

**Supplementary table 2. Event-scale SM metrics at each location and depth during the drying-down 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)	17.3 $\pm$ 2	19 $\pm$ 2.7	Not significant
	High-connectivity high-gradient hillslope (10 cm)	8.7 $\pm$ 1.2	10.1 $\pm$ 2.3	Not significant
	High-connectivity upslope-edge terrace 1 (10 cm)	30.3 $\pm$ 2.8	32.3 $\pm$ 4.2	Not significant
	High-connectivity upslope-edge terrace 2 (10 cm)	18.3 $\pm$ 1.9	21.3 $\pm$ 2.9	Not significant
	Low-connectivity mid-terrace (10 cm)	23.1 $\pm$ 2.3	25.1 $\pm$ 3.2	Not significant
	Collapsed wall-adjacent terrace (10 cm)	16.1 $\pm$ 1.5	16.5 $\pm$ 1.9	Not significant
	Collapsed wall-adjacent terrace (50 cm)	24 $\pm$ 3.1	24.8 $\pm$ 3	Not significant
	Intact wall-adjacent terrace (10 cm)	16.6 $\pm$ 2.2	17.7 $\pm$ 2.4	Not significant
	Intact wall-adjacent terrace (50 cm)	21.1 $\pm$ 3	22.7 $\pm$ 3.7	Not significant
	Disconnected mid-terrace (10 cm)	16 $\pm$ 1.8	16.4 $\pm$ 1.4	Not significant
	Disconnected mid-terrace (50 cm)	19.6 $\pm$ 3.2	21.1 $\pm$ 2.5	Not significant
Average SM (%)	High-connectivity low-gradient hillslope (10 cm)	26.7 $\pm$ 2.8	19.6 $\pm$ 2.8	**
	High-connectivity high-gradient hillslope (10 cm)	17.9 $\pm$ 3.5	10.6 $\pm$ 2.5	*
	High-connectivity upslope-edge terrace 1 (10 cm)	41 $\pm$ 3	33 $\pm$ 4.3	**
	High-connectivity upslope-edge terrace 2 (10 cm)	32.2 $\pm$ 4.8	21.7 $\pm$ 3.1	*
	Low-connectivity mid-terrace (10 cm)	33.6 $\pm$ 2.2	25.4 $\pm$ 3.2	**
	Collapsed wall-adjacent terrace (10 cm)	21.1 $\pm$ 1.7	16.5 $\pm$ 1.9	**
	Collapsed wall-adjacent terrace (50 cm)	34.2 $\pm$ 3.6	25 $\pm$ 3.2	**
	Intact wall-adjacent terrace (10 cm)	25.3 $\pm$ 2.5	17.8 $\pm$ 2.6	**
	Intact wall-adjacent terrace (50 cm)	29 $\pm$ 3.8	22.6 $\pm$ 3.7	*
	Disconnected mid-terrace (10 cm)	18.7 $\pm$ 2.5	16.4 $\pm$ 1.4	Not significant
	Disconnected mid-terrace (50 cm)	26.5 $\pm$ 5.1	21.1 $\pm$ 2.5	*
Maximum SM (%)	High-connectivity low-gradient hillslope (10 cm)	37.1 $\pm$ 3.9	22.3 $\pm$ 5	**
	High-connectivity high-gradient hillslope (10 cm)	36.8 $\pm$ 13	12.2 $\pm$ 4.6	**
	High-connectivity upslope-edge terrace 1 (10 cm)	47.8 $\pm$ 1.6	36.5 $\pm$ 6.9	***
	High-connectivity upslope-edge terrace 2 (10 cm)	42.4 $\pm$ 4.3	24.1 $\pm$ 5.8	**
	Low-connectivity mid-terrace (10 cm)	44.5 $\pm$ 1.8	26.6 $\pm$ 4.1	**
	Collapsed wall-adjacent terrace (10 cm)	26.1 $\pm$ 2.4	16.7 $\pm$ 2.2	**
	Collapsed wall-adjacent terrace (50 cm)	40.2 $\pm$ 0.3	25.6 $\pm$ 4	**
	Intact wall-adjacent terrace (10 cm)	33 $\pm$ 1.4	18.8 $\pm$ 3.8	**
	Intact wall-adjacent terrace (50 cm)	39.4 $\pm$ 3.6	22.7 $\pm$ 3.7	**
	Disconnected mid-terrace (10 cm)	22.2 $\pm$ 2.9	16.5 $\pm$ 1.5	**
	Disconnected mid-terrace (50 cm)	36.4 $\pm$ 6.2	21.3 $\pm$ 2.6	**
$\Delta$ SM (%)	High-connectivity low-gradient hillslope (10 cm)	19.8 $\pm$ 5	3.5 $\pm$ 4.8	**
	High-connectivity high-gradient hillslope (10 cm)	28.1 $\pm$ 12.8	2.3 $\pm$ 4.3	**
	High-connectivity upslope-edge terrace 1 (10 cm)	17.7 $\pm$ 4.1	4.4 $\pm$ 6.9	*
	High-connectivity upslope-edge terrace 2 (10 cm)	19 $\pm$ 11.5	2.9 $\pm$ 5.1	*
	Low-connectivity mid-terrace (10 cm)	21.5 $\pm$ 2.8	1.6 $\pm$ 3.3	**
	Collapsed wall-adjacent terrace (10 cm)	10.1 $\pm$ 3.5	0.3 $\pm$ 0.8	**
	Collapsed wall-adjacent terrace (50 cm)	13.3 $\pm$ 7	0.8 $\pm$ 1.9	**
	Intact wall-adjacent terrace (10 cm)	16.4 $\pm$ 3.3	1.2 $\pm$ 2.9	**

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Intact wall-adjacent terrace (50 cm)	$18.4 \pm 4.1$	$0.2 \pm 0.2$	**
Disconnected mid-terrace (10 cm)	$6.2 \pm 4.5$	$0.2 \pm 0.1$	Not significant
Disconnected mid-terrace (50 cm)	$16.9 \pm 6.7$	$0.3 \pm 0.8$	**

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