

RECENT CLIMATE CHANGE RECONSTRUCTED FROM THE BOREHOLE TEMPERATURE DATA

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Air temperature is one of the principal characteristics of climate. Variations in the air temperature produce also variations in the surface temperature, which propagate downward into the rock subsurface and modify the ambient thermal regime. Heat conduction smears the climate signal, its high frequency components are diffused out with time (and depth) and only traces of robust long wavelength past events are preserved. The ground thus remembers the major climate (temperature) episodes of the past and the inversion of the present-day borehole temperature-depth profiles may well contribute to the paleoclimate reconstruction. This method is notably valuable to complement various proxies and in the combination with the long-term meteorological series may improve our knowledge of the climate in the pre-instrumental era. The first two years of the IGCP 428 project Borehole and Climate not only revealed a complex climate pattern of the last millennium, provided a clear evidence that the world climate got warmer by at least 1 K in the last five centuries, the 20th century being the warmest. The detailed regional studies further enabled to assess the environmental character of the observed ground surface temperature warming, e.g. to detect a certain man-made component due to industrialisation and urbanisation (example from the Czech Republic), or due to deforestation and change in land-use (example from Cuba). Several years of the regular subsurface temperature monitoring confirmed the present-day warming rate of 0.02-0.03 K/yr.