



Climate reconstruction from boreholes in Eastern Europe

Darius Mottaghy (1), Volker Rath (2), and Jacek Majorowicz (3)

(1) Geophysica Beratungsgesellschaft mbH, Aachen, Germany (d.mottaghy@geophysik.rwth-aachen.de), (2) Universidad Complutense Madrid, Spain, (3) Northern Geothermal, Edmonton, Canada

We present results from ground surface temperature histories (GSTH) reconstructed from boreholes in Poland and Lithuania. Earlier works suggest a high spatial variability in terms of the magnitude of the post glacial warming (Pleistocene-Holocene). This study focuses on better characterizing this variability using data from different locations.

These deep boreholes (1000 m -3000 m) are located in sedimentary regions, and high porosities are common. Additionally, possible effects of fluid flow have to be excluded when interpreting with respect to GSTH. Because of the high porosities (up to values of 0.4), a considerable contribution of latent heat effects during the last glacial and afterwards have to be expected. This renders the underlying partial differential equation highly non-linear. Therefore, inversions cannot be obtained by analytical solution of the forward problem, but by numerical, in particular by finite difference methods.

We applied several deterministic inversion schemes based on Tikhonov approaches, as well as a novel stochastic approach using Markov Chain Monte Carlo methods in order to obtain reliable estimates of average GSTH and its uncertainty.