

Directions of contemporary horizontal compression in the Polish Outer Carpathians

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For the Polish Outer Carpathians (POC) and the Carpathian Foredeep directions of the contemporary maximum horizontal stress (SHmax) were determined by means of borehole breakout analysis method for 29 wells. Geometry of the borehole wall surface was investigated using six-arm dipmeter tool. Digital data were processed with SPIDER program.

The results of stress analysis are presented separately for two distinguished regions: western segment of the POC

(westward from the Kraków–Nowy Sącz–Krynica line) characterised by Upper Silesian Massif basement and eastern segment of the POC (the rest of the area), underlain by the Małopolska Massif basement.

For three wells, in the western segment of the POC, systematic counterclockwise SHmax rotation with increasing depth in the range of 30–60 was determined. Less complete profiles of the next 3 boreholes constrained this trend of stress distortion. The following SHmax distribution is proposed for this region: the Carpathian flysch nappes are characterised by NE–SW to N–S-oriented SHmax; un-

folded autochthonous basement which comprises the Miocene, Upper Palaeozoic and Precambrian rocks is under NNW to NW-directed compression.

In the eastern segment of the POC, for the Silesian nappe and Skole nappe, moderate and low quality data from 3 wells indicate SHmax orientation in a range from NNE to NE, thus roughly perpendicular to the trend of the nappes. For the basement of the nappes good quality data from 9 wells show that SHmax varies in the narrow range of azimuths: 5–20. Low quality data from the folded and unfolded Miocene molasse deposits in front of the orogen reveal SHmax perpendicular to the front of the orogen.

Generally, for the basement of the orogen, stress directions create radial, fan-like pattern, with SHmax transversal

to the general trend of the orogenic arc. Another distinguished feature is systematic counterclockwise SHmax rotation with increasing depth in the western segment of the POC. In the author's opinion NNE compression in both the nappes of the western segment as well as in the autochthonous basement of the eastern segment of the POC is produced by the Carpatho–Pannonian collision front which is advancing towards NNE, stress rotation with depth for the western segment of the POC is due to the compensation of Mur–Murerz–Žilina fault. NNW to NW-oriented compression in the basement of the western segment of the POC is generated by the other set of the plate forces acting at the West European Stress Province.