

Supplementary table 3. Event-scale SM metrics at each location and depth during the wetting-up period, comparing flood events and non-flow events. Data are presented as mean \pm standard deviation. Significance is indicated as follows: * $p < 0.001$, ** $p < 0.01$, * $p < 0.05$. “Not significant” indicates $p \geq 0.05$.**

Metric	Location	Flood events	Non-flow events	Significance
Antecedent SM (%)	High-connectivity low-gradient hillslope (10 cm)	19.6 \pm 5	19.7 \pm 4.2	Not significant
	High-connectivity high-gradient hillslope (10 cm)	11.6 \pm 2.3	11.1 \pm 3	Not significant
	High-connectivity upslope-edge terrace 1 (10 cm)	33.2 \pm 6.7	32.8 \pm 5.7	Not significant
	High-connectivity upslope-edge terrace 2 (10 cm)	24.6 \pm 5.3	23.4 \pm 5.9	Not significant
	Low-connectivity mid-terrace (10 cm)	25.4 \pm 6.1	25.7 \pm 4.8	Not significant
	Collapsed wall-adjacent terrace (10 cm)	17.3 \pm 3	17.6 \pm 2.7	Not significant
	Collapsed wall-adjacent terrace (50 cm)	24.5 \pm 4.4	25.6 \pm 3.6	Not significant
	Intact wall-adjacent terrace (10 cm)	21.1 \pm 4	20.2 \pm 4.8	Not significant
	Intact wall-adjacent terrace (50 cm)	23.1 \pm 4.8	23.7 \pm 4.7	Not significant
	Disconnected mid-terrace (10 cm)	13.7 \pm 1.2	15.2 \pm 2.3	Not significant
	Disconnected mid-terrace (50 cm)	18.4 \pm 4.7	19.9 \pm 4.3	Not significant
Average SM (%)	High-connectivity low-gradient hillslope (10 cm)	27.2 \pm 3.9	22.5 \pm 4.1	*
	High-connectivity high-gradient hillslope (10 cm)	18.2 \pm 3.1	14 \pm 3.3	*
	High-connectivity upslope-edge terrace 1 (10 cm)	42.6 \pm 3.6	37.5 \pm 5.2	*
	High-connectivity upslope-edge terrace 2 (10 cm)	33.4 \pm 3.4	26.5 \pm 5.8	*
	Low-connectivity mid-terrace (10 cm)	34.7 \pm 3.5	28 \pm 5	**
	Collapsed wall-adjacent terrace (10 cm)	22.9 \pm 1.8	18.4 \pm 2.9	**
	Collapsed wall-adjacent terrace (50 cm)	33.9 \pm 2	26.9 \pm 4.2	***
	Intact wall-adjacent terrace (10 cm)	27.5 \pm 3.5	22.7 \pm 4.9	*
	Intact wall-adjacent terrace (50 cm)	31.1 \pm 2.6	25.4 \pm 5.2	**
	Disconnected mid-terrace (10 cm)	16.1 \pm 3.4	15.2 \pm 2.5	Not significant
	Disconnected mid-terrace (50 cm)	25.6 \pm 7	20.5 \pm 4.9	Not significant
Maximum SM (%)	High-connectivity low-gradient hillslope (10 cm)	37.6 \pm 7.9	25.5 \pm 6	**
	High-connectivity high-gradient hillslope (10 cm)	33.4 \pm 8.4	17.4 \pm 6.8	**
	High-connectivity upslope-edge terrace 1 (10 cm)	46.7 \pm 2.3	41.2 \pm 6.7	Not significant
	High-connectivity upslope-edge terrace 2 (10 cm)	43.7 \pm 4.1	30.6 \pm 8.5	**
	Low-connectivity mid-terrace (10 cm)	44.2 \pm 4	30.3 \pm 6.8	***
	Collapsed wall-adjacent terrace (10 cm)	30.4 \pm 6.3	19.6 \pm 3.5	***
	Collapsed wall-adjacent terrace (50 cm)	40.1 \pm 1.5	28.9 \pm 6.2	***
	Intact wall-adjacent terrace (10 cm)	34.6 \pm 4.2	25.9 \pm 6.4	*
	Intact wall-adjacent terrace (50 cm)	39 \pm 4.4	27.2 \pm 6.4	**
	Disconnected mid-terrace (10 cm)	19.1 \pm 5.6	15.5 \pm 2.9	Not significant
	Disconnected mid-terrace (50 cm)	33.5 \pm 11.7	21.2 \pm 6.1	*
ΔSM (%)	High-connectivity low-gradient hillslope (10 cm)	18 \pm 6.6	5.6 \pm 6.4	**
	High-connectivity high-gradient hillslope (10 cm)	20.9 \pm 8.4	6.2 \pm 8	**
	High-connectivity upslope-edge terrace 1 (10 cm)	12.7 \pm 6.5	8.2 \pm 8.6	Not significant
	High-connectivity upslope-edge terrace 2 (10 cm)	17.8 \pm 5.2	7 \pm 9	*
	Low-connectivity mid-terrace (10 cm)	18.2 \pm 4.8	4.6 \pm 6.3	**
	Collapsed wall-adjacent terrace (10 cm)	13 \pm 5.5	2.2 \pm 2.9	***
	Collapsed wall-adjacent terrace (50 cm)	15.6 \pm 3.7	3.3 \pm 5.7	**
	Intact wall-adjacent terrace (10 cm)	13.5 \pm 3.2	5.7 \pm 6.7	*

	Intact wall-adjacent terrace (50 cm)	16.1 ± 4.4	3.8 ± 5.9	**
	Disconnected mid-terrace (10 cm)	5.5 ± 5.2	0.6 ± 1.2	*
	Disconnected mid-terrace (50 cm)	15.2 ± 10	1.4 ± 4.7	**