

Abstract

Long-term air and ground temperature series and repeated temperature logs from several boreholes in Czech Republic, Slovenia and Portugal were processed to distinguish and describe possible sources of transient signals in subsurface temperature field. Two methods for estimation of the soil and bedrock thermal diffusivity from long-term temperature records are presented and compared. Results proved that on the annual time scale the convective heat transfer did not contribute significantly to the temperature-time variations monitored in the uppermost 10-m depth zone and that the influence of moisture changes on subsurface temperature field noticeably appears only in upper 5 cm of soil. Using 3D numerical modelling a direct human impact on the subsurface temperature warming was proved and contributions of individual anthropogenic structures to this change were evaluated. It made it possible to split the transient component of the present-day temperature depth profiles into the climatic and anthropogenic signals.