



Complex local Moho topography in the Western Carpathians: Indication of the ALCAPA and the European Plate contact

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Seismic data from deep refraction and wide-angle reflection profiles intersecting the Western Carpathians show distinct upper-mantle Pn phases with anomalous apparent velocities identified in the first and later arrivals. Their systematic analysis indicates that such phases are present in numerous seismic sections both for in-line and off-line shots. They are observed in data from profiles intersecting the Carpathians in the west at the contact with the Bohemian Massif; similar feature was also found in data at the northern edge of the Carpathians at the contact with the North European Platform. Modelling of these anomalous Pn phases shows that they originate due to local structural anomalies of the Moho discontinuity detected in several places along the Western Carpathian arc. Such anomalies are located in close lateral proximity of the Pieniny Klippen Belt representing the contact between the stable European Plate in the north and the ALCAPA (Alpine-Carpathian-Pannonian) microplate in the south. Thus, the complex local Moho topography modelled from the Pn phases suggests tectonic relation to the formation of the Carpathian orogen. The result is supported by correlation with the large-scale Carpathian conductivity anomaly modelled in the Carpathians at a mid-crustal level. Relative lateral position of these two structures together with the Pieniny Klippen Belt at the surface delineates a zone affected by deformations at various depths along the whole Western Carpathian arc. Tectonically, such course of the anomalous zone suggests that its origin is connected with the lithospheric deformations occurring near the contact of the European Plate and the ALCAPA microplate during the Carpathian orogeny, i.e. it is related to the collisional/transpressional processes during and after the Tertiary.

Reference:

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