Geophysical Research Abstracts
Vol. 14, EGU2012-4520, 2012
EGU General Assembly 2012

POLCRUST – a deep reflection seismic profile across the Trans-European Suture Zone in SE Poland

A. Guterch (1), M. Malinowski (1), A. Maksym (2), J. Probulski (2), M. Majdański (1), M. Narkiewicz (3), W. Czuba (1), E. Gaczyński (1), M. Grad (4), T. Janik (1), L. Jankowski (3), and P. Środa (1)

(1) Institute of Geophysics, Polish Academy of Sciences, Warsaw (michalm@igf.edu.pl), (2) PGNIG S.A. - Polish Oil and Gas Company, (3) Polish Geological Institute, (4) Institute of Geophysics, University of Warsaw

A 240-km long deep reflection seismic profile (called POLCRUST) has been recently acquired in SE Poland. It is the first regional reflection profile ever acquired in the country. It traverses major tectonic units of SE Poland: East European Craton (EEC) with the Lublin Basin, Paleozoic terranes forming the Trans-European Suture Zone (TESZ) (e.g. the Malopolska Block) with the Carpathian Foredeep and finally the young Alpine orogen, i.e. the Carpathians.

The data were acquired with state-of-the art parameters (30 m receiver spacing, 60 m shot spacing) and high CDP fold (175). Most of the sources were Vibroseis (4 trucks) with very high source effort (45 s long sweeps). Correlated record length was 30 s. During the reflection data acquisition we also deployed refraction-type recorders (single channel RefTek-125) every 1.2 km along the line in order to record Vibroseis shots and produce common-receiver gather with extended offset range. This piggy-back experiment resulted in seismic sections with offset up to 25-30 km, which is significantly above the nominal offset range of the reflection spread (10 km). Using the refraction measurements we build a first-break tomography model that was used in further seismic imaging.

Reflection seismic data were processed commercially. Some post-stack in-house processing was implemented to enhance the deeper part of the data. Signal penetration limit was estimated to range from 20 s in the NE part (EEC) to ca. 15 s in the SW part (Carpathians).

For the interpretation of the deep crustal structure we used data from the nearby refraction/wide-angle reflection profiles from the CELEBRATION 2000 experiment (profiles CEL05 and CEL11). Velocity models were used for in-house post-stack migration and depth-conversion of reflection data.

The POLCRUST-01 profile portraits the whole sedimentary cover with an unprecedented resolution. For the first time, the full structural setting of the Lublin Basin can be traced. We imaged the extended crust of the EEC, which resembles crustal structure of the Atlantic-type passive continental margin. A highly-reflective lower crust was found in the NE part of the profile. The reflection Moho agrees well with the Moho defined from wide-angle reflectios and it marks the base of the reflective crust in the NE part, however the crust-mantle boundary is more diffusive below the Carpathians. Some bright-spots were found close to the top of the lower crust below the Carpathian Foredeep and the Carpathians – likely representing some deep shear/thrust zones or remnants of the oceanic crust of unknown origin. POLCRUST data provides an unique opportunity to trace the tectonic evolution from Precambrian to Cenozoic time, with special emphasis on the development of the Teisseyre-Tornquist Zone.