



Subsurface temperature signature of a large Pleistocene - Holocene surface warming in the North Alberta, Canada

J. Majorowicz (1), J. Šafanda (2), W. Gosnold (3), and M. Unsworth (1)

(1) Helmholtz Alberta Initiative , University of Alberta, Physics, Edmonton, Alberta, Canada (majorowi@ualberta.ca; unsworth@ualberta.ca), (2) Institute of Geophysics Czech Acad.Sci., Prague, Czech Republic (jsa@ig.cas.cz), (3) Department of Geology and Geological Engineering ,University of North Dakota, Grand Forks, ND, USA (will.gosnold@engr.und.edu)

Recent results from a 2.3km deep temperature log in northern Alberta, Canada acquired as part of the University of Alberta Helmholtz-Alberta Initiative (HAI) geothermal energy project in 2010-2011 shows that there is a significant increase in thermal gradient in the granites. Inversion of the measured T-z profile between 550 – 2320 m indicates a temperature increase of 9.6 ± 0.3 °C, at 13.0 ± 0.6 ka and that the glacial base surface temperature was -4.4 ± 0.3 °C. This inversion computation accounted for granite heat production of $3 \mu\text{W}/\text{m}^3$. This is the largest amplitude of Pleistocene - Holocene surface warming in Canada inferred from borehole temperature logs, and is compatible with the results of similar studies in Eurasia (KTB, Outokumpu, Torun-1 etc.) reported previously.

Reference:

Majorowicz, J., Unsworth, M., Chacko, T., Gray, A., Heaman L., Potter, D., Schmitt, D., and Babadagli, T., 2011. Geothermal energy as a source of heat for oilsands processing in northern Alberta, Canada, in: Hein, F. J., Leckie, D., Suter, J., and Larter, S., (Eds), Heavy Oil/Bitumen Petroleum Systems in Alberta and beyond, AAPG Mem., in press.