

Soil Gravimetric Data

Intended 19 Jun values to be the wet runs due to rain 2 days before, but since it was essentially drought conditions the prior 3 weeks, these are some of the driest values!

A plot of all of these data are at the end of this entry. 4 sites have only one data point (data weren't being recorded during the installation sample since there was no power, and these sites had been torn down before SO arrived). 11 sites have two samples and 1 site had 3 samples during the experiment. Of the 12 sites with multiple samples, 8 had gains of nearly one. From the two samples at the remaining 4 sites, 3 had gains greater than 1 – up to ~3 -- and one had a gain of about ~0.5. With this limited sample, we will assume all gains were 1 and simply calculate a bias from these samples. The resulting bias values range from -13 to +2%.

These data also produce the soil bulk density (of course, even from the installation core). The soil structure at several of the sites was not cohesive, so retrieving a core with the correct volume of material was problematic. Rocks were omnipresent and of course sometimes were present at the core depth boundary. Nevertheless, the results were quite consistent with only a few outliers. The median values for each site ranged from 0.7 – 1.8 g/cm³. No sorting by position (valley vs. ridge) is apparent, though further investigation might identify a relation to soil type.

Date Time	Position	Tare (g)	Wet (g)	Dry (g)	rho (g/cm ³)	Moist (%)	Moist (%) EC-5	Comments
05 Dec 16:00	rne01 3-6cm	9.3+73.3	172.2	157.6	1.13	22.0	NA	Part of soil sensor installation; no coincident data recorded; crumbly peat; wet weighing was 2 days later, so likely dried somewhat.
10 Dec 09:00	tse12 3-6cm	9.3	114.8	108.5	1.49	9.5	NA	Part of soil sensor installation; no coincident data recorded; rocky sand
10 Dec 11:00	rsw04 3-6cm	9.3	106.2	91.9	1.24	21.5	NA	Part of soil sensor installation; no coincident data recorded; quite organic
18 Jan 13:00	tse07 3-6cm	9.3	94.6	82.7	1.10	17.9	11.4	Part of soil sensor installation; Site started logging data 4 hours later (17:01); started weighing about 4 hours after sample taken, but wasn't very hot today.
20 Jan 14:00	tnw09 3-6cm	73.3	174.1	169.5	1.45	6.9	NA	Part of soil sensor installation; no coincident data recorded; rocky sand
20 Jan 14:00	rne06 3-6cm	73.3	130.4	118.5	0.68	17.9	NA	Part of soil sensor installation; no coincident data recorded; light organic
26 Jan 11:00	v04 3-6cm	9.3	115.7	101.9	1.25	20.8	NA	Part of soil sensor installation; no coincident data recorded; loose organic+rock
2 Feb 14:30	rne07 3-6cm	9.3	143.1	136.0	1.91	10.7	NA	Sensor installation; data started next day; interesting multi-colored (orange /grey) rocky sand

2 Feb 17:00	tse02 3-6cm	9.4+73.3	150.1	134.3	0.78	23.8	NA	Sensor installation; no coincident data
3 Feb 11:30	v07 3-6cm	9.4+73.3	176.4	161.2	1.18	22.88	NA	Sensor installation; organic; Drying in cold oven while we are gone.
6 Apr 18:30	v06 3-6	9.4	91.2	74	0.97	25.89	NA	Sensor installation; light organic
14 Apr 18:30	rme03	9.4	98	89	1.20	13.55	NA	Sensor installation; clay (????NO SOIL SENSORS HERE)
24 Apr 17:13	tnw05	9.4	79	70.8	0.92	12.64	3.4	Sensor installation; clay
24 Apr 17:14	v01	9.4	84.2	74.2	0.98	15.05	6.9	Sensor installation; mix of organic and clay
10 May 14:00	tnw02	9.4+73.3	191.7	188.2	1.59	5.3	-2.7	Sensor installation; very dry grey power /sand below 2cm (despite rain starting)
16 May 12:40	tse05	9.4+73.3	164.4	153.2	1.06	16.9	14.6	Sensor installation; lots of fist-sized stones in peat;
19 May 1335	tse01	9.4+73.3	178.2	170.7	1.33	11.3	6.8	Beginning of second round of cores; pretty dry since rain last week
19 May 1405	tnw02	9.4+73.3	182.3	178.4	1.44	5.9	-0.2	
19 May 1435	tse02	9.4+73.3	184.5	179.4	1.46	7.7	10.5	
19 May 1550	tse07	9.4+73.3	155.4	142.4	0.90	19.6	13.2	
19 May 1615	tnw09	9.4	118.4	114.2	1.58	6.3	-7.2	
21 May 1405	rsw04	9.4+73.3	143.5	138.5	0.84	7.5	3.6	
21 May 1420	v01	9.4+73.3	141.1	130.0	0.71	16.7	13.2	
21 May 1820	rme01	9.4	117.0	110.4	1.52	9.9	11.4	
21 May 1900	tse12	9.4	138.4	133.3	1.87	7.7	4.2	
22 May 1600	v07	9.4	115.3	107.2	1.47	12.2	9.2	
22 May 1630	tnw05	9.4	64.2	56.6	0.71	11.4	8.3	
22 May 1700	rme06	9.4+9.4	82.4+125.1	80.1+124.0	2.79	5.1	6.2	Rock included as part of sample; required separate pan to weigh
22 May 1720	rme07	9.4	131.1	129.6	1.81	2.3	3.7	
22 May 1800	v04	9.4	130.1	121.7	1.69	12.6	11.8	
23 May 1645	v06	9.4	112.4	97.5	1.33	22.4	9.52	
19 Jun 1520	tse07	9.4	54.3	49.6	0.61	7.1	3.12	Rain 2 days ago
19 Jun 1610	rme01	9.4	108.4	105.1	1.44	5.0	1.92	Rain 2 days ago
19 Jun 1700	v01	9.4	82.2	73.1	0.96	13.7	9.93	Rain 2 days ago
20 Jun 0900	rme06	9.4	65.1	63.0	0.81	3.2	-1.77	
20 Jun 0910	tnw09	9.4	124.7	123.2	1.71	2.3	-10.75	
20 Jun 1020	tnw05	9.4	66.1	60.7	0.77	8.1	-0.47	
20 Jun 1050	v07	9.4	158.7	153.2	2.17	8.3	3.75	Sample contains stone
20 Jun 1120	v06	9.4	63.9	59.2	0.75	7.1	2.60	
20 Jun 1810	rme07	9.4	90.2	89.4	1.21	1.2	2.83	

20 Jun 1835	v04	9.4	98.6	95.4	1.30	4.8	5.64	
21 Jun 1725	tse12	9.4	119.7	117.7	1.63	3.0	1.52	Sample contains stone

```
loc = c("rne01", "tse12", "rsw04", "tse07", "tnw09", "rne06", "v04", "rne07", "tse02", "v07", "v06", "rne03", "tnw05", "v01", "tnw02", "tse05", "tse01", "tnw02", "tse02", "tse07", "tnw09", "rsw04", "v01", "rne01", "tse12", "v07", "tnw05",
```

```
"rne06", "rne07", "v04", "v06", "tse07", "rne01", "v01", "rne06", "tnw09", "tnw05", "v07", "v06", "rne07", "v04", "tse12")
```

```
loc = loc[-12]
```

```
locs = sort(unique(loc))
```

```
tare = 9.3+c(73.3,0,0,0,73.3-9.3,73.3-9.3,0,0,0,73.3,73.3,0,0,0,0,73.3,73.3,73.3,73.3,73.3,0,73.3,73.3,0,0,0,9.4,0,0,0,0,0,0,0,0,0,0,0,0)
```

```
wet = c
```

```
(172.2,114.8,106.2,94.6,174.1,130.4,115.7,143.1,150.1,176.4,91.2,98.0,79.0,84.2,191.7,164.4,178.2,182.3,184.5,155.4,118.4,143.5,141.1,117.0,138.4,115.3,64.2,82.4+125.1,131.1,130.1,112.4,54.3,108.4,
```

```
82.2,65.1,124.7,66.1,158.7,63.9,90.2,98.6,119.7)-tare
```

```
dry = c(157.6,108.5,91.9,82.7,169.5,118.5,101.9,136.0,134.3,161.2,74.0,89.0,NA,NA,
```

```
188.2,153.2,170.7,178.4,179.4,142.4,114.2,138.5,130.0,110.4,133.3,107.2,56.6,80.1+124.0,129.6,121.7,97.5,49.6,105.1,73.1,
```

```
63.0,123.2,60.7,153.2,59.2,89.4,95.4,117.7)-tare
```

```
ec5 = c(rep(NA,3),11.4,rep(NA,8),3.4,6.9,-2.7,14.6,6.8,-0.2,10.5,13.2,-7.2,3.6,13.2,11.4,4.2,9.2,8.3,6.2,3.7,11.8,9.52,3.12,1.92,9.93,-1.77,-10.75,-0.47,3.75,2.60,2.83,5.64,1.52)
```

```
wet = wet[-12]; dry = dry[-12]; ec5 = ec5[-12]
```

```
vol = c(3)*pi*(5.31/2)^2
```

```
moist = 100*(wet-dry)/vol
```

```
rho = dry/vol
```

```
bias = c(-1,-2,2,-4,-7,-6,-13,-5,2,-2,-6,-2,-3,0,-9,-3) # eyeballed biases
```

```
il = match(loc,locs)
```

```
par(mfrow=c(4,4),xaxs="i",yaxs="i",las=1,tck=0.03,mgp=c(2,0.5,0),mar=c(2,2,3,0.5))
```

```
for (i in 1:length(locs)) {
```

```
im = il==i
```

```
plot(moist[im],ec5[im],xlim=c(-15,30),ylim=c(-15,30),xlab="",ylab=""); abline(0,1,lty=2); abline(bias[i],1,col=3,lty=2); abline(h=0,v=0)
```

```
points(moist[im],rho[im]*10,pch="r",col=4)
```

```
rhom = median(rho[im],na.rm=T)
```

```
abline(h=rhom*10,col=4); text(-10,rhom*10+3,col=4,round(rhom,dig=2))
```

```
title(locs[i])
```

```
}
```

```
And finally, the plot from all this!!
```

