Clim. Past Discuss., 3, S118–S120, 2007
www.clim-past-discuss.net/3/S118/2007/

Climate of the Past Discussions

Interactive comment on "Repeated temperature logs from the sites of the Czech, Slovenian and Portuguese borehole climate stations" *by* J. Šafanda et al.

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Received and published: 27 March 2007

General comments

Repeat temperature measurements in boreholes can assist in resolving of a number of important problems, e.g. isolating paleoclimate subsurface signal from nonclimatic ones and thus obtaining more reliable ground surface temperature history reconstruction; evaluation of air-ground surface temperature relationship on decadal to centennial scales; better understanding of the heat propagation mechanism. The paper provides a new reliable borehole/climate data which is an important contribution to the existing paleoclimate database. I have no doubts that the paper should be published in Climate

of the Past.

Specific comments.

1. It's not clear, what idea unites these three sites into the one paper (besides, certainly, of the method of investigation and the joint project). Each of three sites is characterized by its own environmental conditions, climate history, and geological structure. On the other hand, the authors did not made an attempt to evaluate spatial features of GST changes.

2. The reconstruction obtained by the FSI inversion algorithm is most sensitive to a priori standard deviations (SD) of thermal conductivity and temperature (Shen et al., 1995). It was necessary to demonstrate how the SDs choice influences on the GSTH amplitude. Probably, the differences between SAT and GSTHs in 19Th century (Fig 5a,b) are caused by this reason. Another reason of these differences may be connected with the limited depth of temperature-depth profiles (Majorowicz et al., 2002). Our experience (Golovanova et al., 2002) shows that in order to reliably reconstruct the last Millennium using the FSI one should perform an inversion for the period not less than 3000 years ago, which demands at least 800 m temperature-depth profile. I think it's not casual that the deepest Portuguese hole provides the closest to the SAT reconstruction.

3. Concerning the GST-SAT comparing for the period 1980-2000. Authors state that GST-SAT (or, that is the same, T(z)measured-T(z)simulated) differences in three stations are connected with different processes: local surface temperature change due to new structures built near Czech station, coastal/continental climate difference in Portugal, and horizontal groundwater flow influence in Slovenia. It is hard to accept or to reject these conclusions without additional information. In case of Czech station, this information can be provided by high-resolution observations of air and subsurface temperatures (e.g. Smerdon et al., 2006). Spurious climatic events in GSTH due to nonclimatic changes within a local (compared with the depth of investigation) territory

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can be easily identified by analyzing of repeat reconstructions (Demezhko, 2001, p. 15-21, 87-89). As the date of real climatic event doesn't depends on the logging date, the spurious one is shifted to the recent times for the recent logging. I haven't noticed such evidence of local temperature change in the GSTH curves obtained in Czech station (Fig 5a).

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Interactive comment on Clim. Past Discuss., 3, 631, 2007.