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Round-Air Temperature Coupling: Results of Long-Term Temperature-Time Monitoring at the Experimental Borehole Site at Prague (The Czech Republic)

V. Cermák, J. Safanda, P. Dedecek, and M. Kresl

Academy of Sciences of the Czech Republic, Geophysical Institute, Prague 4, Czech Republic (cermak@ig.cas.cz, 00420-2-72762546)

Borehole-based subsurface temperature-time monitoring site has been running at the Sporilov campus of the Institute of Geophysics in Prague since 1993. As the system needed certain reconstruction after such successful long "service" a new observation borehole site has been proposed and drilled near-by. We present the basic information of the improved version of the new system together with the complete interpretation of the obtained old records completed with detail studies of the effect of various surfaces on the downward penetration process and of the effect of snow cover, ground freezing and precipitation. The 17-years Sporilov records were further processed with the help of the Fast Fourier Transform (FFT) and Recurrence Quantification Interval (RQI) analysis to uncover the potential hidden periodicities in the noisy time series. The results show considerable similarity for all investigated depth levels; besides the characteristic pronounced annual wave all series contain 8-year and 11-year periodicities. The hypotheses about possible dynamics responsible for the occurrence of the 8-year wave are discussed. As the site presents a typically urban environment, the numerous repeated temperature-depth logs provided suitable material for the climate reconstruction studies. The gradual year-to-year increase of temperature below the "seasonal-variation zone" amounts to 0.03 K/yr, while another observational site at the rural site Kocelovice (southern Bohemia) gave lower value of 0.02 K/yr