MYNEKO 2019 STUDY SEASON REPORT

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Introduction

From Monday, June 3rd, through Friday, July 19th, 2019, Prof. Michael Lane and four undergraduate students from UMBC, Luke Bieber Chaparro, Connor R. Cataldo, Ashley K. Williams, and Christopher L. Zale, carried out post-excavation research attendant to the Mycenaean Northeast Kopais (MYNEKO) fieldwork program (summers of 2016, 2017, and 2018). This consisted of two main sets of operations. The first was a soil survey on transects in the vicinity of the archaeological sites of Aghia Marina Pyrghos (AMP), one locus of MYNEKO fieldwork, and of the Mycenaean fortress of Glas in the Late Bronze Age *polder* below AMP. The second was the analysis and detailed description of the decorated ceramic pottery excavated at AMP during MYNEKO, creating a relational database of specimens in Microsoft Access. A proof-of-concept soil phosphate method was also tested.

Soil Survey

Methods

The team plotted two traverses in the northeastern bay of the Kopaic Basin. Each traverse was designed to permit coring and profiling of soils in a variety of physiographic environments (see attached map). The first (Traverse 1) proceeded from the base of the cellphone repeater station at the western end of Mt. Mytikas, about 1.5 kilometers southwest of the town of Akraifnio, west along the ridge of Mytikas for about 600 hundred meters, then north down a steep rocky slope to an upland alluvial valley floor, and finally down seasonal canyon (*rema*) to an old alluvial fan about 500 meters east-southeast of Glas (just beyond its "Peripheral Canal"). The second (Traverse 2) started from the ending point of the first, ran northeast to the scarp of Nisi east of Glas, north following the scarp closely, until the colluvial slope turned in front of it, and then onto Nisi's rocky tableland to a point near the LARCO nickel mine's spoil pile. Thirteen points were profiled in Traverse 1 and seven of Traverse 2.

The team employed a hand-driven AMS 3.25-inch (ca. 8.25-cm) steel Dutch mud bit on an extendable (5/8-inch threaded) chrome-steel alloy rod with a cross-handle. This was supplemented by a screw bit when attempts were made to puncture heavy concentrations of subsurface gravel. The profiles were recorded on printed pro-forms (sample attached), which included, *inter alia,* the initials of corers and profilers, geodetic location (in the GGRS-87 coordinate–projection system), notes on the weather, slope, and surrounding landforms, and a table for recording soils horizons, including their characteristics (texture, inclusions, compactness, dominant color, and mottles, etc.). Coordinates were recorded with a Garmin stand-alone HCx GPS receiver. With only one exception on Traverse 1—point 2019-1-10, which was an exposed erosional scarp—profiles were drawn from measured segments of cored material laid out in stratigraphic sequence.

Survey Results

Soils on the ridge and slopes of Mytikas and on the rocky tableland of Nisi (six profiles) were exceptionally shallow, between 9 and 25 centimeters deep and manifesting only a silt loam A horizon, which was generally dark brown or dark reddish brown, an effect of both the iron and nickel oxides in the substrate limestone and thin humic contribution of the sparse vegetation. Nothing larger and requiring deeper penetration than evergreen oak (*Quercus coccifera,* commonly *pournari*) can take root in these physiographic zones. These soils are not now cultivated but are used for pasturage, especially for goats. The soils of the upland alluvial valley floor (three profiles) were deep and well developed. They comprised an Ap (plow zone) horizon, A2 horizon, and Bh (humic illuvial) horizon, as much as two or more meters deep. That at the base of the escarpment of Mytikas had the deepest Ap horizon, some 70 centimeters, presumably because of colluvium or mass deposition. The A horizons were dark brown to dark yellowish brown silt loam or silty clay loam, whereas the B horizon was dark yellowish brown to yellowish red silty clay loam with weakly prismatic structures. Of these three profiles, the last (2019-1-05) contained small fragments of light red fine ceramic at the base of the A2 horizon (ca. 90 cm), with no evidence of bioturbation, suggesting a buried ancient plow zone. The valley is currently cultivated almost exclusively with wheat or barley. Soils in the *rema* bottom, in the alluvial fan, and on the wash (colluvial) slope of Nisi (11 points) shared a characteristic impenetrable layer of small to medium-size gravel at the base of the A horizons. These A horizons differed in depth, ranging from 39 centimeters in the *rema* to 115 centimeters in the alluvial fan. Those at the top and bottom (fan) of the *rema* were generally light yellowish brown to olive brown loams, while those mid-course, as well as those at the base of colluvial slopes were generally reddish-brown silt loams or silty clay loams. The soils in these last three physiographic zones appear to be well drained through the gravel. Those in the *rema* and on the slopes are currently planted with olives, that of the alluvial fan with olives, a few other fruit trees (*Malus, Prunus*), vines, and, in some places, wheat.

Interpretations

Comparanda from the region suggest that the impenetrable layer of gravel mentioned above (*rema,* fan, wash/colluvial slopes) represents Pleistocene (before ca. 12 kya) deposition, when the climate was generally colder and wetter than today, sometimes experiencing sustained and violent precipitation, the exposed subarctic landscape prone to massive erosion. There is no reason to suppose that the soils were substantially different in the Bronze Age, the period of greatest interest to the MYNEKO program, though they may have shallower in some places, and the margins of the alluvial fan may have been inundated periodically before the construction of the *polder.* Hence, land use may have been much as it is today. However, the presence of full-grown uncultivated trees (*Crataegus, Populus, Quercus*) along stream bed and field boundaries in the alluvial fans suggests that forest cover could have been greater than it is today where soil depth permitted (see also “Further plans” below).

All geodetic data, copies of pro-formas, final drawings of profiles (attached), and preliminary written interpretations were shared with the Hellenic Survey of Geological and Mineral Exploration (HSGME, formerly IGME).

Museum Studies

Phosphate Testing of Soil Samples

Five test samples from excavated contexts (strata) at AMP and five control samples each from local topsoil and vegetation (*pournari*), taken in 2018, were analyzed for pH and phosphate content according to a proof-of-concept field-operable method devised by a former UMBC student (S. Radinsky, pers. comm. 2016). The pH of the test samples was consistently somewhat more basic (7.5+) than that of the control topsoil (7.5) and vegetation samples (5.5–7.5). The phosphate levels of contexts containing burnt organic material, including seeds (170, 175), which also contain laminae of burnt ruminant manure (D. Fallu, pers. comm. 2019), was on the same order as that of the topsoil and distinctly different from that of the vegetation, where it was almost lacking, except in a vegetation sample that may have been contaminated with mold. These contrasted with the lower phosphate levels of samples from contexts identified with a plaster floor (149) and fills of collapsed building material, including mud brick (156, 160). Hence, the field method utilized may help accurately and quickly sort out, at a price of about 50 US dollars, those contexts that merit further sampling for more precise analysis, at a higher price, of phosphates, key indicators of human and animal habitation.

Analysis and Recordation of Decorated Ceramic Pottery ("Study Collection")

From the total collection of 7,915 potsherds or, in just two instances, intact ceramic vessels, recovered from AMP between 2016 and 2018, a "study collection" of 420, including the intact vessels, was assembled. This meant that they were selected because they displayed formal elements and decoration thought to be chronologically or techno-culturally diagnostic (e.g., "Mycenaean decorated," fine gray burnished "Minyan," Mainland Polychrome), and that they were provisionally analyzed in reference to 48 formal, color, measurement, and comparison criteria, recorded in a *sui generis* Microsoft Access database. This analysis included description and recording of shape, size, and color of the six most prevalent inclusions in the ceramic pastes represented, as seen through a Bausch and Lomb jeweler's loupe (5–20 ×) or occasionally a Coolingtech USB digital microscope (40 ×). These measurements were made to allow provisional fabric groups to be identified through statistical use of the database, which in turn can be sampled for precise ceramic petrography and chemical and physical analyses of constituent materials. Detailed explanation of the study collection database is beyond the scope of the present report, and further specialist analyses and interpretations await. Suffice it to say that it has permitted the construction of a relative chronology more precise than that offered in the annual reports of 2016 through 2018, and that this sequence correlates positively with both the stratigraphy developed over those years and with relevant radiocarbon dates.

Further Plans

Interim Fieldwork

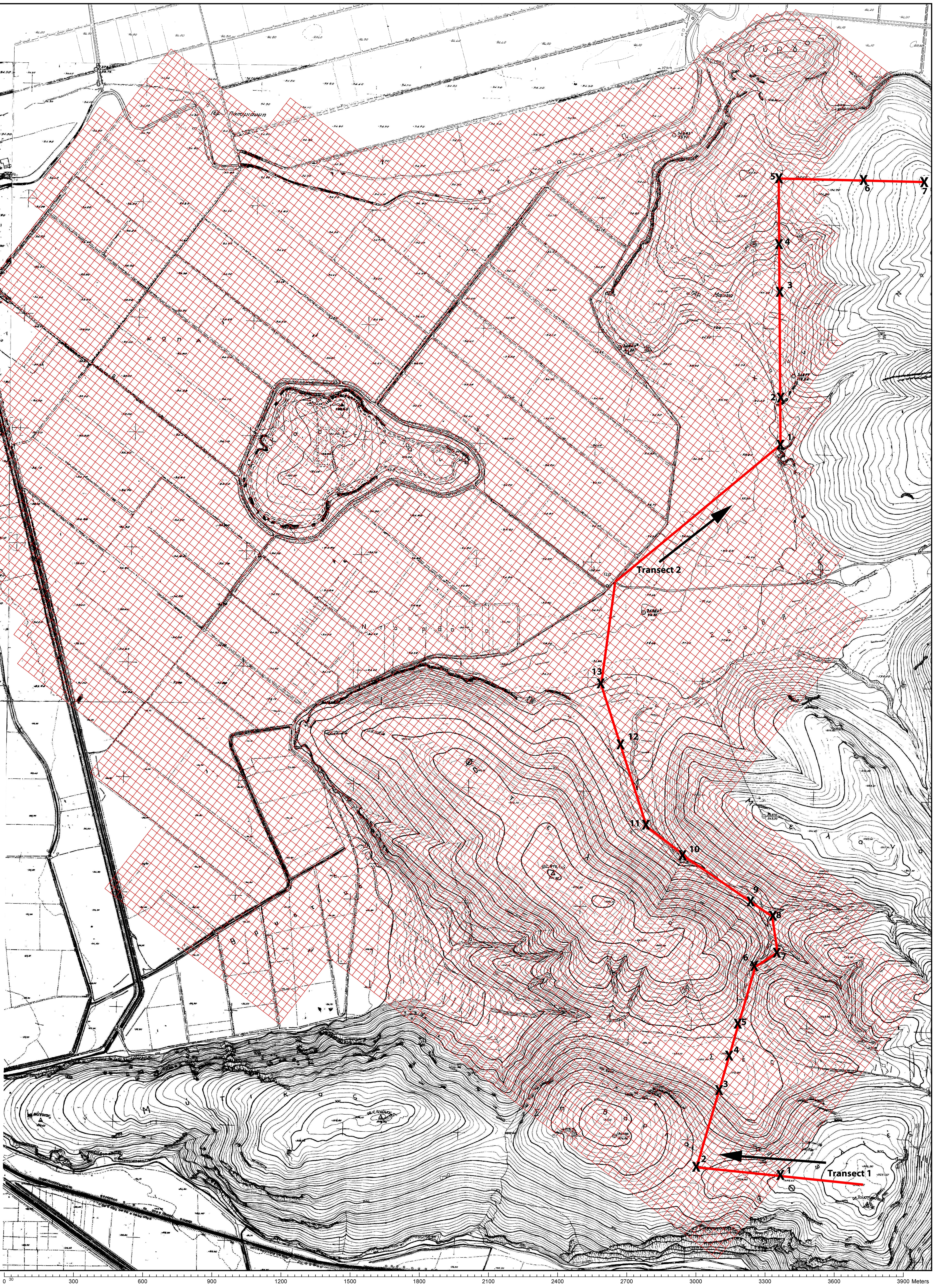
Prof. Lane intends to return to the region in 2020 with a group of UMBC undergraduate students, spending three weeks carrying out vegetation studies along the same transects followed for the soil survey (above). The purpose of this is to provide a climatically modern uniformitarian baseline of expectations for comparison with the kinds and proportions of vegetal remains that shall be recovered in future excavations (see below). It will also allow vegetation taxa and their associations, community, and evident succession to be correlated with soil profiles. Accordingly, both a physiognomic survey, recording the vertical structure of vegetation, using a basic typology (herbaceous, woody shrub, tree; deciduous, evergreen, etc.), along the whole length of the two transects, and a floristic census (using the "minimal quadrat" method), precisely recording taxa represented in their proportions, within identified associations at a ecotones between them, will be carried out. It is hoped that when archaeological fieldwork commences again in a few years, the loci of the floristic survey can in turn be employed for vertebrate animal censuses, involving both observation in person and remotely operated wildlife cameras with infrared night-vision capability. This would provide another uniformitarian baseline of comparative data.

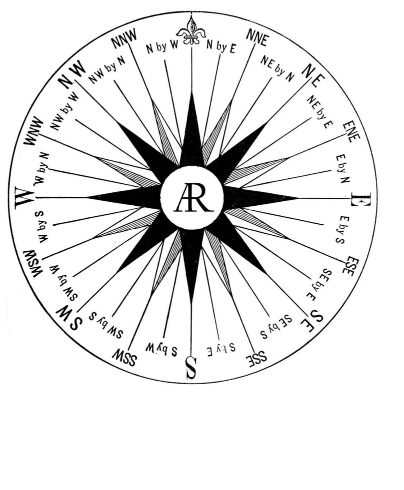
I the meantime, Prof. Lane has begun two feature articles concerning the results of the MYNEKO program, one focusing on AMP, the other, co-authored with Dr. Elena Kountouri, on the archaeology of the wider region, including her discoveries at Aghios Ioannis, during the Bronze Age.

Permit Application

Prof. Lane intends to apply in 2019 for a collaborative research (συνεργασία) permit with the Ephorate of Antiquities of Boiotia to conduct further extensive stratigraphic excavations and a full compliment of attendant analyses at AMP, every summer from 2021 through 2024.

AROURA Project Area



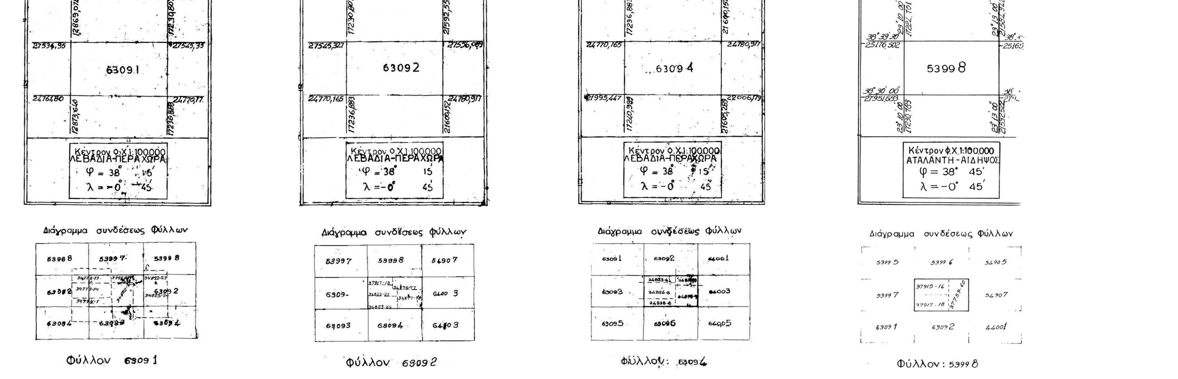


30x30m Grid Squares covering 14,489,100m²

1:5000 Scale

GGRS-87

Hellenic Military Geographic Service (ΓΥΣ) Topographic Plans
Akraifnia Quadrangles 63091, 63092, 63094 and 53998.



W.S.Bittner 2012

Document Size: ANSI E: 34x44in

MYNEKO 2016 SOIL PROFILE RECORD **Profile no. ________________** **Geophys. Files? _________ Context Rec.? __________**

Name(s) of Investigators:

Name(s) of Recorders:

Date:

Time of Day:

Air Temperature (°C):

Soil Temperature (°C) (actual / estimate):

Cloud Cover (%):

Precipitation (dur./intens.):

Location (prefect. / townsh. / commun. if known):

Grid Square (if applicable):

Southwest Corner Coord. (GGRS-87 UTM)

E:

N:

Elevation (m):

Surrounding Arch. Features / Landforms:_________________

NW **Grid Square (if applicable):** NE

Grid Square (if applicable): (left side)

Grid Square (if applicable): (right side)

SW **Grid Square (if applicable):** SE

E:___________
N:___________

1 cm = 2 m (1:200)

N

MARK LOCATION

How located: tape / GPS / other______? (circle/fill in one)

Current Land Use

Cultiv. field	Fallow field
Abandoned field	Pasture
Vineyard	Wild (maquis)
Other:	

Substrate Geol. / Parent Mat.:

Slope

0–2%	17–35%
3–7%	> 35%
8–16%	

Form: linear / concave / convex

Contour: linear / concave / convex

Physiog. Type (optional)
(bench/terrace/fan/depress. etc.)

Surface Erosion

0–5%	36–65%
6–15%	> 65%
16–35%	

Surface Deposit(s) (if appl.)

Surface Stoniness

0–5%	36–65%
6–15%	> 65%
16–35%	

Surface Rockiness

0–2% 3–10% > 10%

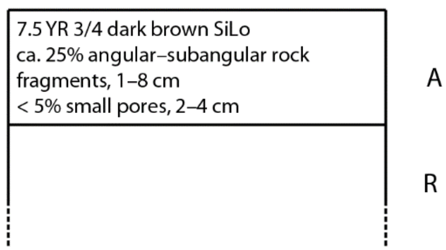
Please turn page /…

Surface Vegetation: **Corresp. Photo File(s):**

Sketch / Sample (opt.)	**No.**	**Depth (cm)** upper / lower	**Horiz. Design.** (discont.#)	suff.	**Dry Color** H-V-C (%)	**Moist Color** H-V-C (%)	**Texture** S-Si-Cl-L	**Structure** size / shp		**Consist.** dry / moist / wet	**Mottles** H-V-C (%/size)	**Surf. Feat.** (kind/qty /loc.)	**Bound.**	**Roots** (size / qty/loc.)	**Pores** (size / qty/loc.)	**Concent.** (size/shp/ kind/qty)	**Rock frag.** (size/shp/ %)
	1								w m s	l–s sh–mh h–vh eh–r+			a c g d				
	2								w m s	l–s sh–mh h–vh eh–r+			a c g d				
	3								w m s	l–s sh–mh h–vh eh–r+			a c g d				
	4								w m s	l–s sh–mh h–vh eh–r+			a c g d				
	5								w m s	l–s sh–mh h–vh eh–r+			a c g d				
	6								w m s	l–s sh–mh h–vh eh–r+			a c g d				
	7								w m s	l–s sh–mh h–vh eh–r+			a c g d				
	8								w m s	l–s sh–mh h–vh eh–r+			a c g d				
	9								w m s	l–s sh–mh h–vh eh–r+			a c g d				

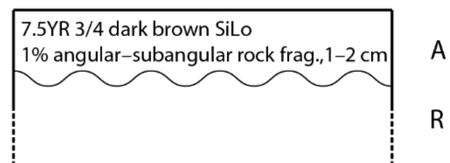
CULTURE MAT. (Y/N)? (△ in sketch)__________________________ ^{14}C SAMPLE (Y/N)? (⊗ in sketch)__________________________ (Kind / no.)

Soil Profile 2019-1-1



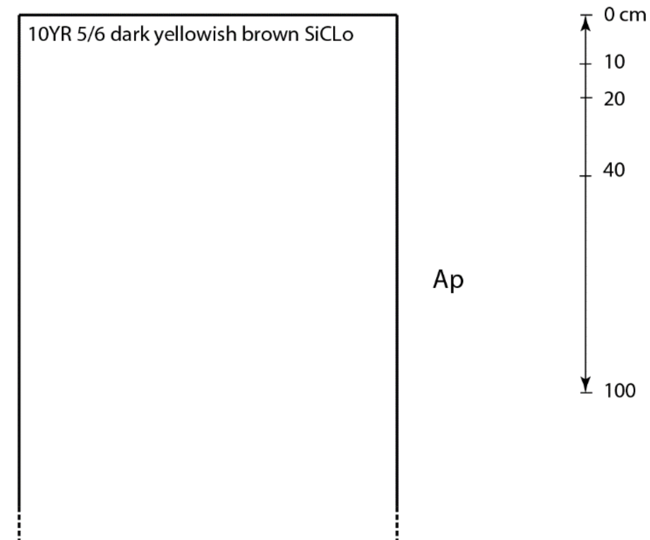
GGRS-87 E 0430462
N 4256352 ± 3

Soil Profile 2019-1-2

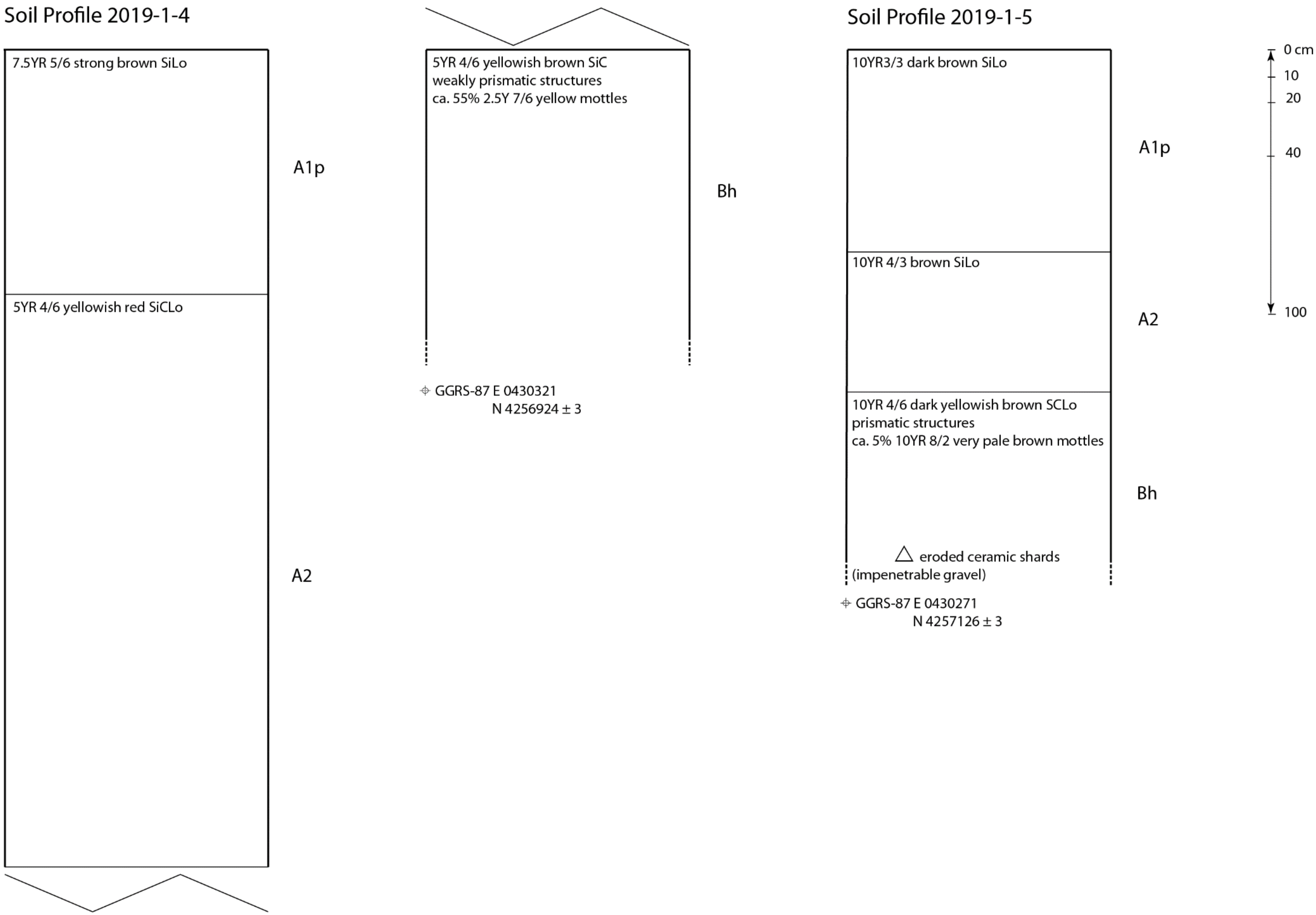


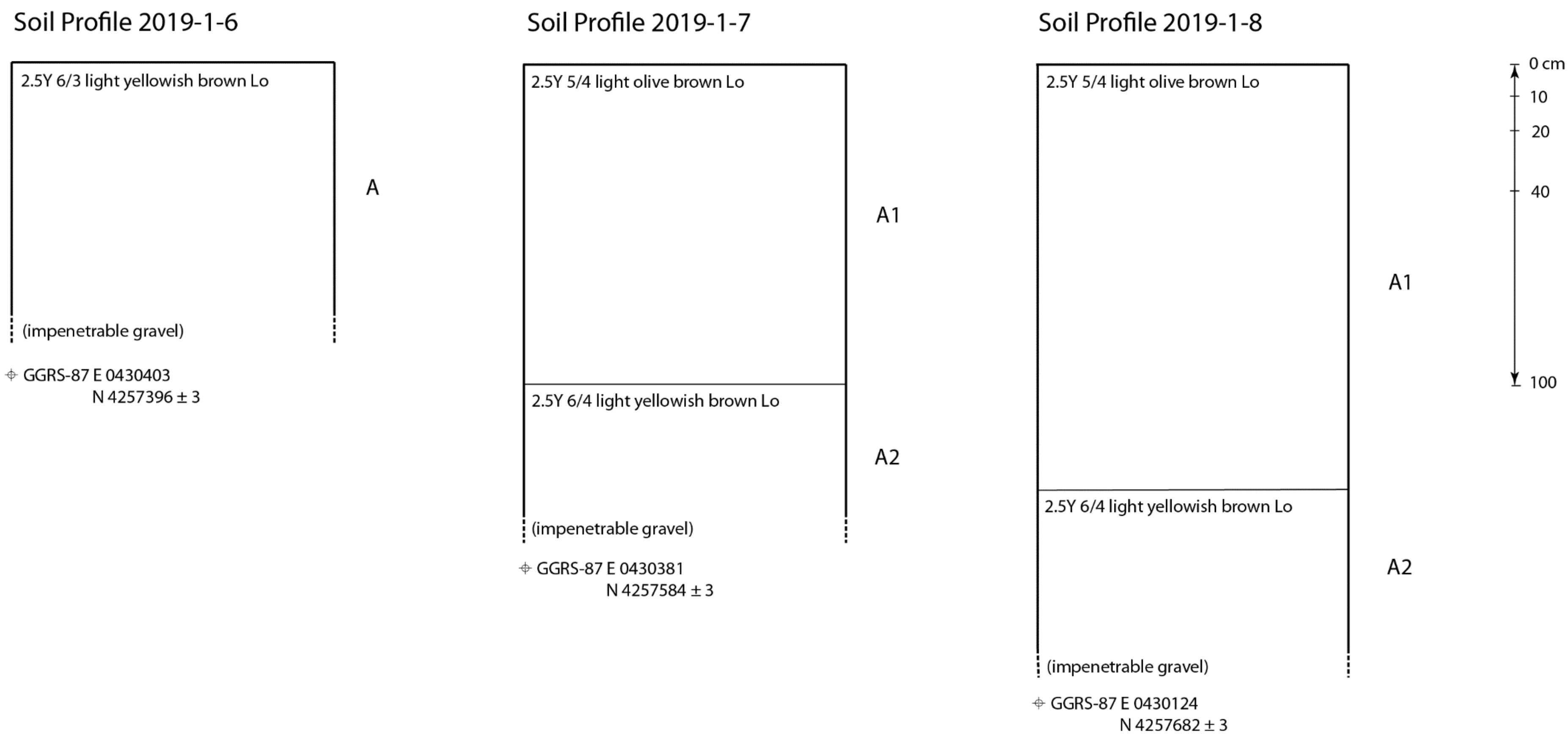
GGRS-87 E 0430151
N 4256412 ± 3

Soil Profile 2019-1-3

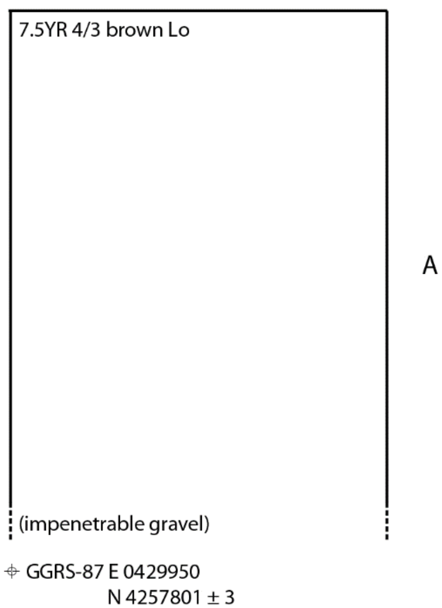


GGRS-87 E 0430252
N 4256693 ± 3

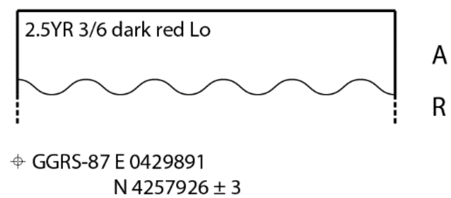

Soil Profile 2019-1-4
7.5YR 5/6 strong brown SiLo
A1p
5YR 4/6 yellowish red SiCLo
A2
5YR 4/6 yellowish brown SiC
weakly prismatic structures
ca. 55% 2.5Y 7/6 yellow mottles
Bh
GGRS-87 E 0430321
N 4256924 ± 3
Soil Profile 2019-1-5
10YR3/3 dark brown SiLo
A1p
10YR 4/3 brown SiLo
A2
10YR 4/6 dark yellowish brown SCLo
prismatic structures
ca. 5% 10YR 8/2 very pale brown mottles
Bh
eroded ceramic shards
(impenetrable gravel)
GGRS-87 E 0430271
N 4257126 ± 3
0 cm
10
20
40
100


Soil Profile 2019-1-6
2.5Y 6/3 light yellowish brown Lo
A
(impenetrable gravel)
GGRS-87 E 0430403
N 4257396 ± 3
Soil Profile 2019-1-7
2.5Y 5/4 light olive brown Lo
A1
2.5Y 6/4 light yellowish brown Lo
A2
(impenetrable gravel)
GGRS-87 E 0430381
N 4257584 ± 3
Soil Profile 2019-1-8
2.5Y 5/4 light olive brown Lo
A1
2.5Y 6/4 light yellowish brown Lo
A2
(impenetrable gravel)
GGRS-87 E 0430124
N 4257682 ± 3
0 cm
10
20
40
100

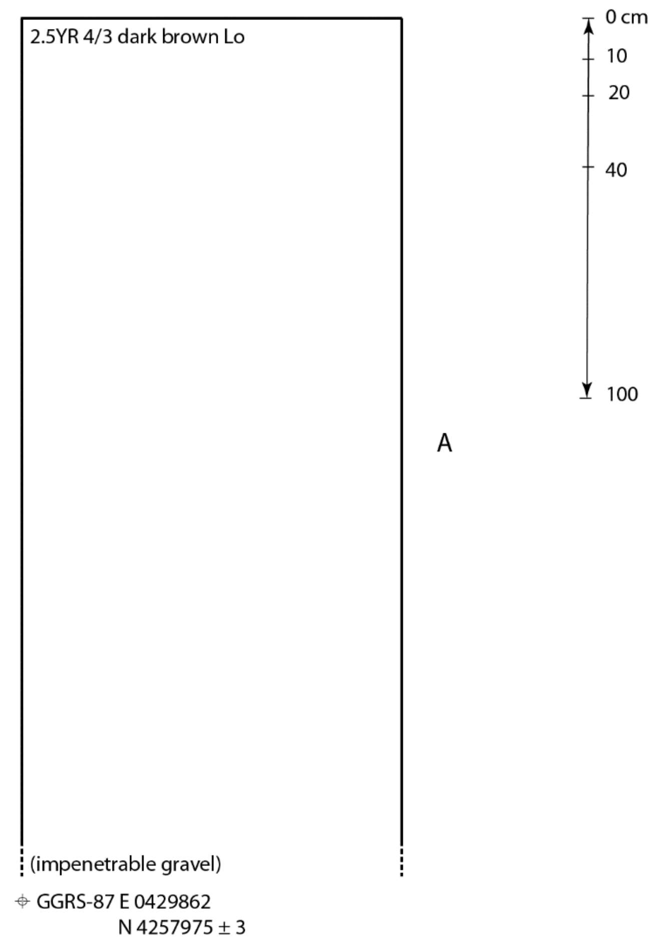
Soil Profile 2019-1-9

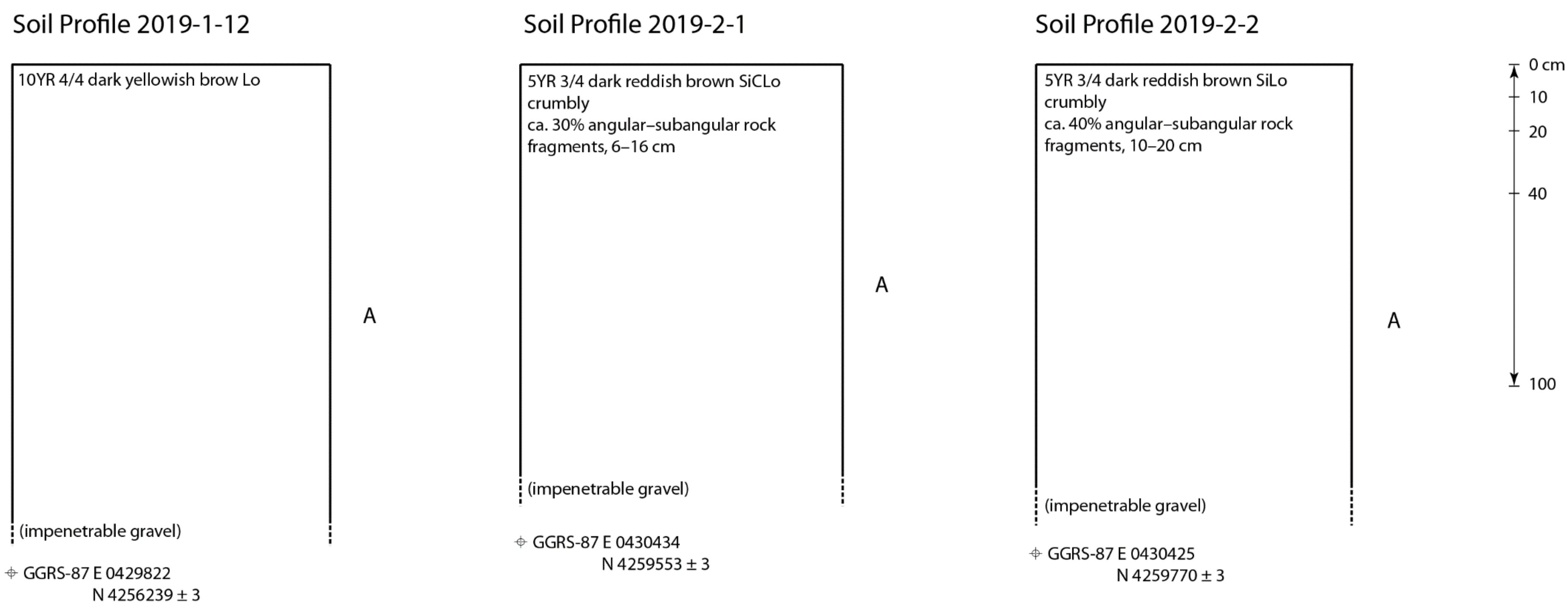


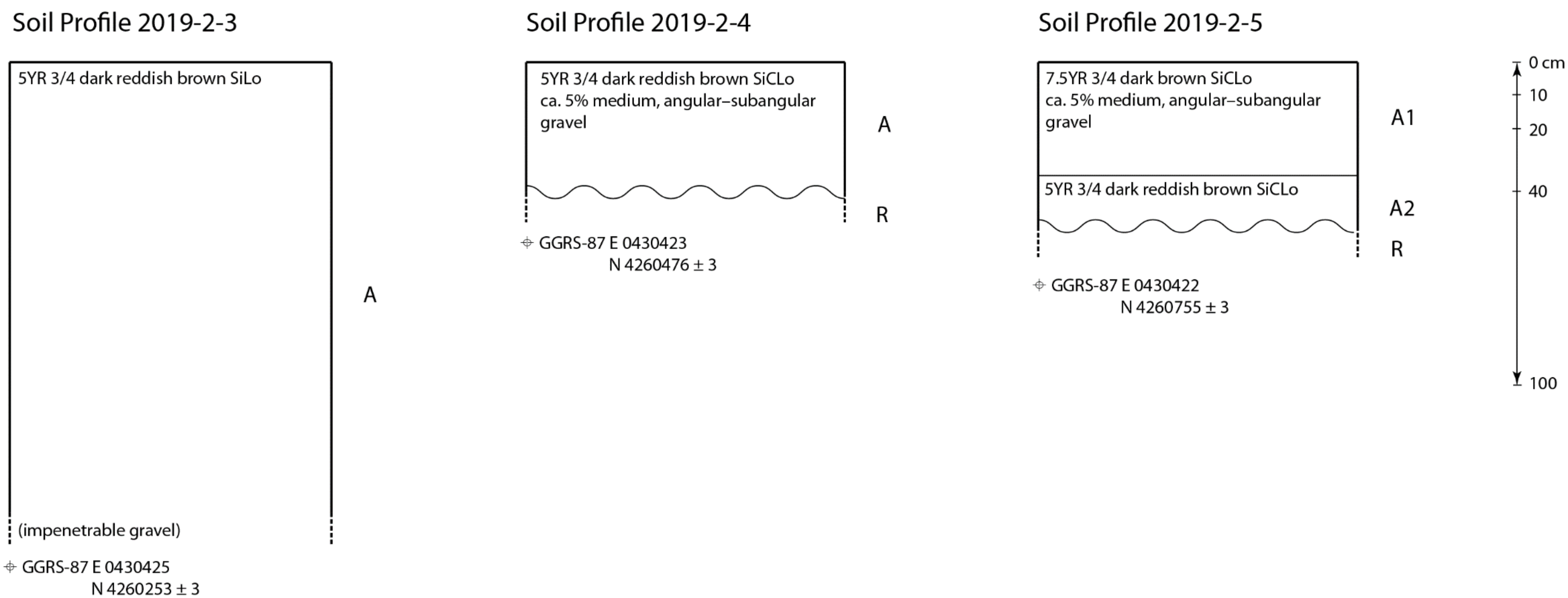
Soil Profile 2019-1-10

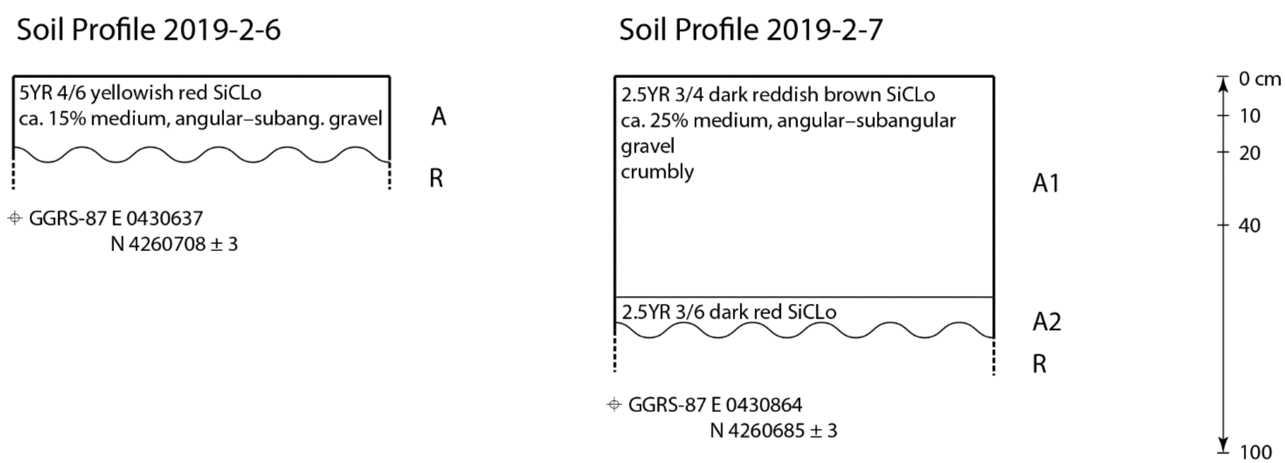


Soil Profile 2019-1-11




Soil Profile 2019-1-12
10YR 4/4 dark yellowish brow Lo
A
(impenetrable gravel)
GGRS-87 E 0429822
N 4256239 ± 3
Soil Profile 2019-2-1
5YR 3/4 dark reddish brown SiCLo
crumbly
ca. 30% angular–subangular rock
fragments, 6–16 cm
A
(impenetrable gravel)
GGRS-87 E 0430434
N 4259553 ± 3
Soil Profile 2019-2-2
5YR 3/4 dark reddish brown SiLo
crumbly
ca. 40% angular–subangular rock
fragments, 10–20 cm
A
(impenetrable gravel)
GGRS-87 E 0430425
N 4259770 ± 3
0 cm
10
20
40
100


Soil Profile 2019-2-3
5YR 3/4 dark reddish brown SiLo
A
(impenetrable gravel)
GGRS-87 E 0430425
N 4260253 ± 3
Soil Profile 2019-2-4
5YR 3/4 dark reddish brown SiCLo
ca. 5% medium, angular–subangular
gravel
A
R
GGRS-87 E 0430423
N 4260476 ± 3
Soil Profile 2019-2-5
7.5YR 3/4 dark brown SiCLo
ca. 5% medium, angular–subangular
gravel
A1
5YR 3/4 dark reddish brown SiCLo
A2
R
GGRS-87 E 0430422
N 4260755 ± 3
0 cm
10
20
40
100


Soil Profile 2019-2-6
5YR 4/6 yellowish red SiCLo
ca. 15% medium, angular–subang. gravel
A
R
GGRS-87 E 0430637
N 4260708 ± 3
Soil Profile 2019-2-7
2.5YR 3/4 dark reddish brown SiCLo
ca. 25% medium, angular–subangular gravel
crumbly
A1
2.5YR 3/6 dark red SiCLo
A2
R
GGRS-87 E 0430864
N 4260685 ± 3
0 cm
10
20
40
100