Geophysical Research Abstracts, Vol. 7, 01962, 2005
SRef-ID: 1607-7962/gra/EGU05-A-01962

Recent climatic change - Evidence from repeated borehole temperature logs in the Canadian Prairie Provinces

Jacek Majorowicz (1), Walter Skinner (2), William Gosnold (3) and Jan Safanda (4)

(1) Northern Geothermal, 105 Carlson Close, Edmonton, Alberta, Canada T6R 2J8

(2) Climate Research Branch, Environment Canada, Toronto, Ontario, Canada, M3H 5T4

(3) UND Northern Plains Climate Research Center, Grand Forks, ND, USA

(4) Geophysical Institute, Prague, Czech Republic

majorowicz@shaw.ca/Fax:780-438-9385

Temperature-depth (T-z) profiles from shallow boreholes of less than 250 m in depth in the Canadian Prairie Provinces and northern U.S.A. Great Plains initially measured in the 1980's and early 1990's and repeated in the years 1995, 1999, 2000 and 2004 are compared with synthetic profiles based on the surface air temperature time series at nearby meteorological stations. Similar comparisons are currently being made for the northern U.S.A. Great Plains. The multiple T-z profiles of western Canadian boreholes indicate general agreement between ground surface temperature (GST) warming and warming observed in surface air temperature (SAT) series from meteorological stations. GST temperature changes of 0.1 – 0.2º C and 0.4º C are observed between the measurements for the shorter (decade) and longer (two decades) time spans respectively. Temperature changes for the last 200 years derived from the FSI inversion of the deeper logs in Southern Saskatchewan and central Alberta in Canada are 2.5º C. These changes correspond to those changes derived from synthetic profiles in which surface temperature time series are used as forcing signals. Repeated measurements in the U.S.A. northern Great Plains show similar large relative temperature change as in the Saskatchewan wells. The comparison of changes from repeated temperature logs in the high warming areas of the Canadian Prairies and U.S.A. Great Plains with those simulated from SAT forcing shows that surface temperature forcing is responsible for

the majority (70-80%) of the observed deviation of temperature with depth. In some cases, differences higher than the error of measurements are observed between the model based on surface temperature forcing and observation. These are interpreted in terms of well hydrogeological conditions and influence of snow cover.