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# Interannual Changes of Soil Temperature, Moisture and Thermal Diffusivity under Different Surfaces

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We present results of a soil temperature monitoring under different surface conditions represented by grass, barren soil, sand and asphalt. The experimental plots were established and the monitoring launched on the grounds of Geophysical Institute Prague (50˚ 02' 27" N, 14˚ 28' 39" E, 274m a.s.l.) in June 2002. Soil temperatures at depths of 2, 5, 10, 20 and 50 cm below the ground surface, air temperatures at 5 and 200 cm above the ground and a soil moisture at depths of 20 and 50 cm are recorded every 5 minutes together with a registration of precipitation and snow cover. The temperature series observed in the individual soil levels are used for a detailed examination of changes of the soil thermal diffusivity caused by variations of soil moisture, soil density and the temperature itself.

Mean annual temperatures have been calculated for two complete calendar years of the monitoring, 2003 and 2004, which enabled us to do a first assessment of an interannual variability of the soil and air temperature coupling. The air temperature at 2 m above the ground was lower by 0.2 ˚C in 2004 (9.69 ˚C) compared to 2003 (9.85 ˚C). The air temperature means at 5 cm above the ground differ for the individual surfaces: year 2004 was colder than 2003 by 0.5 ˚C above the asphalt (10.16 ˚C in 2003, 9.64 ˚C in 2004), by 0.4 ˚C above the bare soil (9.89 ˚C, 9.52 ˚C) and by 0.1˚C above the sand (9.97 ˚C, 9.87 ˚C). Because of a smaller number of sunny days in the 2004 summer, the differences under individual surfaces were higher than in the air above them. The interannual cooling at 2 cm under the asphalt amounted to 1.1˚C (15.00 ˚C in 2003, 13.86 ˚C in 2004), under the bare soil to 0.5 ˚C (11.47 ˚C, 10.94 ˚C) and under the sand to 0.2 ˚C (11.89 ˚C, 11.70 ˚C). The monitoring on the grassy plot was biased, when the grass was completely grubbed out during April 2004 and sown again. This temporary change in the vegetation cover, when the surface was almost bare for several weeks,

caused an increase in the annual means both 5 cm above and 2 cm below the ground by 0.6 ˚C in 2004 (10.12 ˚C in 2003, 10.70 ˚C in 2004 in the soil, 9.92 ˚C and 10.70 ˚C in the air). The vegetation change also led to an increase in the soil thermal diffusivity, probably due to a soil density increase.