



Comparison of climate model simulated and observed borehole temperature profiles

J. F. Gonzalez-Rouco (1), M. B. Stevens (2), H. Beltrami (2), H. Goosse (3), V. Rath (4), E. Zorita (5), and J. Smerdon (6)

(1) PalMA Res. Group, UCM Madrid, Spain (fidelgr@fis.ucm.es), (2) Environmental Sciences Research Centre, St. Francis Xavier University, Antigonish, Canada, (3) Institut d'Astronomie et de Géophysique G. Lemaître, Univ. Catholique Louvain, Belgium, (4) Applied Geophysics and Geothermics RWTH Aachen University (Lochnerstr. 4-20 D-52056 Aachen, (5) GKSS Research Centre, Geesthacht, Germany, (6) Lamont-Doherty Earth Observatory, NY, USA

Advances in understanding climate variability through the last millennium lean on simulation and reconstruction efforts. Progress in the integration of both approaches can potentially provide new means of assessing confidence on model projections of future climate change, of constraining the range of climate sensitivity and/or attributing past changes found in proxy evidence to external forcing.

This work addresses specifically possible strategies for comparison of paleoclimate model simulations and the information recorded in borehole temperature profiles (BTPs). First efforts have allowed to design means of comparison of model simulated and observed BTPs in the context of the climate of the last millennium. This can be done by diffusing the simulated temperatures into the ground in order to produce synthetic BTPs that can be in turn assigned to collocated, real BTPs. Results suggest that there is sensitivity of borehole temperatures at large and regional scales to changes in external forcing over the last centuries.

The comparison between borehole climate reconstructions and model simulations may also be subjected to non negligible uncertainties produced by the influence of past glacial and Holocene changes. While the thermal climate influence of the last deglaciation can be found well below 1000 m depth, such type of changes can potentially exert an influence on our understanding of subsurface climate in the top ca. 500 m. This issue is illustrated in control and externally forced climate simulations of the last millennium with the ECHO-G and LOVECLIM models, respectively.