Geophysical Research Abstracts,
Vol. 10, EGU2008-A-04428, 2008
SRef-ID: 1607-7962/gra/EGU2008-A-04428
EGU General Assembly 2008


# Heat energy gain for the last two decades from Canadian Prairies from repeated borehole temperature logs

**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 Division, Environment Canada, Toronto, Ontario, Canada, M3H 5T4

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

(4) Institute of Geophysics, Prague, Czech Republic

Temperature depth profiles (>150m) in the Canadian Prairie and U.S.A northern Great Plains region have been interpreted to infer a very strong ground surface temperature (GST) warming over the past 100 years of 1 - 4ºC. In the grassland areas of this region, the GST increases are comparable to surface air temperature (SAT) change from meteorological records. Temperature-logs in boreholes initially made one to two decades ago in the Canadian Prairies and U.S.A northern Great Plains were recently repeated. Temperature changes at a neutral level (minus 20 m) average 0.4ºC for the two decade time span. Temperatures were logged as recent as 2006 and 2007 at four specific sites. Surface warming of this magnitude causes the Earth to store large amount of heat. The magnitude of heat storage is calculated for the last 100 years, and the last 2 decades, based on 40 individual well sites (some multiple boreholes) and 51 temperature–depth logs in the Canadian Prairies and U.S.A northern Great Plains. The heat needed to warm the vertical column with a cross-section of 1 m2 in the depth interval 20 – 150 m for the Canadian Prairies is 1.9E08 J. The average heat flux into the ground is calculated to be between 30 and 80 mW/m2. The average heat flux into the ground of the Canadian Prairies is 60 mW/m2. This is comparable to eastern Canada where it is 70 mW/m2. The calculations of transient temperature-depth (T-z) synthetic profiles based on the solar forcing and SAT forcing were compared with the observed T-z transients

for the repeated logs for the period 1986 to 2006. The T-z transients forced by SAT match the observed T-z transient data, while solar forcing based T-z transients explain only a small portion of observed underground heat gain. This demonstrates that the large heat gain by the ground cannot be fully explained by changes in solar forcing. Other factors, such as greenhouse gas forcing are likely responsible.