

## ***Interactive comment on “Borehole climatology: a discussion based on contributions from climate modeling” by J. F. González-Rouco et al.***

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Generally, this is a good contribution and I want to recommend it for publication in the Climate of the Past Discussions.

As a co-author (with Louise Bodri) of the recently published book on a similar topic, namely Borehole Climatology (by Elsevier, 2007), I welcome this contribution. The work suitably extended the problem how to apply a relatively new powerful method to reconstruct the past climate changes by inverting the observed temperature versus depth profiles measured in the shallow subsurface. The authors concerned their effort to describe the interaction between models and results of borehole loggings, they focus on explaining how models can be used as a validation tool for paleoclimate reconstructions and compared practical borehole information and model simulations. They go

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even further and discuss the potential realism of estimating the future climate changes by simulating subsurface climate.

The author team presents four experienced authors, each of them proved the ability to understand the problem by contributing to various problems of borehole climatology. They compiled a huge material which they arranged into systematic flow of information. The unquestionable valuable input of the work is the extensive list of references and existing data sources. Another most valuable input is the discussion of the climate modeling, its advances at the interface of climate reconstructions and General Circulation Model simulation. The discussions on using the external forcing in climate modeling and the role the snow cover and soil content effect on the global scale belong to the most interesting part of the paper.

There are several, rather trifle comments (technical) For labeling of models sometimes is used CON, CTRL, and Control, similarly FOR 1 x For 1, see text, figures and figure captions Ad Figure 5, I guess the panels C and E are to be exchanged with panels D and F ? Several figures could be improved; for better illustration by suitably adapt the size of the vertical axis (see graphs 6, 11, 12)

Some general comments (aimed for certain discussion and considering the future work)

Due to the downward smoothing of the climate signal from the surface, any effect of climate events older than 500 years is difficult to recognize; majority of visited holes are less than 400 or 500 m deep. Therefore any reliable detection of the Little Climate Optimum/Medieval Warmer Period is problematic, especially for cutoff values of 0.15 and higher (see e.g. Figure 6). The limited depth range of borehole data together with the nature of inversion techniques can hardly contribute to substantial progress. For the future studies it may be recommended to select a borehole data set of holes of minimum 500 m depth, drilled in consolidates (hard rock) basement with no or little potential disturbances (such as long-term vegetation changes, soil moist, &#8230;)

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and individually approach each borehole log and location features. As the likely area for such study is North-East America (Canadian Shield). Inversion procedure can be completed with other statistical methods (Monte Carlo evaluation?).

For a more detailed insight, the assessment of the massive deforestation on the ground temperature history can help. In Europe the deforestation took its climax much earlier than in America, in America itself there may be some east to west trend. The Prairies may be a good area to test. There is a certain remarkable difference in the shallow temperature-vs-depth profiles on both continents.

The major communication of the present work is definitely formulated in the first three chapters the Fargo & Cape Hatteras story is focused on a rather specific problem (geographically as well as substantially). If the paper is subdivided in two parts, the first part can be completed with several practical cases showing the effect of snow cover or soil moisture effects in detail and better illustrate the theoretical consideration.

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