Measuring Sequestered Carbon Contents of NEON Grassland and Forest Soil Profiles

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at NEON

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Northeastern

National Soil Project

Initiated 2008 at Northeastern

2000+ samples from all 50 US states

- Conventional agricultural soil profiles
- Organic agricultural soil profiles
- Hydric soils
- Forest and grassland soils

National Soil Project

Measuring:

- Water retention
- Total SOM content by LOI[1]
- Humic acids content, gravimetric[2]
- Fulvic acids content, visible spectrum[3]
- DOC content, UV spectrum[4]

1- Ghabbour EA, Davies G. et al. *J. Plant Nutr. Soil Sci*. 2014, DOI: 10.1002/jpln.201400326

2- Ghabbour EA, Davies G. et al. *Annal. Environ. Sci.*, 2012, 6: 1-12.

3- Ghabbour EA, Davies G. *Annal. Environ. Sci.*, 2009, 3: 131-138.

4- Carter HT, Tipping E, et al., *Water Research*, 2012, 46: 4532-42.

Ecosystem Types

Grassland

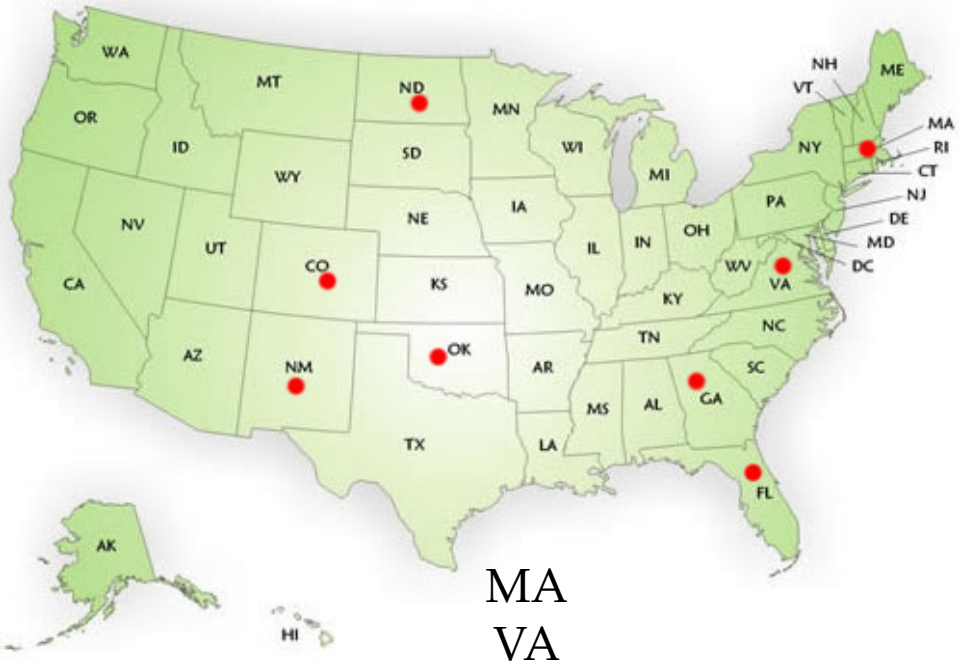
- grazed
- Regenerating longleaf pine-wiregrass
- seasonal grazing
- shortgrass steppe

Plowed cropland

Regenerating old field

Temperate

- coniferous forest
- longleaf pine-wiregrass
- deciduous forest



MA
VA
GA
FL
ND
CO
OK
NM

NEON Profiles

Harvard

Blandy

Jones

Disney

Ordway

Woodworth

Dakota Coteau

CPER

Sterling

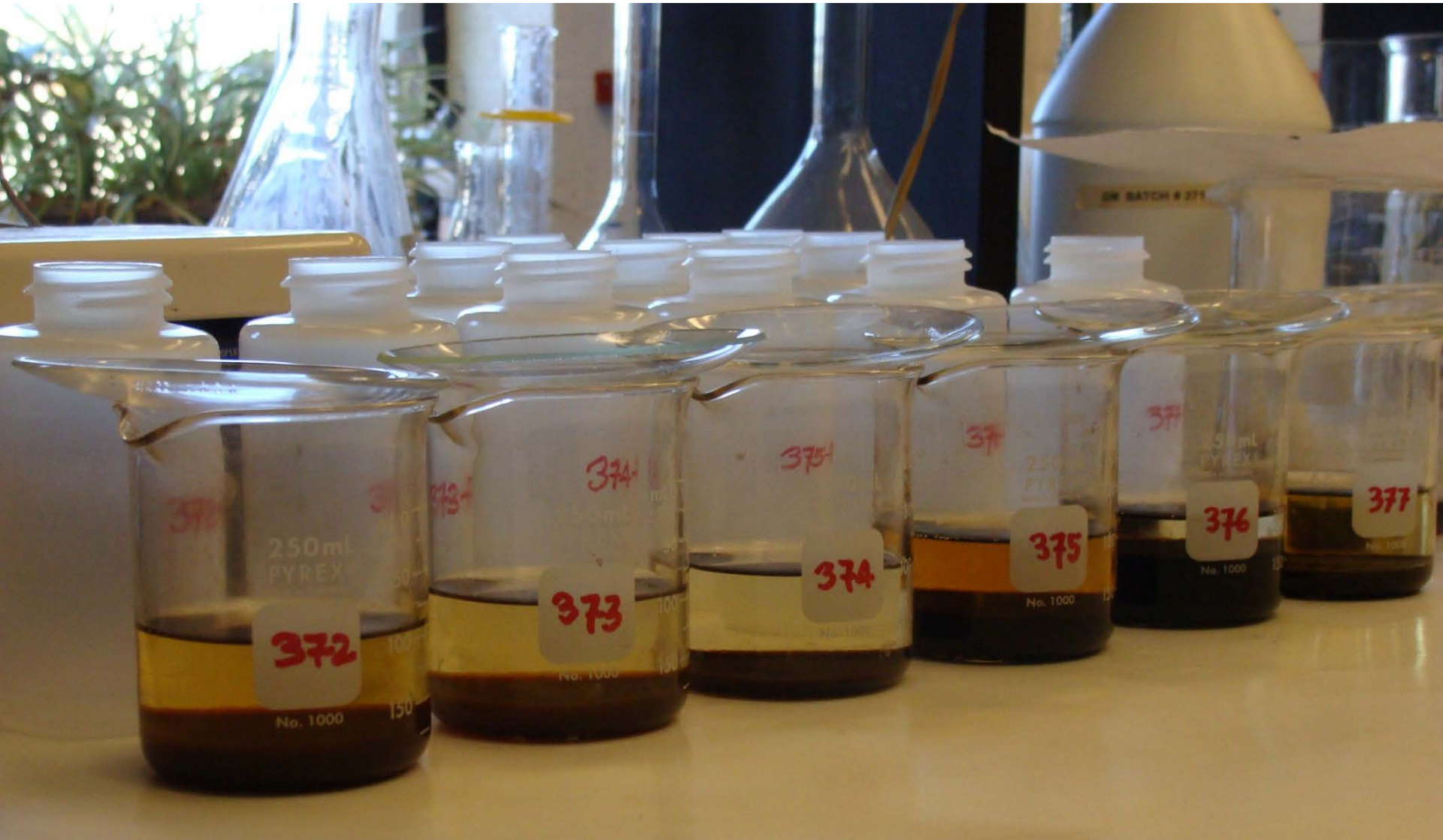
Klemme

Jornada

Profile Descriptions

NEON Profile	Horizons	Depth (cm)	%SOC	%Sand	%Silt	%Clay	%$CaCO_3$
Ordway	4	0-200	0.51 - **0.03**	97 – 98	1 - 2	1 - 2	
Harvard Forest	10	0-160	25.5 - 0.07	53 - 95	2.5 - 31	2 - 16	1
CPER	7	0-200	0.8 - 0.35	49 - 74	14 – 21	12 - 26	0-5
Dakota-Coteau	10	0-200	7.1 - 1.6	27 -37	30 - 45	22 - 37	0-16
Woodworth	7	0 - 200	5.6 - 1.9	55 - 91	6 - 25	3 - 20	1-26
Jones	5	0-200	1.4 - 0.02	76 - 86	8.6 - 12	3 - 15	
Blandy	7	0 - 200	**43.0** - 0.07	18 - 32	34 - 79	0 - 43	0
Disney	9	0-200	2.3 - 0.04	94 - 97	2 - 5	0 – 2	1
Klemme	4	0 - 46	4.4 -3.3	13 - 23	57 - 71	16 - 20	0
Jornada	6	0-200	4.0 - 0.23	68 - 87	6 - 15	5 - 17	0-**34**
Sterling	6	0-200	2.0 - 0.68	36 - 84	14 - 41	5 – 24	0-16

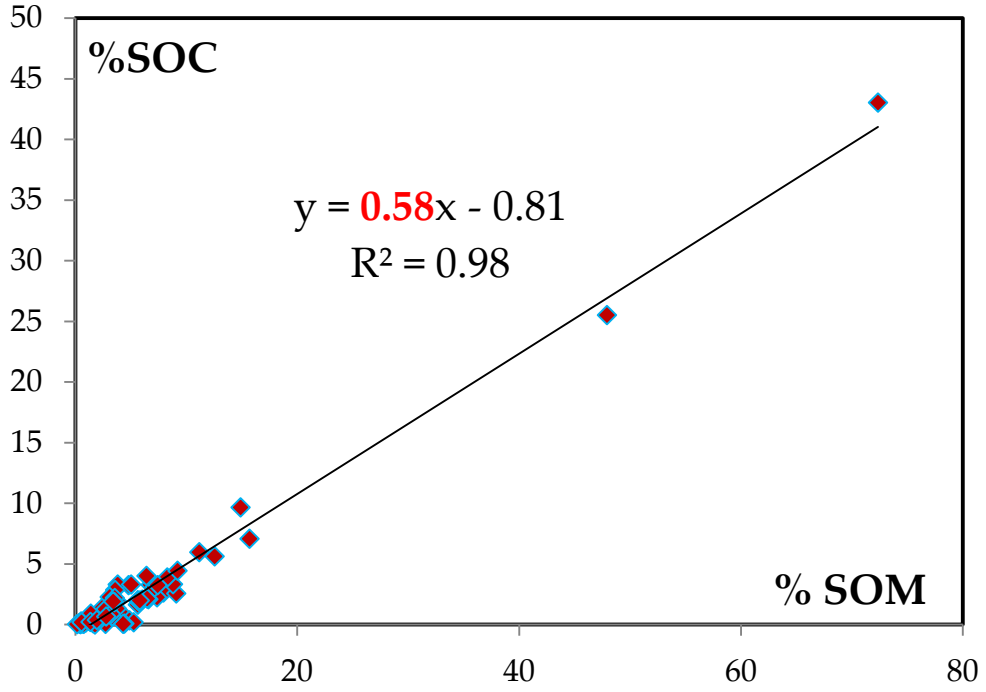
Sequestered Carbon Fractionation



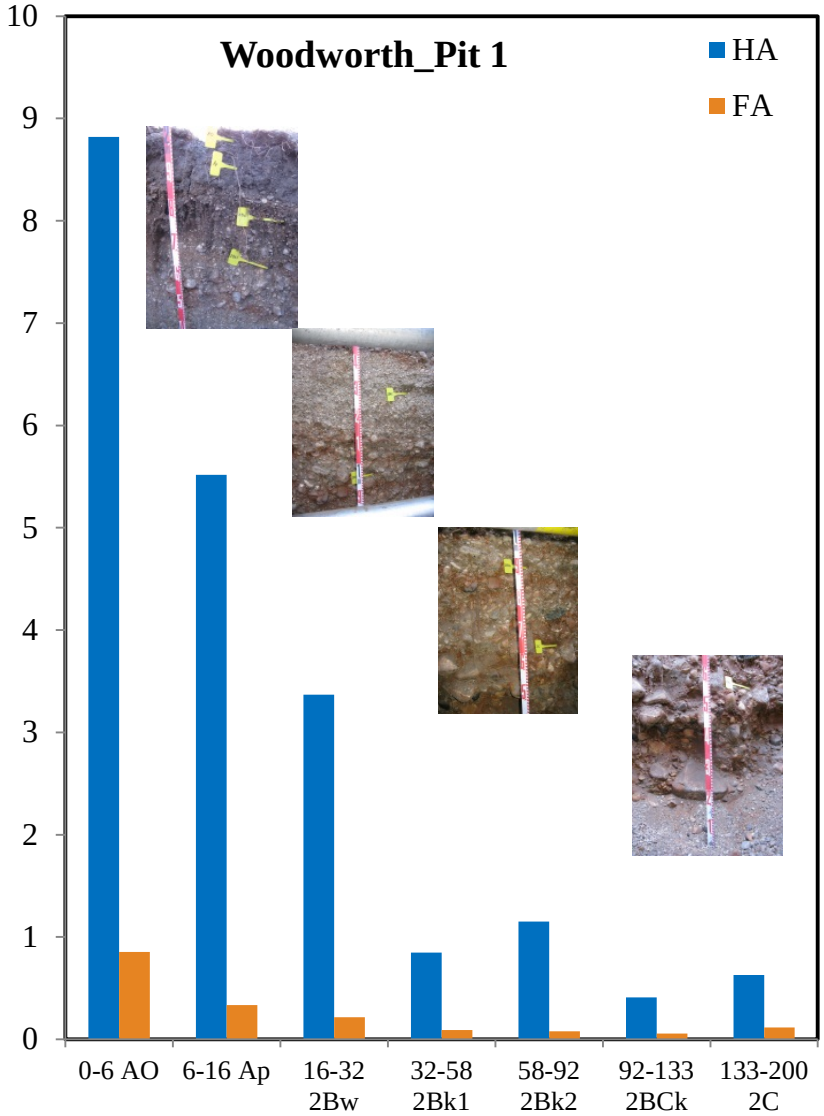
Data Summary

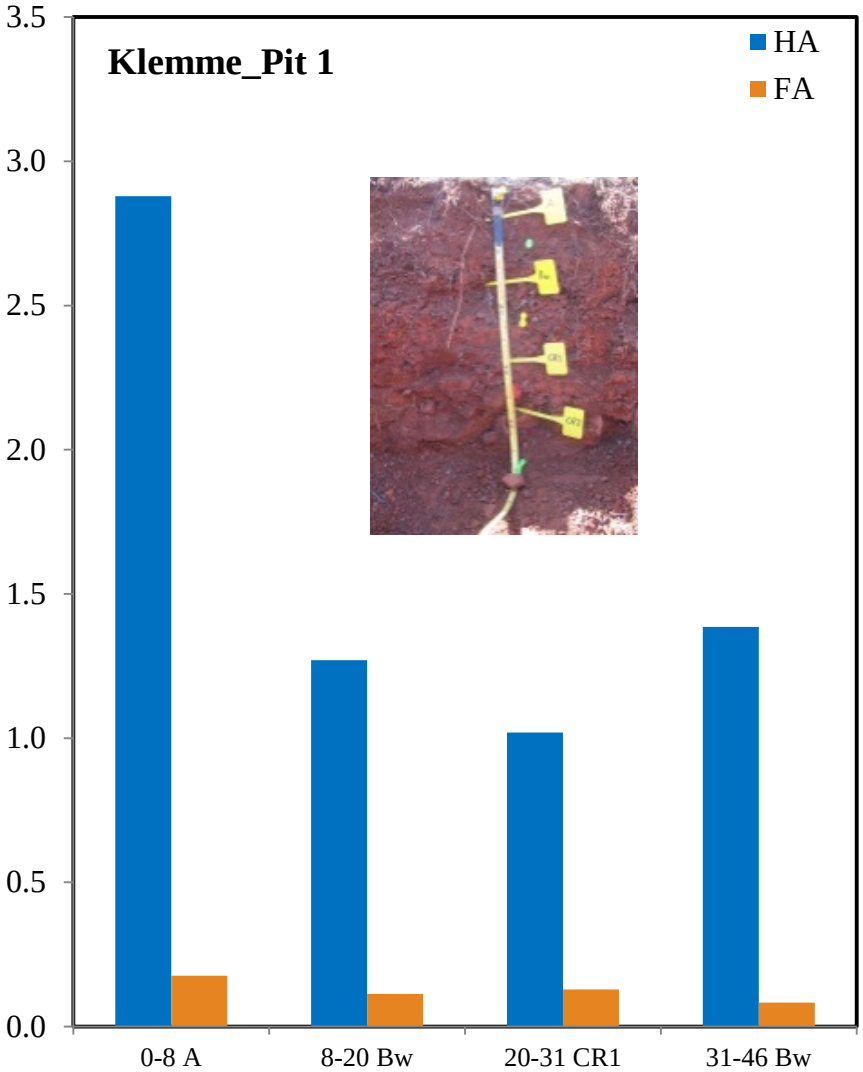
NEON ID	Depth, cm	% HA	%FA	% Retained Water	%SOM	% H
Ordway	0-200	0.2 – 0.1	0.07 – 0.02	0.17 – 0.07	1.03 – 0.38	29 - 46
Harvard Forest	0-160	15.4 – 0.1	6.2 – 0.03	5.8 – 0.3	47.9 – 0.61	46 - 15
CPER	0-200	3.0 - 0.5	0.19 – 0.02	2.6 - 1.2	4.2 - 2.2	97 - 3
Dakota Coteau	0-200	13.5 – 2.3	1.1 - 0.12	3.7 – 1.9	15.7 – 5.6	83 -46
Woodworth	0-200	9.5 – 0.4	0.92 – 0.06	2.7 – 0.69	12.6 – 3.6	77 - 13
Jones	0-200	1.0 – 0.02	0.28 – 0.02	1.0 - 0.54	2.4 – 1.3	53 - 2
Blandy	0-200	**16.6 - 0.0**	**11.7 – 0.02**	**10.7** – 1.4	**72.4** – 4.1	47 - 1
Disney	0-200	1.1 - 0.1	0.34 – 0.06	0.77 – 0.03	3.6 – 0.07	65 - 22
Klemme	0-46	2.9 – 1.0	0.21 – 0.08	2.4 – 2.1	9.2 – 7.4	35 - 12
Jornada	0-200	2.4 - 0.3	0.07 – 0.02	1.5 – 0.74	6.5 - 1.4	81 - 6
Sterling	0-200	2.5 – 0.6	0.20 – 0.02	3.2 – 1.0	5.8 – 2.8	80 - 18

NEON SOC vs NSP SOM

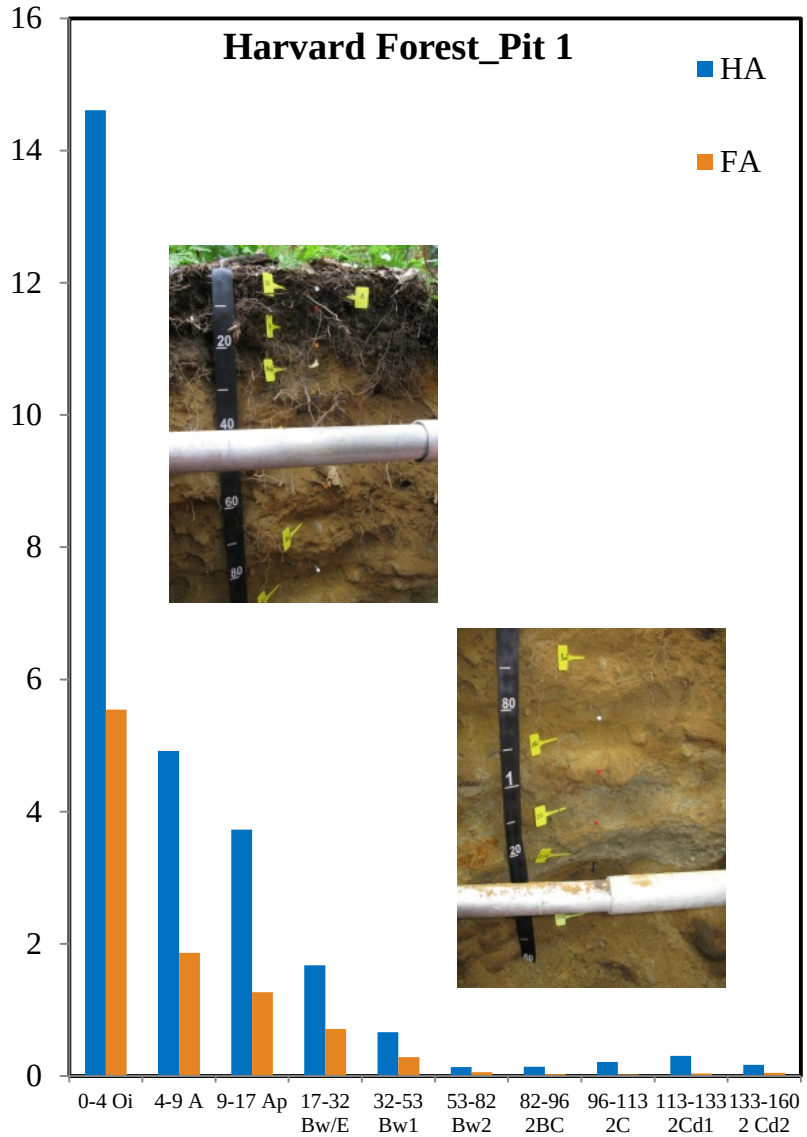


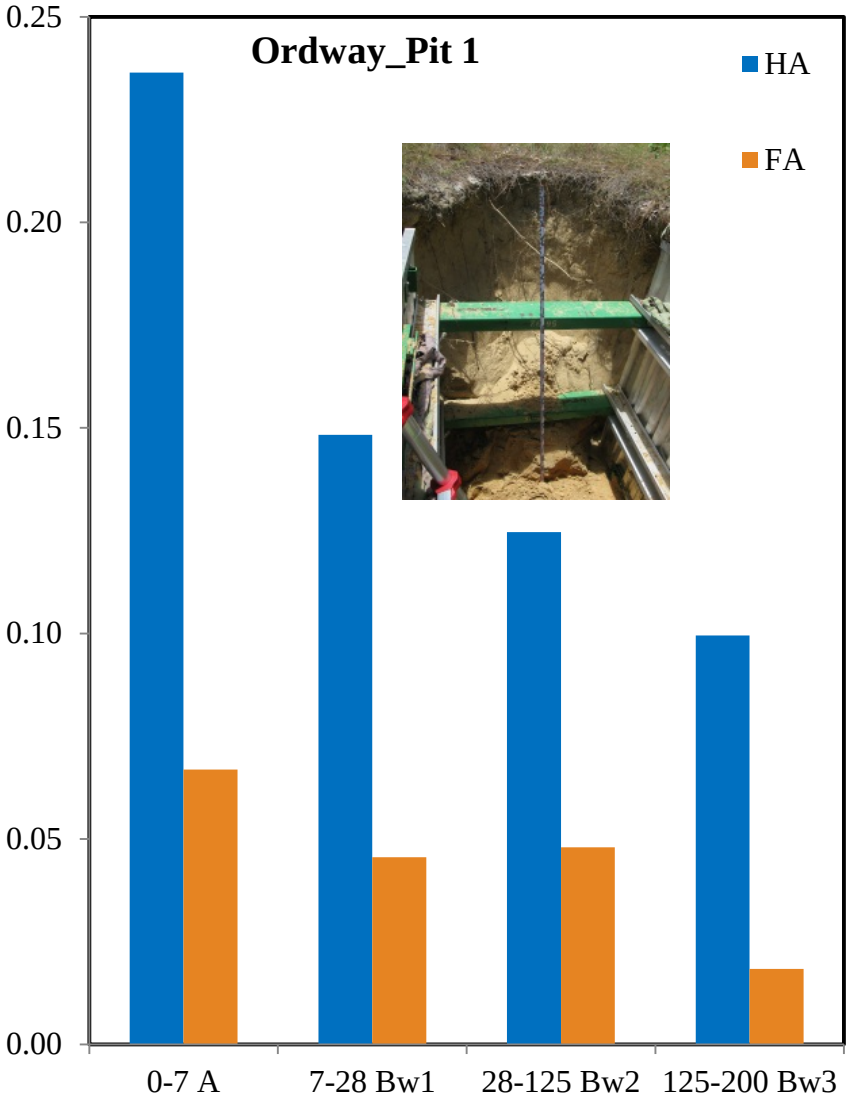
Type A Profiles



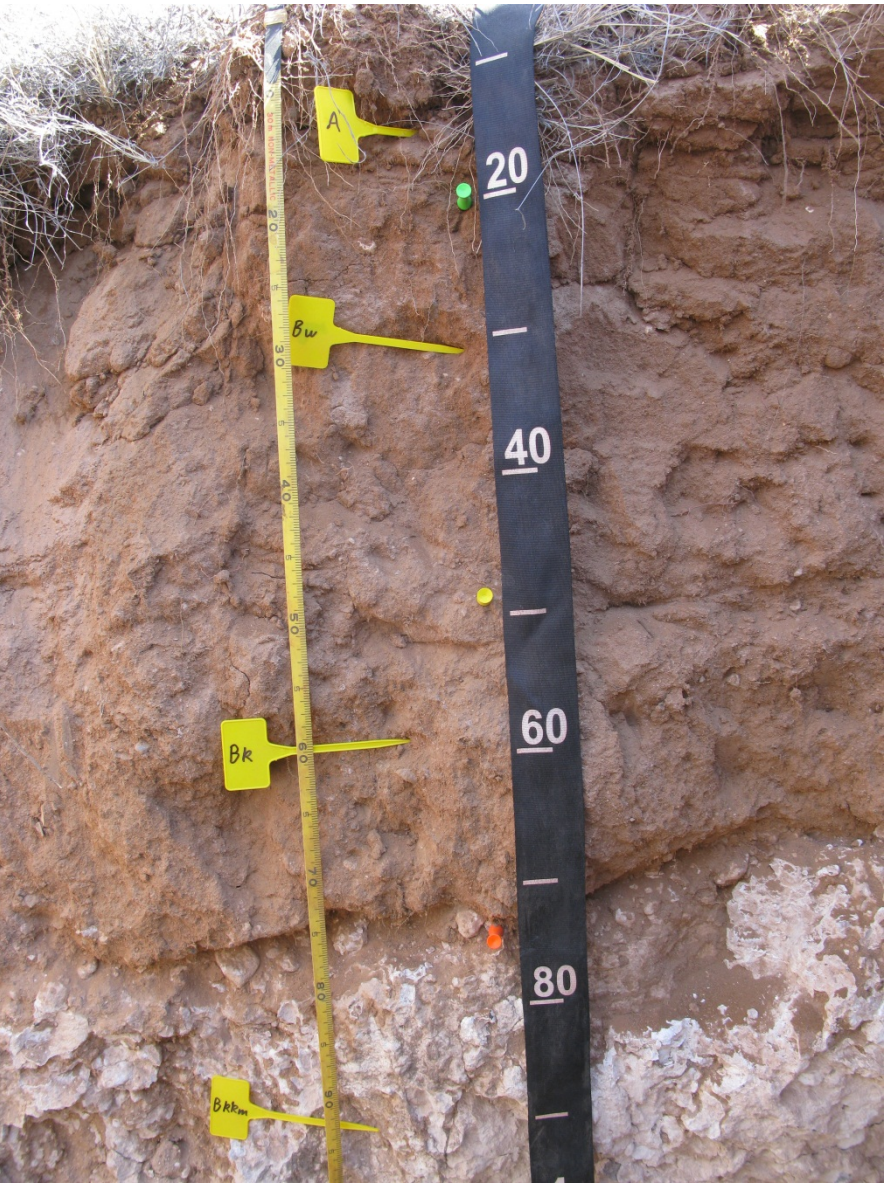


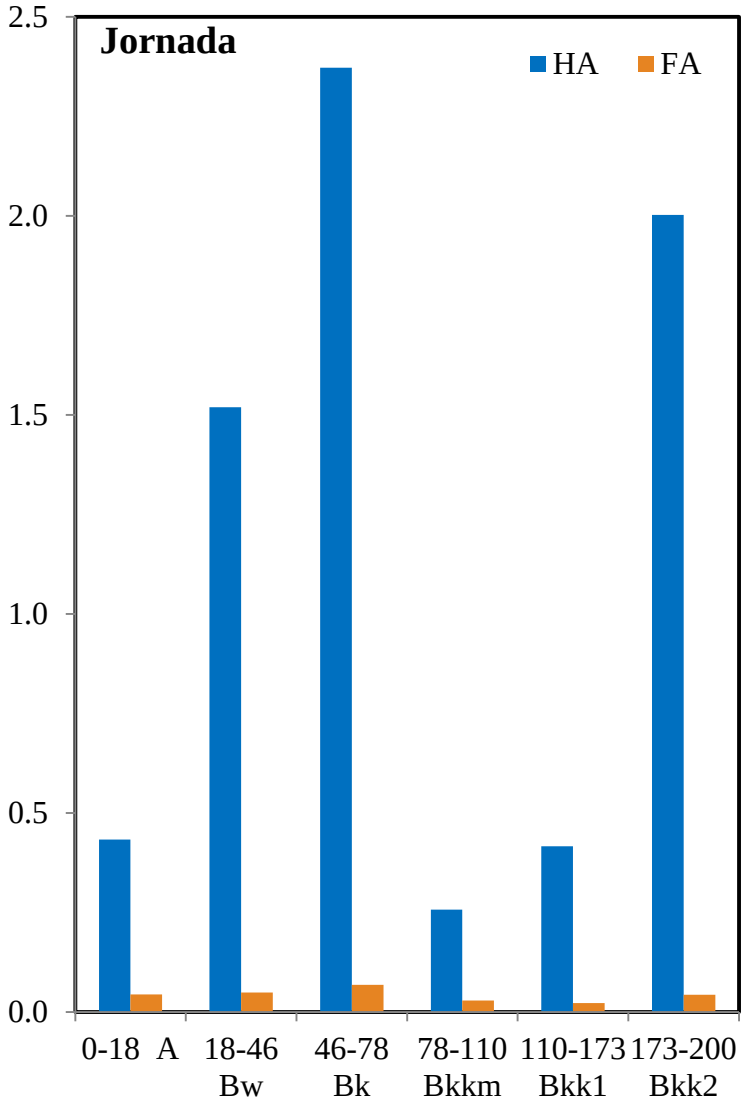
Type B Profiles



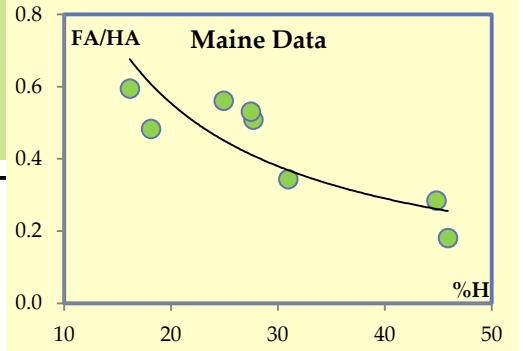


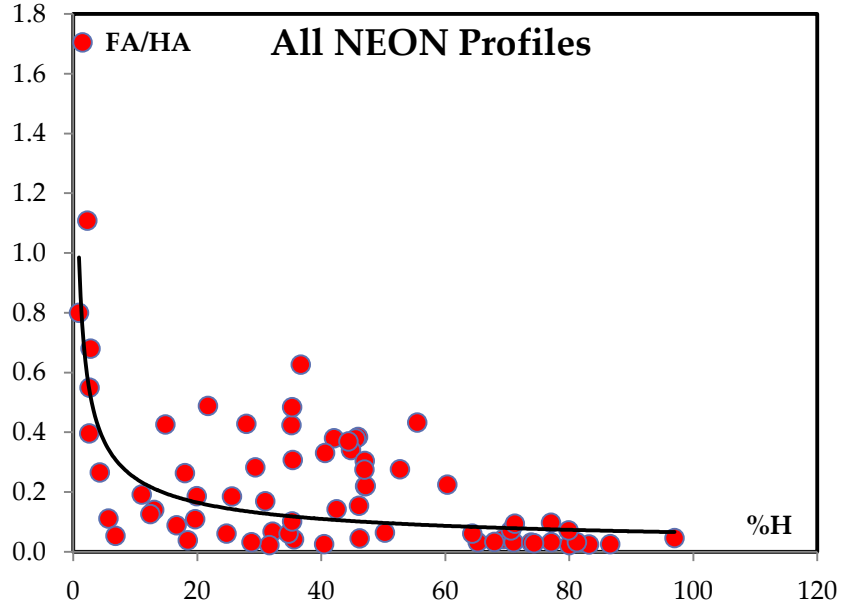
Type C Profile

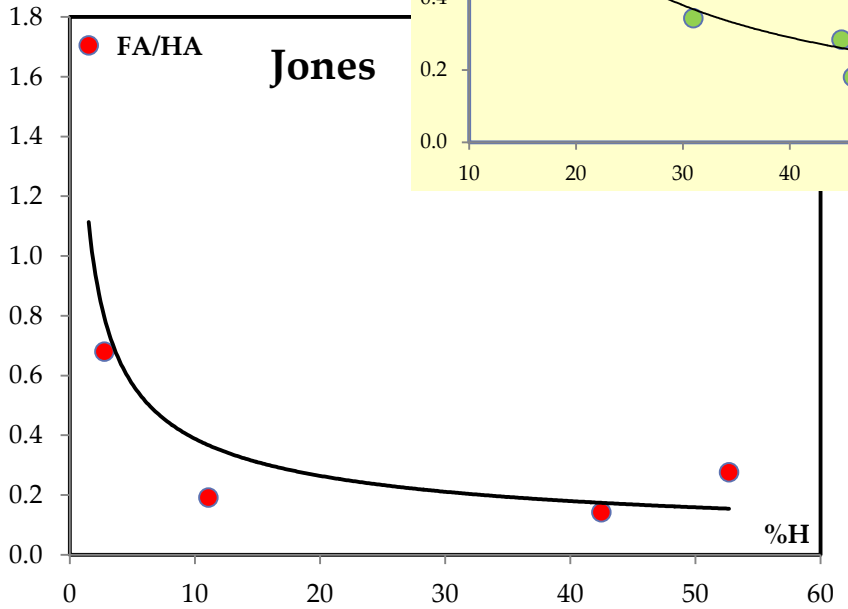


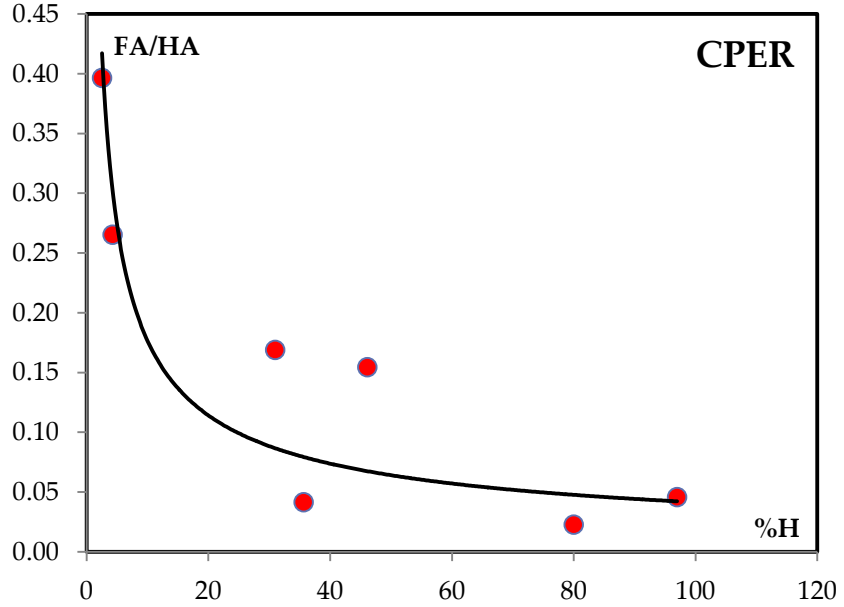


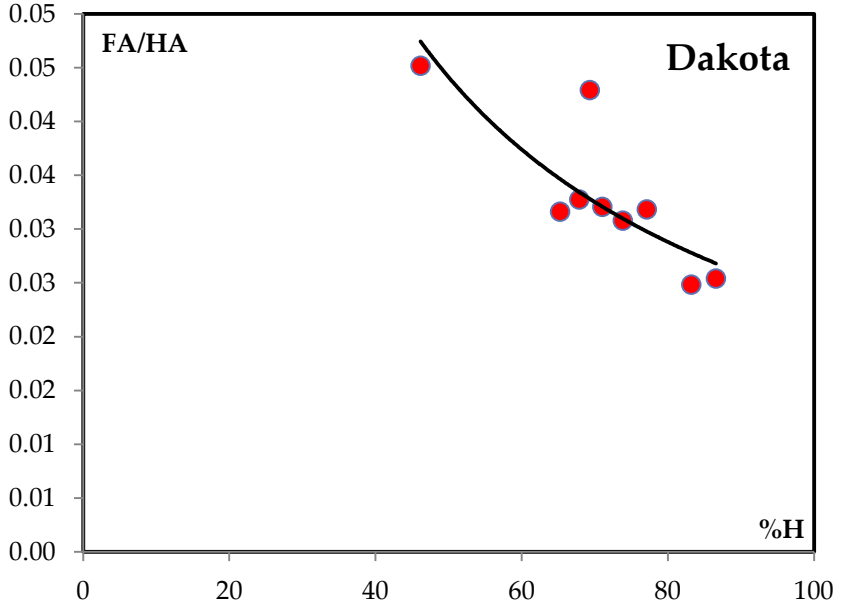
Humification: %H = ([%HA + %FA]/%SOM) x 100



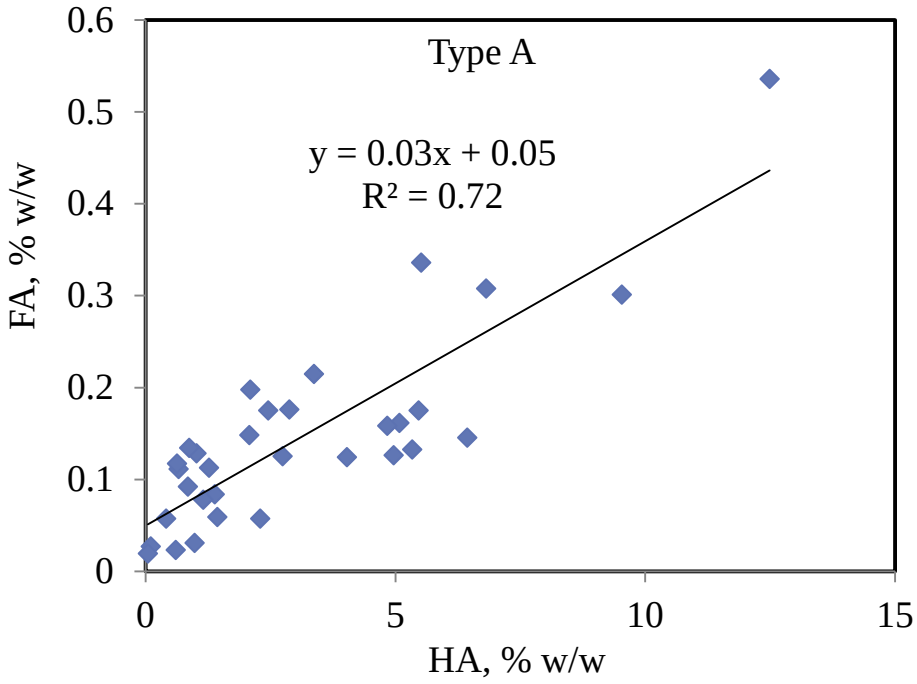


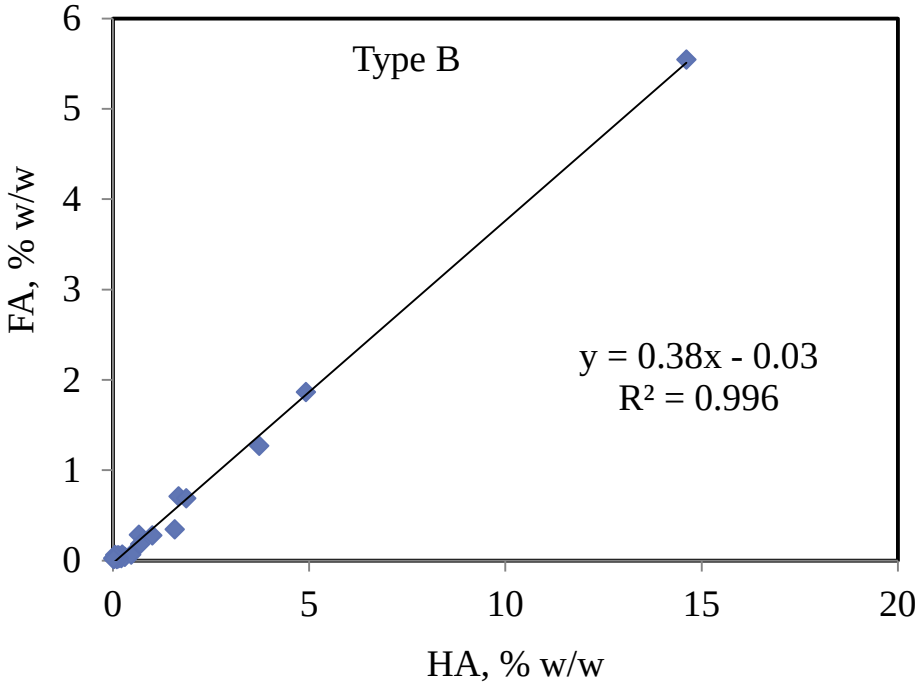




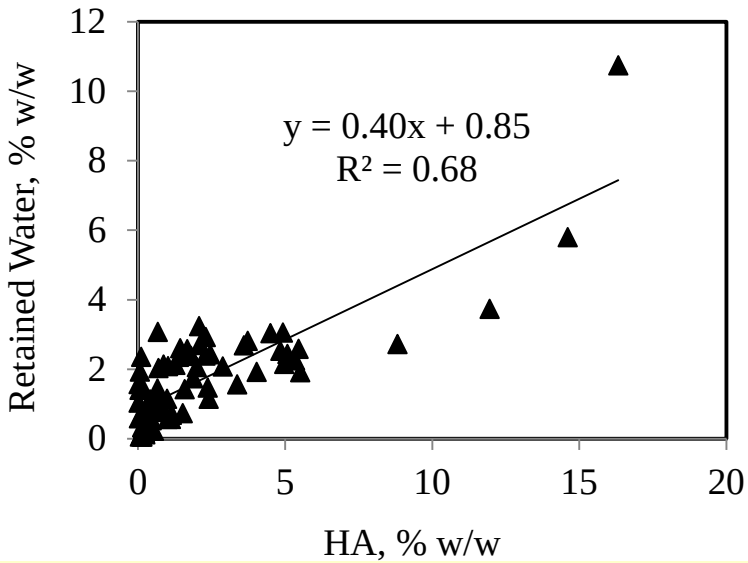


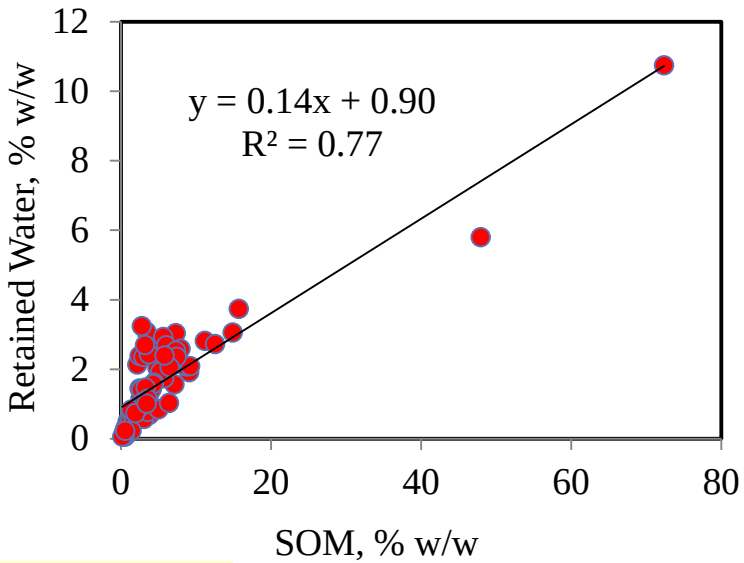
Is FA related to HA?



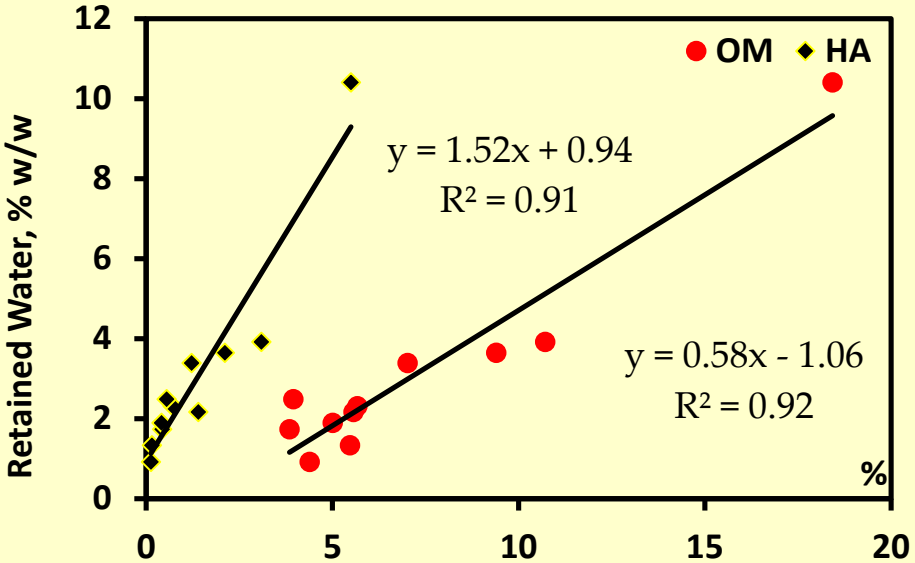


Water Retention





Maine



NEON and NSP

HA and FA are much longer-lived in soils compared to other organic components

Data for grassland and forest soils are a baseline for variations of SOM with climate and season in other soils

NEON collaboration with NSP broadens the scope of

soil carbon sequestration monitoring

in the long term

Acknowledgements

vkrf VK Rasmussen

FARMERS ADVOCATING FOR ORGANICS

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