

Supplementary table 1. Event-scale SM metrics at each location and depth during the wet 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)	26.2 \pm 2.1	22.7 \pm 3.3	***
	High-connectivity high-gradient hillslope (10 cm)	14.2 \pm 2.2	12.6 \pm 2.8	Not significant
	High-connectivity upslope-edge terrace 1 (10 cm)	39.7 \pm 2.2	37 \pm 3	***
	High-connectivity upslope-edge terrace 2 (10 cm)	30 \pm 2.1	26.9 \pm 4	*
	Low-connectivity mid-terrace (10 cm)	33.1 \pm 1.5	29 \pm 4.3	**
	Collapsed wall-adjacent terrace (10 cm)	21.9 \pm 1	19.7 \pm 2.3	**
	Collapsed wall-adjacent terrace (50 cm)	31.4 \pm 2	28.5 \pm 3.1	**
	Intact wall-adjacent terrace (10 cm)	26.9 \pm 2.2	23.5 \pm 3.5	**
	Intact wall-adjacent terrace (50 cm)	30.1 \pm 3.1	27.2 \pm 4	*
	Disconnected mid-terrace (10 cm)	22.2 \pm 2.8	20.5 \pm 3.1	*
	Disconnected mid-terrace (50 cm)	28.7 \pm 1.9	25.8 \pm 3.3	**
Average SM (%)	High-connectivity low-gradient hillslope (10 cm)	31 \pm 3.5	25.1 \pm 3.4	***
	High-connectivity high-gradient hillslope (10 cm)	18.6 \pm 2.7	14 \pm 3.7	***
	High-connectivity upslope-edge terrace 1 (10 cm)	43.2 \pm 1.5	39.4 \pm 3.6	***
	High-connectivity upslope-edge terrace 2 (10 cm)	34.2 \pm 3.1	29.4 \pm 4.5	***
	Low-connectivity mid-terrace (10 cm)	38.2 \pm 2.6	31.4 \pm 5	***
	Collapsed wall-adjacent terrace (10 cm)	24.5 \pm 1.9	20.7 \pm 2.6	***
	Collapsed wall-adjacent terrace (50 cm)	34.7 \pm 2.4	29.8 \pm 3.6	***
	Intact wall-adjacent terrace (10 cm)	30.3 \pm 2.1	25.2 \pm 3.6	***
	Intact wall-adjacent terrace (50 cm)	33.3 \pm 2.5	27.9 \pm 4.2	***
	Disconnected mid-terrace (10 cm)	23 \pm 2.8	20.8 \pm 3.2	**
	Disconnected mid-terrace (50 cm)	31.1 \pm 2.4	26.3 \pm 3.4	***
Maximum SM (%)	High-connectivity low-gradient hillslope (10 cm)	41.1 \pm 6.9	29.3 \pm 6	***
	High-connectivity high-gradient hillslope (10 cm)	34.3 \pm 10.9	17.6 \pm 7.8	***
	High-connectivity upslope-edge terrace 1 (10 cm)	44.7 \pm 1.1	41.6 \pm 4.3	**
	High-connectivity upslope-edge terrace 2 (10 cm)	42.4 \pm 6.2	33.2 \pm 7.7	***
	Low-connectivity mid-terrace (10 cm)	44.2 \pm 3	35.2 \pm 7.9	***
	Collapsed wall-adjacent terrace (10 cm)	30.3 \pm 6.2	21.9 \pm 3.5	***
	Collapsed wall-adjacent terrace (50 cm)	39.2 \pm 2.6	31.9 \pm 5.6	***
	Intact wall-adjacent terrace (10 cm)	35.9 \pm 2.1	28 \pm 5.3	***
	Intact wall-adjacent terrace (50 cm)	38.1 \pm 2.7	29.5 \pm 5.5	***
	Disconnected mid-terrace (10 cm)	24.2 \pm 3.1	21.3 \pm 3.4	**
	Disconnected mid-terrace (50 cm)	35.3 \pm 5.3	27.5 \pm 4.7	***
Δ SM (%)	High-connectivity low-gradient hillslope (10 cm)	15 \pm 7.2	6.5 \pm 5.5	***
	High-connectivity high-gradient hillslope (10 cm)	20.2 \pm 10.9	5.2 \pm 6.9	***
	High-connectivity upslope-edge terrace 1 (10 cm)	5.2 \pm 2.1	4.7 \pm 3.9	Not significant
	High-connectivity upslope-edge terrace 2 (10 cm)	12.5 \pm 6	6.1 \pm 7	**
	Low-connectivity mid-terrace (10 cm)	11.3 \pm 3.5	6.1 \pm 6.3	*
	Collapsed wall-adjacent terrace (10 cm)	8.5 \pm 6.2	2.1 \pm 2.6	***
	Collapsed wall-adjacent terrace (50 cm)	8.1 \pm 3.3	3.4 \pm 4.8	**
	Intact wall-adjacent terrace (10 cm)	9.1 \pm 1.7	4.4 \pm 4.3	**

	Intact wall-adjacent terrace (50 cm)	8.2 ± 2.9	2.4 ± 3.5	***
	Disconnected mid-terrace (10 cm)	2.1 ± 1.9	1 ± 1.4	*
	Disconnected mid-terrace (50 cm)	6.9 ± 6.1	1.8 ± 3.6	***