Geophysical Research Abstracts
Vol. 20, EGU2018-5174, 2018
EGU General Assembly 2018

Perturbation of subsurface temperatures by episodic seepage of meteoric waters: Implications for climate history deduced from geothermal logs of shallow boreholes

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Electrical resistivity soundings were carried out along seven profiles across a dry stream bed, in the semiarid region of south east Brazil. The results indicate episodic occurrences of water seepage through subsoil permeable zones. Analysis of temperature data from a nearby borehole indicates that such seepage are capable of inducing localized thermal anomalies at shallow depths. In the specific case of the locality Martins (Brazil) seepage has led to temperature increases at depths of up to 32 meters. The result has been an apparent increase of nearly one degree centigrade in the estimation of ground surface temperature, deduced from models of climate change. Seepage effect has also contributed to errors in estimation of the age of climate change. Results of model studies are presented illustrating how the seepage effects can be minimized. We propose that estimation of changes in ground surface temperatures (GST) by geothermal methods should include evaluation of subsurface permeable zones and its effect on temperatures recorded in well log data.