To describe the air-ground temperature coupling and downward propagation of the surface temperature changes the air, soil and bedrock temperatures have been monitored in three experimental sites: (i) Sporlov (Czech Republic, since 1993), (ii) Malence (Slovenia, 2003), and (iii) Caravelinha (Portugal, 2005). Comparative studies allowed estimating mean annual difference between ground and air temperatures and its inter-annual variance. Depending on variance of meteorological factors (such as number of sunny hours, height and duration of snow cover), the inter-annual variation of the ground-air difference can amount up to 1.4 °C. This amplitude is comparable with a range of long-term (decadal to centennial) changes of the air temperature and suggests that these factors have a potential to generate a spurious signal in bedrock temperature field – depth profile about the air temperature changes.

The monitoring also revealed that at Portuguese and Slovenian stations the annual mean temperature generally decreases with depth between the ground surface and the depth of 2.5 m. As a result, the difference between warmer ground and colder air is appreciably smaller at 2.5 m than at the surface. A value of the decrease varied between 0.4 – 1.5 °C at Caravelinha and between 0.5 – 1.4 °C at Malence in the individual years. The seasonal change of thermal conductivity, non-conductive heat transfer connected with infiltration of meteoric water and/or evapotranspiration are discussed as a possible explanation.