



Influence of Late Pleistocene Paleoclimate on Heat Flow Density in Polish Carpathians

J. Szewczyk, M. Wróblewska

Polish Geological Institute, Warsaw (e: mail: Jan.Szewczyk@pgi.gov.pl,
Marta.Wroblewska@pgi.gov.pl)

Climatic changes of Earth undoubtedly influence underground temperature values observed in wide range of depths. Attention is currently focused on last glaciation of Weichselian effect (Kukkonen i Joeleht, 2003). The depth range of such effect appears up to 2000 m in temperature's logs what was recently confirmed by Szewczyk (2002) (Szewczyk and Gientka, 2003). Elaboration on a new Heat Flow Density map (Szewczyk et. al., 2004) showed that the problem range is not merely limited to North of Poland. Most of the Poland area was in Weichselian in periglacial climatic condition outside of an ice cover. The average annual ground temperature for N of Poland was as low as -10 deg C (Łafanada et. al., 2004). Based on our investigation of vertical variation of the heat flow densities for deep boreholes in Polish Lowlands for uppermost part (<2000 meters) are in thermal transient state. Commenced researches at the Polish Carpathians area recorded the paleoclimatic influence on temperature log in Tarnawa 1 (5523 m depth) just in the beginning. We are using in this investigation the original geophysical method of thermal conductivity of sedimentary rocks calculation (Szewczyk, 2001) there are well confirmed by lab tests at rock samples (Wróblewska, 2004), allows inter alia climatic forecasting of paleotemperatures for each borehole log. Therefore Heat Flow Density map within this area will be revised. It could be concluded, that potentially all existing maps of HFD, not only for Poland, but also for any area where HFD is based on data from shallow (< 1000- 2000 m) boreholes, should be revised.

References:

Kukkonen I.T., Joeleht A., 2003 -Weichselian temperatures from geothermal heat flow data. Jour. Geophys. Res., 108 (B3), 2163, doi: 10.1029/2001JB001579

Safanda J., Szewczyk J., and Majorowicz J. J., 2004. Geothermal evidence of very low glacial temperatures on a rim of the Fennoscandian ice sheet. *Geophys. Res. Lett.*, 31, L07211, doi:10.1029/2004GL019547.

Szewczyk J. and Gientka D., 2003. The Late Pleistocene Ground Surface Temperatures and Corrected Heat Flow Density for Northern part of Poland (abstract). EGS Esemb. Nice. 2003.

Szewczyk J. and D. Gientka, 2004. The subsurface paleotemperatures and normal state of heat flow density, Conference of IUGG: New and classical application of heat Flow studies. Aachen, 2004.

Szewczyk J., 2002. Evidences for the Pleistocene-Holocene Climatic Changes from the deep well temperature profiles from the Polish LowLands. In Int. Conf., The Earth's Thermal Field and Related Research Methods, Moscow, 2002.

Szewczyk J., 2001. Heat flow density determination by thermal parameter modeling, *P. Geolog.* vol. 49, no.11. 1083 - 1088 (in Polish)

Wróblewska M., 2003. Pomiar przewodności cieplnej skal na rdzeniach wybranych otworów z obszaru NW Polski (obszar projektu POLONAISE'97), CAG PIG, Warszawa (unpublished)