

2019-08-25-hatch-ph-multifactorial-merged

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Introduction

[...]

```
library(ggplot2)
```

```
dat <- read.csv(file = "2019-08-25-hatch-ph-multifactorial-merged.csv", header = T)
dat$co2.pH.diff <- dat$Lab.CO2.MicropH-dat$High.CO2.MicropH
dat$co2.exp.pH.diff <- 10^-(dat$Lab.CO2.MicropH)-10^-(dat$High.CO2.MicropH)
str(dat)
```

```
## 'data.frame':    500 obs. of  45 variables:
##  $ Water.Soil.Ratio      : Factor w/ 4 levels "1-to-1","1-to-2",...: 1 1 1 1 1 1 1
##  $ Sample.ID             : Factor w/ 125 levels "1-K1-0-17","10-K4-30-50",...: 1 3
##  $ Sample.Number         : int   1 2 3 5 6 7 8 9 10 11 ...
##  $ DNA.Extr.MicropH.MoBio : logi  NA NA NA NA NA NA ...
##  $ Lab.CO2.MicropH        : num   5.39 5.36 5.49 5.04 5.34 5.32 5.07 5.22 5.31 5.9
##  $ High.CO2.MicropH       : num   5.13 5.1 5.33 4.87 5.2 5.15 4.74 5.15 4.98 5.79 .
##  $ Tube.Empty.g           : num   1.06 1.07 1.06 1.07 1.05 ...
##  $ Moist.Soil.g           : num   0.756 0.785 0.813 0.807 0.826 0.76 0.795 0.859 0.
##  $ Water.Added.mL         : num   0.756 0.785 0.813 0.807 0.826 0.76 0.795 0.859 0.
##  $ Tube.Dry.Soil.g        : num   1.74 1.78 1.84 1.78 1.8 ...
##  $ Dry.Soil.g             : num   0.68 0.716 0.777 0.712 0.748 0.712 0.755 0.808 0.
##  $ Soil.Water.Content.mass : num   0.101 0.088 0.044 0.118 0.094 0.063 0.05 0.059 0.
##  $ Target.Water.Soil.ratio : num   1 1 1 1 1 1 1 1 1 1 ...
##  $ Real.Water.Soil.ratio   : num   1.11 1.1 1.05 1.13 1.1 ...
##  $ Error.Water.Soil.ratio  : num  -0.112 -0.096 -0.046 -0.133 -0.104 -0.067 -0.053
##  $ Perc.Sand              : num   64 68 72 64 60 70 78 74 72 82 ...
##  $ Perc.Silt              : num   25.2 21.2 19.2 27.2 31.2 19.2 15.2 15.2 15.2 11.2
##  $ Perc.Clay              : num   10.8 10.8 8.8 8.8 8.8 10.8 6.8 10.8 12.8 6.8 ...
```

```

## $ Texture.Name           : Factor w/ 10 levels "", "Clay Loam",...: 7 7 7 7 7 7 4 7
## $ OM.perc                : num  2.5 1.3 0.4 4 1.5 0.8 2.5 1.4 0.8 1.2 ...
## $ Scoop.Density.g.4.24.cc : num  4.6 5.36 6.28 4.38 5.05 5.76 4.89 5.44 5.51 6.16
## $ Soil.pH                : num  4.9 5.4 5.6 4.7 5.1 5.2 4.5 5 4.4 5.5 ...
## $ Sikora.pH              : num  6.3 6.5 7.1 6.1 6.4 6.7 6.1 6.4 6.5 6.8 ...
## $ Total.N.perc           : num  0.13 0.09 0.08 0.18 0.12 0.11 0.13 0.11 0.11 0.13
## $ Total.Org.C.perc       : num  1.64 0.71 0.11 2.52 0.77 0.33 1.63 0.68 0.34 0.81
## $ Bray.1.P.ppm           : int  99 101 37 63 40 24 18 64 16 197 ...
## $ K.ppm                  : int  44 41 26 67 57 63 42 29 23 62 ...
## $ K.perc.CEC             : int  1 1 4 1 2 3 1 1 1 6 ...
## $ AmmAcet.Ca.ppm         : int  237 194 327 382 170 189 122 22 22 134 ...
## $ Ca.perc.CEC            : int  12 13 96 15 11 19 5 1 2 23 ...
## $ Mg.ppm                 : int  40 32 58 85 39 38 22 6 5 8 ...
## $ Mg.perc.CEC            : int  3 4 28 5 4 6 2 1 1 2 ...
## $ Na.ppm                 : logi  NA NA NA NA NA NA NA ...
## $ Na.perc.CEC            : int  0 0 0 0 0 0 0 0 0 0 ...
## $ Est.Acidity.Hplus.meq.100g: num  8.6 6.1 0 10.9 7 4 10.7 7.3 5.5 2 ...
## $ Hplus.perc.CEC         : int  87 85 0 84 87 78 94 98 97 71 ...
## $ CEC.summation.meq.100g  : int  9 6 1 13 7 4 10 6 4 2 ...
## $ Date.of.Collection      : Factor w/ 10 levels "", "11/3/2017",...: 4 4 4 4 4 4 4 4
## $ Station.Name           : Factor w/ 9 levels "Arlington", "Hancock",...: 3 3 3 3 3
## $ St.pH.WSS              : num  5.4 5.4 5.4 5.4 5.4 5.4 5.4 5.4 5.4 5.5 ...
## $ Site.Number            : int  1 1 1 3 3 3 4 4 4 1 ...
## $ Upper.Depth.cm         : int  0 17 45 0 15 35 0 15 30 0 ...
## $ Lower.Depth.cm         : int  17 45 60 15 35 50 15 30 50 27 ...
## $ co2.pH.diff            : num  0.26 0.26 0.16 0.17 0.14 ...
## $ co2.exp.pH.diff        : num  -3.34e-06 -3.58e-06 -1.44e-06 -4.37e-06 -1.74e-06

```

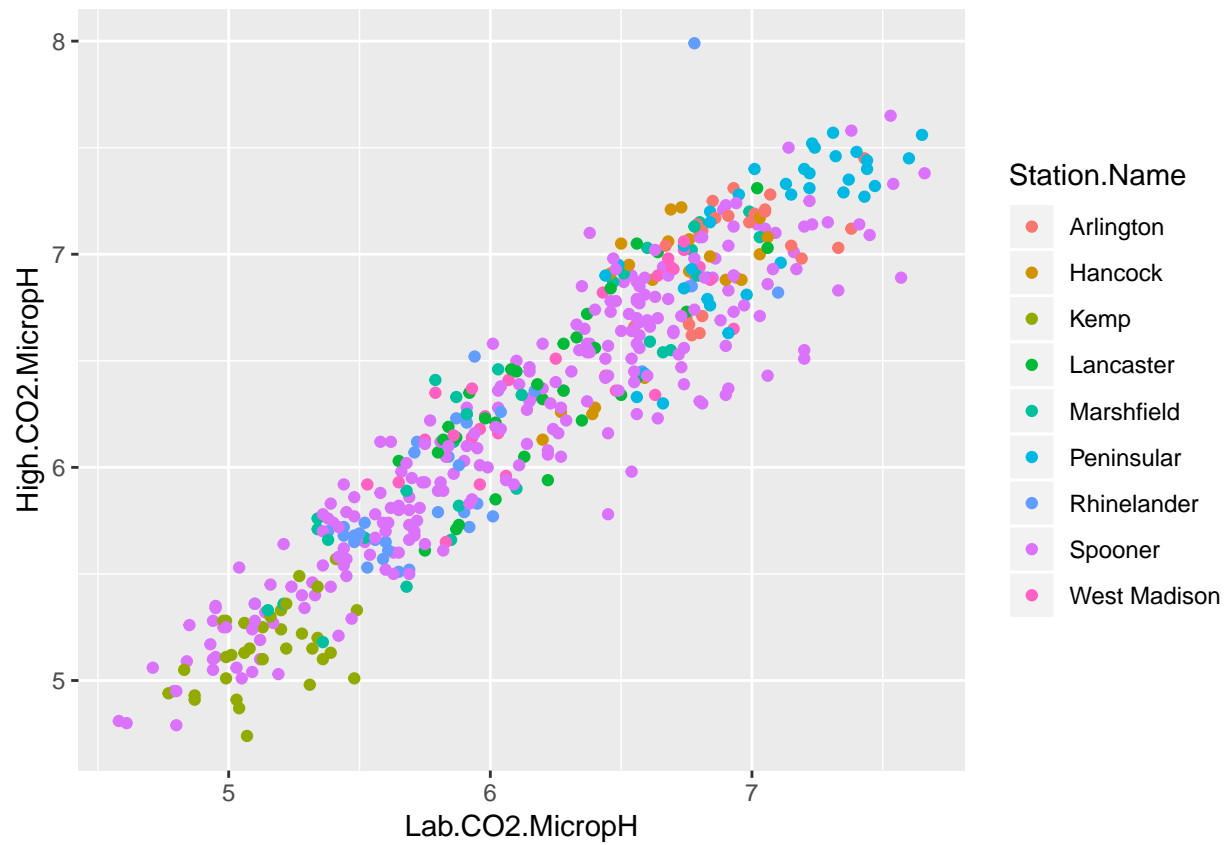
```

qplot(data = dat, x = Lab.CO2.MicropH, y = High.CO2.MicropH, color = Water.Soil.Ratio)

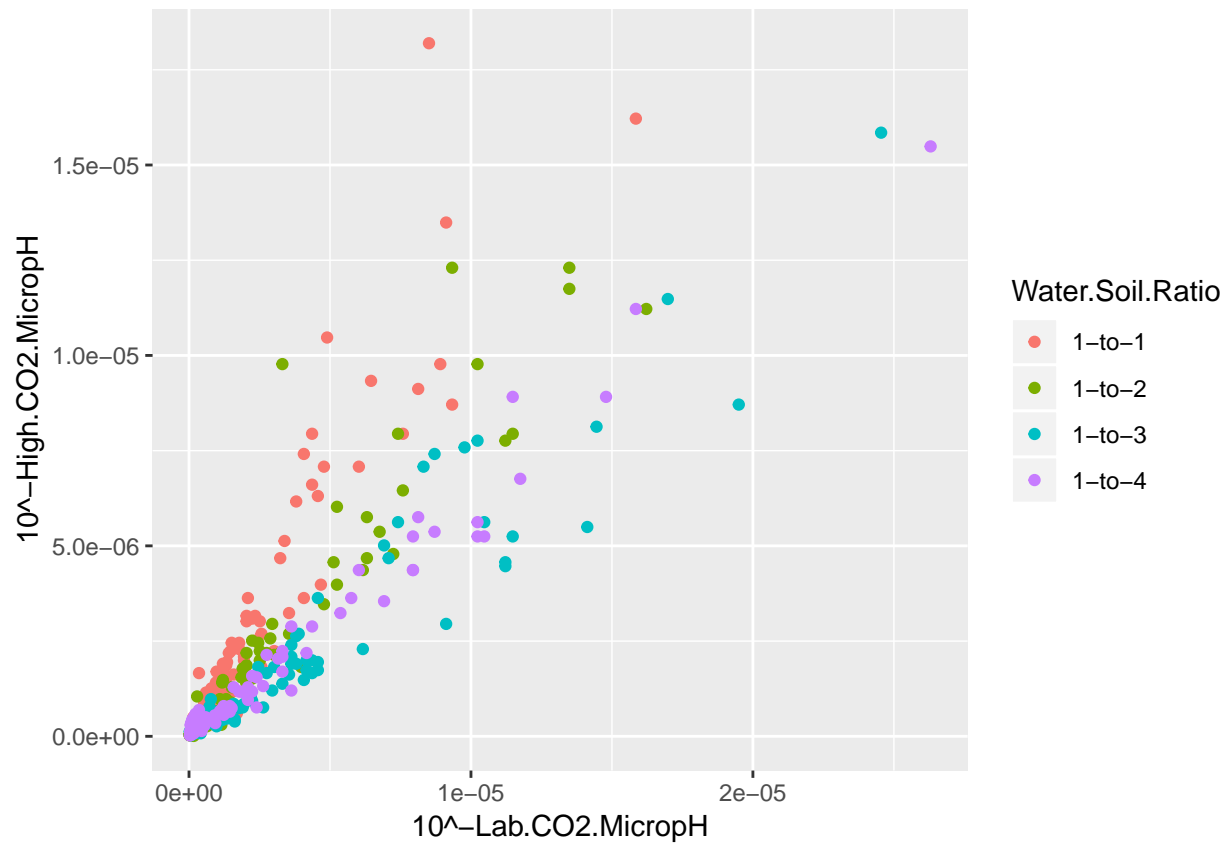
```



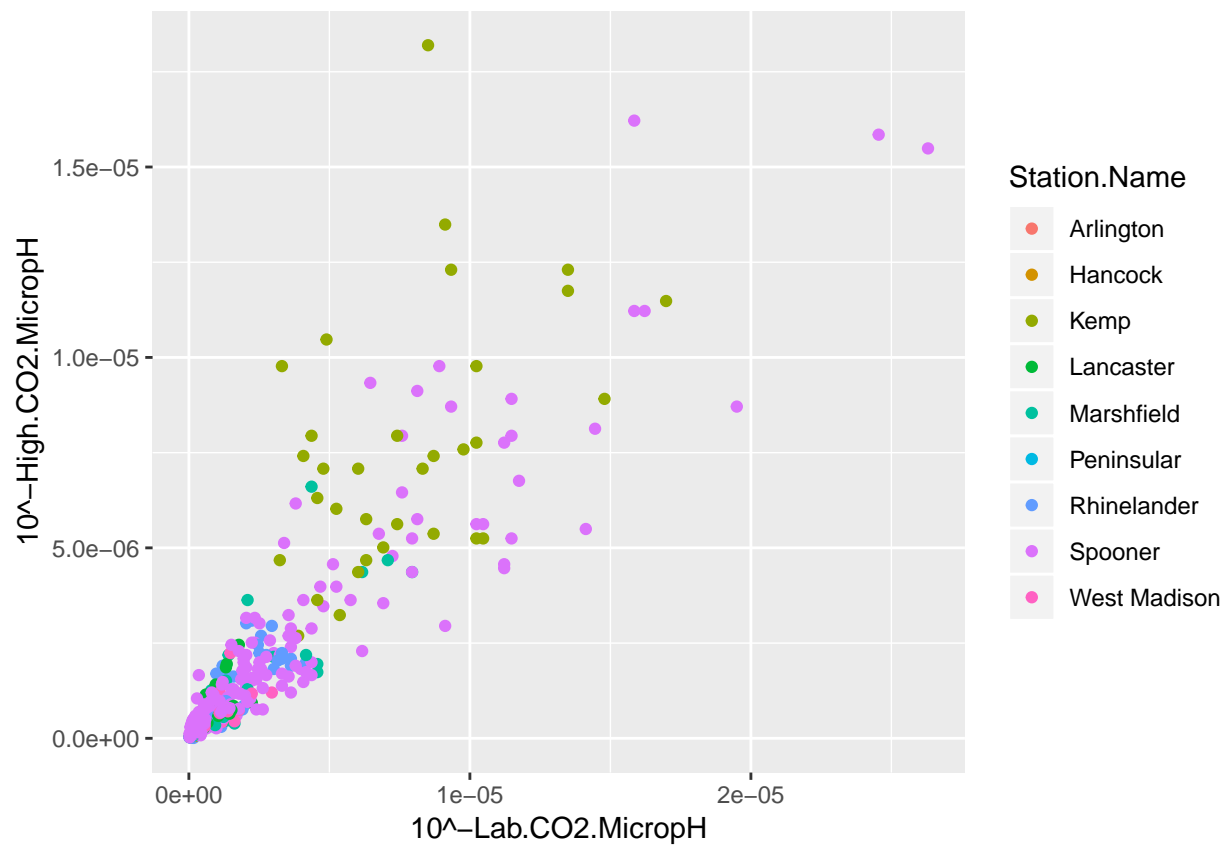
```
qplot(data = dat, x = Lab.CO2.MicropH, y = High.CO2.MicropH, color = Station.Name)
```



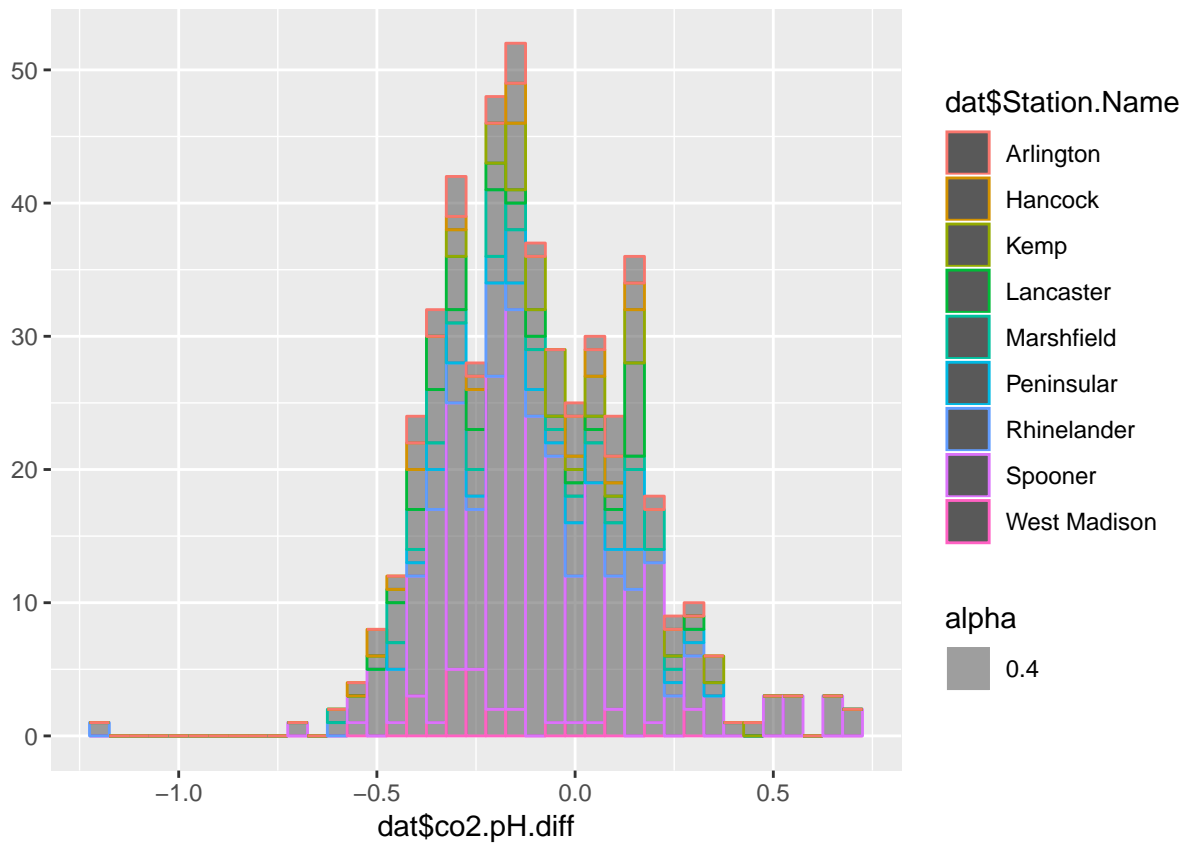
```
qplot(data = dat, x = 10^-Lab.CO2.MicropH, y = 10^-High.CO2.MicropH, color = Water.Soil.)
```



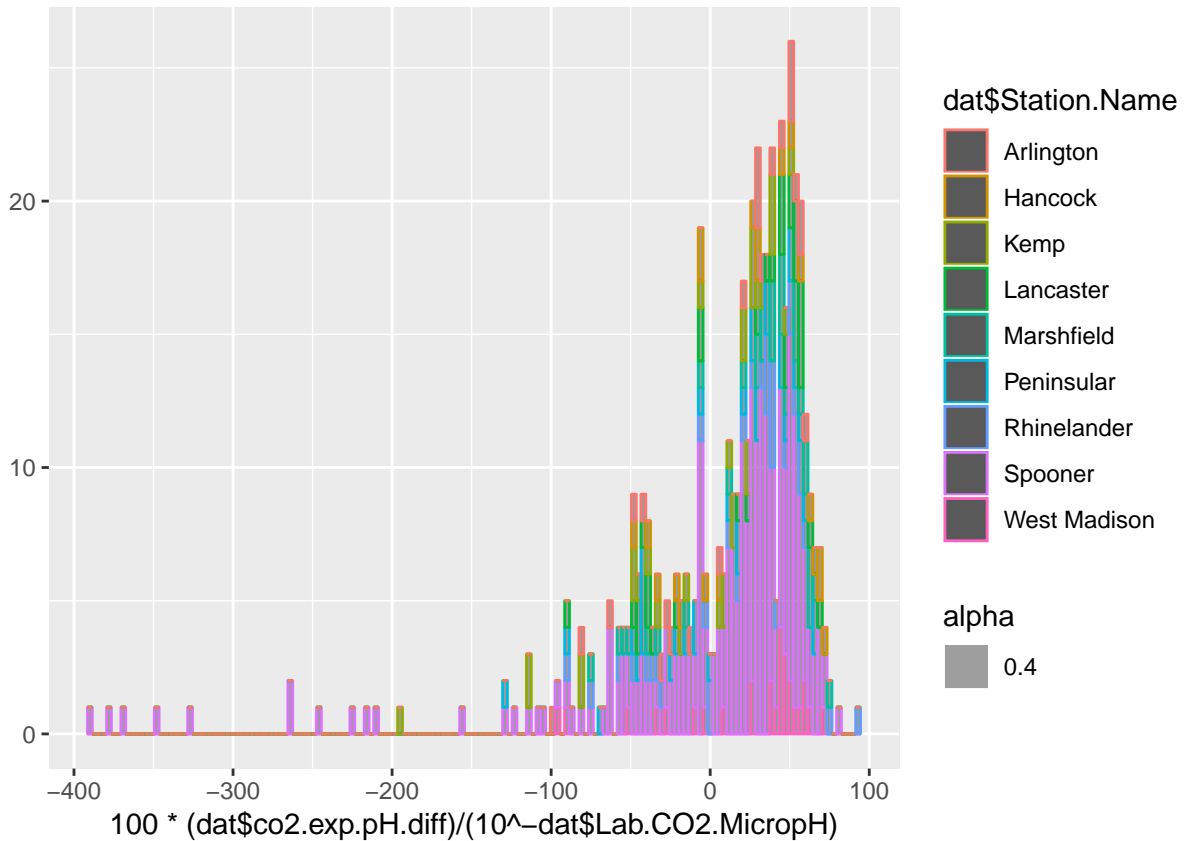
```
qplot(data = dat, x = 10^-Lab.CO2.MicropH, y = 10^-High.CO2.MicropH, color = Station.Name)
```



```
qplot(dat$co2.pH.diff, geom="histogram", color = dat$Station.Name, alpha = 0.4, binwidth=)
```



```
qplot(100*(dat$co2.exp.pH.diff)/(10^-dat$Lab.CO2.MicropH), geom="histogram", color = dat$Station.Name)
```



```
t.test(dat$Lab.CO2.MicropH, dat$High.CO2.MicropH, paired = TRUE, alternative = "two.sided")
```

```
##
## Paired t-test
##
## data: dat$Lab.CO2.MicropH and dat$High.CO2.MicropH
## t = -9.4651, df = 490, p-value < 2.2e-16
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
## -0.12383293 -0.08125872
## sample estimates:
## mean of the differences
## -0.1025458
```

Just Spooner:

```
dat.Spooner <- subset(dat, Station.Name=="Spooner")
t.test(dat.Spooner$Lab.CO2.MicropH, dat.Spooner$High.CO2.MicropH, paired = TRUE, alternative = "two.sided")
```

```
##
## Paired t-test
```

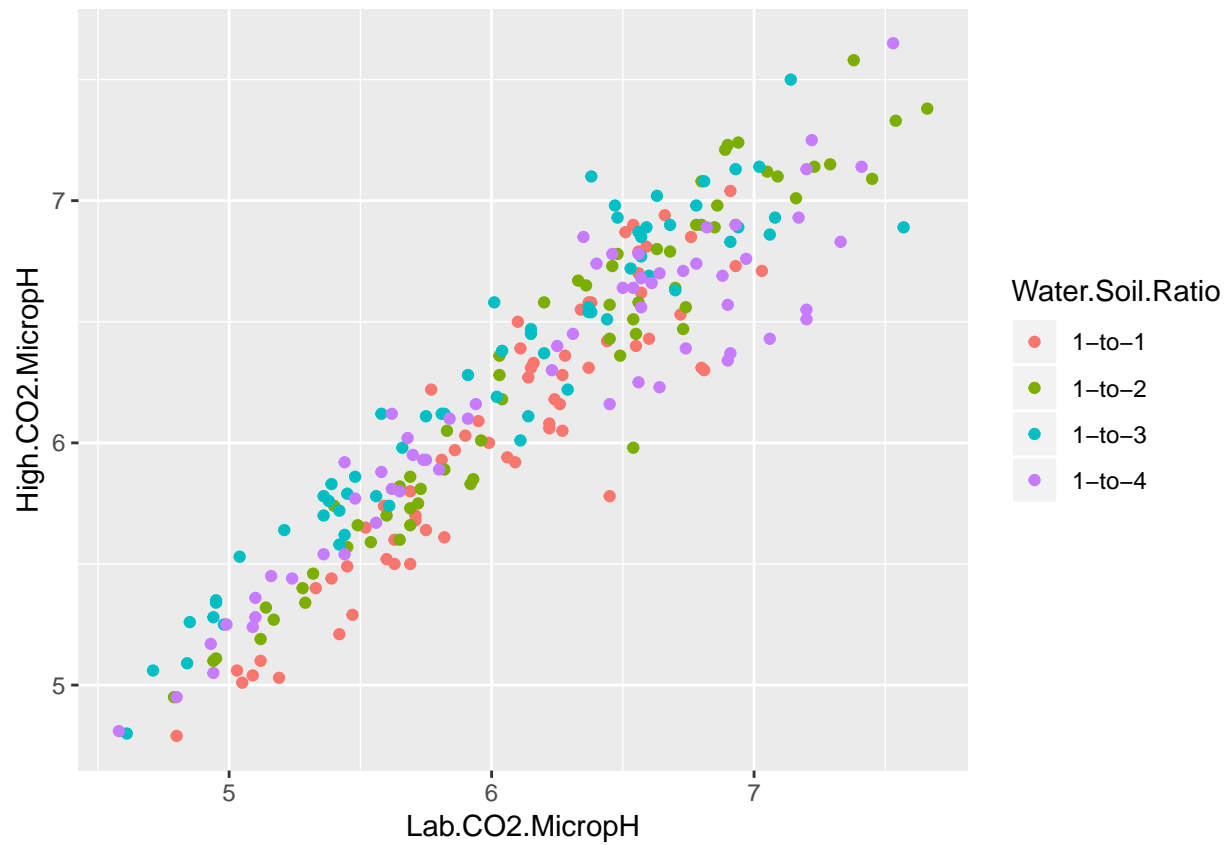


```
##
## data: dat.Spooner$Lab.CO2.MicropH and dat.Spooner$High.CO2.MicropH
## t = -5.5481, df = 251, p-value = 7.322e-08
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
## -0.11598004 -0.05521044
## sample estimates:
## mean of the differences
## -0.08559524

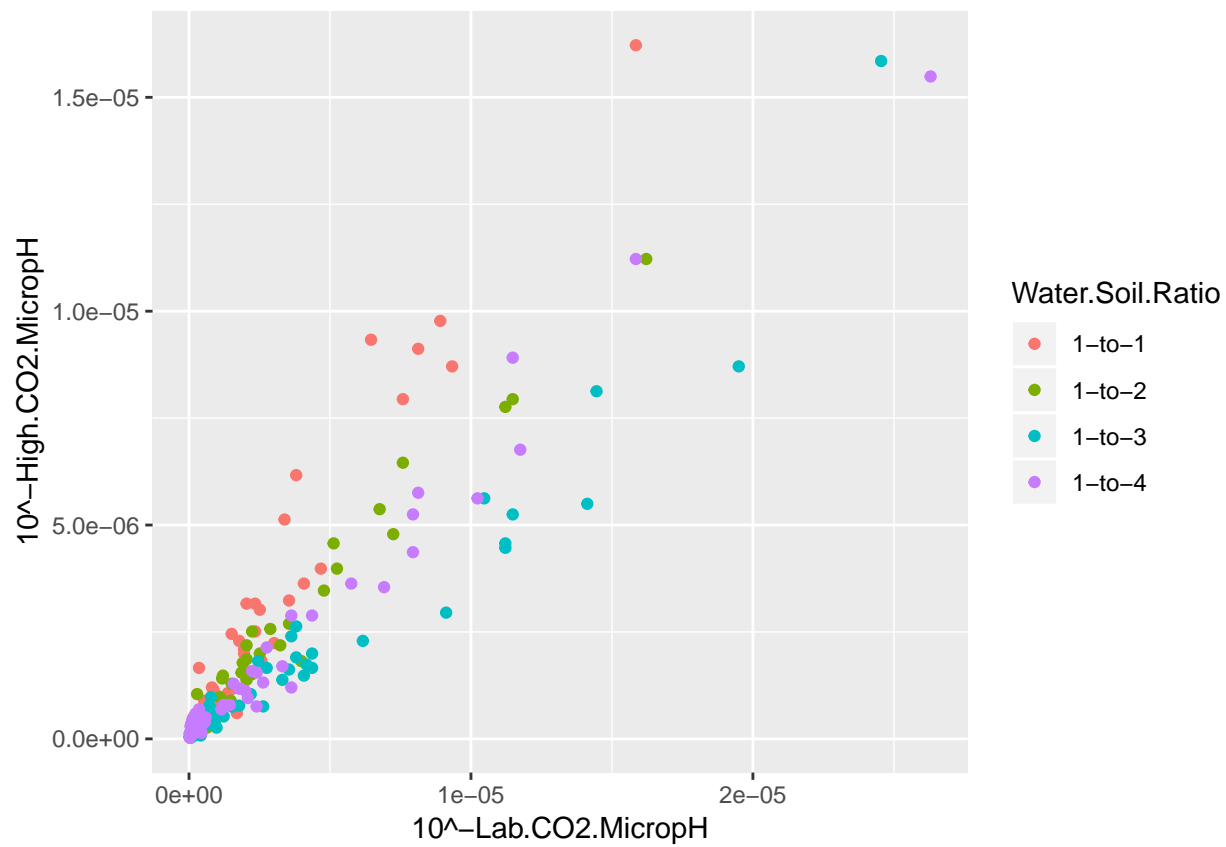
t.test(10^-dat.Spooner$Lab.CO2.MicropH, 10^-dat.Spooner$High.CO2.MicropH, paired = TRUE,

##
## Paired t-test
##
## data: 10^-dat.Spooner$Lab.CO2.MicropH and 10^-dat.Spooner$High.CO2.MicropH
## t = 6.2194, df = 251, p-value = 2.072e-09
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
## 4.767876e-07 9.186779e-07
## sample estimates:
## mean of the differences
## 6.977328e-07

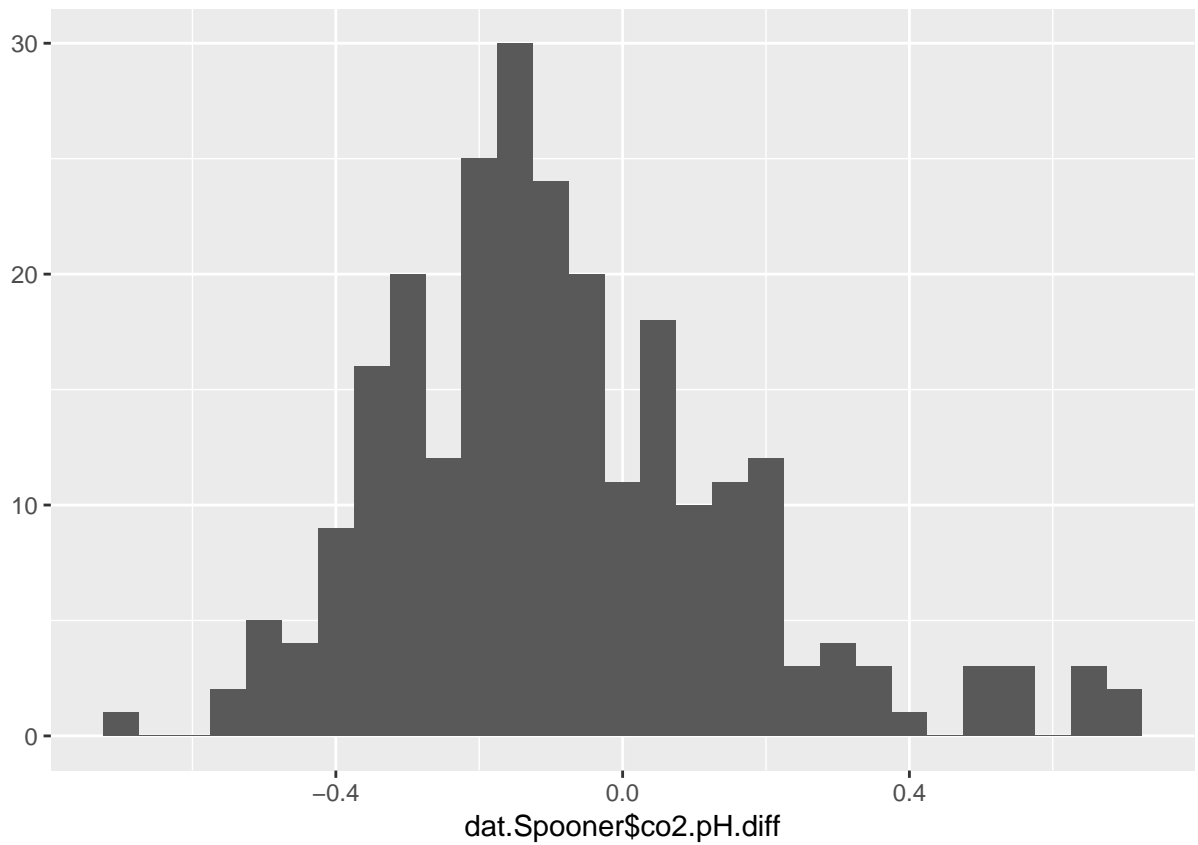
qplot(data = dat.Spooner, x = Lab.CO2.MicropH, y = High.CO2.MicropH, color = Water.Soil.
```



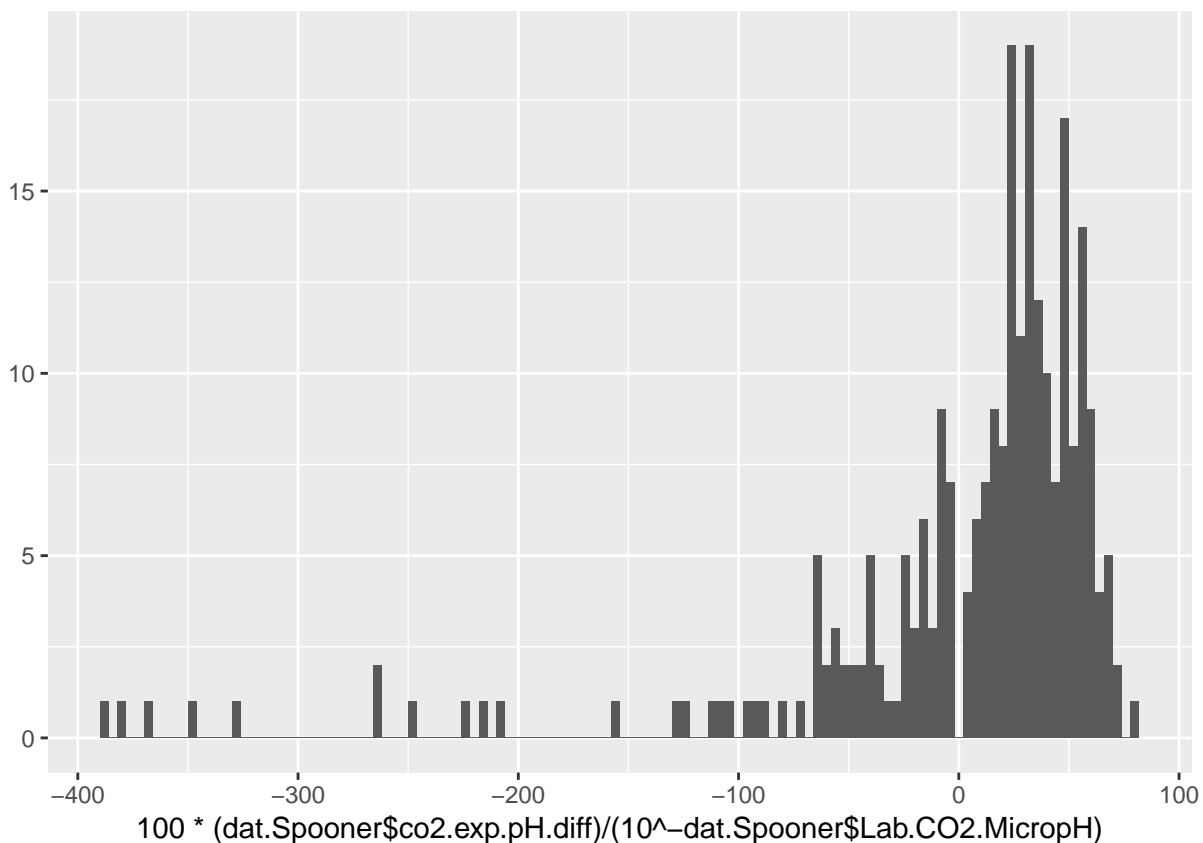
```
qplot(data = dat.Spooner, x = 10^-Lab.CO2.MicropH, y = 10^-High.CO2.MicropH, color = Water.Soil.Ratio)
```



```
qplot(dat.Spooner$co2.pH.diff, geom="histogram", binwidth = 0.05)
```



```
qplot(100*(dat.Spooner$co2.exp.pH.diff)/(10^-dat.Spooner$Lab.CO2.MicropH), geom="histogr
```



Just Wisconsin:

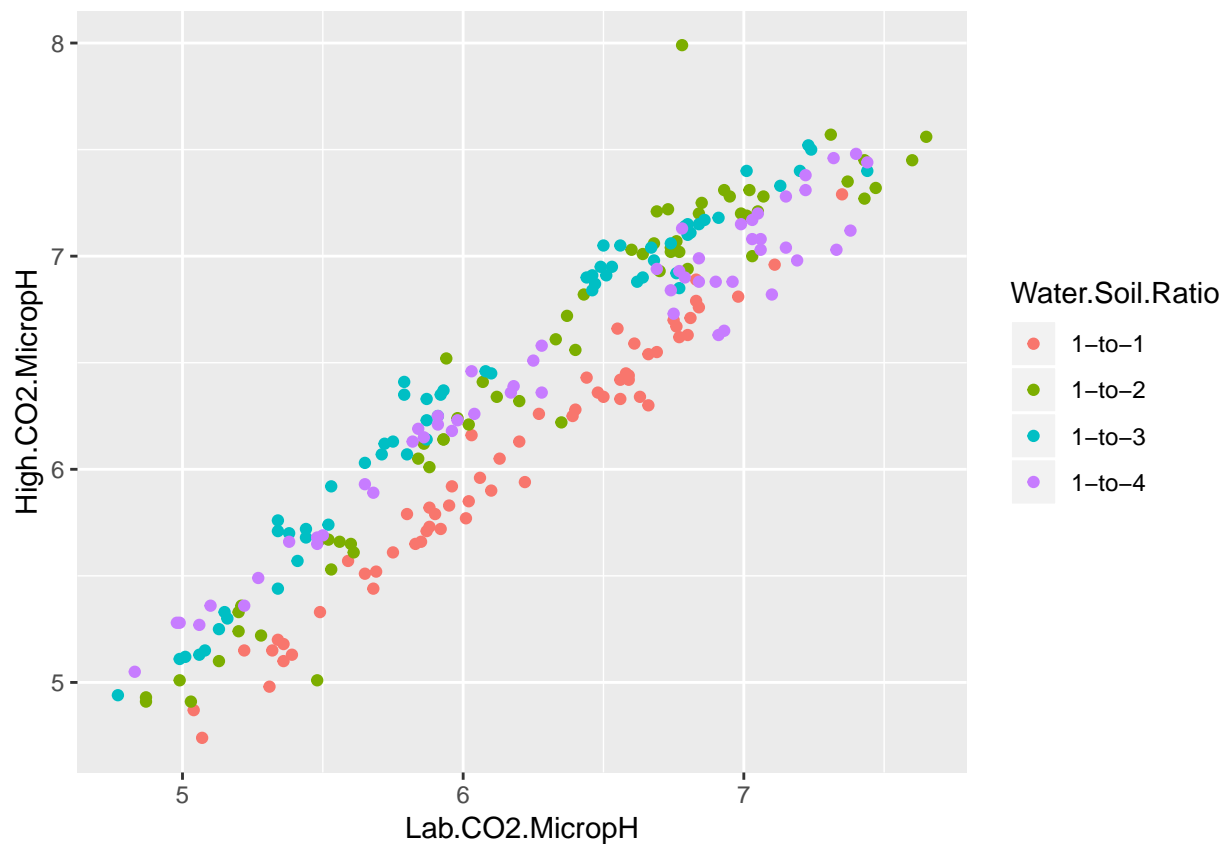
```
dat.Wisconsin <- subset(dat, Station.Name!="Spooner")
t.test(dat.Wisconsin$Lab.CO2.MicroH, dat.Wisconsin$High.CO2.MicroH, paired = TRUE, alt

##
## Paired t-test
##
## data: dat.Wisconsin$Lab.CO2.MicroH and dat.Wisconsin$High.CO2.MicroH
## t = -7.9544, df = 238, p-value = 7.276e-14
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
## -0.15024106 -0.09059576
## sample estimates:
## mean of the differences
## -0.1204184
t.test(10^(-dat.Wisconsin$Lab.CO2.MicroH), 10^(-dat.Wisconsin$High.CO2.MicroH), paired = T

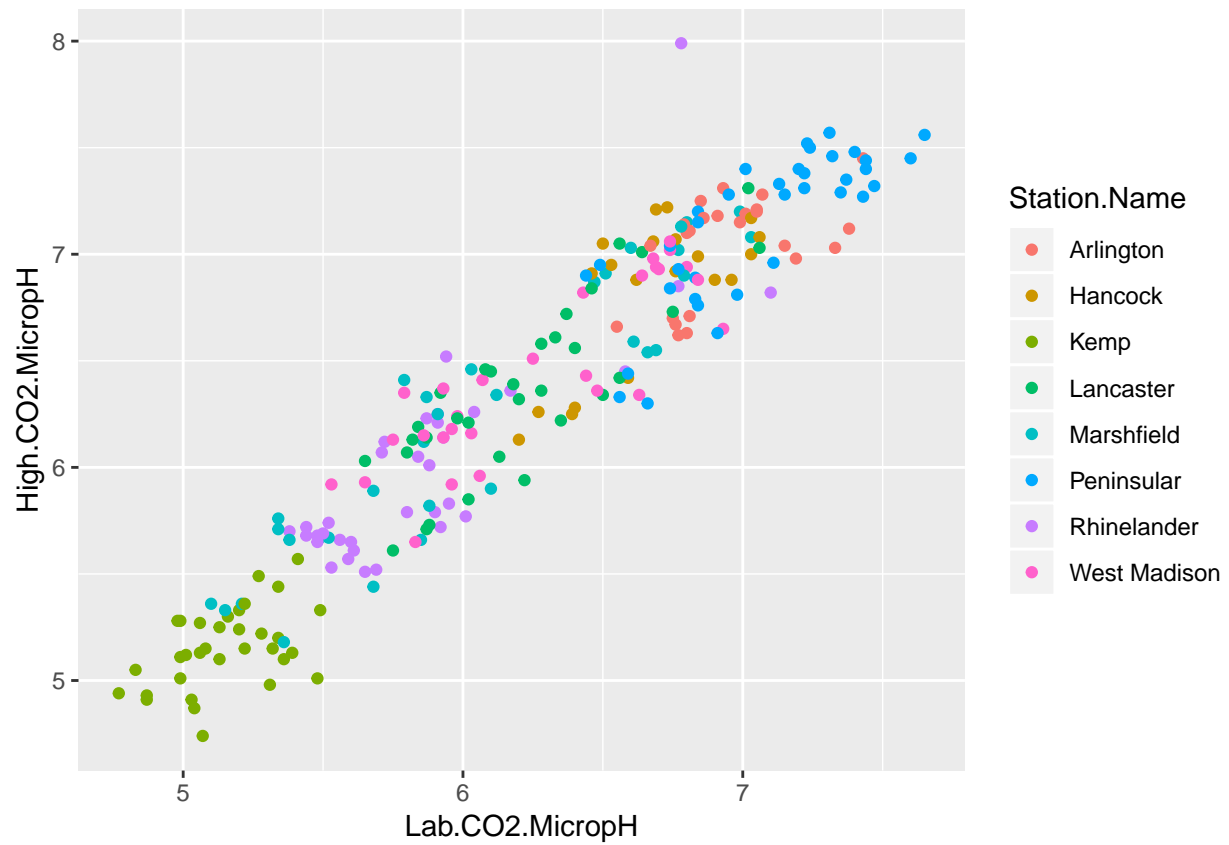
##
## Paired t-test
```

```
##
## data:  10^-dat.Wisconsin$Lab.CO2.MicropH and 10^-dat.Wisconsin$High.CO2.MicropH
## t = 2.2675, df = 238, p-value = 0.02426
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
##  2.742817e-08 3.906861e-07
## sample estimates:
## mean of the differences
##                2.090572e-07
```

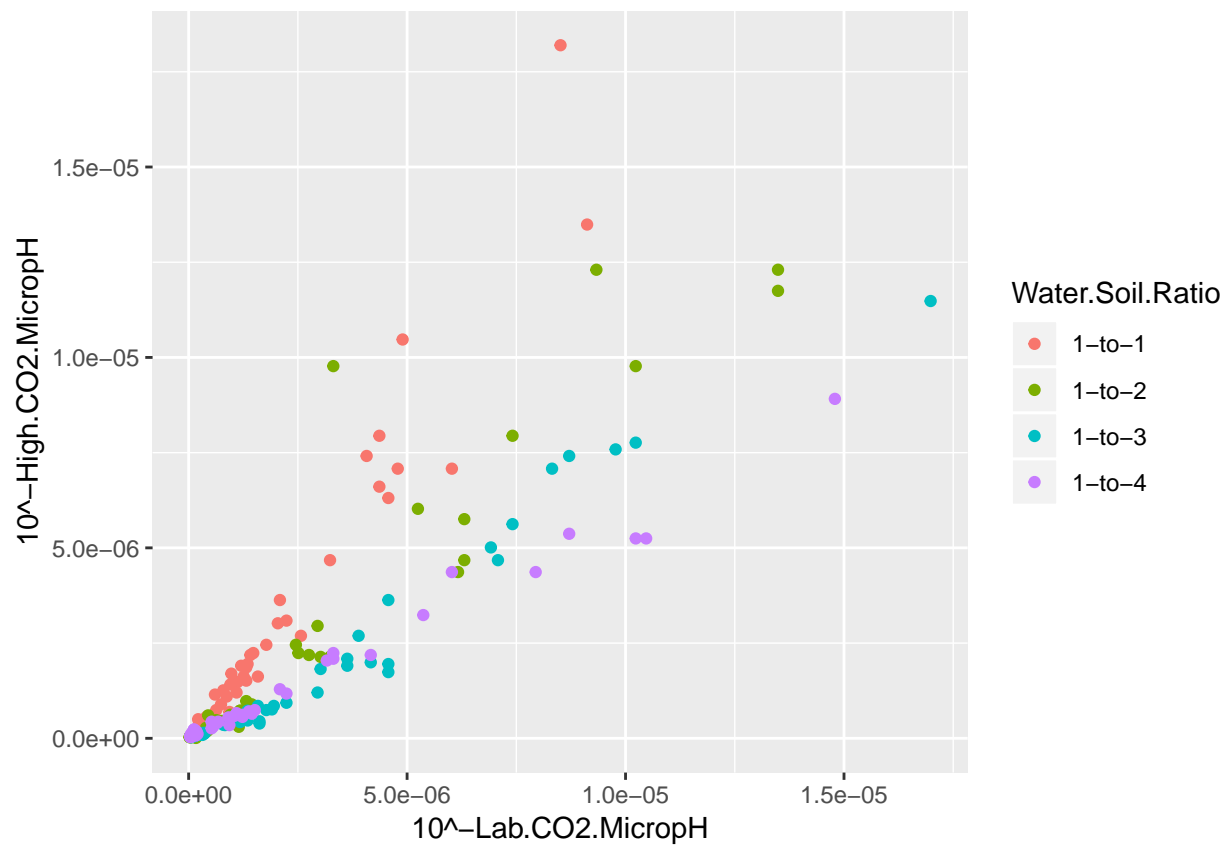
```
qplot(data = dat.Wisconsin, x = Lab.CO2.MicropH, y = High.CO2.MicropH, color = Water.Soi
```



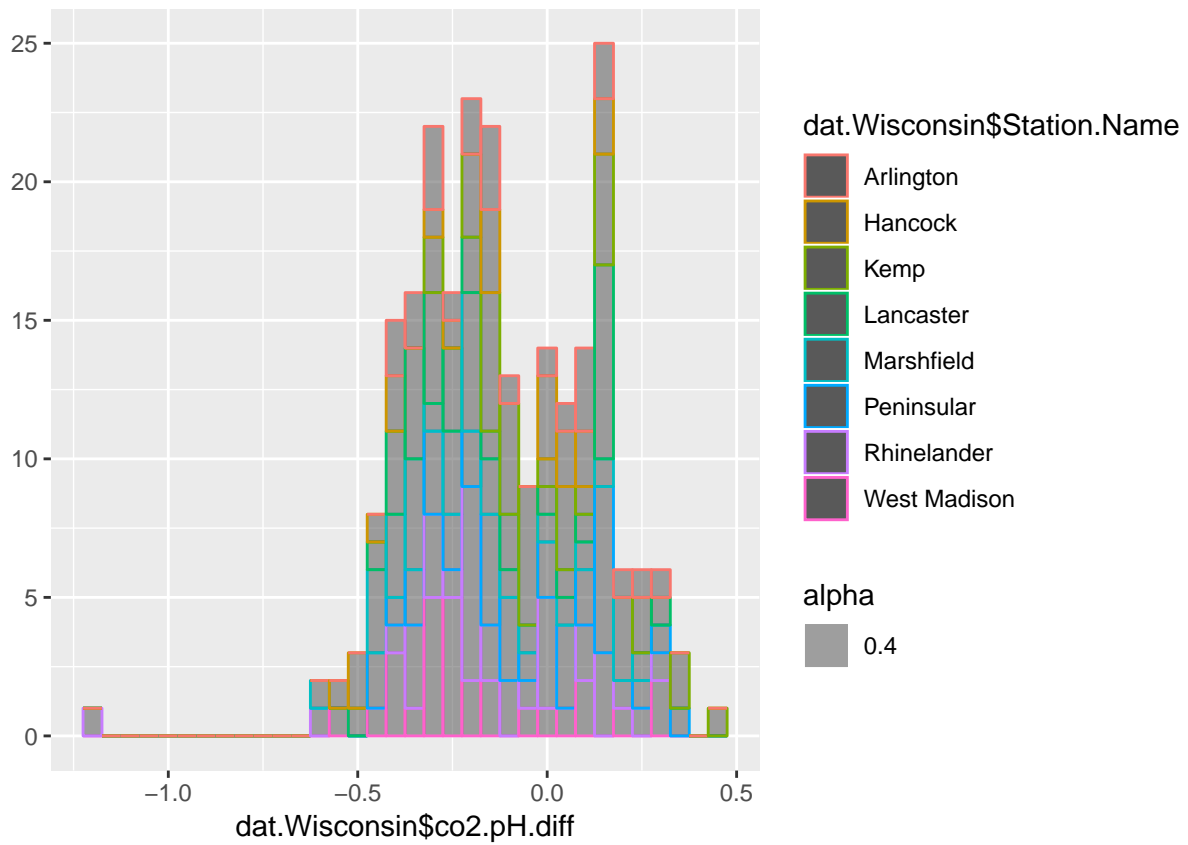
```
qplot(data = dat.Wisconsin, x = Lab.CO2.MicropH, y = High.CO2.MicropH, color = Station.N
```



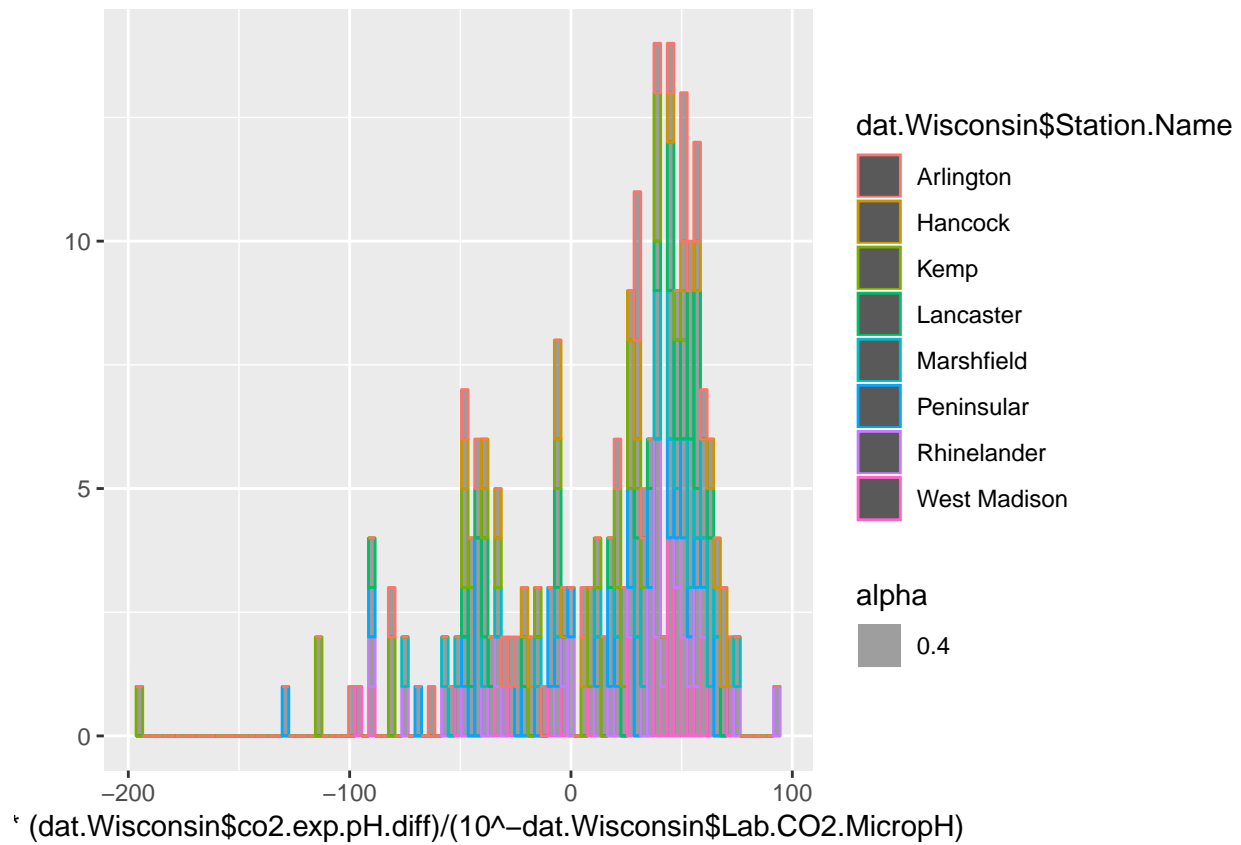
```
qplot(data = dat.Wisconsin, x = 10^-Lab.CO2.MicropH, y = 10^-High.CO2.MicropH, color = Station.Name)
```



```
qplot(dat.Wisconsin$co2.pH.diff, geom="histogram", color = dat.Wisconsin$Station.Name, a
```

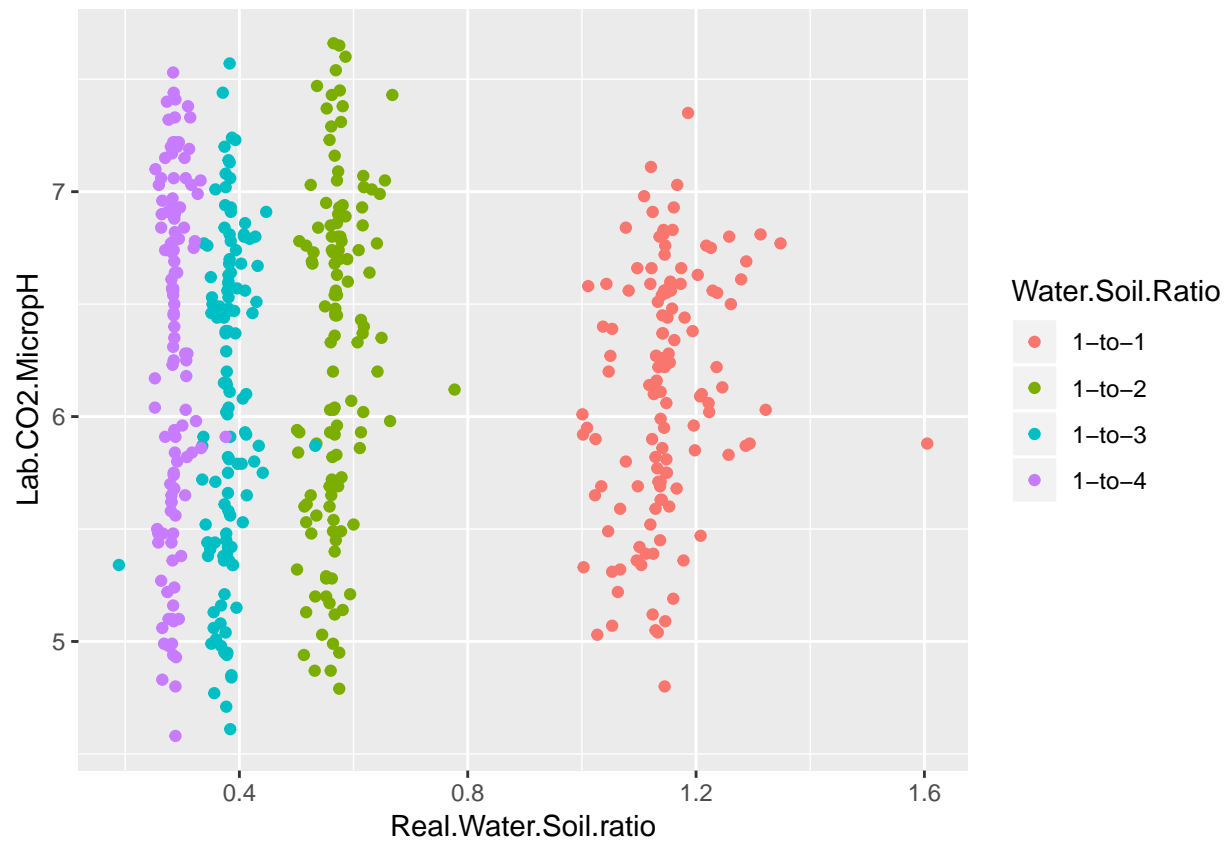



```
qplot(100*(dat.Wisconsin$co2.exp.pH.diff)/(10^-dat.Wisconsin$Lab.CO2.MicropH), geom="hist")
```

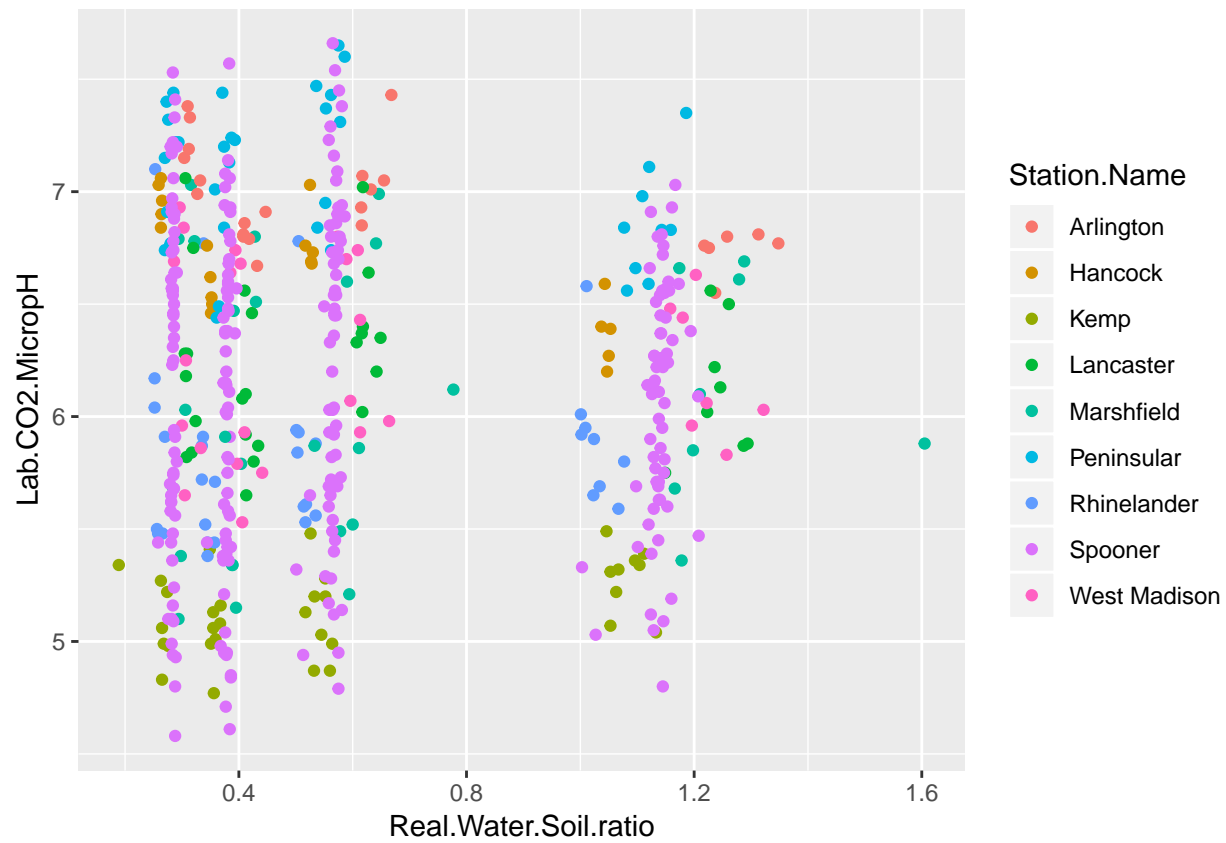


More Plots with All Data:

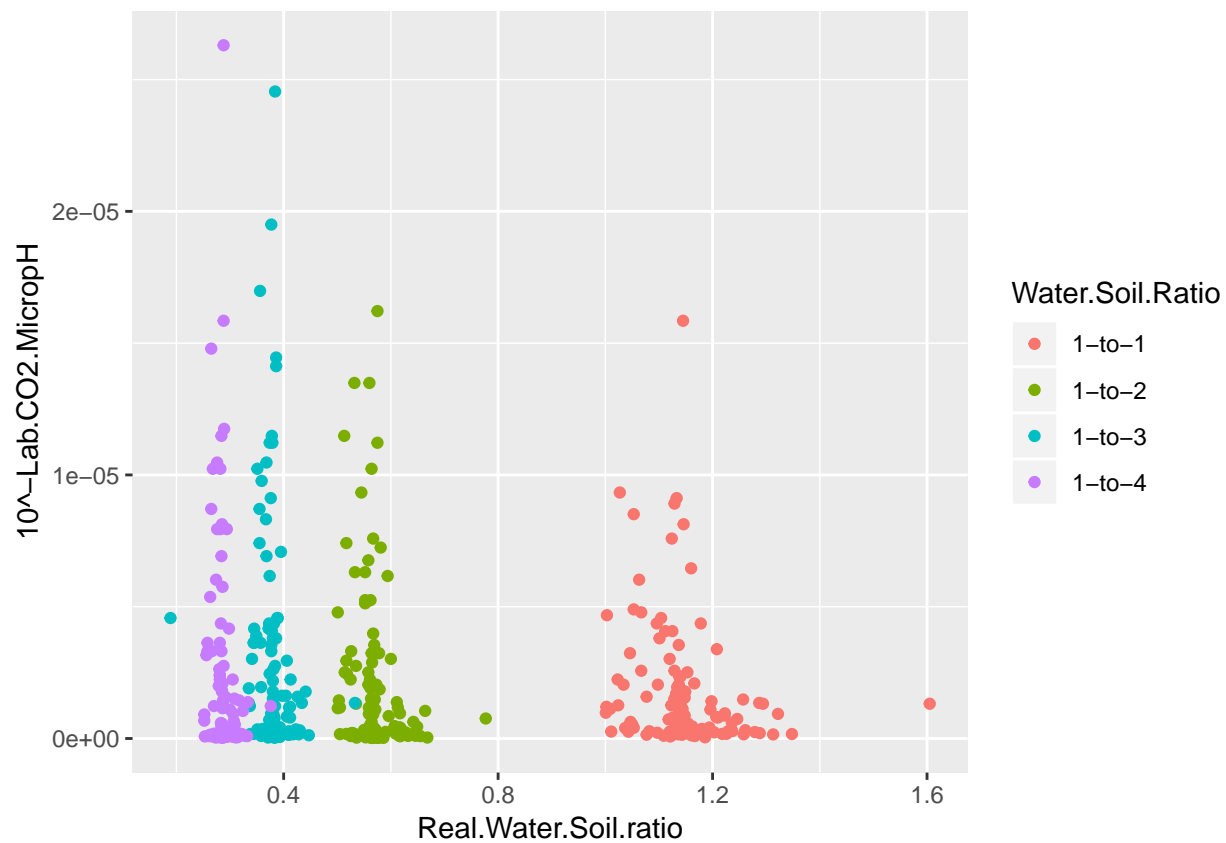
```
qplot(data = dat, x = Real.Water.Soil.ratio, y = Lab.CO2.MicropH, color = Water.Soil.Rat
```



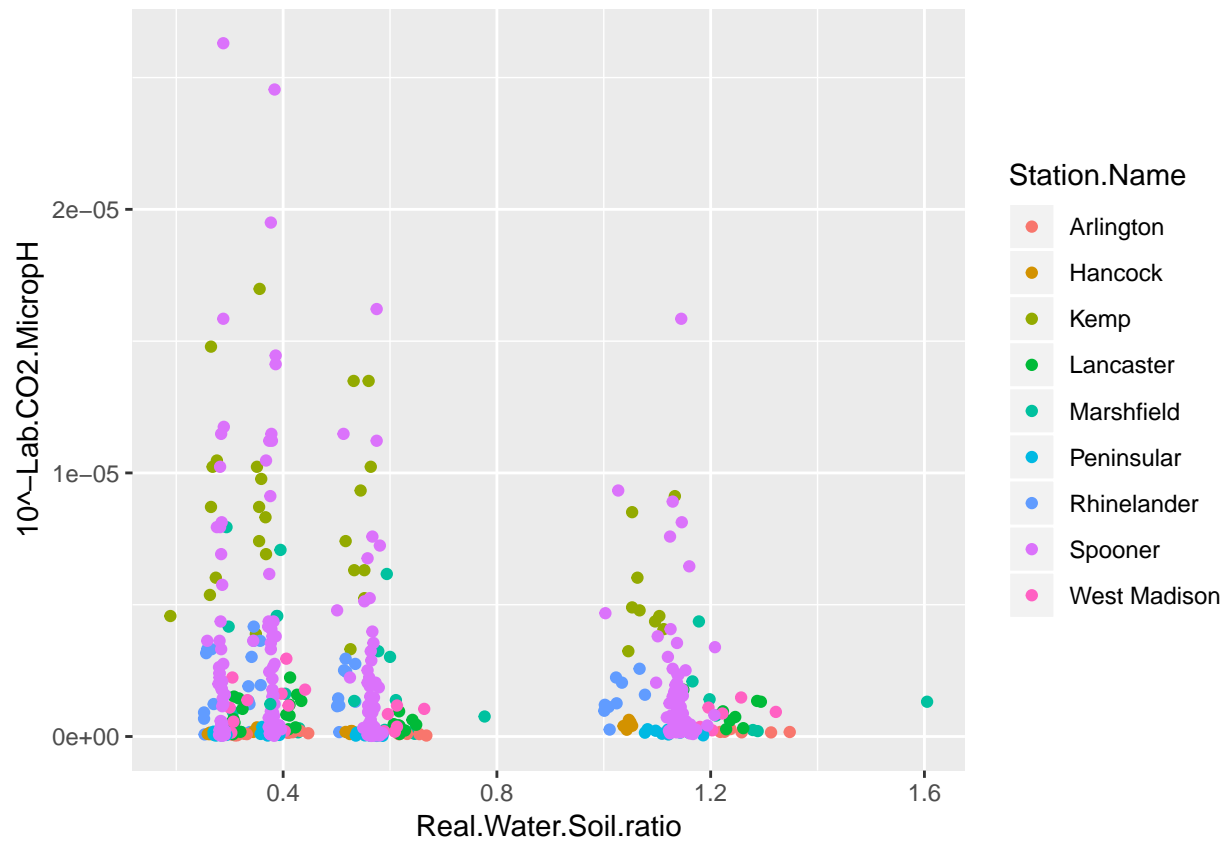
```
qplot(data = dat, x = Real.Water.Soil.ratio, y = Lab.CO2.MicropH, color = Station.Name)
```



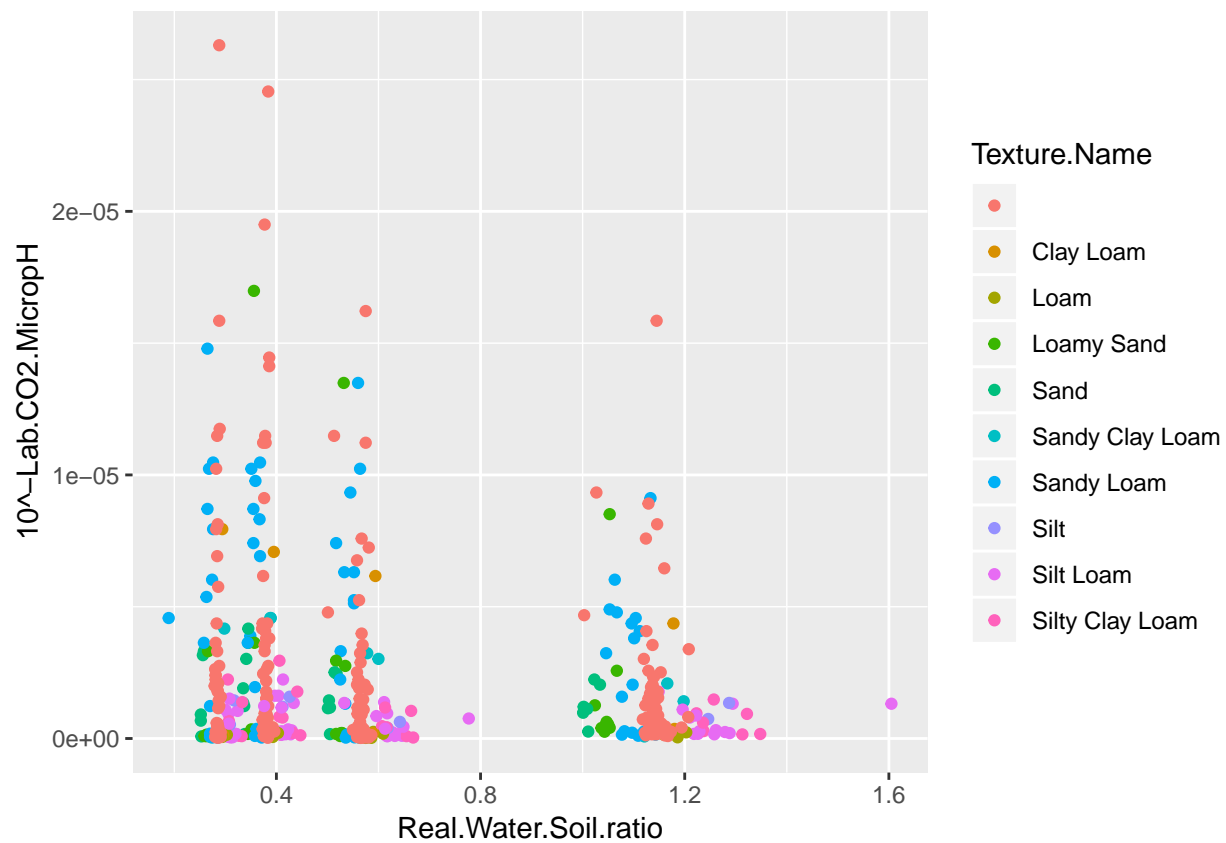
```
qplot(data = dat, x = Real.Water.Soil.ratio, y = Lab.CO2.MicropH, color = Station.Name)
```



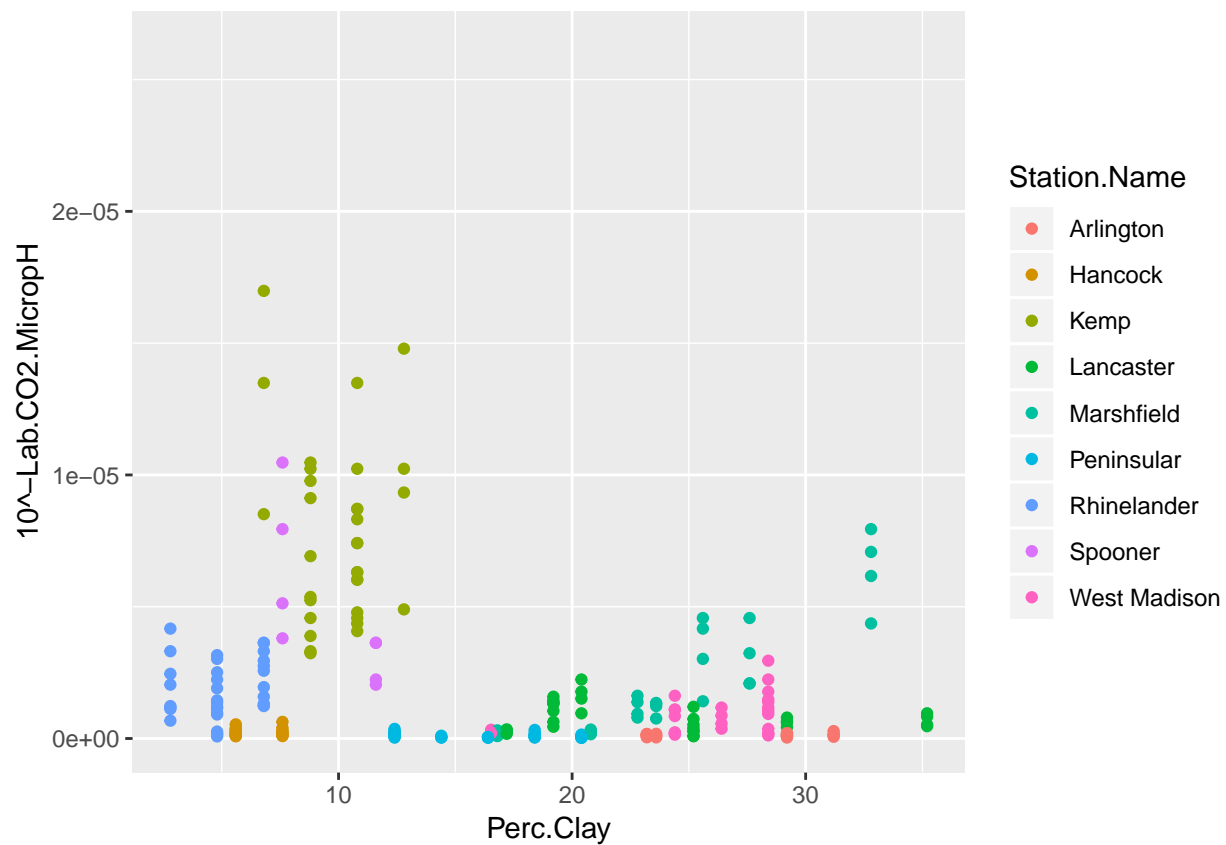
```
qplot(data = dat, x = Real.Water.Soil.ratio, y = 10Lab.CO2.MicropH, color = Station.Na
```



```
qplot(data = dat, x = Real.Water.Soil.ratio, y = 10Lab.CO2.MicropH, color = Texture.Na
```



```
qplot(data = dat, x = Perc.Clay, y = 10^-Lab.CO2.MicropH, color = Station.Name)
```



Plots with 16S Amplicon Analysis:

[...]