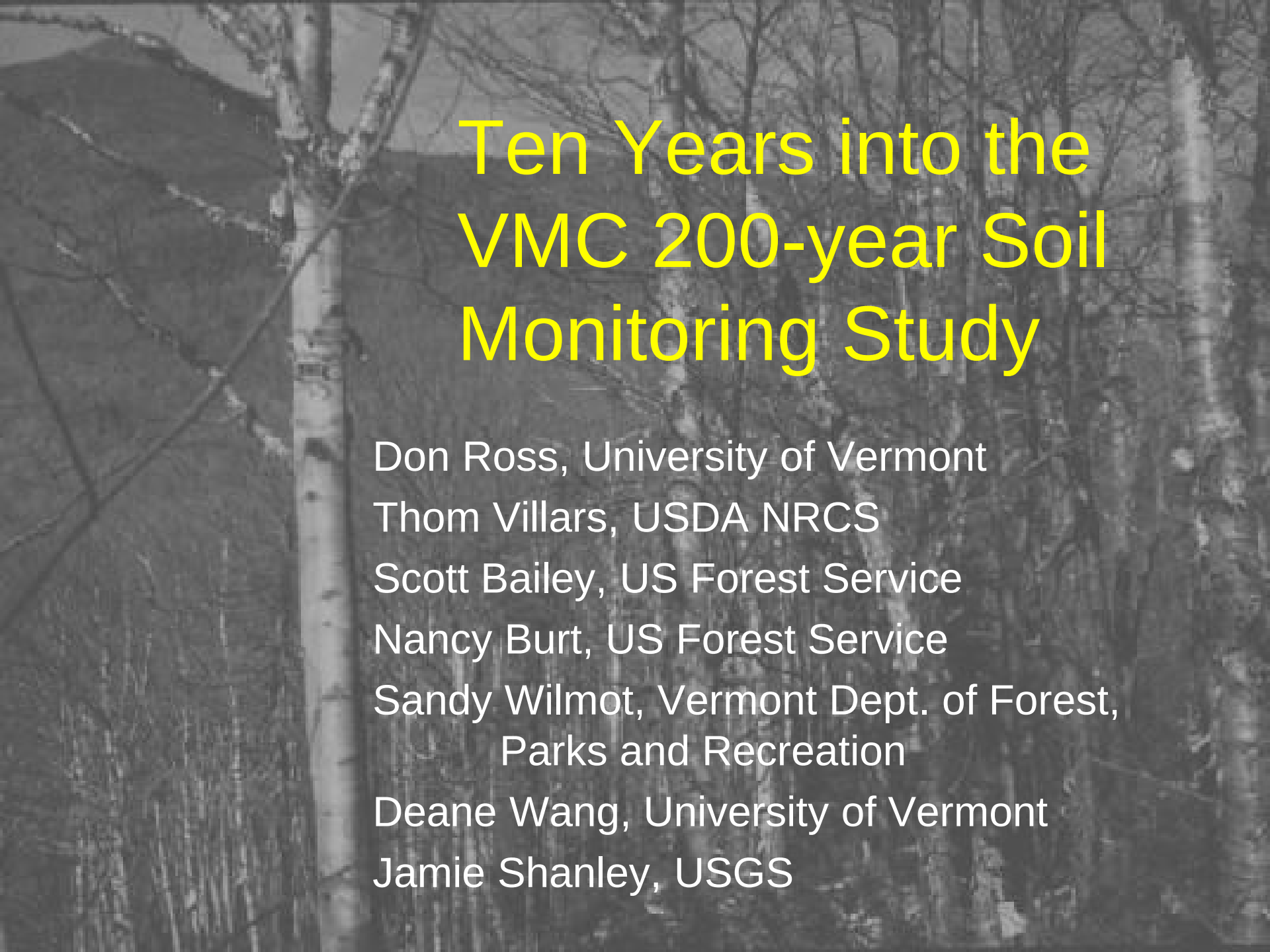


Ten Years into the VMC 200-year Soil Monitoring Study

Don Ross, University of Vermont

Thom Villars, USDA NRCS

Scott Bailey, US Forest Service

Nancy Burt, US Forest Service

Sandy Wilmot, Vermont Dept. of Forest, Parks and Recreation

Deane Wang, University of Vermont

Jamie Shanley, USGS

Original Project Goals:

1. Establish five 50 x 50 m relatively uniform plots in sites associated with the VMC.
2. Sample plots at **0, 5, 10**, 20, 50, 100, 150 and 200 years.
3. Archive samples for later comparisons.
4. Analyze initial samples at three different laboratories to determine baseline values.
5. Protect the plots for future monitoring.

Sites:

- Mt. Mansfield Ranch Brook
  - northern hardwood
- Mt. Mansfield Forehead
  - high elevation spruce/fir
- Mt. Mansfield Underhill State Forest
  - transitional
  - SCAN site
- Lye Brook “Road”
  - northern hardwood
  - SCAN site
- Lye Brook “Trail”
  - transitional

Mansfield Forehead

NW ← 50 m → 5m NE

50 m

91	92	93	94	95	96	97	98	99	100
81	82	83	**84**	85	86	87	88	89	90
71	72	73	74	75	76	**77**	78	79	80
61	**62**	63	64	65	66	67	68	69	70
51	52	53	54	55	56	57	58	59	60
41	42	43	44	**45**	46	47	**48**	49	50
31	32	**33**	34	35	36	37	38	39	**40**
21	22	23	24	25	**26**	27	28	29	30
11	12	13	14	15	16	17	18	19	**20**
1	2	3	4	**5**	6	7	8	9	10

SW SE

A typical plot plan.

Plots with red numbers were sampled in 2002 (Year 0).

2007 and 2012 Sampling Scheme

- 4 large samples from each pit
  - Litter layer (Oi)
  - Oa or A (near-surface humified horizon)
  - Top 10 cm of B horizon
  - C horizon 60-70 cm deep
- All but Forehead had all of these samples
- Also took small bags of each described horizon
- Air-dried, sieved, riffled into polyethylene containers (currently in Jeffords basement UVM)


VYCC crew, Lye Road

Lye Road samplers and Swedish bird watcher


Lye Road


Lye Road

Lye Road

Lye Road

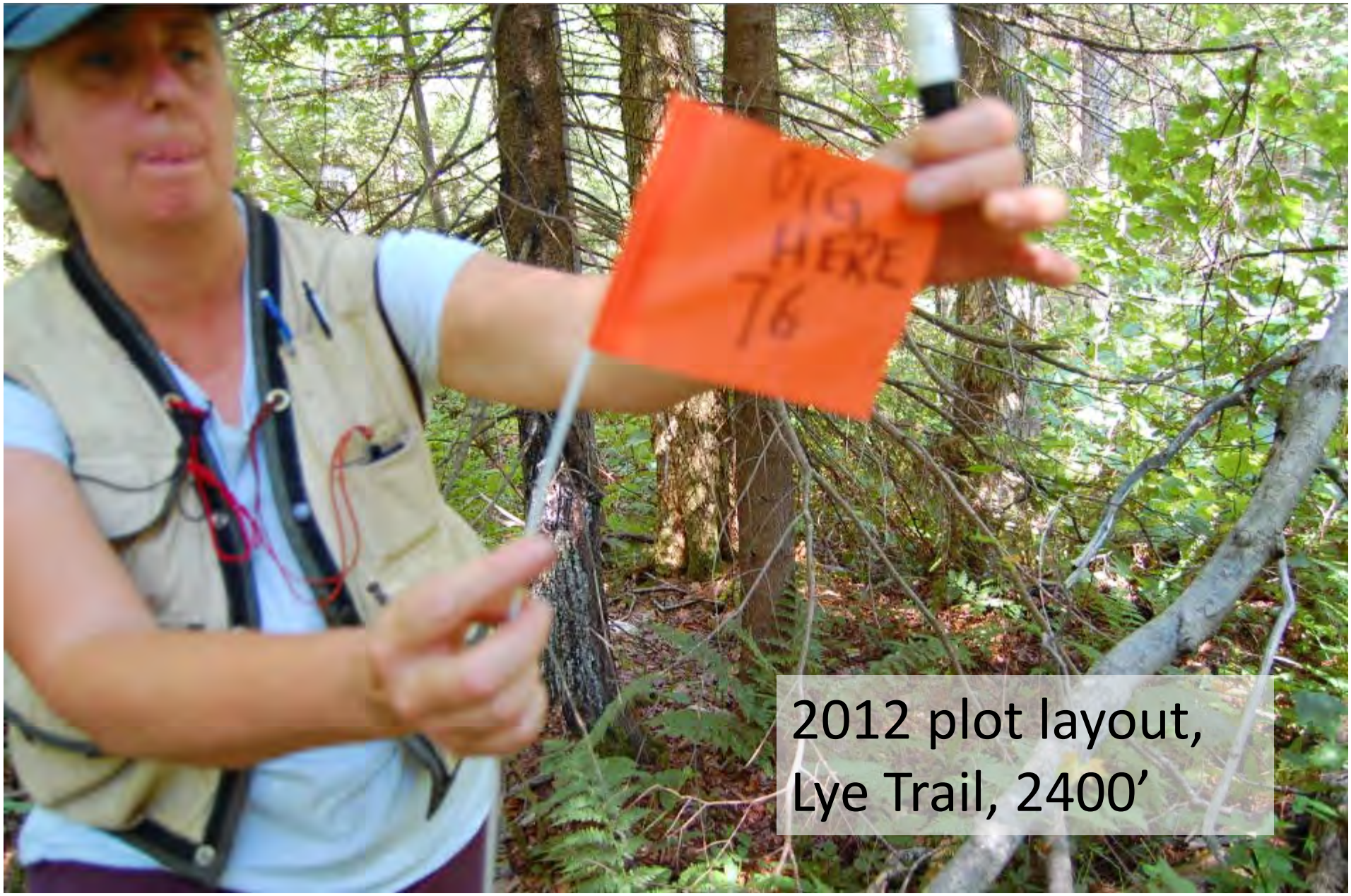

Lye Road

Lye Road


DIG HERE
37
Lye Road

Lye Road


Lye Road



2012 plot layout,
Lye Trail, 2400’


Lye Trail

Lye Trail


Lye Trail


Lye Trail

Lye Trail

Lye Trail


Lye Trail


Ranch Brook 2002
1800’


Ranch Brook
2002


Forehead, 3600’

Forehead (actually looking at the nose)


Forehead

Forehead

Thom Villars hiding in the shrubbery

Forehead

Forehead

Forehead


Dig Here
36
Forehead

Forehead


Forehead


Forehead

Forehead

Forehead


Forehead

Stu Clark, USGS, sampling for mercury, Forehead 2007

Underhill State Park or ‘Polka-Dot’, 2400’


Scott and
Guin in 2002

Polka-dot

Polka-dot

Polka-dot

Polka-dot

Polka-dot

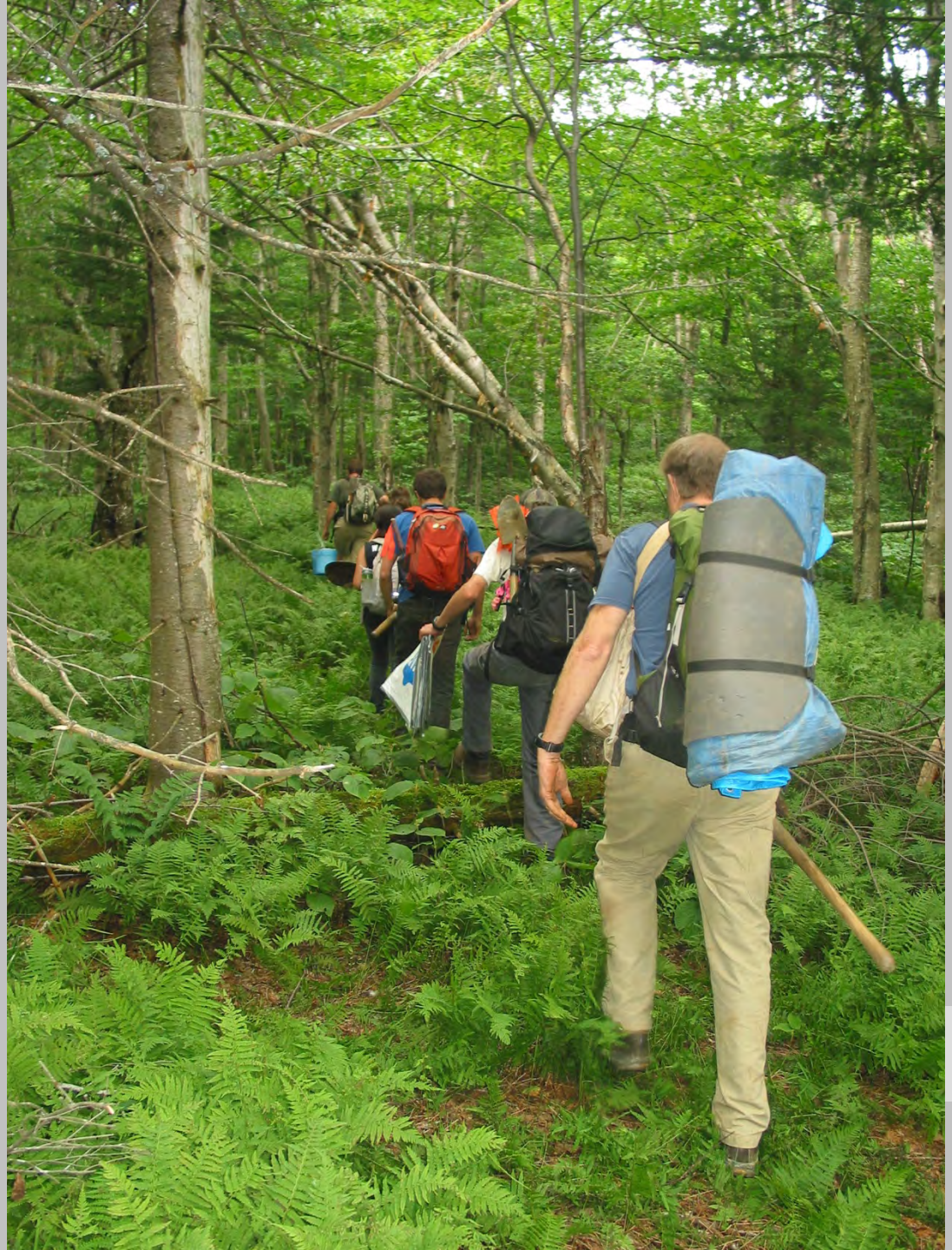
Polka-dot


Do Not
Polka-dot

Polka-dot


Polka-dot

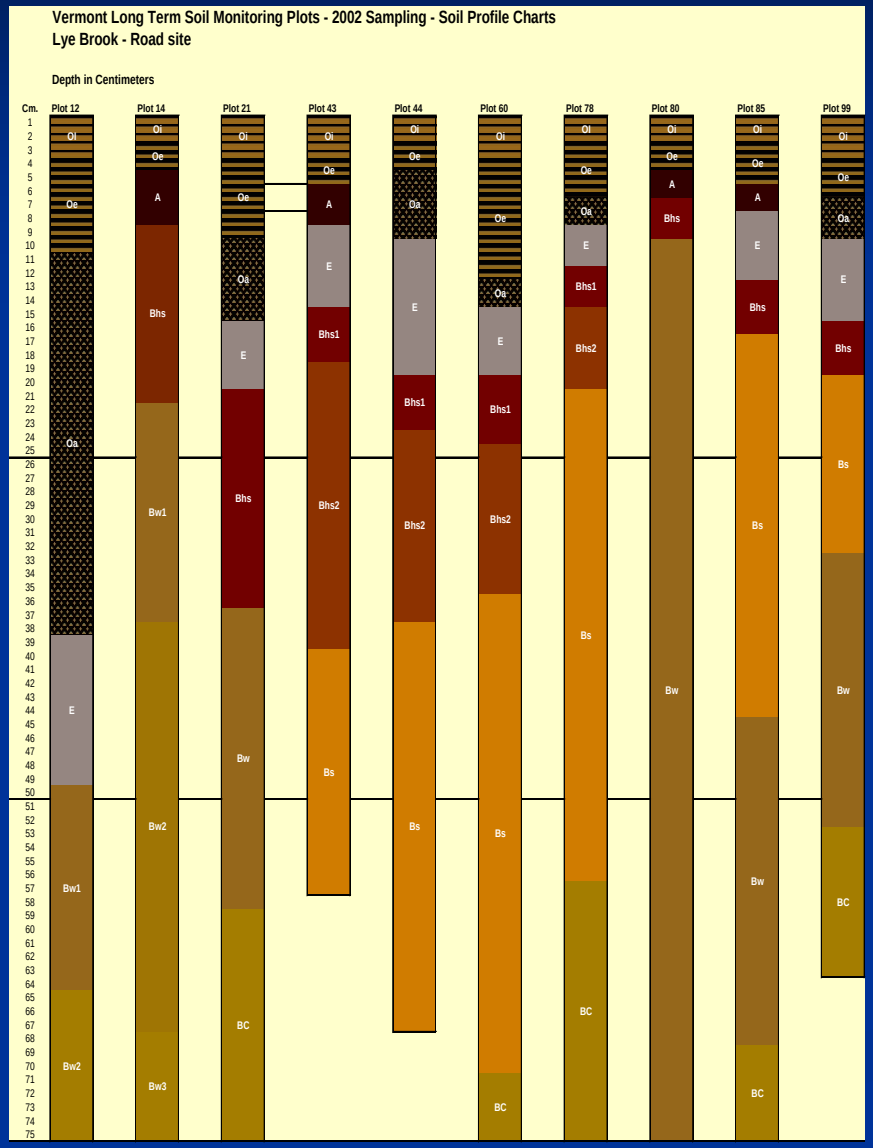

Underhill
State Park
Plot 2002

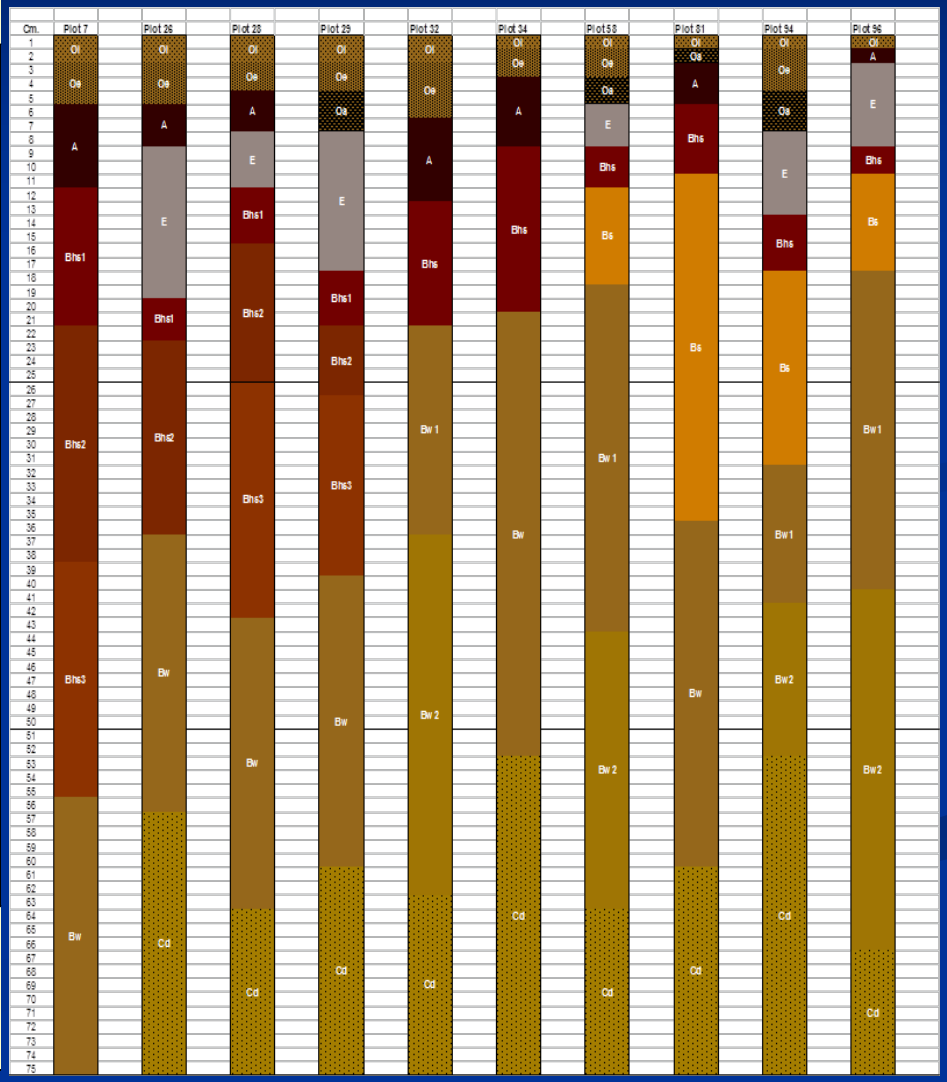


Polka-dot

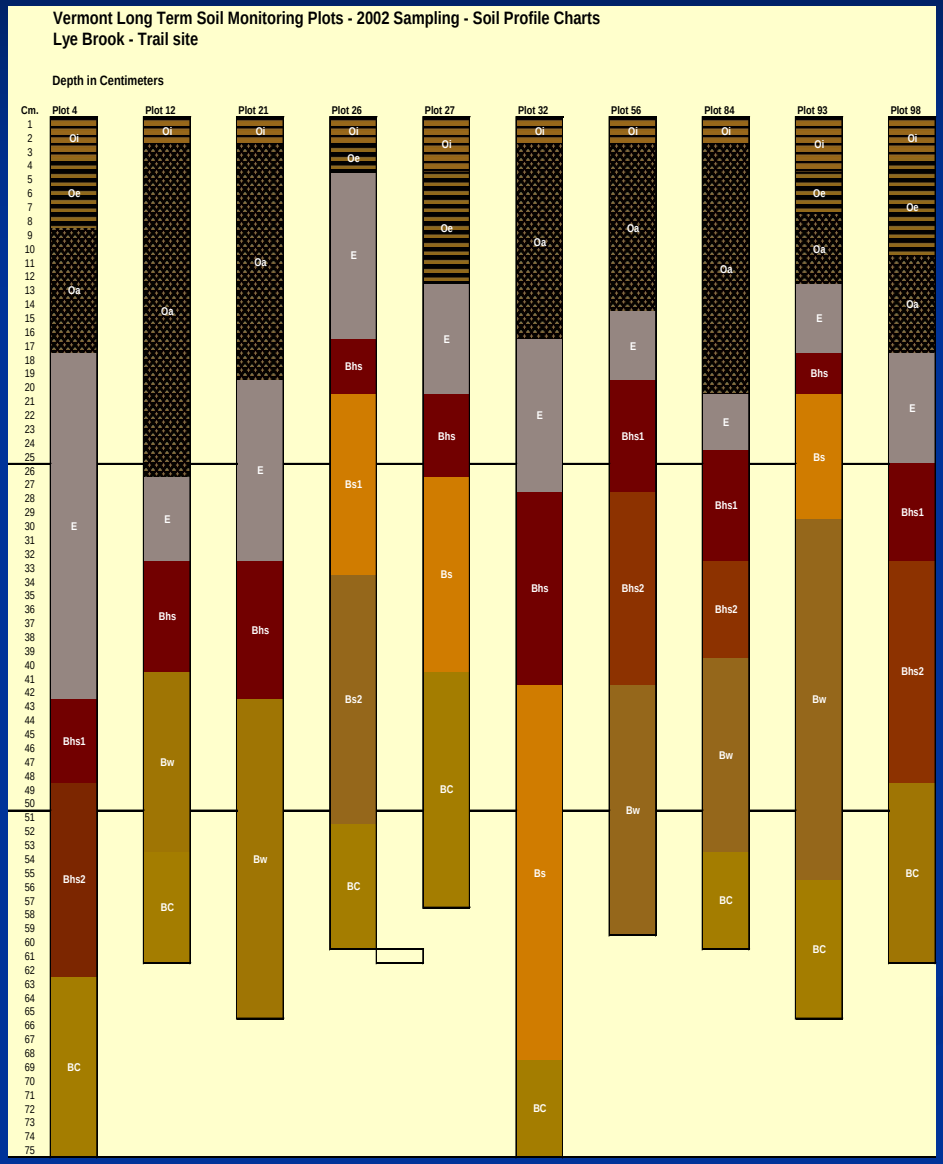
Polka-dot

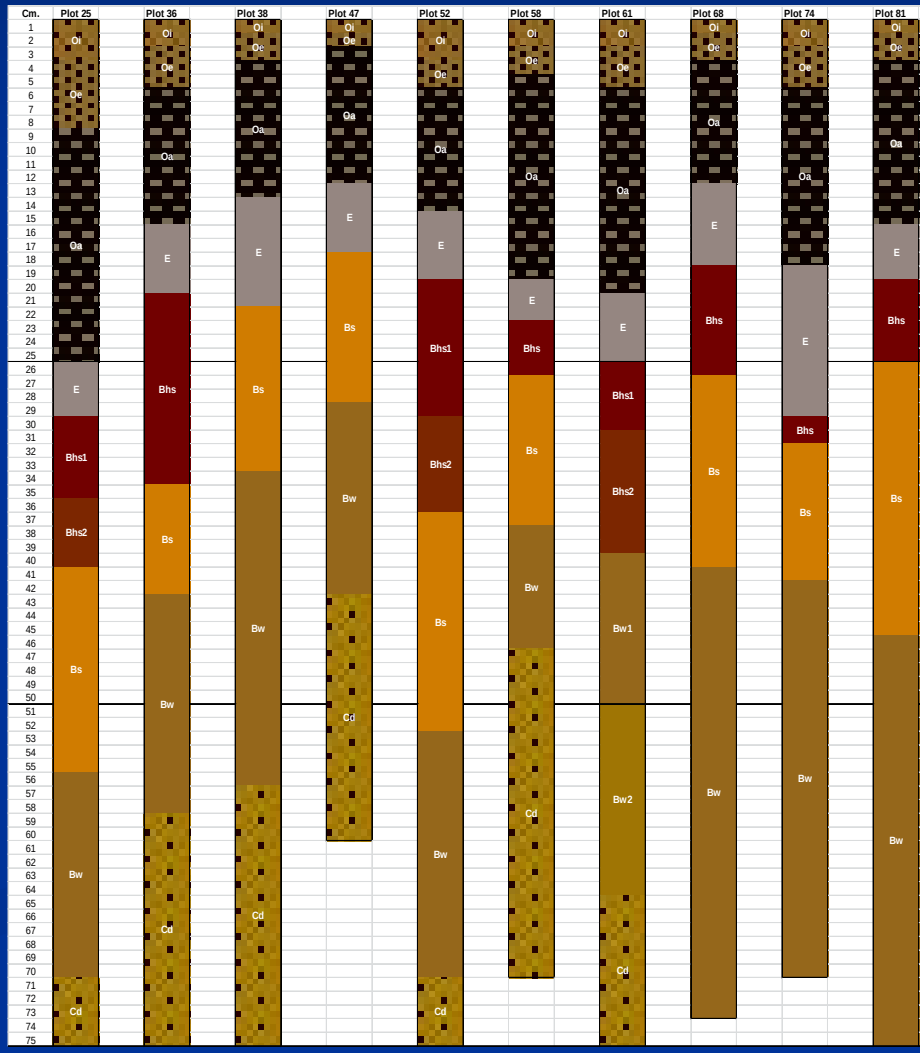
2002Lye Brook – Road site 2007
Compiled by Thom Villars



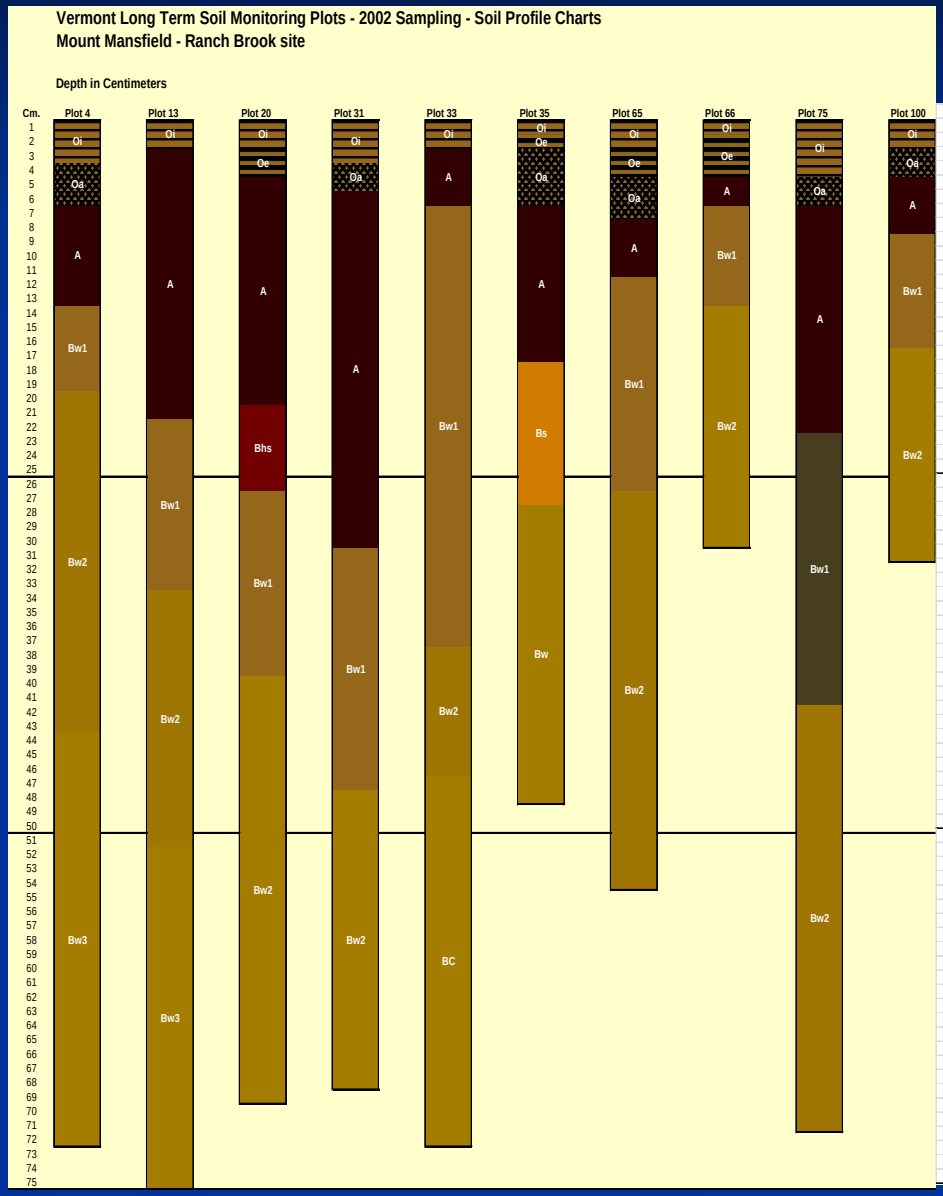


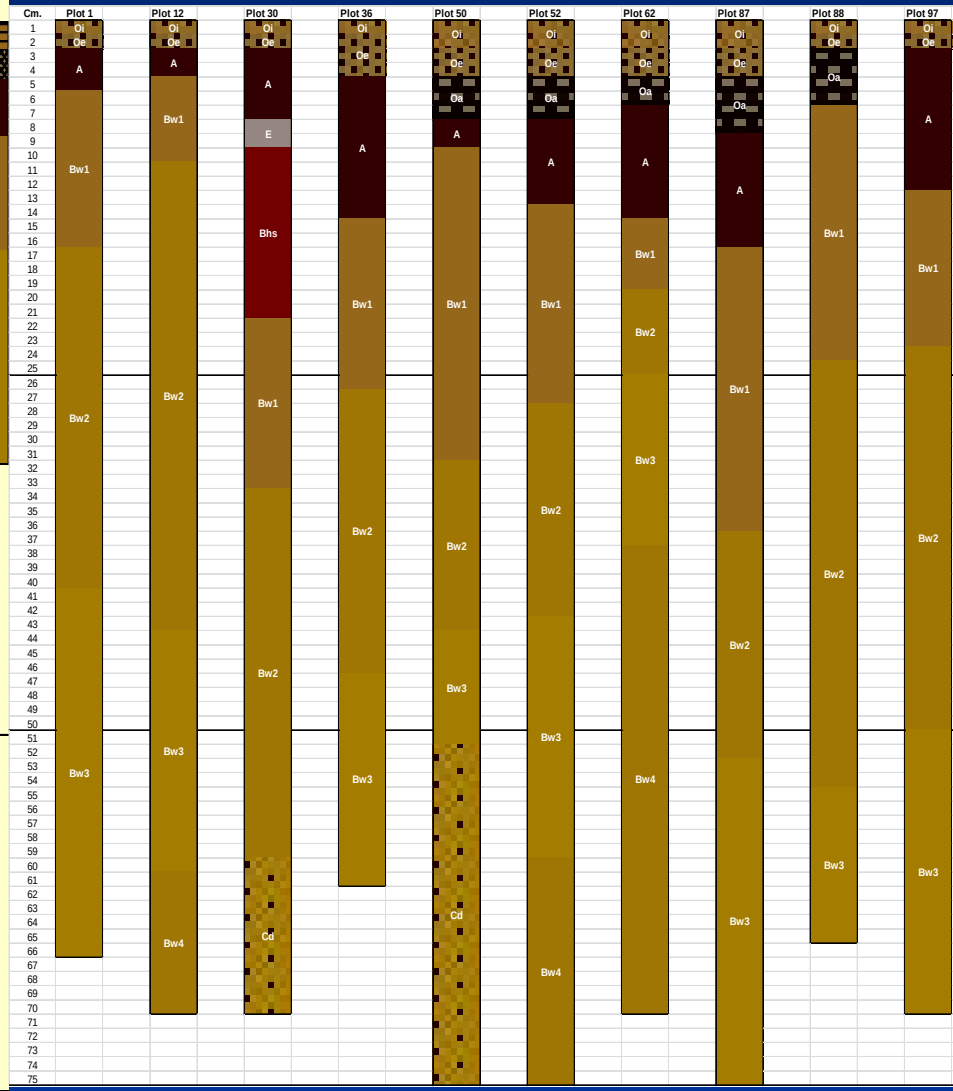
2002 Lye Brook – Trail site 2007



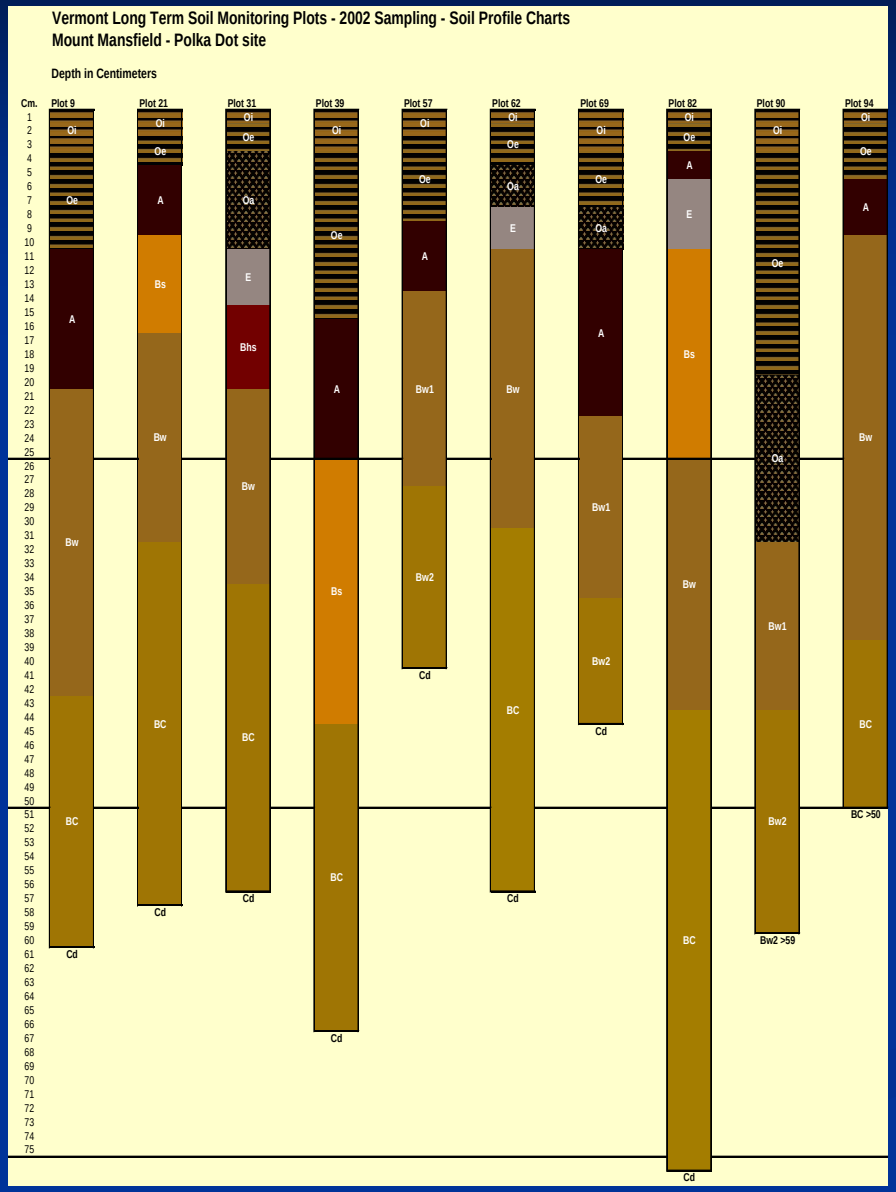


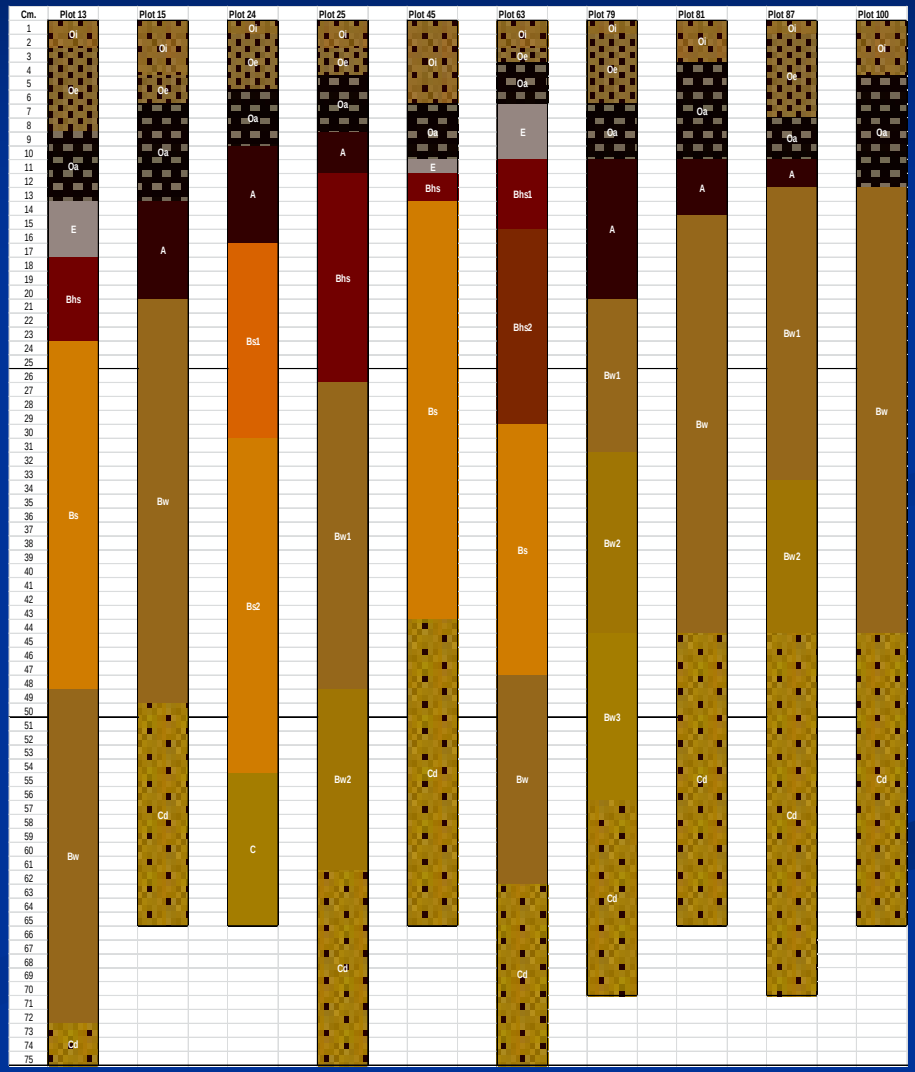
2002 Mt. Mansfield – Ranch Brook 2007



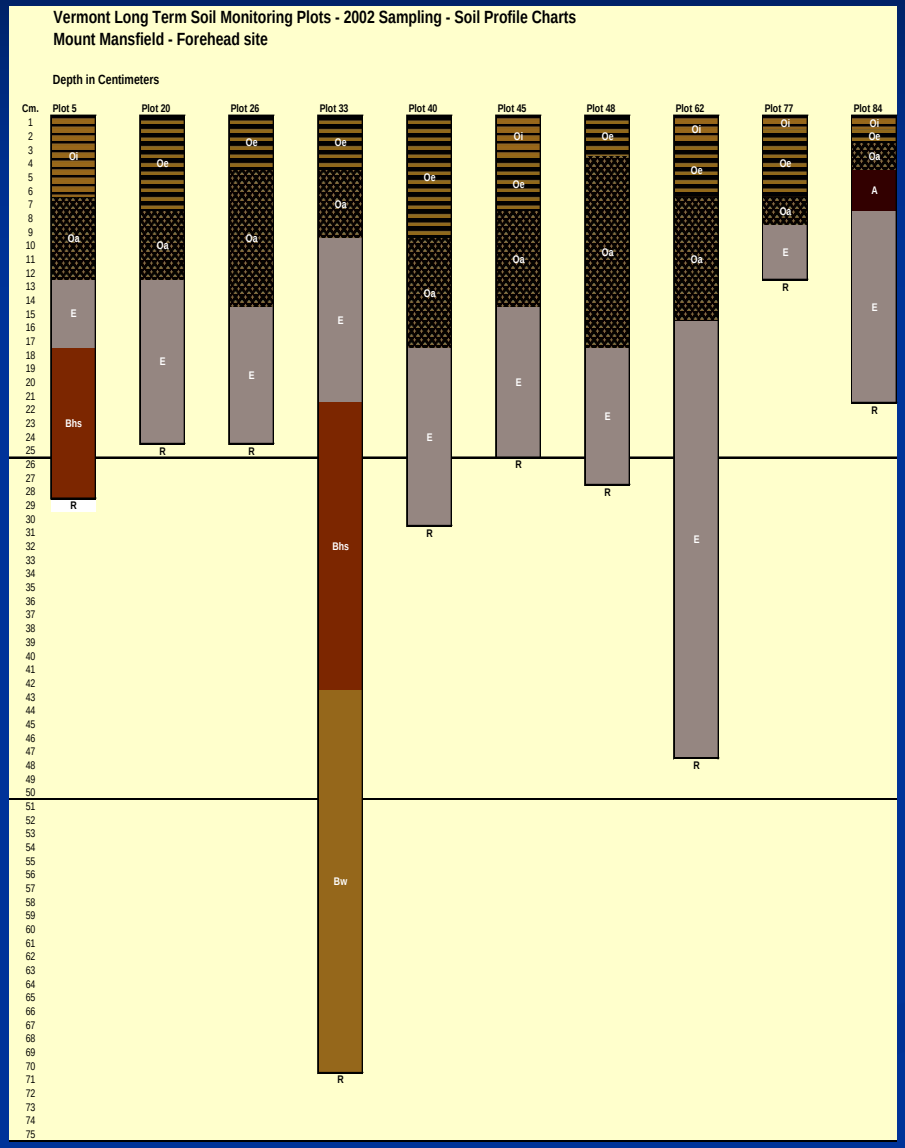


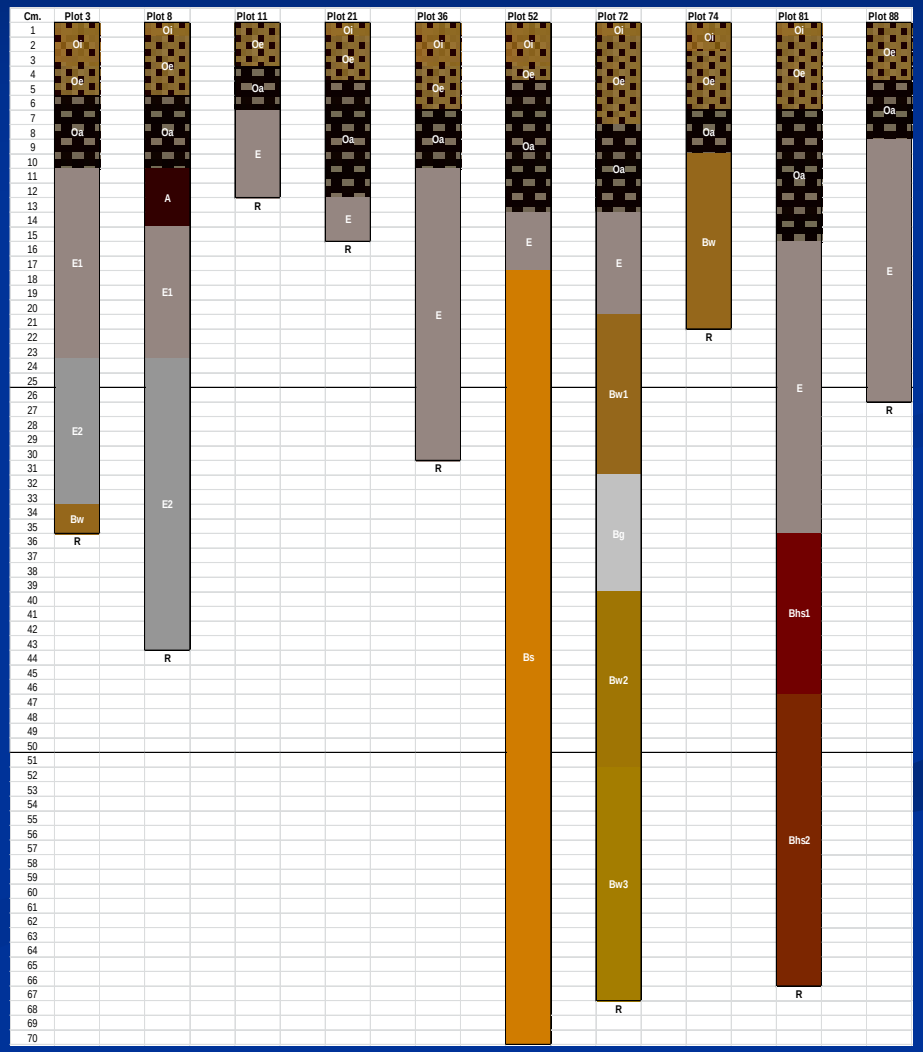
2002 Mt. Mansfield – Polka Dot site 2007





2002 Mt. Mansfield – Forehead Site 2007

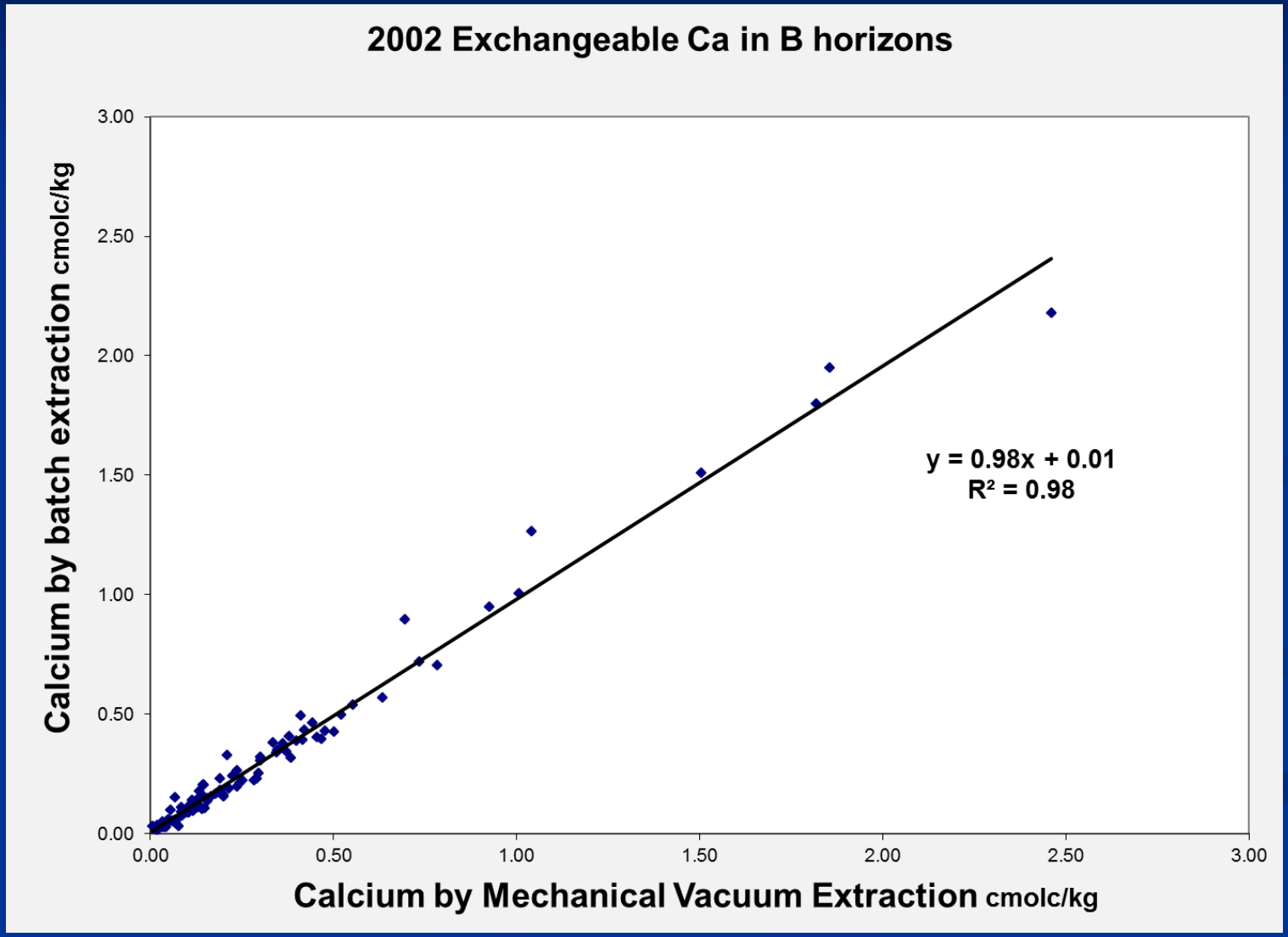




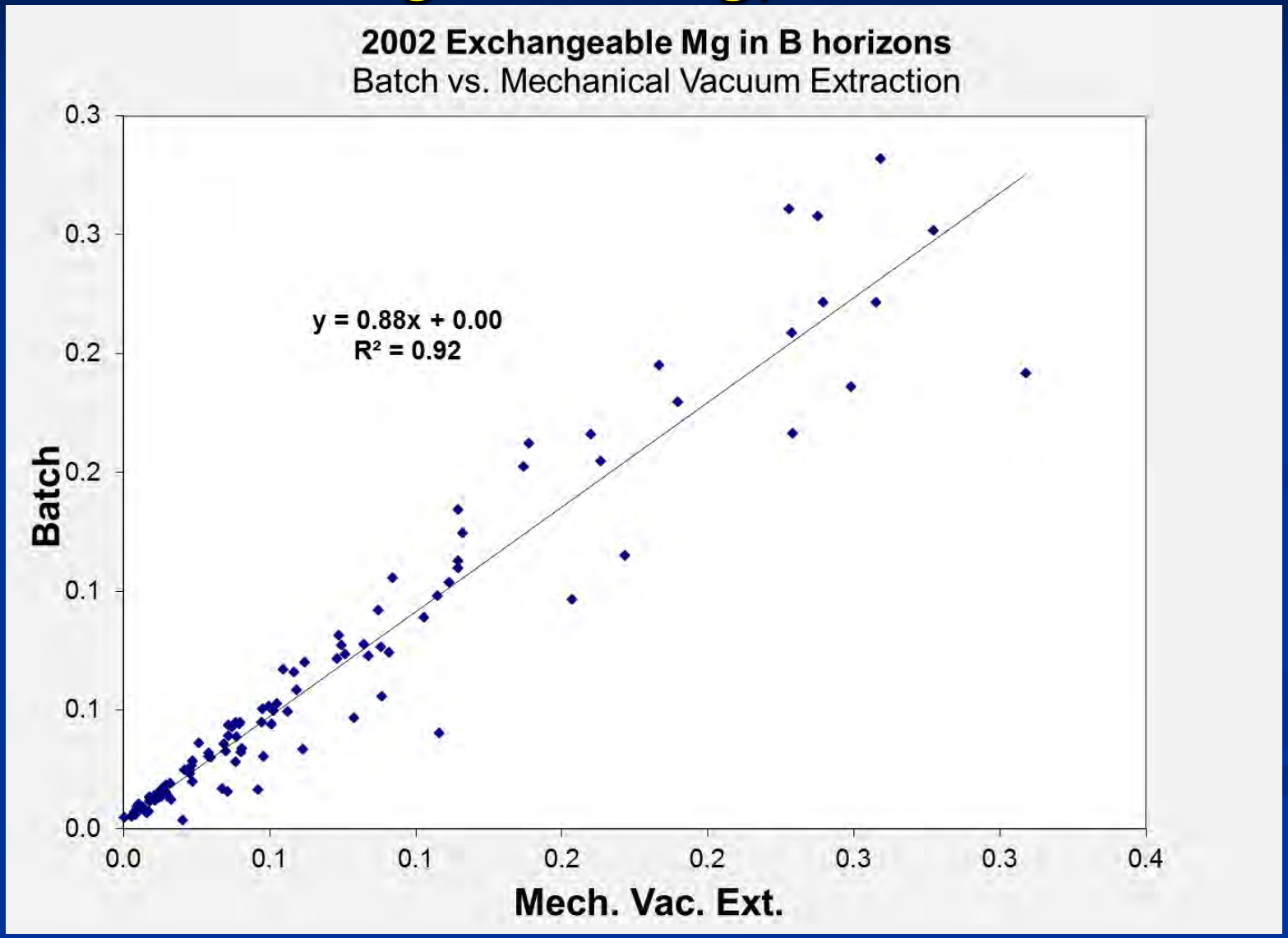
Comparisons

- 1. 2002 B horizon exchangeable cations
  - UVM batch vs. UVM/FS MVE
  - NRCS data not used
- 2. 2007 depth samples vs. 2007 horizons
  - Horizons ‘prorated’ to 10 cm
  - If: 7 cm Bhs1, 16 cm Bhs 2
  - 10-cm Ca = 0.7 x Ca1 + 0.3 x Ca2
- 3. 2002 vs. 2007
  - Average of all B horizons

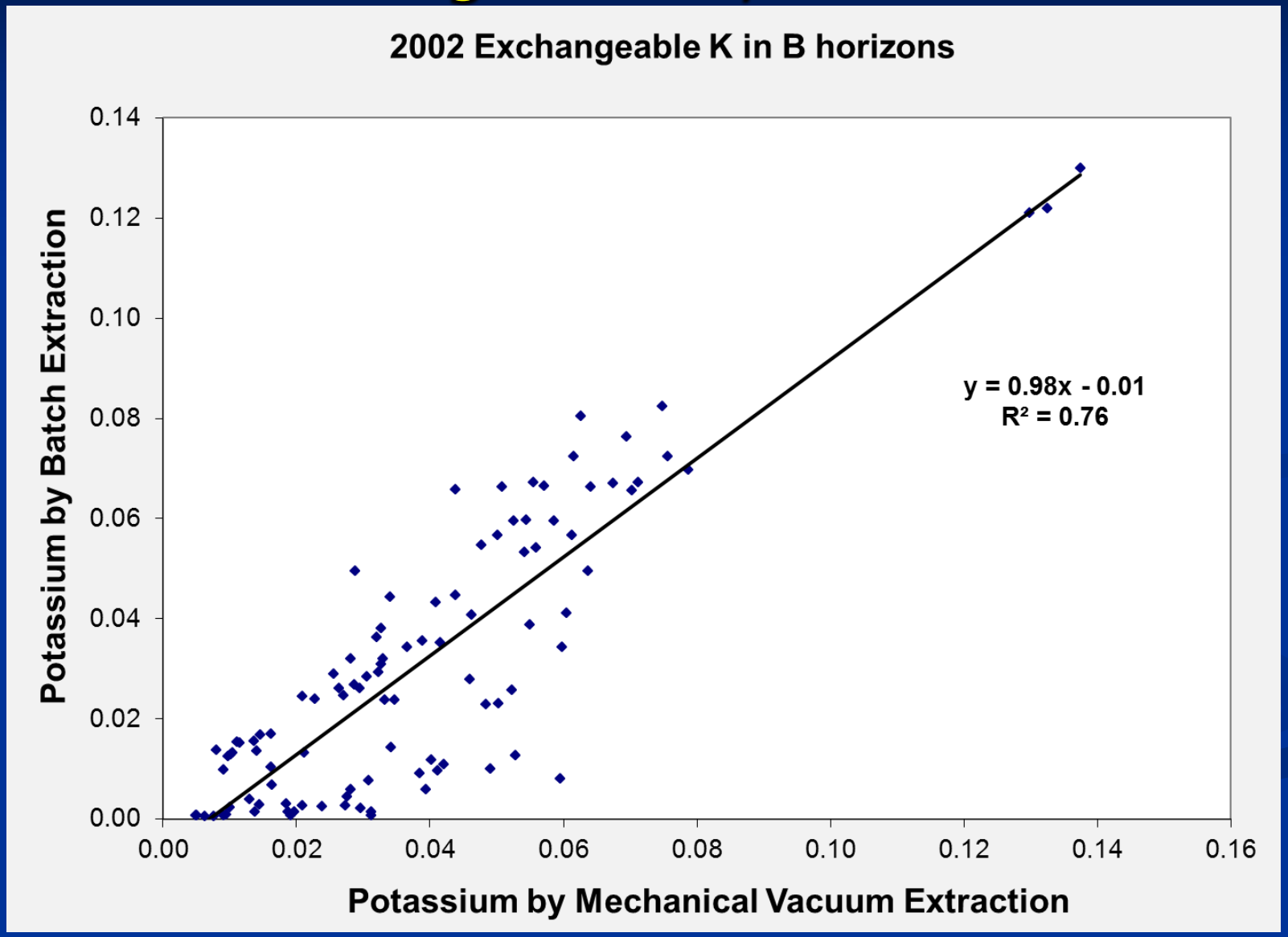
2002 exchangeable Ca, lab comparison



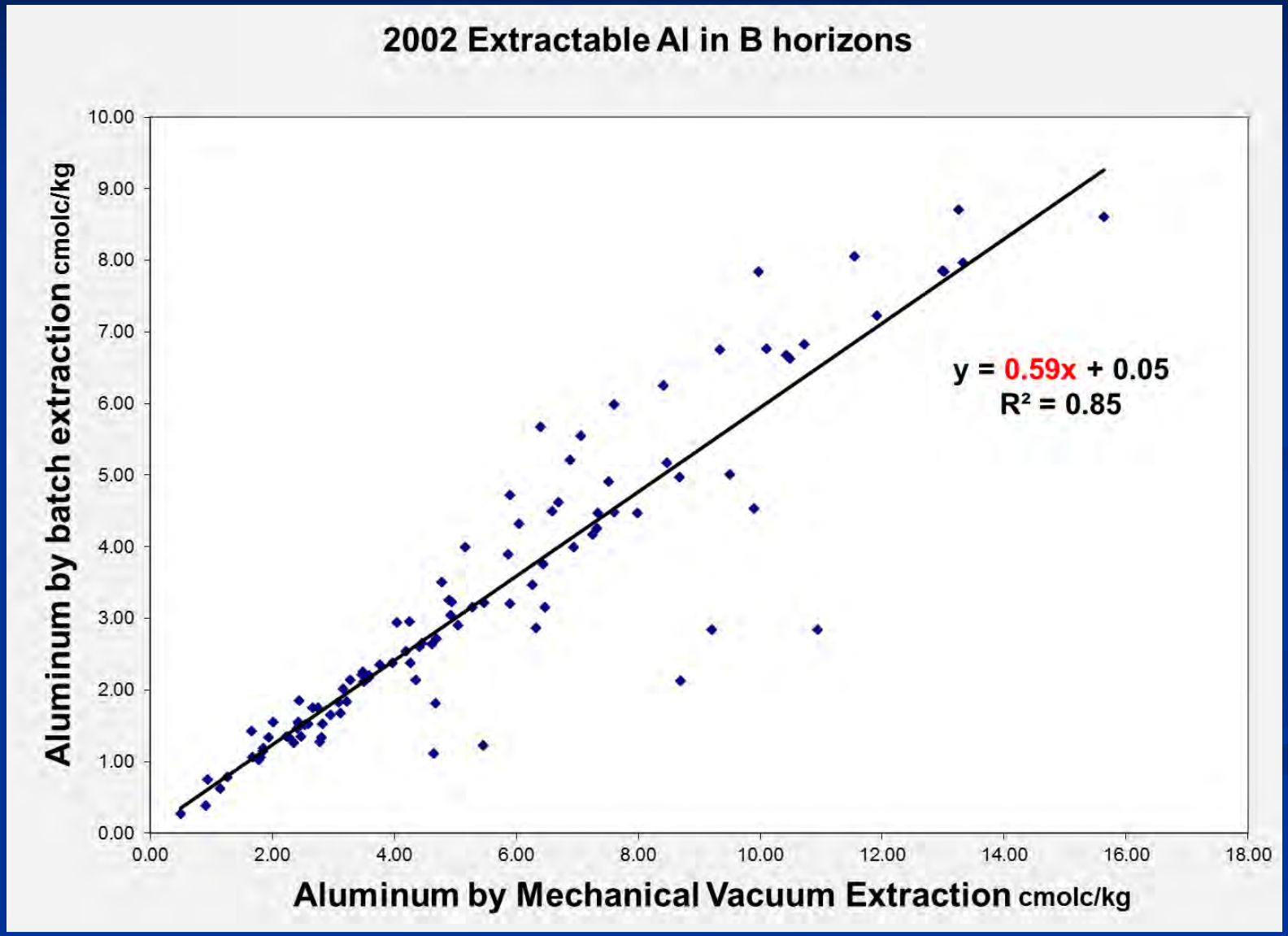
2002 exchangeable Mg, batch vs. MVE



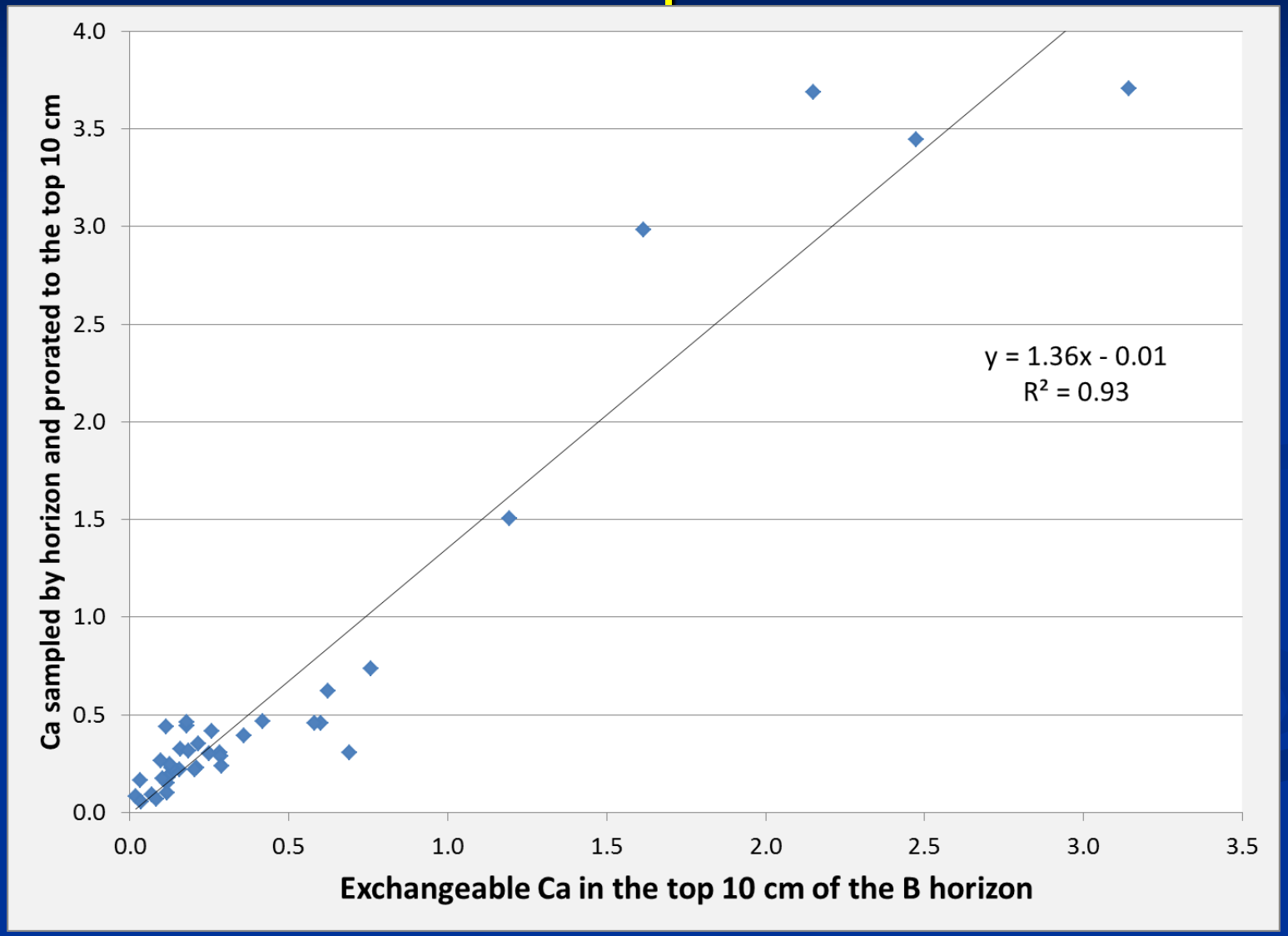
2002 exchangeable K, batch vs. MVE



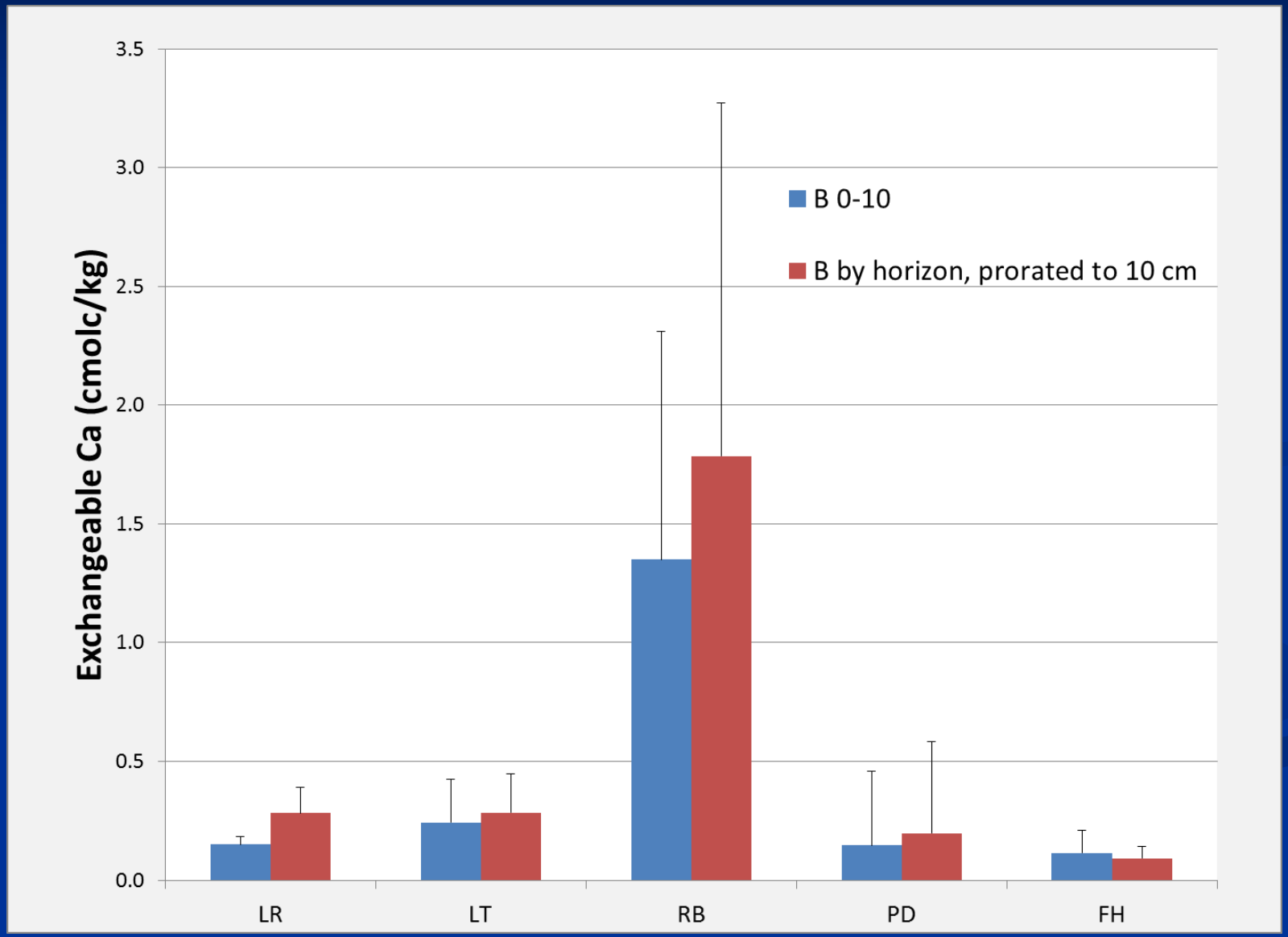
2002 exchangeable Al, batch vs. MVE



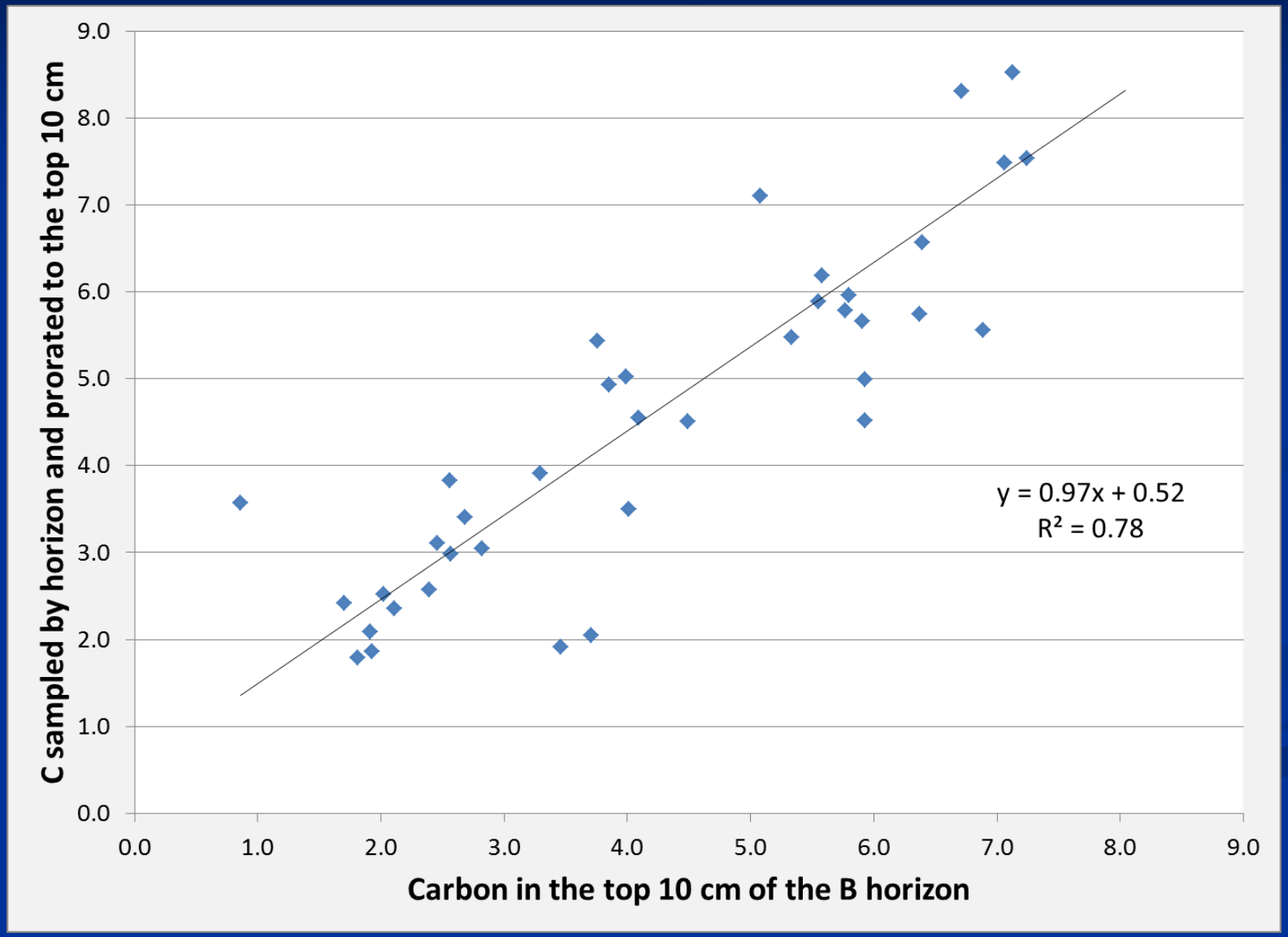
2007 exchangeable Ca
0-10 cm sample vs. prorated horizon



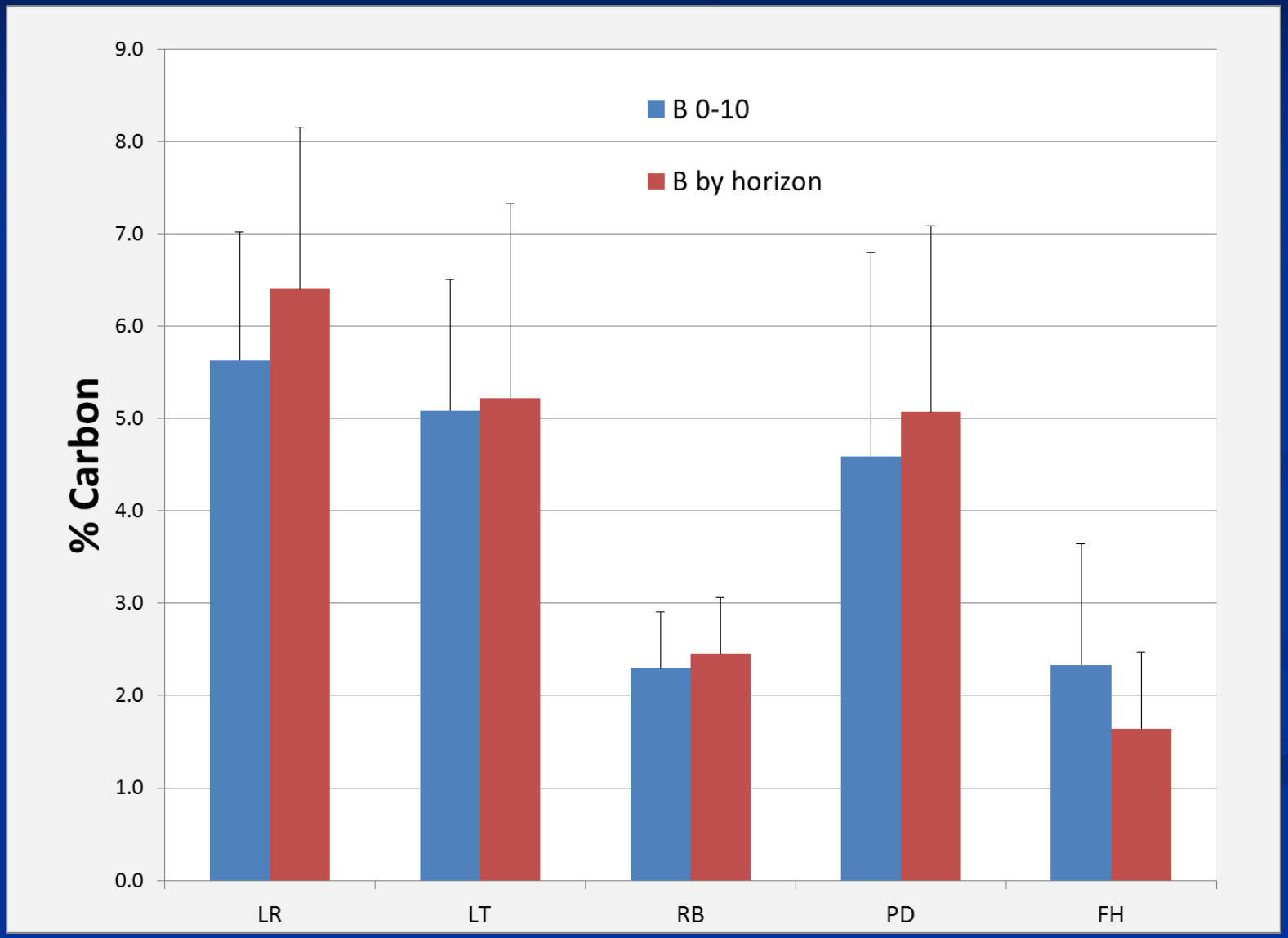
2007 exchangeable Ca
0-10 cm sample vs. prorated horizon



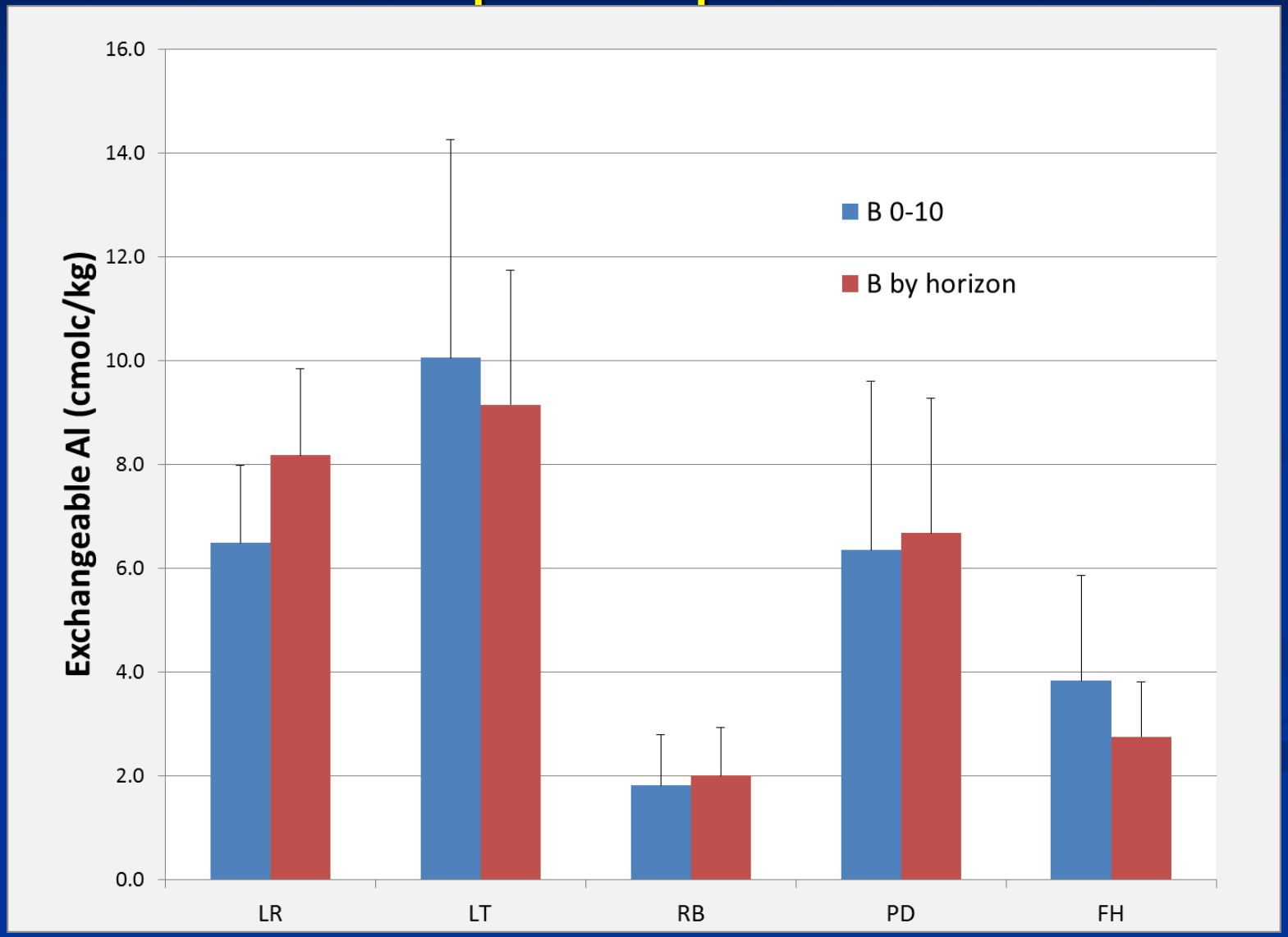
2007 total carbon
0-10 cm sample vs. prorated horizon



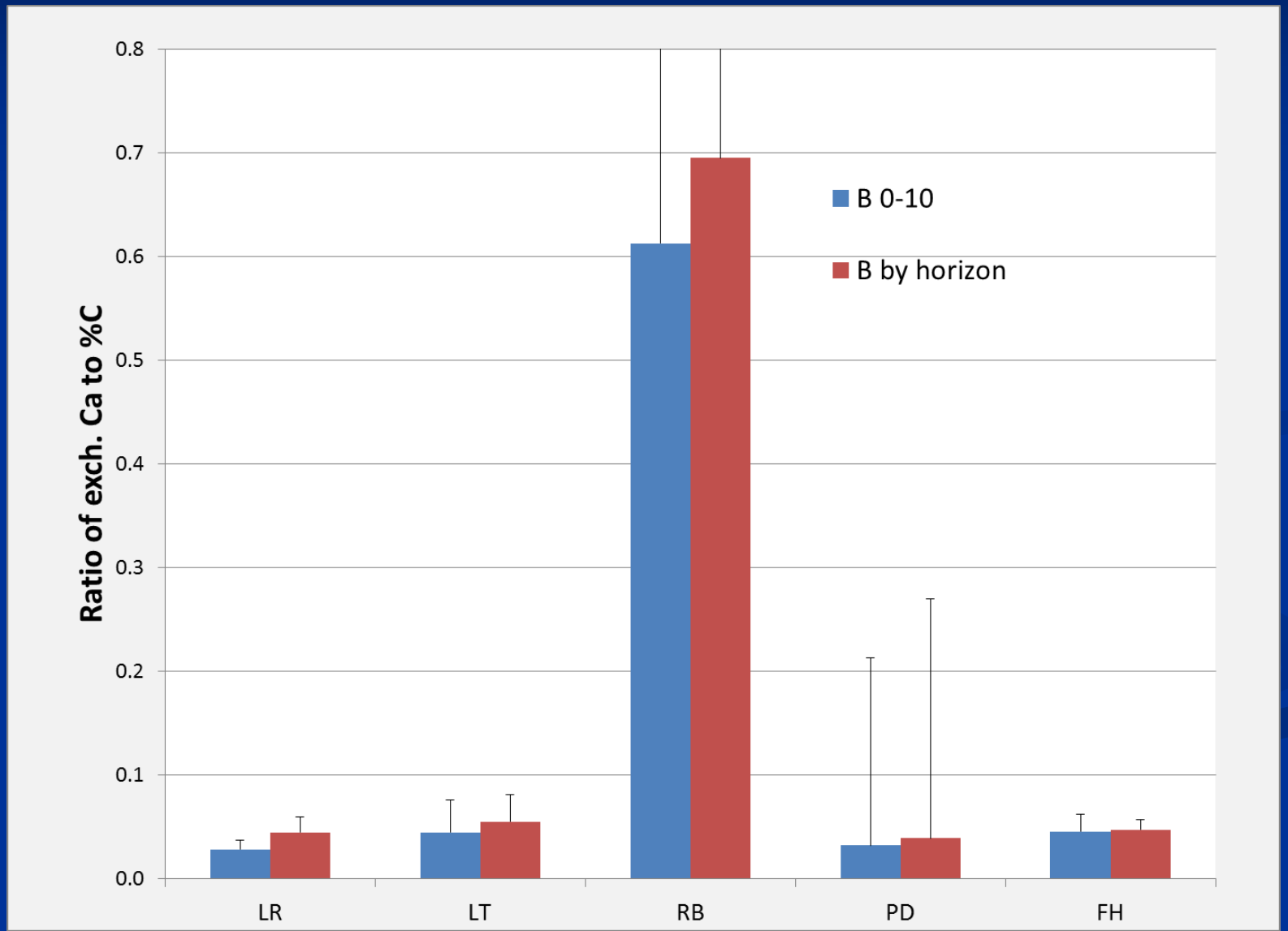
2007 total carbon
0-10 cm sample vs. prorated horizon



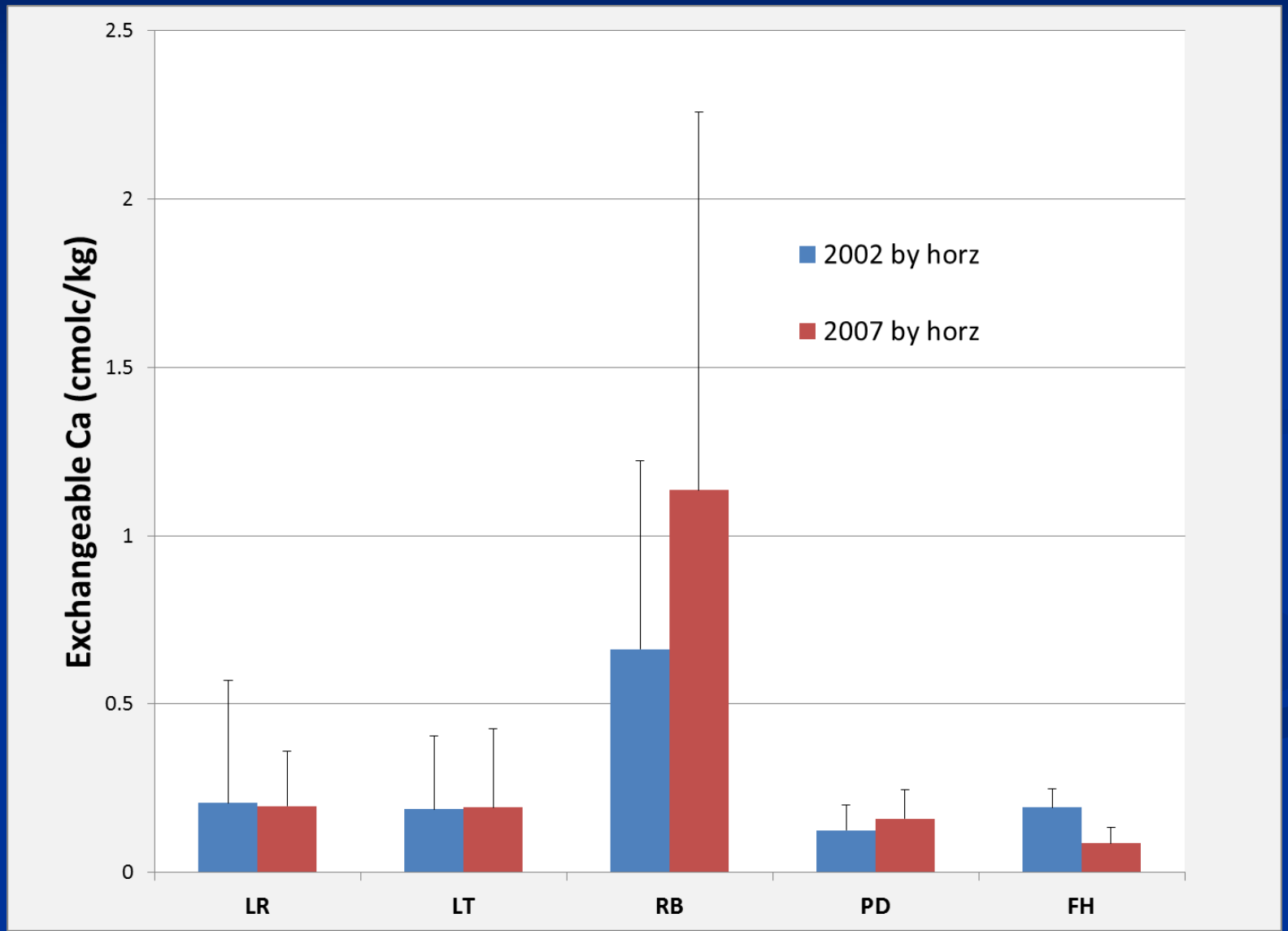
2007 exchangeable Al
0-10 cm sample vs. prorated horizon



2007 Ca:C ratio
0-10 cm sample vs. prorated horizon



2002 vs. 2007 exchangeable Ca
average of all B horizons

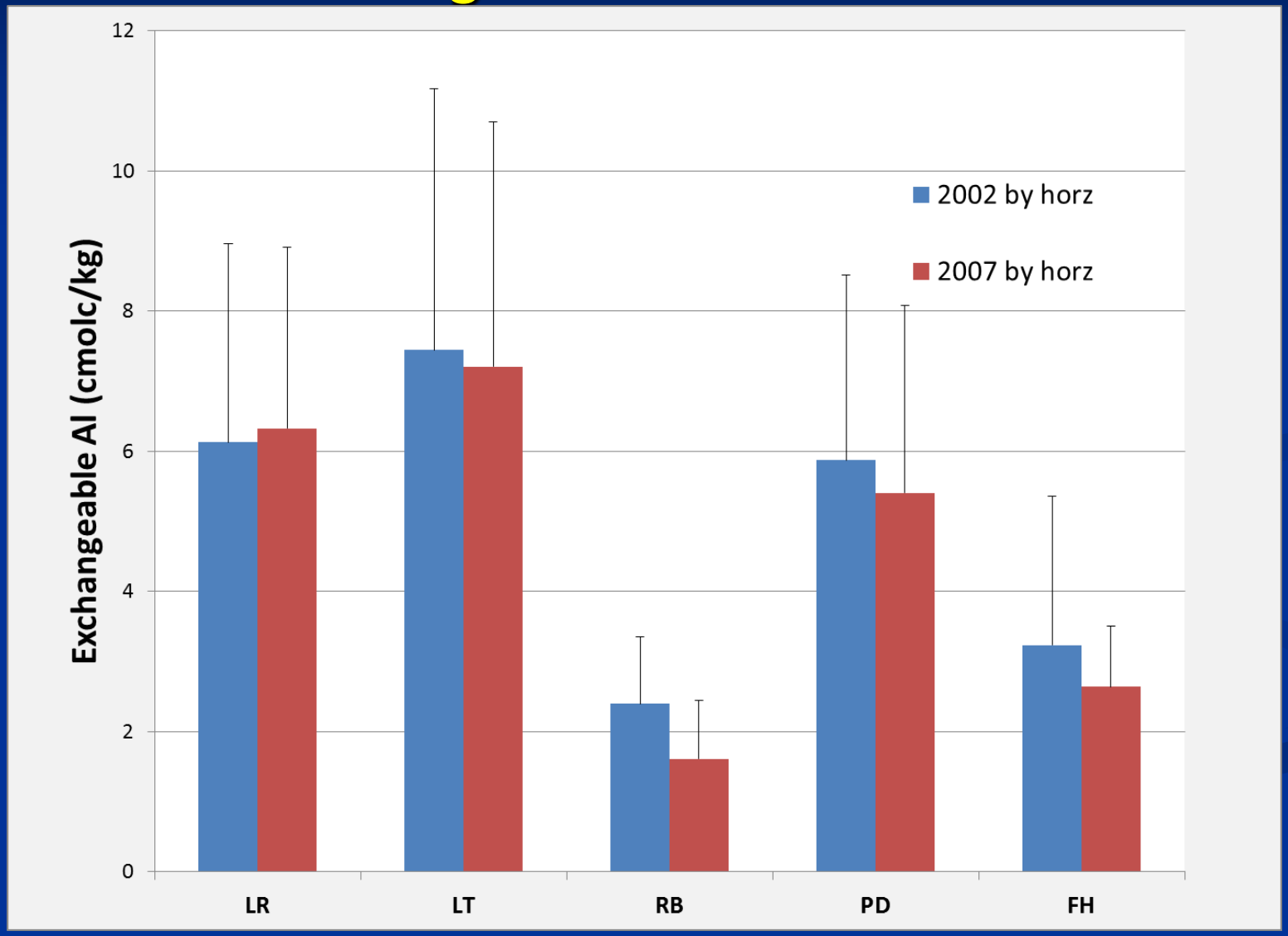


Ranch exchangeable Ca in the uppermost B horizon
Red is 2002 and blue is 2007

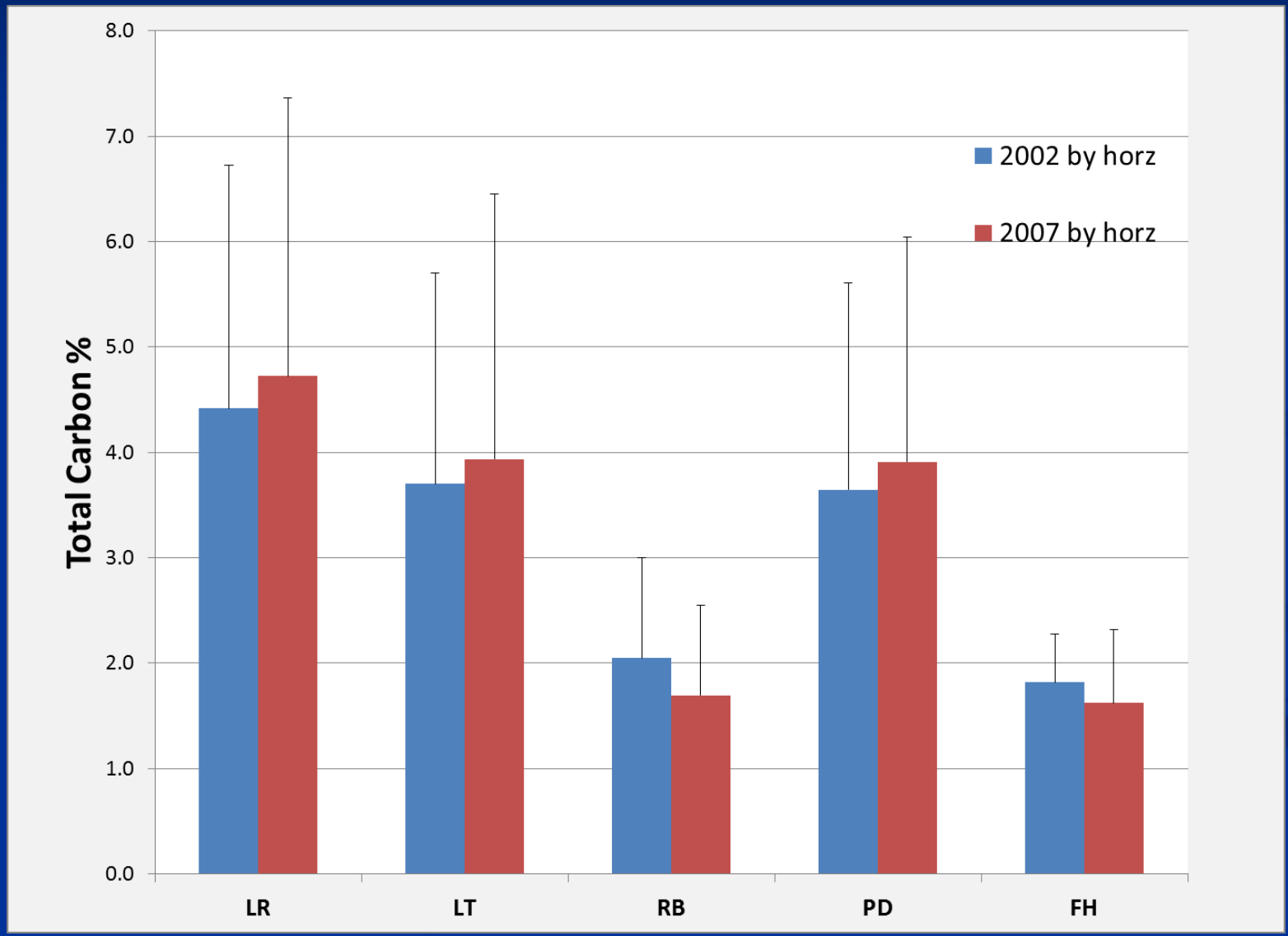
91	92	93	94	95	96	1.50	98	99	1.85
81	82	83	84	85	86	3.71	3.69	89	90
71	72	73	74	0.74	76	77	78	79	80
61	0.31	63	64	0.78	2.46	67	68	69	70
51	0.74	53	54	55	56	57	58	59	60
41	42	43	44	45	46	47	48	49	3.45
0.33	32	0.34	34	0.37	0.31	37	38	39	40
21	22	23	24	25	26	27	28	29	2.98
11	0.55	0.44	14	15	16	17	18	19	0.93
0.46	2	3	0.70	5	6	7	8	9	10

N

2002 vs. 2007 exchangeable Al
average of all B horizons



2002 vs. 2007 total carbon
average of all B horizons



Challenges facing the project:

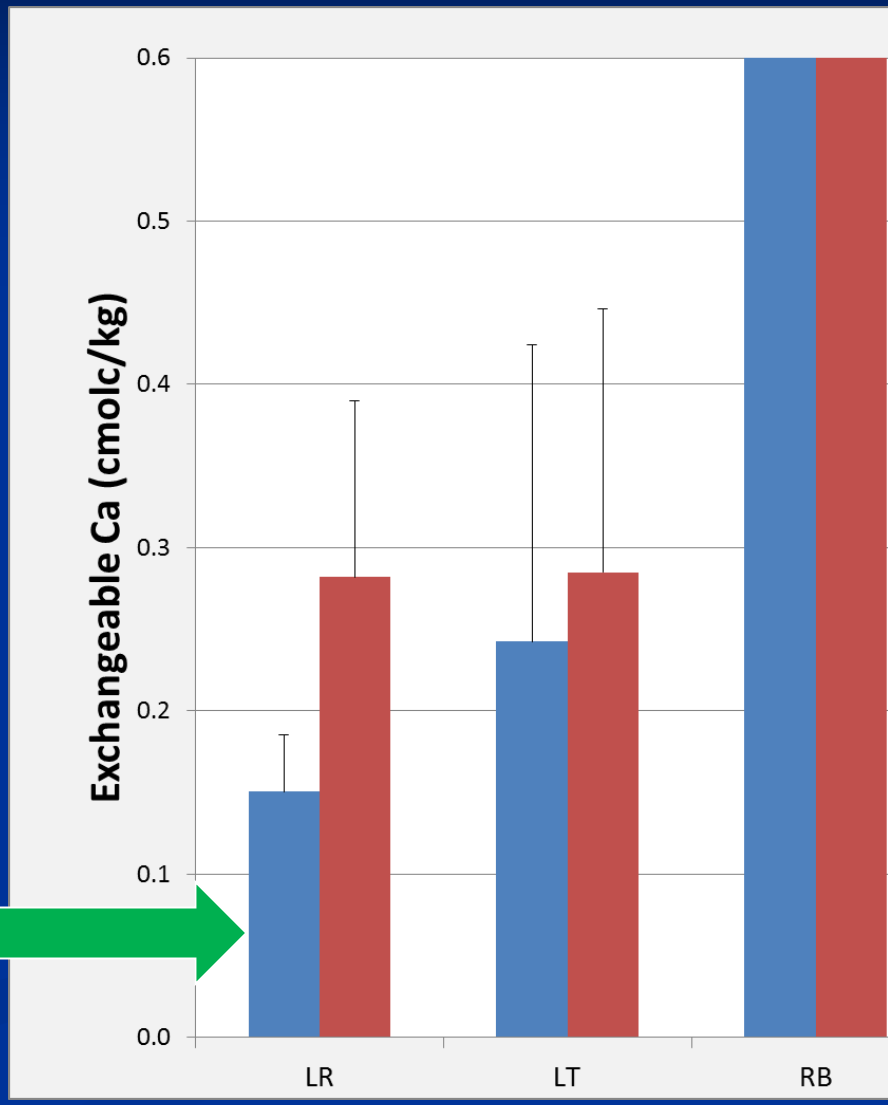
- Separating natural soil variation from actual long-term changes
- Developing a permanent archive plan
- Funding for lab work and unsupported personnel costs
- 200 years??? - Institutionalizing the program into agencies and passing on the project to a new generation of scientists

Power analysis

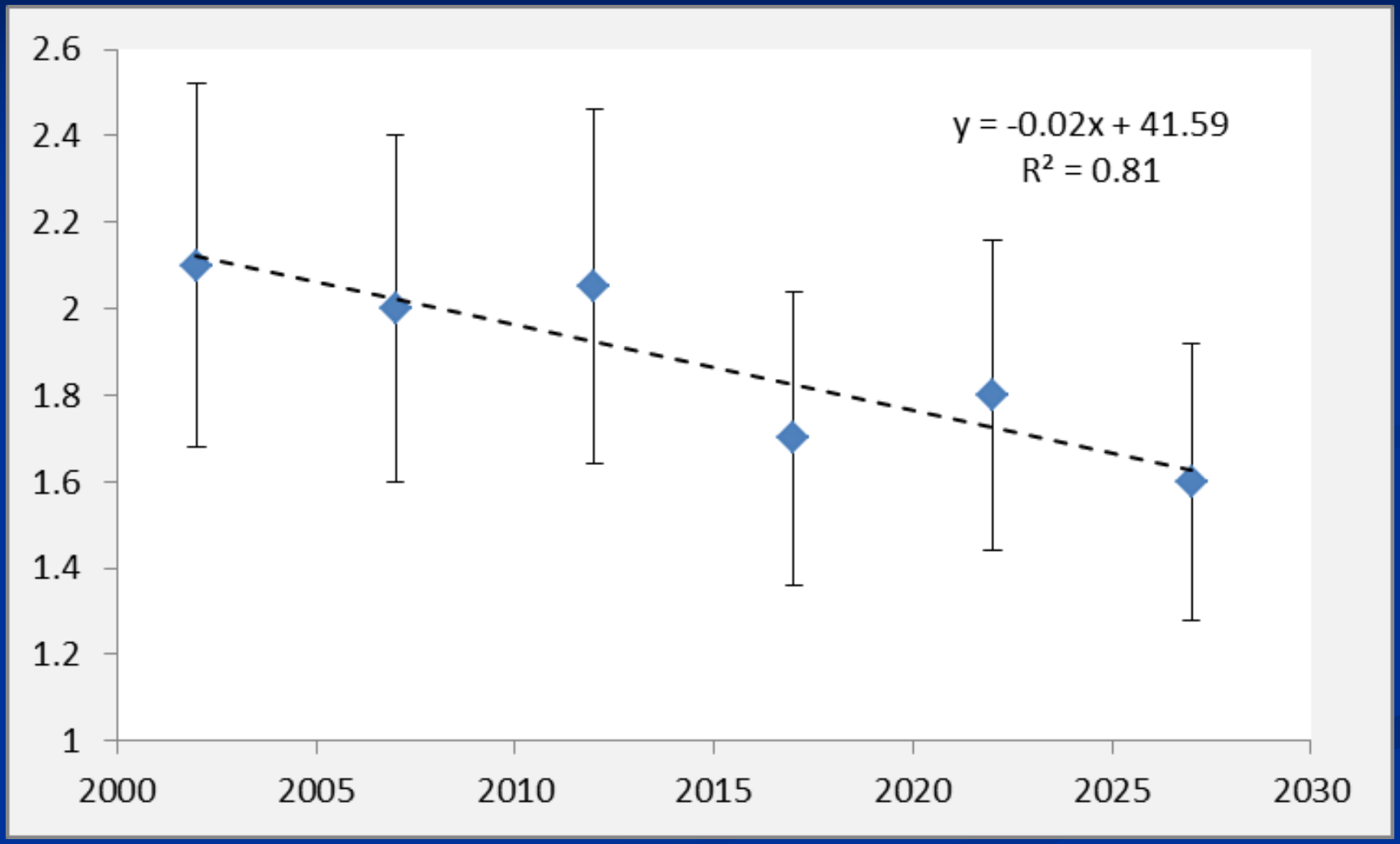
Lye Road B 0-10 cm
Exchangeable Ca
cmolc/kg

0.114
0.118
0.119
0.157
0.140
0.118
0.160
0.179
0.184
0.216

n	10
std dev	0.0348
mean	0.150
difference to detect	
P 0.05	0.071
P 0.10	0.060



Detecting change



Detecting change

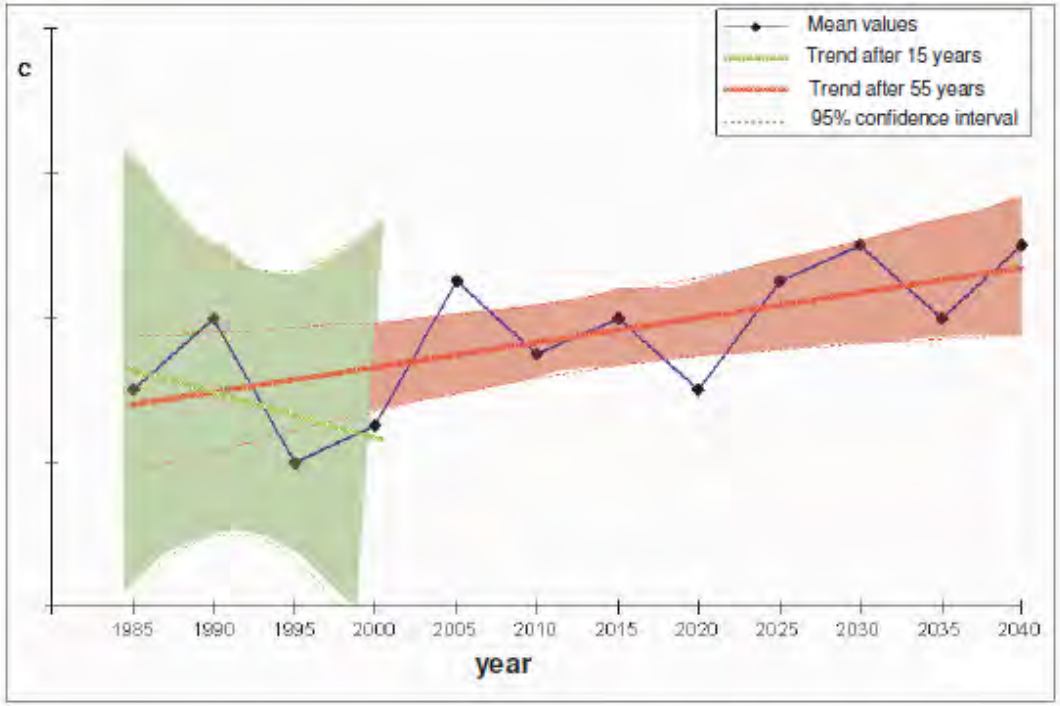
Overview and experiences of the Swiss soil monitoring network over 25 years
- Focus on forest soils -

André Desaules
andre.desaules@art.admin.ch

Lesson 2: Trends can be identified and certified only after sufficiently intense and long measurement series. Measurements within the noise cannot be interpreted. With increasing number of measurements and accurracy noise can be reduced and trends earlier detected. This is the foundation of pleading for increasing measurement periodicity in soil monitoring as well.

Detecting change

2) Increasing measuring periodicity



(Almost) everyone involved in 2012:

- Ashley Walker, UVM
- Ben Dillner, Vermont Forest, Parks and Rec
- Charlotte Ford, UVM
- Courtney Dyche, UVM
- Dana Andrews, UVM
- Deane Wang, UVM
- Don Ross, UVM
- Doug Morin, UVM
- Emily Piche, UVM
- Meghan Knowles, UVM
- Nancy Burt, US Forest Service
- Noah Ahles, UVM
- Rebecca Bourgault, UVM
- Ryan Melnichuk, UVM
- Ryan Morra, UVM
- Sandy Wilmot, Vermont Forest, Parks and Rec
- Scott Bailey, US Forest Service
- Thom Villars, NRCS
- Vermont Youth Conservation Corp

Funding generousy provided by VMC and Green Mountain and Finger Lakes National Forests

Thanks Carl Waite and Nancy Burt!


Young volunteers needed!