SOIL MOISTURE DYNAMICS IN A PIT-MOUND AFFECTED FOREST SOIL: A MICRORELIEF SCALE STUDY

Ondřej Hemr, David Juřička, Jan Deutscher, Zdeněk Patočka, Libor Joura, Lucie Pálková, Martin Valtera

INTRODUCTION

The microrelief of forest soils is being formed by various agents of human and natural origin. Wind is out of the important ones, particularly in temperate forests, which typically influences the soil surface with tree uprooting. When uprooting occurs, a considerable amount of the original soil layers is reverted, which affects soil and microsite conditions, tree regeneration, and tree growth (ŠEBKOVÁ et al. 2012). This contribution aims to present the evaluation of soil moisture dynamics at the microsite scale with an emphasis on the temporal and spatial variation: (i) in different soil depths and (ii) at different microtopographic positions from the perspective of the slope transect through pit-mound microrelief.

Figure 1: Field measurement with Z meter (up); blinding plugs in the holes for probes (bottom).

METHODS

The methods were already presented elsewhere (VALTERA et al. 2019). We established a research plot of 0.25 ha area with well-developed pit-mound microrelief on moderately steep slope with an even-aged forest stand of Norway spruce (*Picea abies)* at the municipality Kanice. Within the plot, we selected 10 topographic transects along the pit-mound pairs, with the four micro-topographic positions along the slope line (above pit, pit bottom, mound top, below mound) plus the nearby unaffected (control) position. Soil electrical resistance (*Rx*) was measured using paired profile probes (Fig. 1) bi-weekly in 5 depth intervals (0-5, 10-15, 20-25, 30-35, and 40-45 cm). For statistical comparisons among microsites, mixed linear models, with the date as the random effect and microsite as the fixed effect, and the Tukey's HSD test were used.

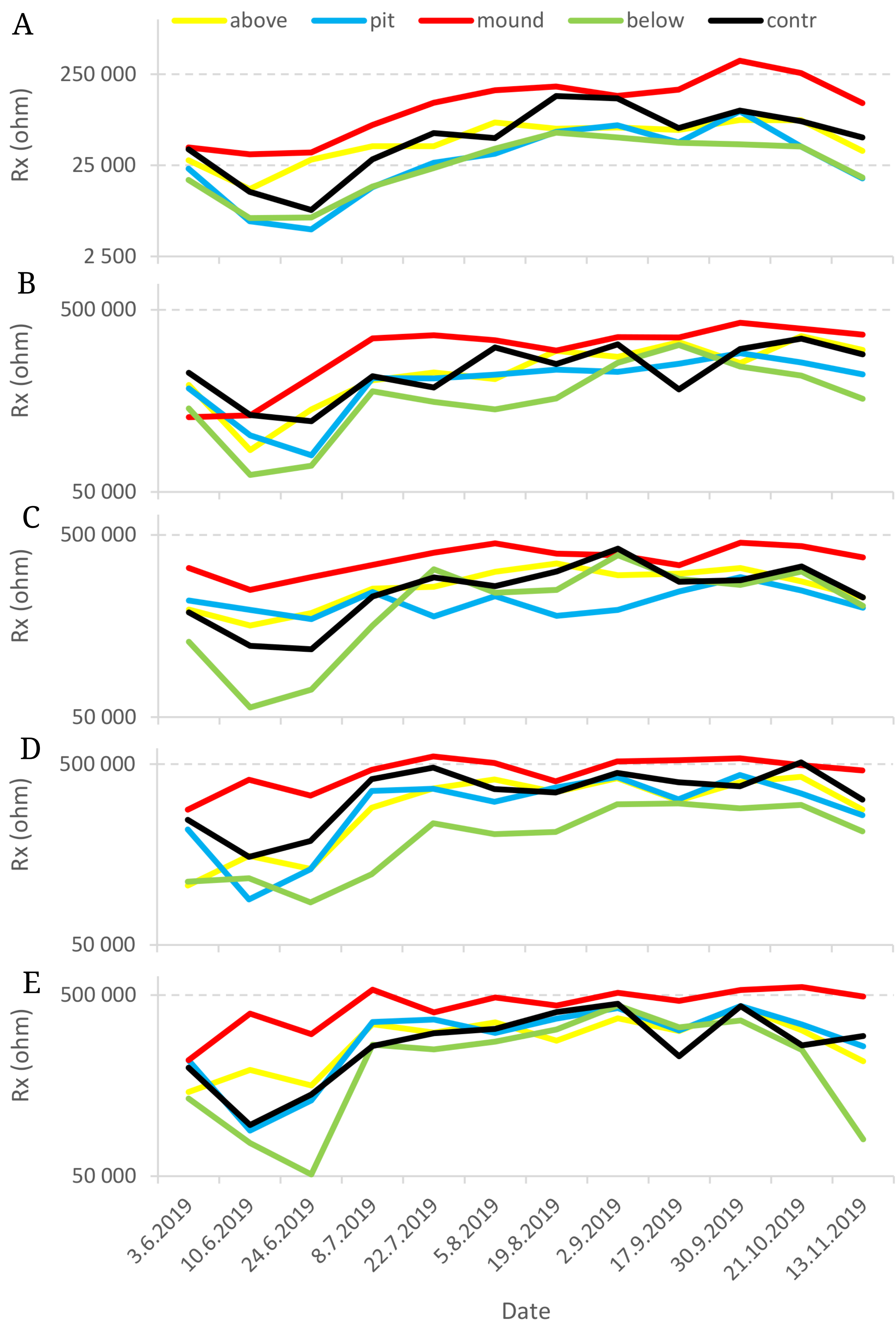

Figure 2 Seasonal dynamics of soil electrical resistance (Rx) at particular microsites in the 0–5 cm (A), 10–15 cm (B), 20–25 cm (C), 30–35 cm (D), and 40–45 cm (E) depth.

RESULTS

The dynamics of *Rx* through the growing season of 2019 at the Kanice site showed lowering at the beginning of the summer (higher soil moisture), its rising as the growing season goes on (soil gets dry) and lowering again in the autumn, with somewhat higher values in the topmost layer (Fig. 2). In general, the mound as the naturally driest microsite had the highest *Rx* values. In contrast, the lowest *Rx* values were observed in pit and downslope at the below-mound position (Table 1).

Table 1: Mean Rx values at different depths.

Layer	Microsite	Rx (ohm)	*
0-5 cm	Above	50 638	b
	Pit	36 342	d
	Mound	140 829	a
	Below	30 139	cd
	Control	63 746	bc
10-15 cm	Above	240 081	ab
	Pit	207 473	d
	Mound	309 379	a
	Below	176 487	cd
	Control	240 389	bc
20-25 cm	Above	263 000	ab
	Pit	216 374	c
	Mound	370 966	a
	Below	224 561	b
	Control	256 146	b
30-35 cm	Above	303 625	b
	Pit	265 963	c
	Mound	457 005	a
	Below	207 198	c
	Control	353 612	b
40-45 cm	Above	286 866	b
	Pit	301 995	b
	Mound	444 559	a
	Below	239 262	c
	Control	283 926	bc

* Different letters indicate significant differences between microsites at $p < 0.05$.

CONCLUSIONS

Our results confirm the general assumption of the pit as the relatively moist and mound as the dry microsite. The lowest *Rx* values downslope the pit-mound pair were surprising. We hypothe the size that the soil moisture in pit transfers under the mound and shows again downslope. Further research of the hydrological processes within pit-mound microrelief should also focus on deeper soil layers (below the 0.5 m depth).

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