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Del Vecchio, J., DiBiase, R.A., Denn, A.R., Bierman, P.R., Caffee, M.W., and Zimmerman, S.R., 2018, Record of coupled hillslope and channel response to Pleistocene erosion and deposition in a sandstone headwater valley, central Pennsylvania: GSA Bulletin, https://doi.org/10.1130/B31912.1.

DATA REPOSITORY

Table DR1. Soil horizon sampling by soil pit.

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Table DR3. Cosmogenic nuclide data (Table DR3.xls).

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Figure DR2. Overview map of soil pit locations.

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Soil pit descriptions

Supplementary dataset: GR_point_count_data.csv contains all individual measurements from field point counts in centimeters, which are summarized in Table DR2.

References

Table DR1: Soil horizon sampling by soil pit[1]

TMMS		**LRVF**		**LRMS**		**LRRT**	
Depth (cm)	*Horizon*	*Depth (cm)*	*Horizon*	*Depth (cm)*	*Horizon*	*Depth (cm)*	*Horizon*
0-6	A	0-10	E	0-12	E	0-5	E
6-21	AE	10-14	Bhs	12-15	Bhs	5-7	Bhs
21-37	Bw1	14-20	Bs	15-26	Bs	7-14	Bs
37-75	Bw2	20-32	Bw1	26-50	Bw1	14-33	Bw1
75-95+	Bw3	32-65+	Bw2	50-72	Bw2	33-60	Bw2
				72-145	C	60-95	Bt
						95-138	BC
						138-155+	2Cr

[1]Reproduced from Brantley et al. 2016

Table DR2. Summary of point count locations and results.

Site ID	Easting	Northing	N[1]	D_{min} (cm)[2]	D_{16} (cm)	D_{50} (cm)	D_{84} (cm)	D_{max} (cm)	Cover type
TMOB1	252743	4509567	77	20	28	43	69	132	Open boulder field
TMOB2	253015	4509661	51	16	28	45	70	124	Open boulder field
TMOB3	252810	4509520	79	14	20	30	44	79	Open boulder field
TMOB4	252977	4509547	65	10	19	26	37	65	Open boulder field
TMOB5	252985	4509480	95	11	21	29	43	102	Open boulder field
LRBC1	253474	4508925	92	12	21	31	42	72	Canopied boulder field
LRBC2	253186	4508836	103	13	23	35	56	115	Canopied boulder field
LRBC3	253149	4508944	103	14	21	34	53	105	Canopied boulder field
LRBC4	253095	4509035	103	9	15	22	32	60	Canopied boulder field
TMBC1	252800	4509558	108	10	18	28	44	103	Canopied boulder field
TMBC2	253052	4509500	88	10	19	29	40	62	Canopied boulder field
TMBC3	252898	4509414	102	11	17	25	35	52	Canopied boulder field
TMBC4	253082	4509415	70	10	17	26	35	59	Canopied boulder field
TMBS1	252808	4509625	52	12	16	20	30	57	Boulder/soil mix
TMBS2	252967	4509232	82	12	17	23	30	57	Boulder/soil mix
TMBS3	253032	4509165	40	11	15	22	27	66	Boulder/soil mix
TMBS4	253213	4509256	75	10	16	23	33	77	Boulder/soil mix
LRBS1	253324	4508936	54	10	19	28	35	57	Boulder/soil mix
LRBS2	253295	4509027	49	12	15	23	28	47	Boulder/soil mix
LRBS3	253186	4509091	68	7	14	18	26	47	Boulder/soil mix
B1	253332	4509604	100	12	25	47	86	191	Open boulder field
B2	253267	4509439	100	7	14	20	29	62	Canopied boulder field
B3	253388	4509400	98	8	17	23	34	110	Canopied boulder field
GPC01	253258	4509216	75	f[3]	1.0	12	21	41	Channel
GPC02	253188	4509148	112	f	0.8	15	27	66	Channel
GPC03	253111	4509082	116	f	1.9	20	33	73	Channel
GCP04	253030	4509032	99	f	1.5	13	25	59	Channel
GPC05	248083	4505270	90	f	5.4	9.8	16	45	Channel
GPC06	248129	4504988	106	f	1.5	9.3	23	58	Channel
GPC07	250023	4506728	100	f	3.3	8.5	15	26	Channel
GPC08	249550	4506569	99	f	f	5.7	12	30	Channel

[1] N = number of clasts counted

[2] D_{16}, D_{50} and D_{84} refer to the 16th, 50th and 84th percentile of clast intermediate axis measurements, respectively. D_{min} and D_{max} refer to the minimum and maximum intermediate clast size observed.

[3] f = fine (< 0.2 cm)

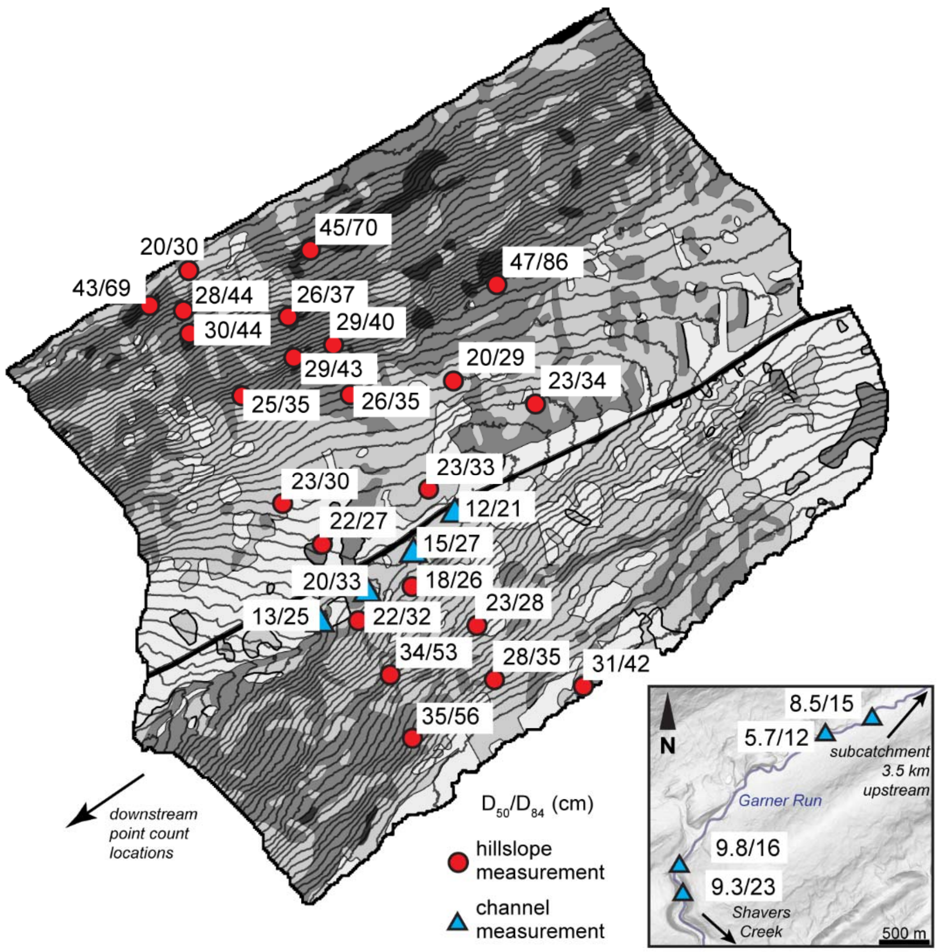

Figure DR1: *D*50 and *D*84, in cm, of intermediate axis diameter of clasts on both hillslopes and channels. Inset shows channel point count observations downstream of subcatchment outlet.

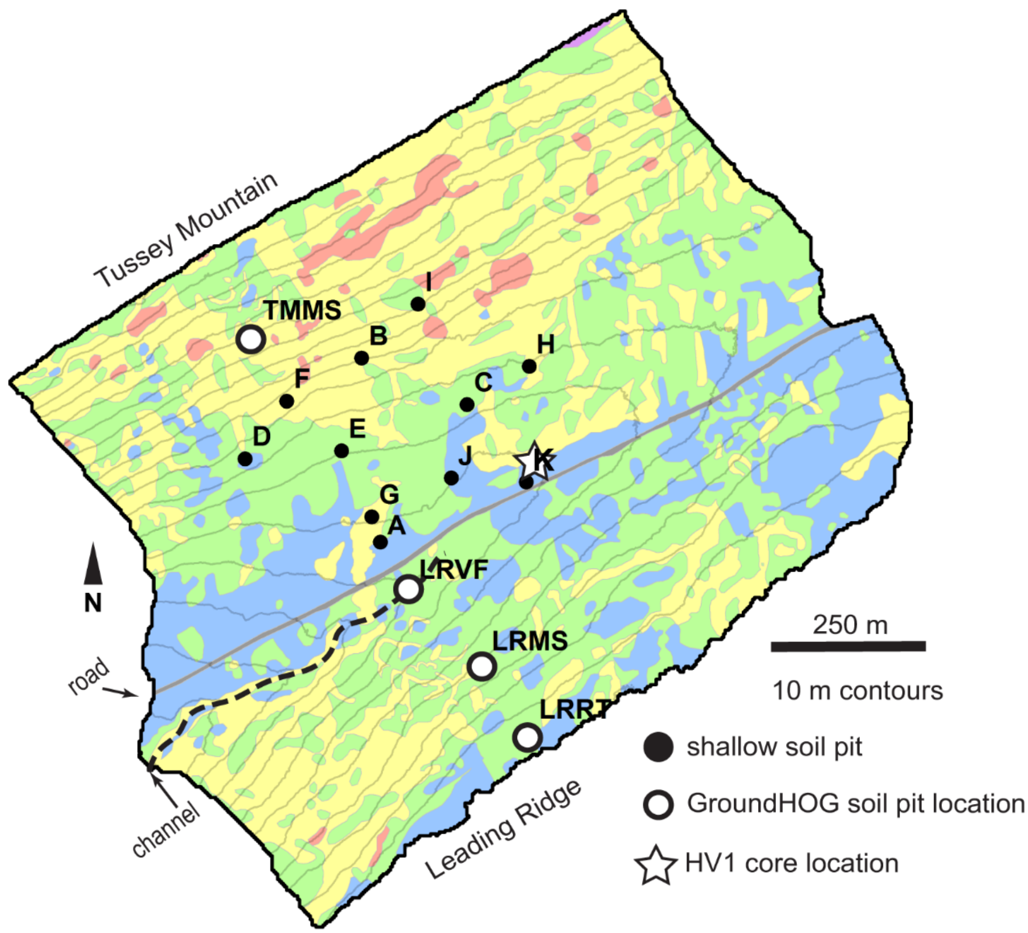

Figure DR2. Location of soil pit observations, including GroundHOG soil pits (Brantley et al., 2016) and shallow pits from this study (lettered; see profile descriptions in Data Repository).

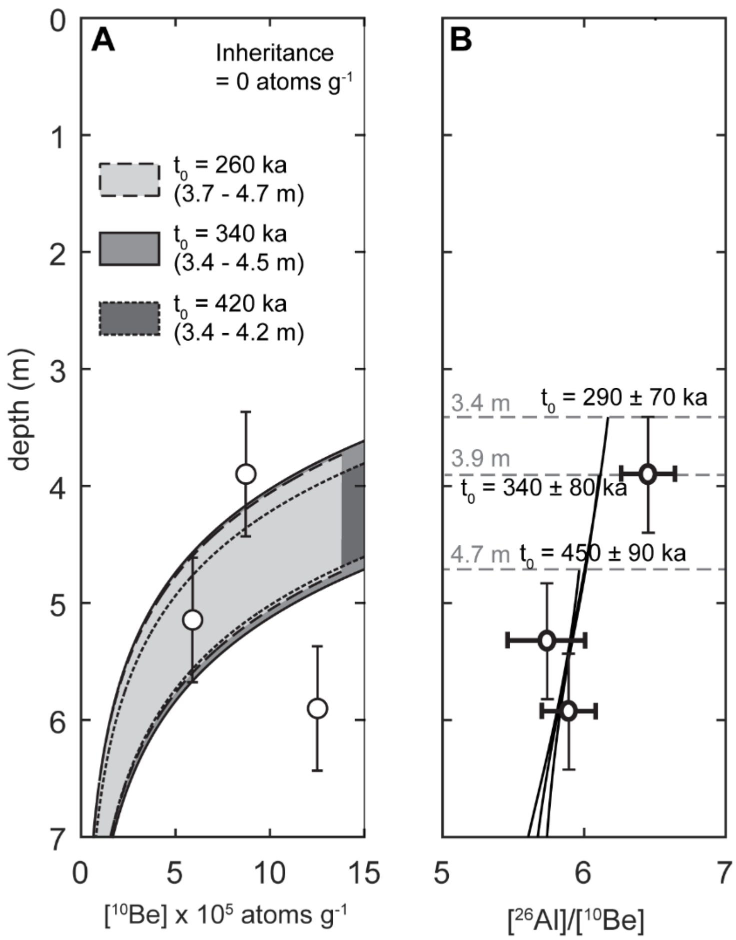

Figure DR3. Determining the influence of choice in hiatus depth on modeled ages, assuming t_1 = 16 ka. (A) Constraints on the depth of the hiatus surface based on the concentration of ^{10}Be in the middle clast at a depth of 5.3 ± 0.5 m for the end-member case of no inherited ^{10}Be. For the minimum burial age of 260 ka, the light gray envelope demonstrates possible hiatus depths between 3.7 and 4.7 m. For a burial age of 340 ka, the medium gray envelope demonstrates possible hiatus depths between 3.4 and 4.5 m. The darkest gray envelope demonstrates the possible hiatus depths of 3.4 to 4.2 m depth given the maximum burial age of 420 ka. (B) Sensitivity of inferred value of t_0 for hiatus depths ranging from 3.4-4.7 m.(B) Depending on the depth of the hiatus surface the best-fitting burial ages changes, with a deeper hiatus allowing for older burial ages and a shallower hiatus allowing for a younger burial age. Hiatus depths are shown as dashed gray lines, along with the burial age corresponding to each of the three model outputs.

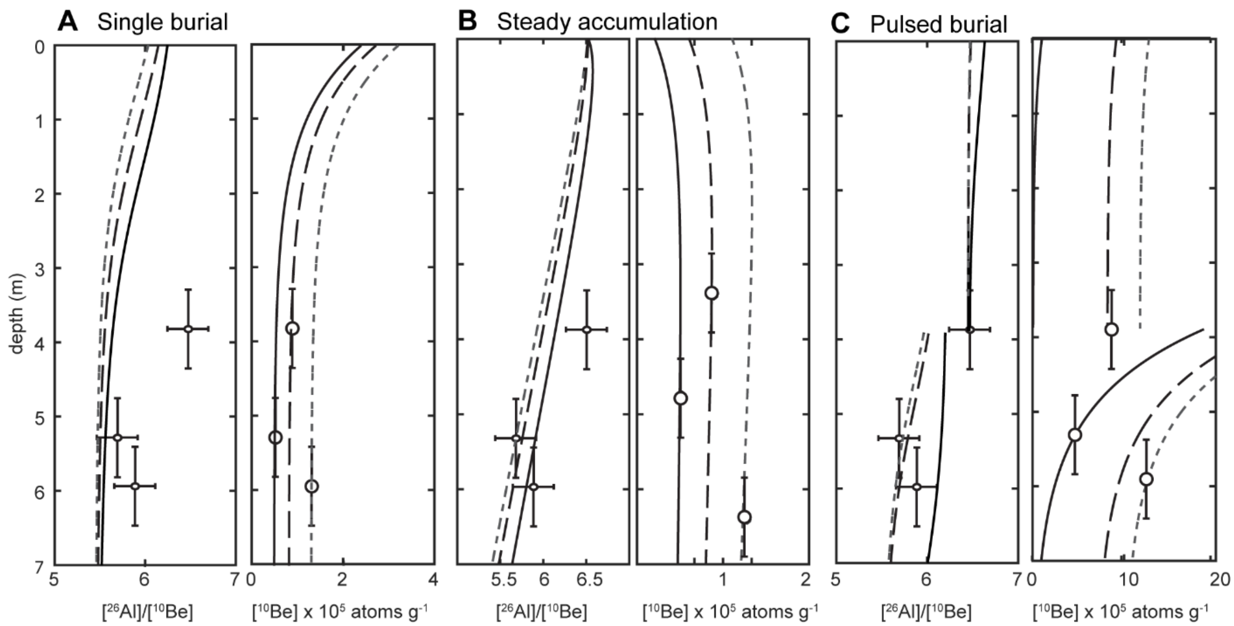

Figure DR4. The effect of the range in possible inheritance of buried grains, N_{10Be}^{inh}, on the predicted [^{26}Al]/[^{10}Be] ratio in core samples for a burial age t_0 = 340 ka. Three curves indicate predictions constrained to match the modern ^{10}Be concentration of each clasts. In the single burial (A) and steady accumulation (B) cases, inherited concentrations of ^{10}Be do not result in significant variability of [^{26}Al]/[^{10}Be]. For the pulsed burial case (C), the relatively low concentration of ^{10}Be exhibited by the middle clast results in predicted [^{26}Al]/[^{10}Be] inconsistent with observations, likely due to variable inheritance or more complicated exposure history.

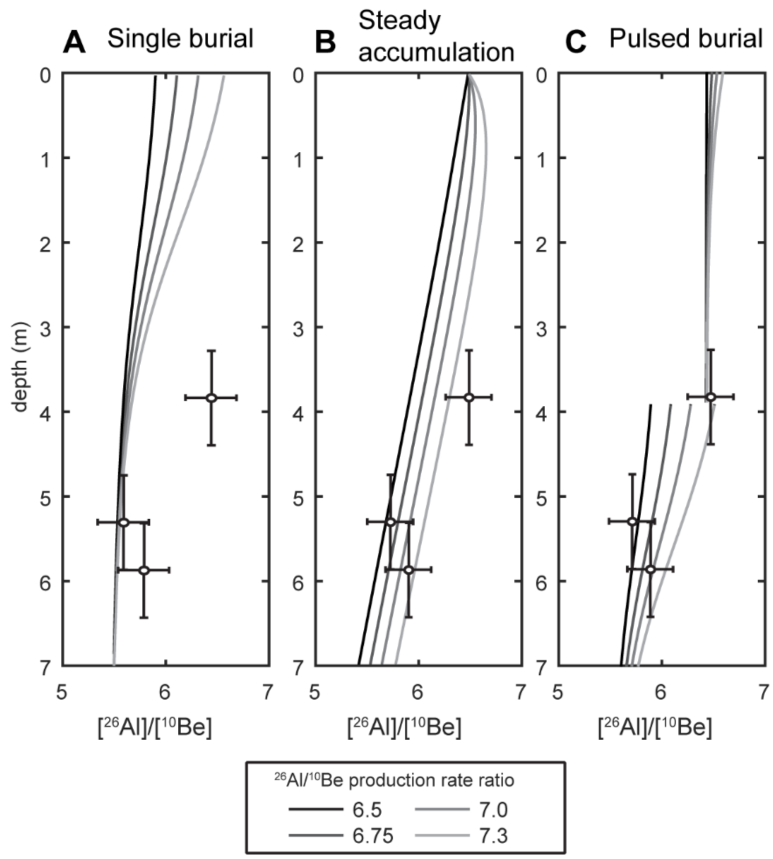

Figure DR5. Sensitivity of predicted [^{26}Al]/[^{10}Be] ratios in core samples to the assumed production rate ratio $R_{26/10}$, assuming t_0 = 340 ka, t_1 = 16 ka, and N_{10Be}^{inh} = 6.5. (A) For the single burial case, the range of surface production ratios do not result in significant variability of [^{26}Al]/[^{10}Be] at depths greater than 3 m. (B) For the steady accumulation case, surface production rate ratio directly influences predicted [^{26}Al/^{10}Be] at depth, but cannot reconcile measured values. (C) For the pulsed burial case, a higher surface production ratio requires older burial times for samples at depth.

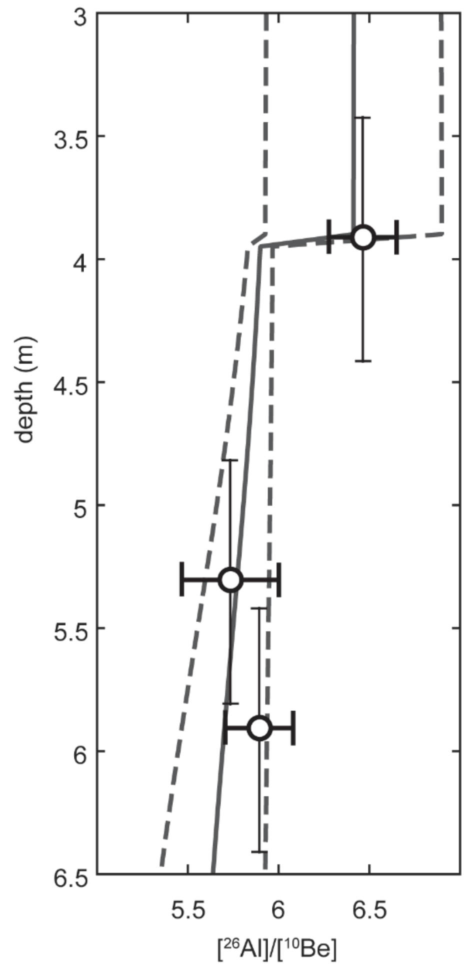

Figure DR6. Predicted range of [^{26}Al]/[^{10}Be] ratios in core samples due to variability in the inherited [^{26}Al]/[^{10}Be] ratio, $N_{26Al}^{inh}/N_{10Be}^{inh}$, generated from a normal distribution with mean of 6.5 and standard deviation of 0.48 based on the mean and standard deviation measured surface clasts (Table 1, main text). Solid line indicates mean and dashed lines indicate 1σ spread from 1000 simulations, for case where t_0 = 340 ka and t_1 = 16 ka.

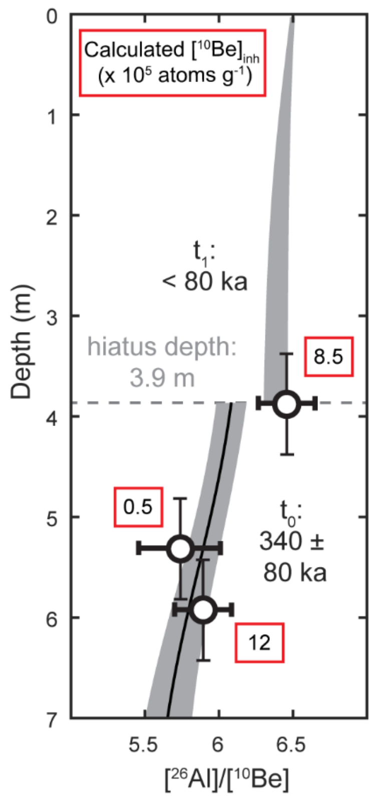

Figure DR7. Predictions of inherited ^{10}Be concentrations in clasts for pulsed burial case with t_0 = 350 ka and t_1 = 16 ka. Initial ^{10}Be concentrations of buried clasts, N_{10Be}^{inh}, were determined by using an initial, inherited concentration that, given our favored scenario of t_0=340 ka, resulted in a final, modern ^{10}Be concentration that best fit the observed concentrations of ^{10}Be measured in samples (the same process is shown graphically in Fig. DR4).

Soil pit descriptions

Soil horizons were described using a standard NRCS pedon description form. Dry and moist colors were determined in the field according to the Munsell® soil color book. Where described, texture was determined by feel in the lab (modified from Thien 1979).

Profile A
07-10-2015
253113 E, 4509192 N
Soil-mantled, adjacent to boulder canopy in valley floor

0-34+ cm	O/A and B	Very clayey soil with boulders mixed in; Dense root assemblage in first 10 cm or so

Profile B
07-10-2015
253082 E, 4509495 N
Steep; soil-mantled pit flanked by boulder patches

0-8 cm	O/A	*no description*
8-17 cm	E	*no description*
17+ cm	B	sandy brownish yellow layer, fine-grained but still gritty. Very sandy to medium/coarse gravels

Profile C
07-15-2015
253256 E, 4509418 N
On top of lobe and just uphill of toeslope boulder field

0-14 cm	O/A	*no description*
14-27+ cm	E	Crumbly, not clayey. Peds have roots. Rock at 27 cm.

Profile D
07-15-2015
252890 E, 4509329 N
Soil pit at the foot of boulders, soil-mantled

0-7 cm	O/A	*no description*
7-20+ cm	B	brown/red clayey soil

Profile E
07-29-2015
0243049 E, 4509342 N

Bouldery soil, Tussey side, valley floor

6-0 cm	O	crumbly w/ roots forming a mat, dry
0-3 cm	E	No rock fragments in E. Sparse root assemblage. 2-3 VF roots. Color: 7.5YR 5/3. Subrounded blocky peds, fine-medium. Wavy boundary
4-20+ cm	B	Varied spatial distribution of roots: some areas with 2-3 VF roots, others with 6-7 F roots. Rock fragments of quartzite, volumetrically less than 5%.0-17 cm depth contains coarse, gravel-cobble sized fragments in a soil matrix. 17+ cm rock fragments cease to be seen in the observable horizon. Peds are coarse to very coarse in size, angular-subangluar blocky. Color: 7.5YR 5/6. Lower boundary not observed

Profile F
07-30-15
252959 E, 4509424 N
Boulder canopy, steep Tussey Mountain side

4-0 cm	O	*no description*
0-6 cm	A	10YR 2/1 (10YR 2/1 moist), clear wavy boundary, sandy clay loam, many very fine/fine roots throughout. Very friable, slightly sticky, moderately plastic
6-13 cm	E	7.5 YR 6/2 (10YR 4/2 moist), clear wavy boundary, sandy clay loam. 60% subrounded quartzite cobbles. Some very fine/fine roots throughout. Friable, slightly sticky, moderately plastic
13-16 cm	B1	7.5 YR 3/3 (7.5 YR 4/3 moist), broken boundary, sandy clay loam. 60% subrounded quartzite coarse gravel to cobbles. Many very fine/fine roots throughout. Very friable, slightly sticky, moderately plastic
16-26+ cm	B2	7.5 YR 4/4 (7.5 YR 4/3 moist), broken boundary, sandy clay loam. 75% subrounded quartzite coarse gravel to cobbles. Some medium to coarse roots throughout. Friable, slightly sticky, moderately plastic. Lower boundary not observed (large boulder in the way)

Profile G
07-30-2015
253099 E, 4509233 N
Boulder canopy in valley floor. Angry ants.

4-0 cm	O	*no description*
0-7 cm	A	7.5 YR 2.5/1 (10YR 3/1 moist), clear wavy boundary, loam. 60% subangular quartzite cobbes. Many very fine to fine roots throughout, few medium roots throughout. Friable, slightly sticky, very plastic.
7-35+ cm	B	7.5 YR 4/4 (10 YR 5/4 moist), silty clay. From 7-30 cm, 60% subruonded quartzite cobbles; from 30+ cm, 20% subrounded coarse gravel. Many fine roots throughout, few coarse roots throughout. Firm, moderately sticky, very plastic.

Profile H
07-06-2016
4509481 N, 253359 E

+5 – 0 cm	O	Organic horizon; largely leaves with very fine to fine roots throughout.

0 – 3 cm	O/A	Organic horizon; fewer roots, with some very fine sand grains
3 – 16 cm	E	Sandy clay loam. 7.5YR 6/2 color (7.5YR 5/2 moist). Abrupt wavy boundary. Moderate sub-angular blocky structure, with dark organic stains on pedon surfaces. Few fine tubular pores. Common very fine to fine roots and few medium roots throughout. Abundant gravel to cobble size rock fragments.
16 – 46+ cm	B	7.5YR 3/4 color (5YR 3/4 moist), with 5YR 3/3 (5YR 2.5/2 moist) color mottles associated with weathering rinds on clasts. Gradual wavy boundary. Moderate granular structure. Common fine roots and few medium roots throughout. Few medium gravel to cobble size rock fragments throughout.

Profile I
07-06-2016
4509583 N, 253175 E

+14 – 0 cm	O	Organic horizon
0 – 30 cm	E	7.5YR 6/2 color (7.5YR 6/2 moist). Moderate sub-angular blocky structure, with 7.5YR 5/6 color pedons. Rocky boundary. Few to common coarse roots and common fine roots throughout. Few coarse and common fine dendritic tubular pores. Abundant sub-angular to sub-rounded medium gravel to cobble size rock fragments.
30 - 47+ cm	B	Sandy clay loam. 10YR 5/6 color (10YR 4/4 moist). Moderate sub-angular blocky structure. Rocky, gradual irregular boundary. Few coarse roots, common medium roots, and few to common fine roots throughout. Few very fine tubular pores. Sub-angular to sub-rounded coarse gravel to cobble size rock fragments.

Profile J

07-07-2016

253230 E, 4509297 N
Below lobe

+3 – 0 cm	O	Organic horizon
0 – 4 cm	E	7.5YR 5/2 color (7.5YR 4/2 moist). Clear wavy boundary. Common fine roots and few medium roots throughout. Medium gravel to cobble fragment blocks.
4 – 16+ cm	B	10YR 6/6 color (10YR 5/6 moist). Common fine roots and few medium roots throughout. Medium gravel to cobble fragment blocks.

Profile K
7-7-2016
253354 E, 4509290 N
Just above lobe

+2 – 0 cm	O	Organic horizon

0 – 5 cm	E	Medium gravelly. 7.5YR 3/2 color (7.5YR 2.5/2 moist). Abrupt smooth boundary. Common fine roots throughout.
5 – 15+ cm	B	Medium gravely to cobbly. 10YR 5/6 color (10YR 4/6 moist). Sub-angular blocky structure. Common fine roots and common coarse roots throughout.

References

S.J. Thien. 1979. *A flow diagram for teaching texture by feel analysis.* Journal of Agronomic Education. 8:54-55