about 600 km long unit between the Outer Western Carpathians (OWC) and Central Western Carpathians (CWC) (Plašienka *et al.*, 1997; Schmid *et al.*, 2008).

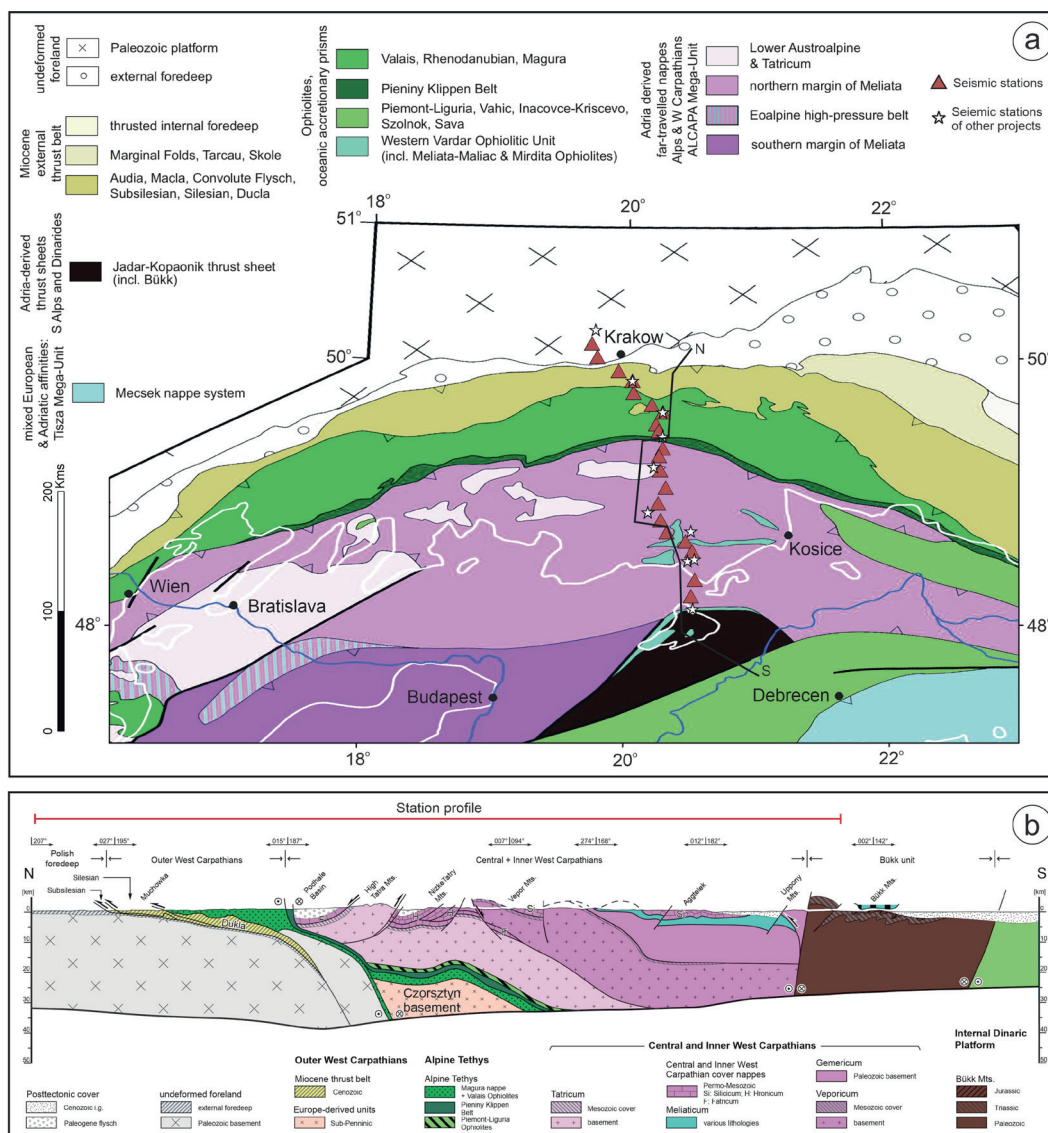


Fig. 1. Geological map of the Western Carpathians and surrounding region (the red triangles are the station locations) (a) and cross-section across the Carpathians (b) showing the extent of this profile (Schmid *et al.*, 2008)

Unlike the Neotethian suture in the Western Carpathians, the PKB does not show the typical characteristics of a suture. The PKB is a sub-vertical unit with mainly shallow marine limestone and flysch deposits in a conspicuous “block-in-matrix” structure (Plašienka *et al.*, 1997). The presence of “exotic” sediments in the PKB and the southernmost units of the OWC along with their shallow marine deposition environment led to the theory proposing the presence of a continental sliver called the Czorsztyn Ridge in the Alpine Tethys, dividing it into two oceanic/marine basins: the Magura Ocean to the north and the Vahic Ocean to the south (Plašienka, 2018). This controversial continental fragment possibly forming the basement for PKB successions, and its structural relationship with the adjoining OWC and CWC units, make it the main target of this project. The objective is to find evidence of the presence of this continental block, the Czorsztyn Ridge, which may have subducted along with the Vahic oceanic lithosphere underneath the CWC (Schmid *et al.*, 2008).

A passive seismic experiment will provide insight into the deep lithospheric structure across the PKP, testing the presence of a tectonic suture along with relaminated remnants of the Czorsztyn Ridge, and potential remnants of subducted or underthrust lithosphere. Eighteen broadband stations have been deployed in a ~N-S transect (Fig. 1a) under the umbrella of the AdriaArray initiative, cutting across the PKB and Neotethian Meliata suture to the south. The data obtained during up to three years will complement 10 other permanent and temporary broadband stations, forming an

approximate 370 km long profile and will be used to perform receiver function analysis and build structural and velocity models of the lithosphere (i.e., Schiffer, 2014; Schiffer *et al.*, 2023) beneath the Western Carpathians. The horizontal extent of the imaging is shown in Figure 1b.

## References

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