

Interactive comment on “Thermal log analysis for recognition of ground surface temperature change and water movements” by M. Verdoya et al.

M. Verdoya et al.

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Answer to Referee #3

The referee’s main concerns substantially focus on the description of the adopted approach. He requires more explanations at several points. We strictly followed his remarks and incorporated improvements both in the text and in figures, which widen and clarify the description of the method. In particular, the referee states that the description of POM calculation is incomplete, and this might be a problem in view of the reproduction of the method by fellow scientists. Moreover, he suggests a graphical example on how we inferred POM and Darcy velocity. To this regard, we widened the description by incorporating more details as well as the adopted equations. We added a new figure showing an rms misfit map, whose minimum allows the inference of the best fitting POM and groundwater velocity. These additions, together with the examples given

in Fig. 1, should make clearer the understanding of the method also by non-expert readers. In addition, the referee suggests one graphical example of the variability tests performed on SAT data. We added a new figure showing the year-by-year temperature variability and the trend for longest SAT time series (Florence and Genoa).

He finds the figure presenting the borehole locations is too small. Therefore, we modified also Fig. 2. It was split into two figures. The part showing the locations of the boreholes and meteorological stations was enlarged, as suggested by the referee. In the other part, depicting the T-depth profiles, we did not add the linear trend inferred from the lowermost section of the boreholes. We agree with the referee that, albeit useful, this would render the graph too complicated. However, we better specified in the text the definition for reduced temperatures. This makes easier the comprehension of the significance of T_0 and G_0 .

Discussion on borehole GH13 was slightly modified and turned into a more cautious form. This modification takes also account of the suggestions provided by another referee. We specified in the new manuscript that all the investigated boreholes are located in rural areas. Unfortunately, little information is available about the changes in local conditions in the borehole surroundings, except for the last twenty years. Thus, definitive conclusions about microclimatic effects require further data. Concerning the possible influence of heterogeneity of thermal parameters, we agree with the referee conclusions that in view of the relatively homogeneity of the strata penetrated by the boreholes such effects can be neglected. However, for completeness, we incorporated additional discussion about the limitations and possible sources of bias in climatic reconstruction.

Interactive comment on Clim. Past Discuss., 3, 95, 2007.

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