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Climate of the Past Discussions

Interactive comment on "Selection of borehole temperature depth profiles for regional climate reconstructions" *by* C. Chouinard and J.-C. Mareschal

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We are grateful to both reviewers for their constructive comments. They pointed out several minor inconsistencies that we shall eliminate in the final version of the manuscript. We would like to clarify some of the points that were raised by reviewer 2.

The first point concerns the investigation of boundary conditions. Although we agree with the reviewer that the constant heat flow boundary condition has little physical meaning, we felt the need to raise this point because some authors have used these different surface boundary conditions, including a constant heat flux [e.g. Beltrami, H., Surface heat flow histories from inversion of geothermal data: Energy balance at the Earth's surface, J. Geophys. Res., 106, 21,979-21,993, 2001]. This would become an

issue if the parameterization is not sufficiently fine.

The second point concerns the use of variable physical properties. If thermal diffusivity has been determined by measurements on rock samples, different values of thermal diffusivity can be used without leading to a non-linear inverse problem. The solution of the heat equation for a horizontally layered half space with constant diffusivity in each layer is straightforward. One could thus use the thermal resistance approach with variable diffusivity, but the additional complication is probably not worth the trouble.

The last point concerns the possible bias because holes within lakes are not logged. There are of course many holes drilled on lakes, but they are almost never logged for temperature. In Canada, these holes are normally drilled when the lakes are frozen in the winter. Such holes are usually cemented after drilling has been completed. Even when they are not cemented, the casing is never left to stick out in the middle of the lake and is pulled out. Among several hundreds holes that we have logged in Canada, not one was in the middle of a lake.

We are thankful to the reviewer for raising these questions and trust that these points have now been clarified.

Interactive comment on Clim. Past Discuss., 3, 121, 2007.