



Recent Subsurface Temperature Changes in the Czech Republic, Portugal and Slovenia and Their Coupling to Air Temperatures

J. Šafanda (1), A. Correia (2), D. Rajver (3), P. Dědeček (1)

(1) Geophysical Institute, Prague, Czech Republic, (2) University of Evora, Evora, Portugal,
(3) Geological Survey of Slovenia, Ljubljana, Slovenia (jsa@ig.cas.cz)

Climatic interpretation of the ground surface temperature history obtained from present-day temperature-depth profiles measured in deep boreholes is based on an assumed long-term tracking of the mean annual surface air temperature and the ground surface temperature. To explore this assumption, we have started a project on a long-term monitoring of the coupling between air and soil temperatures in three different climatic provinces of Europe, namely in the Czech Republic, Slovenia and Portugal. The "borehole climate" stations have already been established and the monitoring launched in Prague and Slovenian Kostanjevica; a similar station will be installed in Portugal, near Evora, this year. We present data on the difference between mean annual air and soil temperatures and their inter-annual variability obtained both from the established stations and from other existing series.

Another method of checking the air-ground temperature coupling is based on a repeated temperature logging of boreholes. The present rate of the surface warming is large enough for a reliable detection of the subsurface temperature time changes in the temperature - depth profiles obtained by the repeated logging during several years. The difference between the logs can be compared with the difference of the synthetic temperature - depth profiles based on the surface air temperature series observed at nearby meteorological stations. We show the results of the repeated logging in several boreholes in the three countries, when the time span of the logging was 7 - 17 years. The observed time changes of the subsurface temperature agree reasonably well with the time changes simulated by using the surface air temperature series as a ground surface forcing function.