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Deep structure of the East European Craton marginal zone in Poland from joint inversion of surface-wave dispersion and receiver functions

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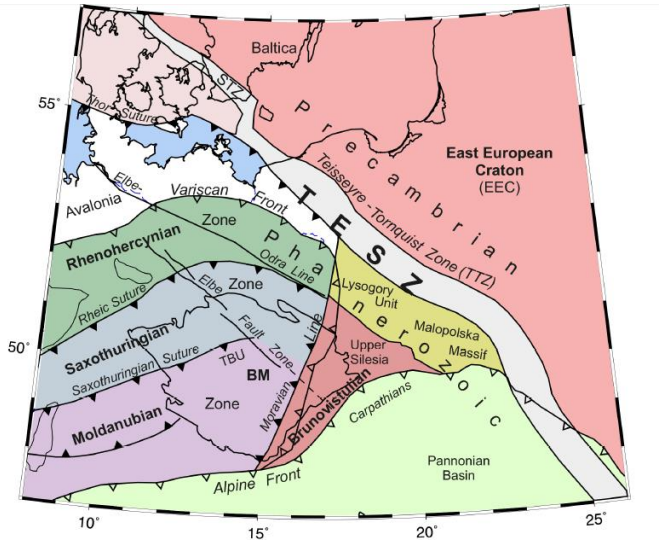
For the first time a joint inversion of surface-wave dispersion and receiver functions has been applied to study the south-western edge of the East European Craton (EEC).



The studied area lies in the vicinity of Trans-European Suture Zone (TESZ) regarded as the most prominent lithospheric boundary in Europe [1], separating Precambrian EEC from assemblage of Phanerozoic-accreted terranes (fig. 1). While the sedimentary and crystalline crust of EEC margin has been precisely recognized with borehole and refraction data compilation [2, 3], the structure of lithosphere-asthenosphere boundary (LAB) underneath remains poorly understood.

Figure 1: The tectonics of SW margin of EEC [4].

The knowledge of detailed structure of the LAB is a key point in our understanding of global mantle dynamics, but detecting it beneath old Precambrian cratons still remains a challenge [5], making the nature of the boundary a subject to debate [6, 7].

This work presents the first attempt of joint inversion of surface-wave dispersion and receiver functions to study LAB beneath the EEC marginal zone. This approach has natural advantage of constraining shear-wave discontinuities, and hence, avoiding severe non-uniqueness problems of surface-wave data [8]. The data was gathered in still ongoing “13 BB star” experiment in northern Poland [9] from both ambient noise and teleseismic events.

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