Supplement of

Designing a suite of measurements to understand the critical zone

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Table S1. Summary of Measurements Planned for Shavers Creek Watershed.

| Installation | Field Site  | Measurement                  |
|--------------|-------------|------------------------------|
| GroundHOG    | Shale Hills | Soil Moisture                |
|              |             | Soil Temperature             |
|              |             | Soil Dielectric              |
|              | Garner Run  | Soil CO\textsubscript{2}      |
|              |             | Soil O\textsubscript{2}      |
|              | Shale Hills | Sap Flux                     |
|              |             | Groundwater Level            |
| TowerHOG     | Shale Hills | CO\textsubscript{2} Concentration |
|              |             | H\textsubscript{2}O Concentration |
|              |             | 3-D Wind Velocity           |
|              |             | Air Temperature              |
|              |             | Virtual Temperature         |
|              |             | Relative Humidity           |
|              |             | Precipitation Amount        |
|              |             | Precipitation Type          |
|              |             | Snow Depth                  |
| Location     | Measurements                                                                 |
|--------------|-----------------------------------------------------------------------------|
| TowerHOG     | Shale Hills                                                                 |
|              | 4-Component Radiation (Upwelling & Downwelling; Shortwave & Longwave)       |
|              | Digital Imagery (PhenoCam)                                                  |
| Garner Run   | CO₂ Concentration                                                           |
|              | H₂O Concentration                                                           |
|              | 3-D Wind Velocity                                                           |
|              | Air Temperature                                                             |
|              | Virtual Temperature                                                         |
|              | Relative Humidity                                                           |
|              | Precipitation Amount                                                        |
|              | Precipitation Type                                                          |
|              | Snow Depth                                                                  |
|              | 4-Component Radiation (Upwelling & Downwelling; Shortwave & Longwave)       |
|              | Digital Imagery                                                             |
| Stream       | Shale Hills                                                                 |
|              | Stage/Level                                                                 |
|              | Discharge                                                                    |
|              | Water Chemistry (DOC, TOC, DO, NO₃, NH₄, K, F, Cl, pH, EC, ORP, Major Cations, Fe, Mn, Al, Si) |
|              | Suspended Sediment Chemistry (Major Cations, Fe, Mn, Al, Si)                |
|              | Hyporheic Zone Exchange (Streambed Water Temperature)                       |
|              | Turbidity                                                                   |
| Garner Run   | Stage/Level                                                                 |
|              | Discharge                                                                    |
|              | Chemistry (DOC, TOC, DO, NO₃, NH₄, K, F, Cl, pH, EC, ORP)                    |
|              | Turbidity                                                                   |
| Shavers Creek| Stage/Level                                                                 |
| Above Lake   | Stage/Level                                                                 |
|              | Stage/Level                                                                 |
Table S1 (continued).

| Stream                        | Location            | Parameter                                      |
|-------------------------------|---------------------|------------------------------------------------|
| Shavers Creek                | Above Lake          | Discharge, Chemistry (DOC, TOC, DO, NO₃, NH₄, K, F, Cl, pH, EC, ORP), Turbidity |
| Shavers Creek                | Below Lake          | Stage/Level, Discharge, Chemistry (DOC, TOC, DO, NO₃, NH₄, K, F, Cl, pH, EC, ORP), Turbidity |
| Shavers Creek Outlet         |                     | Stage/Level, Discharge, Chemistry (DOC, TOC, DO, NO₃, NH₄, K, F, Cl, pH, EC, ORP), Turbidity |
| Groundwater                  | Shale Hills         | Chemistry (Major Cations, Fe, Mn, Al, Si), Groundwater Level, Groundwater Temperature, Suspended Sediment Chemistry (major cations, Fe, Mn, Al, Si) |
| COSMOS                       | Shale Hills         | Soil Moisture                                  |
| Kosmogenics                  | Shale Hills         | Meteoric $^{10}$Be Concentrations in Hillslope Regolith |
| Forest Ecology               | Shale Hills         | Tree Survey (Height, Diameter, Species Distribution), Leaf Area Index, Dendrometer-Basal Growth, Leaf Litter |

| Garner Run                   |                     | Soil Moisture                                  |
| Garner Run                   |                     | In Situ $^{10}$Be Concentrations in Surface Boulders |

Leaf Litter
| Forest Ecology | Garner Run | Tree Survey (Height, Diameter, Species Distribution) |
|---------------|-----------|-----------------------------------------------------|
|               |           | Leaf Area Index                                      |
|               |           | Dendrometer-Basal Growth                             |
|               |           | Leaf Litter                                          |
Table S2. Soil Descriptions.

**Tussey Mountain Midslope Soil Pit (TMMS)** (lat/long 40.69965°N, 77.92445°W, dug 6/13/14)

The Tussey Mountain Midslope Soil Pit (TMMS) was observed to be developed on sandstone colluvium parent material. Rock fragments and roots were observed throughout the profile. Large rock fragments were observed mostly below 40 cm. Numerous rock fragments prevented further excavation of the pit. Unaltered parent material was not observed. The hillside was characterized by a 27% slope in the convex-upward part of the hillslope. Pit was dug by hand to 1 m and sampled to 70 cm.

| Depth       | Horizon | Description                                                                 |
|-------------|---------|------------------------------------------------------------------------------|
| +6 – 0 cm   | Oi/a    | Organic horizon; largely leaves and some decomposed material.                |
| 0 – 6 cm    | A       | Extremely gravely loamy sand (~12% clay, ~65% rock fragments), 7.5YR 2.5/2 (very dark brown) color. Weak granular structure, very friable moist consistency. Clear wavy boundary. Abundant fine roots. |
| 6 – 21 cm   | AE      | Extremely gravely loamy sand (~8% clay, ~68% rock fragments), 7.5YR 4/6 (strong brown) color. Clear straight boundary. Weak granular structure, very friable moist consistency. Moderate fine roots. |
| 21 – 37 cm  | Bw₁     | Extremely gravely sandy loam (~14% clay, ~65% rock fragments), 10YR 5/6 (yellowish brown) color. Clear straight horizon boundary. Weak sub-angular blocky structure, very friable moist consistency. Moderate medium to large roots. Large rock fragments. |
| 37 – 75 cm  | Bw₂     | Extremely gravely sandy loam (~16% clay, ~70% rock fragments), 10YR 5/6 (yellowish brown) color. Diffuse straight boundary. Weak sub-angular blocky structure, very friable moist consistency. Abundant fine roots, some large roots. Moderately large rock fragments. |
| 75 – 95+ cm | Bw₃     | Extremely gravely sandy loam (~19% clay, ~70% rock fragments), 10YR 5/6 (yellowish brown) color. Weak to moderate sub-angular blocky structure, very friable moist consistency. Few moderate iron concentrations present but no depletions. Horizon is saturated after storms. Large rock fragment blocks. |
Table S2 (continued).

**Leading Ridge Ridgetop Soil Pit (LRRT)** (lat/long 40.69391°N, 77.91888°W, dug 5/29/14)

The Leading Ridge Ridgetop Soil Pit (LRRT) was observed to be characterized by sandstone colluvium parent material with a spodic horizon. Rock fragments and roots were observed throughout the profile. Large rock fragments were observed mostly in the upper 20 cm of the profile and roots were observed to be prominent in the upper 40 cm. Rock fragments are blocky in the upper 14 cm and smaller gravel size rock fragments were observed between 20 and 40 cm. Standing water in the bottom of the pit (observed shortly after digging) precluded deeper description. Deeper excavation than 105 cm was hindered by large blocks of sandstone that could no longer be cracked by hand with a breaker bar. These boulders (tens of cms in dimension) were cemented in place by clay or were bedrock. At the bottom of the pit there were large sandstone blocks with fine-grained material between blocks. The ridgetop at the location of the pit had <2% slope. Within one week of digging this pit, it was filled with water and remained filled until pit was back-filled.

| Depth Range | Horizon | Description |
|-------------|---------|-------------|
| +7 – 0 cm   | Oe      | Organic horizon; moderately decomposed leaf material. 5YR 2.5/1 (black) color. Abundant find roots. |
| 0 – 10 cm   | E       | Very gravelly fine sandy loam (~10% clay, ~60% rock fragments). 10YR 6/2 (light brownish gray) color. Abrupt wavy horizon boundary. Weak sub-angular blocky structure, very friable moist consistency. Abundant fine roots. Disoriented large rock fragment clasts. Abundant fine roots. |
| 10 – 14 cm  | Bhs     | Very gravelly sandy loam (~12% clay, ~45% rock fragments), 7.5YR 3/3 (dark brown) color. Abrupt wavy horizon boundary. Weak sub-angular blocky structure, very friable moist consistency. Moderate fine roots. |
| 14 – 20 cm  | Bs      | Gravelly sandy loam (~15% clay, ~20% rock fragments), 10YR 5/6 (yellowish brown) color. Clear wavy horizon boundary. Weak sub-angular blocky structure, very friable moist consistency. Moderate fine roots. Few large rock fragments, mostly small rock fragments. |
| 20 – 32 cm  | Bw₁     | Loam (~17% clay, ~10% rock fragments), 10YR 6/6 (brownish yellow) color. Clear straight horizon boundary. Moderate sub-angular blocky structure, friable moist consistency. Few moderate redoximorphic concentrations. Small rock fragments. Possibly faint clay bridges. |
Table S2 (continued).

| Horizon | Symbol | Description |
|---------|--------|-------------|
| 32 – 65+ cm | Bw₂ | Loam (~18% clay, ~10% rock fragments), 10YR 6/6 (brownish yellow) color. Weak prismatic structure, very friable moist consistency. Few moderate redoximorphic concentrations. Small rock fragments. Possibly faint clay bridges. Large laterally-growing roots in upper part of horizon (32 – 40 cm). Large blocks of sandstone in this horizon with fine-grained material present between blocks. |

**Leading Ridge Midslope Soil Pit (LRMS)** (lat/long 40.6949°N, 77.92004°W, dug 6/2/14 to 6/3/14)

The Leading Ridge Midslope Soil Pit (LRMS) was characterized by sandstone colluvium parent material with a spodic horizon. Rock fragments and roots were observed throughout profile. Roots are mostly observed in the upper 26 cm but fine roots extend to the bottom of the pit (145 cm). Large rock fragments are present from 0 – 12 cm and again from 26 – 145 cm, with rock fragment size increasing in size with depth. Ponded water was observed in the bottom of the pit but did not obstruct description. The pit was dug on a 25% slope located at the bottom of the convex-upward part of the hillslope. Digging was similar to LRRT but with fewer large boulders. Clay rinds on rock fragments, when observed, also appeared smaller than those at the LRRT. The pit was dug to 165 cm but sampled only to 140 cm.

| Horizon | Symbol | Description |
|---------|--------|-------------|
| +8 – 0 cm | Oe | Organic horizon; moderately decomposed leaf material. 5YR 2.5/2 (dark reddish brown) color. Abundant fine roots. |
| 0 – 12 cm | E | Extremely gravelly loamy sand (~10% clay, ~65% rock fragments). 10YR 6/2 (light brownish gray) color. Abrupt wavy horizon boundary. Weak sub-angular blocky to granular structure, very friable moist consistency. Abundant fine roots. Disoriented large rock fragment clasts. |
| 12 – 15 cm | Bhs | Very gravelly loamy sand (~12% clay, ~45% rock fragments), 7.5YR 3/3 (dark brown) color. Abrupt wavy horizon boundary. Weak sub-angular blocky structure, very friable moist consistency. Moderate fine roots. |
| 15 – 26 cm | Bs | Very gravelly loamy sand (~14% clay, ~50% rock fragments), 7.5YR 4/6 (strong brown) color. Abrupt wavy horizon boundary. Weak sub-angular blocky structure, very friable moist consistency. Moderate fine to medium roots. Abundant small rock fragments. |
Table S2 (continued).

| Depth  | Soil Type | Description |
|--------|-----------|-------------|
| 26 – 50 cm Bw<sub>1</sub> | Gravely loam (~18% clay, ~20% rock fragments), 10YR 5/6 (yellowish brown) color. Clear straight horizon boundary. Moderate sub-angular blocky structure, friable moist consistency. Very large rock fragments. Fine-grained material between large rocks. Few fine roots, roots often smashed on rock faces and dark in color. |
| 50 – 72 cm Bw<sub>2</sub> | Gravely loam (~20% clay, ~30% rock fragments), 10YR 5/6 (yellowish brown) color. Clear straight horizon boundary. Moderate sub-angular blocky structure, friable moist consistency. Large blocks with fine-grained material present between blocks. Few fine roots. |
| 72 – 145+ cm C | Extremely gravely loamy sand (~8% clay, ~90% rock fragments). 10YR 5/6 (yellowish brown) color. Weak sub-angular blocky to granular structure, loose to friable moist consistency. Very large rock fragments, appear to be oriented somewhat horizontally with fine-grained material between blocks. Water ponded at bottom of pit. |

**Leading Ridge Valley Floor Soil Pit (LRVF)** (lat/long 40.69617°N, 77.92138°W, digging commenced 6/4/14 and proceeded by hand to 90 cm; digging re-commenced 6/23/14-6/24/14 with a jackhammer until 180cm)

The Leading Ridge Valley Floor Soil Pit (LRVF) was dug in the footslope and was characterized by sandstone colluvium over sandstone residuum parent material with a spodic horizon. Roots are mostly present in the upper 45 cm, with abundant fine roots concentrated in the upper 10 cm. Very few roots were observed below 50 cm. Angular rock fragments are abundant in the upper 10 cm and decrease in size from 10 – 33 cm depth. Large rock fragments are observed from 95 – 138 cm depth, with some rounded rock fragments. Redoximorphic iron concentrations are observed between 14 – 138 cm and increase in size and distinction with depth. Most redoximorphic features are present as circular depletions surrounded by a concentration halo. Rotten sandstone is present below 138 cm in some places. Some water present at the bottom of the pit.

| Depth  | Soil Type | Description |
|--------|-----------|-------------|
| +8 – 0 cm Oe | Organic horizon; moderately decomposed leaf material. 5YR 2.5/2 (dark reddish brown) color. Abundant fine roots. |
| 0 – 5 cm E | Extremely gravely sandy loam (~12% clay, ~65% rock fragments). 7.5YR 6/1 (gray) color. Abrupt wavy horizon boundary. Weak sub-angular blocky to granular structure, very friable moist consistency. Abundant fine roots. Disoriented large rock fragment clasts. |
Table S2 (continued).

| Depth Range | Horizon | Description |
|-------------|---------|-------------|
| 5 – 7 cm    | Bhs     | Gravelly sandy loam (~14% clay, ~20% rock fragments), 7.5YR 3/2 (dark brown) color. Abrupt wavy horizon boundary. Weak sub-angular blocky structure, friable moist consistency. Abundant fine roots. |
| 7 – 14 cm   | Bs      | Gravelly sandy loam (~15% clay, ~20% rock fragments), 10YR 6/6 (reddish yellow) color. Abrupt wavy horizon boundary. Weak sub-angular blocky parting to granular structure around roots, very friable moist consistency. Abundant fine roots. |
| 14 – 33 cm  | Bw<sub>1</sub> | Gravelly sandy clay loam (~26% clay, ~20% rock fragments), 10YR 6/6 (brownish yellow) color. Clear wavy horizon boundary. Moderate sub-angular blocky to weak granular structure, very friable moist consistency. Few faint redoximorphic Fe depletions and concentrations, mostly observed as depletions with a concentration halo. Increased abundance of roots in this horizon. |
| 33 – 60 cm  | Bw<sub>2</sub> | Very gravelly sandy clay loam (~32% clay, ~50% rock fragments), 10YR 5/4 (yellowish brown) color. Clear straight horizon boundary. Moderate sub-angular to angular blocky structure, friable moist consistency. Few distinct redoximorphic iron depletions and concentrations, mostly observed as depletions with a concentration halo (Round, penny-sized features). Mn concentrations present. Large roots present to 45 cm, very few roots below 50 cm. |
| 60 – 95 cm  | Bt      | Very gravelly sandy clay loam (~24% clay, ~50% rock fragments). 10YR 4/6 (dark yellowish brown) color. Moderate angular blocky structure, friable moist consistency. Few weak clay films. Moderate distinct redoximorphic iron depletions and concentrations, mostly observed as depletions with a concentration halo (i.e., round, penny-sized features). Mn enrichments observed as coatings. |
| 95 – 138 cm | BC      | Extremely gravelly loamy sand (~8% clay, ~70% rock fragments). 10YR 5/6 (yellowish brown) color. Single grain structure, loose moist consistency. Moderate distinct redoximorphic iron depletions and concentrations, mostly observed as depletions with a concentration halo (Round, 50-cent-sized features). Mn enrichments observed. |
| 138 – 155+ cm | 2Cr   | Large sandstone blocks, with rotten rock within some sandstone blocks in this horizon. Sandstone appears to be residual. |
Table S3. Five Rock Compositions.1

| Sample                                           | Al₂O₃ (%) | BaO (%) | CaO (%) | Fe₂O₃T (%)² | K₂O (%) | MgO (%) | MnO (%) | Na₂O (%) | P₂O₅ (%) | SiO₂ (%) | TiO₂ (%) | LOI (900°C) |
|------------------------------------------------|-----------|---------|---------|-------------|---------|---------|---------|----------|----------|----------|----------|------------|
| LRVF 160-170 cm rock (SSHOOOZIY)                | 0.65      | 0.00    | 0.01    | 0.08        | <.02    | 0.02    | 0.00    | 0.09     | 0.02     | 96.9     | 0.08     | 1.28       |
| LRVF 175cm floor south rock (SSHOOO2JO)         | 0.61      | 0.00    | 0.01    | 0.10        | <.02    | 0.02    | 0.00    | 0.09     | <.02     | 97.8     | 0.07     | 1.05       |
| LRMS 85cm south rock                            | 0.79      | 0.00    | 0.00    | 0.47        | <.02    | 0.02    | 0.00    | 0.08     | 0.03     | 99.3     | 0.06     | 0.34       |
| LRRT 60-70cm rock (SSHOOO2JQ)                   | 11.08     | 0.03    | 0.02    | 2.45        | 2.85    | 0.54    | 0.00    | 0.21     | 0.05     | 77.7     | 1.32     | 3.41       |
| TMMS 50-70cm rock (SSHOOO2IG)                   | 1.03      | 0.00    | 0.03    | 0.63        | 0.02    | 0.04    | 0.00    | 0.08     | <.02     | 96.3     | 0.16     | 1.25       |

1Compositions of bulk rock as measured by inductively coupled plasma atomic emission spectroscopy after Li metaborate fusion. Each rock is noted to have been sampled from one of the soil pits (see Table S2): the sample ISGN number is also given (i.e., SSHOOOZIY). Of these five rock analyses, sshoo2jg was not used in the bulk average estimate of parent rock because of its anomalous composition.

²Total iron presented as ferric oxide (iron speciation was not calculated).
| Sample       | Al₂O₃ (%) | BaO (%) | CaO (%) | Fe₂O₃ T² (%) | K₂O (%) | MgO (%) | MnO (%) | Na₂O (%) | P₂O₅ (%) | SiO₂ (%) | TiO₂ (%) | LOI (900C) |
|--------------|-----------|---------|---------|--------------|---------|---------|---------|----------|----------|----------|----------|------------|
| LRVF 0-10cm  | 2.29      | 0.01    | 0.03    | 1.60         | 0.37    | 0.10    | 0.00    | 0.10     | 0.13     | 94.3     | 0.87     | 3.69       |
| SSH0002KG    |           |         |         |              |         |         |         |          |          |          |          |            |
| LRVF 40-50cm | 6.84      | 0.02    | 0.04    | 2.60         | 1.03    | 0.41    | 0.01    | 0.15     | 0.10     | 84.9     | 0.76     | 4.26       |
| SSH0002KK    |           |         |         |              |         |         |         |          |          |          |          |            |
| LRVF 60-70cm | 4.13      | 0.01    | 0.03    | 2.23         | 0.64    | 0.24    | 0.01    | 0.11     | 0.04     | 90.0     | 0.50     | 2.57       |
| SSH0002KM    |           |         |         |              |         |         |         |          |          |          |          |            |
| LRVF 110-120cm| 3.61     | 0.01    | 0.04    | 3.11         | 0.64    | 0.21    | 0.02    | 0.08     | 0.08     | 90.5     | 0.46     | 2.07       |
| SSH0002KR    |           |         |         |              |         |         |         |          |          |          |          |            |
| LRVF 160-170cm| 2.27    | 0.01    | 0.02    | 1.04         | 0.39    | 0.13    | 0.01    | 0.05     | 0.06     | 95.3     | 0.39     | 1.11       |
| SSH0002KW    |           |         |         |              |         |         |         |          |          |          |          |            |
| LRRT 0-10cm  | 3.63      | 0.01    | 0.03    | 1.17         | 0.93    | 0.19    | 0.01    | 0.04     | 0.06     | 81.9     | 0.82     | 12.3       |
| SSH0002JS    |           |         |         |              |         |         |         |          |          |          |          |            |
| LRRT 10-20cm | 3.22      | 0.00    | 0.02    | 2.30         | 0.52    | 0.12    | 0.01    | 0.05     | 0.22     | 88.7     | 0.74     | 3.99       |
| SSH0002JT    |           |         |         |              |         |         |         |          |          |          |          |            |
| LRRT 20-30cm | 7.18      | 0.01    | 0.04    | 3.02         | 1.15    | 0.29    | 0.02    | 0.12     | 0.21     | 80.5     | 0.91     | 6.25       |
| SSH0002JU    |           |         |         |              |         |         |         |          |          |          |          |            |
| LRRT 30-40cm | 7.23      | 0.02    | 0.04    | 2.45         | 1.35    | 0.34    | 0.01    | 0.13     | 0.13     | 83.2     | 0.98     | 4.05       |
| SSH0002JV    |           |         |         |              |         |         |         |          |          |          |          |            |
| LRRT 60-70cm | 11.4      | 0.03    | 0.02    | 2.48         | 2.85    | 0.55    | 0.00    | 0.16     | 0.10     | 76.3     | 1.36     | 4.22       |
| SSH0002JY    |           |         |         |              |         |         |         |          |          |          |          |            |
| LRMS 0-10cm  | 2.67      | 0.00    | 0.01    | 1.20         | 0.37    | 0.11    | 0.00    | 0.04     | 0.09     | 92.2     | 0.59     | 4.00       |
| SSH0002K0    |           |         |         |              |         |         |         |          |          |          |          |            |
| LRMS 20-30cm | 6.92      | 0.01    | 0.03    | 2.05         | 0.90    | 0.27    | 0.00    | 0.10     | 0.12     | 84.0     | 0.74     | 6.07       |
| SSH0002K2    |           |         |         |              |         |         |         |          |          |          |          |            |
| Depth Interval       | Sample Code | SiO₂ | Al₂O₃ | Fe₂O₃ | K₂O | Na₂O | MgO | CaO | Ba  | P  | TiO₂ | Sr  | Zr  |
|---------------------|-------------|------|-------|------|-----|------|-----|-----|-----|----|------|-----|-----|
| LRMS 60-70cm        | SSH0002K6   | 4.66 | 0.01  | 0.01 | 1.89| 0.68 | 0.19| 0.00| 0.04| 0.06| 89.7 | 0.47| 2.38|
| LRMS 70-80cm        | SSH0002K7   | 5.36 | 0.01  | 0.01 | 2.05| 0.83 | 0.23| 0.00| 0.05| 0.07| 88.3 | 0.53| 2.78|
| LRMS 130-140cm      | SSH0002KD   | 3.63 | 0.00  | 0.01 | 2.72| 0.57 | 0.15| 0.00| 0.04| 0.10| 90.5 | 0.58| 2.01|
| TMMS 0-10cm         | SSH0002L2   | 1.71 | 0.00  | 0.03 | 0.74| 0.18 | 0.08| 0.00| 0.04| 0.08| 94.3 | 0.28| 3.60|
| TMMS 10-20cm        | SSH0002L3   | 2.63 | 0.00  | 0.02 | 1.05| 0.22 | 0.09| 0.00| 0.05| 0.10| 91.2 | 0.38| 3.54|
| TMMS 20-30cm        | SSH0002L4   | 2.38 | 0.00  | 0.02 | 1.22| 0.16 | 0.07| 0.00| 0.04| 0.13| 93.6 | 0.29| 2.35|
| TMMS 30-40cm        | SSH0002L5   | 2.80 | 0.00  | 0.02 | 1.43| 0.21 | 0.10| 0.00| 0.05| 0.10| 94.0 | 0.30| 2.46|
| TMMS 60-70cm        | SSH0002L8   | 2.91 | 0.00  | 0.02 | 1.19| 0.29 | 0.13| 0.01| 0.05| 0.06| 93.9 | 0.29| 1.92|

1. Compositions of bulk rock as measured by inductively coupled plasma atomic emission spectroscopy after Li metaborate fusion. Each rock is noted to have been sampled from one of the soil pits (see Table S2), and the sample ISGN number is also given (i.e., sshoo02jq). Of these five rock analyses, sshoo02jq was not used in the bulk average estimate of parent rock because of its anomalous composition.

2. Total iron presented as ferric oxide (iron speciation was not calculated).
Figure S1. US Department of Agriculture soil series map of Garner Run subcatchment showing location of soil pits TMMS, LRVF, LRMS, and LRRT (brown squares). Data sourced from the Soil Survey Geographic (SSURGO) database (http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/survey/geo/). AcD – Albrights very stony silt loam, 8-25% slopes; AoB – Andover extremely stony loam, 0-8% slopes; BxD – Buchanan extremely stony loam, 8-25% slopes; HTD – Hazelton-Dekalb association, moderately steep, 0-; HTF – Hazelton-Dekalb association, steep; MkD – Meckesville very stony silt loam, 8-25% slopes; Ru – Rubble land.
Figure S2. Schematic summary of all the sensors deployed as Ground HOG, including where the sensors are deployed. D-20cm refers to a position 20 cm above the bottom of the pit (see Table S2). See text for further description of the deployment.
Figure S3. Photographic montage of depth intervals of the TMMS pit in the Garner Run subcatchment. The five images from top to bottom show the following depth intervals: 0 to 30 cm, 30 to 60 cm, 60 to 90 cm, 90 to 120 cm, and 120 cm to bottom. Soil description is summarized in Table S2. Photos show decreasing root density and increasing rock size with depth. The uppermost layer of large rocks can also be seen.