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Multidisciplinary model of the crust and upper mantle in Trans-European Suture Zone in Poland

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Multidisciplinary model of the crust and upper mantle across the TESZ area in Poland has been constrained based on seismic and gravity data. The Trans-European Suture Zone (TESZ) is one of the main tectonic unit in Europe that separates the Precambrian craton of the Baltic shield and East European platform from the younger terranes to the south and west.
To create a seismic model of the TESZ lithosphere in Central Europe we applied different method of interpretation of data recorded along the P4 profile during the POLONAISE'97 and SUDETES 2003 experiments based on P- and S-waves. Results of 2-D ray-tracing, tomography, receiver function and P-residuals methods provide the following conclusions: (a) the Polish basin is a large structure (125 km wide) filled with sedimentary strata ($V_p < 6.0$ km/s) to about 20 km depth. This basin is asymmetric with its north-east margin being most abrupt. (b) The East European craton has thick (about 45 km) three-layered crust. (c) The crystalline crust under this basin is only about 20 km thick; the crust of the accreted terranes to the south-west is relatively thin and similar to that found in other non-cratonic areas of western Europe. (d) The lower crust is relatively fast ($V_p > 7.0$ km/s) along most of the P4 profile. (e) High velocity (about 8.35 km/s) uppermost mantle lies beneath the Avalonia/Variscan terranes, and may be due to rifting and/or subduction. (f) Reflections from within the mantle lithosphere in the south-west suggest the presence of a north-west-dipping

body in the mantle. (g) The seismic lithosphere thickness for the EEC is 180-200 km while it is only 80 km in the Paleozoic Platform and 110 km in TESZ. (h) The mantle transition zone (660-410) is visibly thinner at the Palaeozoic Platform comparing to *iasp91* model.

Gravity modelling was performed based on forward and inversion modelling of geoid. After the elimination the influence of topography, sediments and the crystalline rocks down to the Moho boundary due to forward modelling of well know velocity structure of the crust along P4 profile we can still observe the residual that could be only explained by influence of density inhomogeneities in the upper mantle. The residual geoid data was inverted to evaluate density variations in the upper mantle. We can observe distinct layer with low densities (about 3.24 g/cm^3) at the depth of about 90 km in the Palaeozoic Platform coincident with observed seismic litosheric-asthenosheric boundary. We propose a new 3-D density model for the TESZ down to 180 km depth.