

Termite Data Analysis for Paper: Clagget et al, 2018.

Reference

Clagget, N., A. Surovek, and W. Capehart, 2018: A Bio-inspired examination of the role of material and environment in the development of multi- functional structural forms, Journal of Structural Engineering.

Additional Libraries

```
library("lattice")
```

Reading in Data as CSV for Processing in R

```
data_directory = "https://raw.githubusercontent.com/wjcapehart/Clagget_et_al_2018_Termite_Climate_Mound/Full_Data_Summary_WJC_MOD.csv"

MOUNDS_DATA = read.csv(file = paste(data_directory,
                                     "Full_Data_Summary_WJC_MOD.csv",
                                     sep = ""
                                   ),
                       header = TRUE,
                       sep = ",",
                       )
```

Figure 7

```
sand      = data.frame(Mound_Shape = MOUNDS_DATA$Mound_Shape,
                       Percentage   = MOUNDS_DATA$Soil_Sand_Percentage)
sand$Class = "Sand"

clay      = data.frame(Mound_Shape = MOUNDS_DATA$Mound_Shape,
                       Percentage   = MOUNDS_DATA$Soil_Clay_Percentage)
clay$Class = "Clay"

sand_clay = rbind(sand,
                  clay)

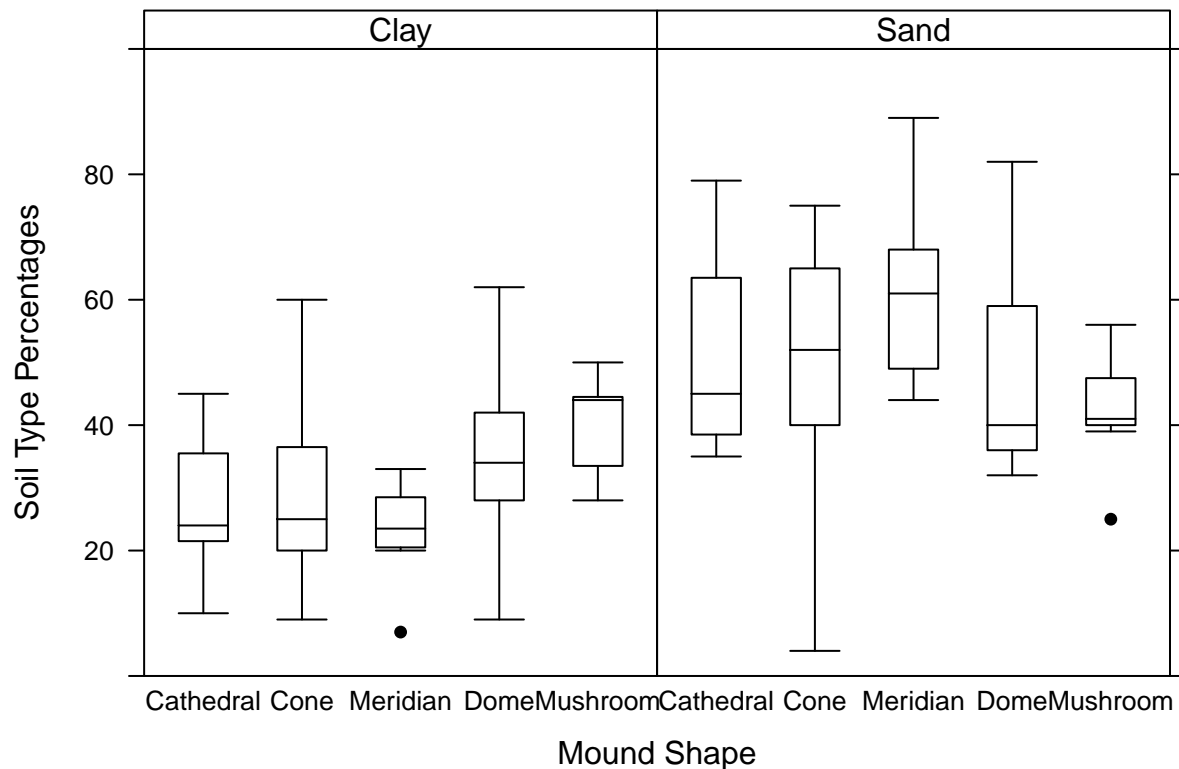
sand_clay$Mound_Shape = factor(x      = sand_clay$Mound_Shape,
                              levels = c("Cathedral",
                                           "Cone",
                                           "Meridian",
                                           "Dome",
                                           "Mushroom"))

bwplot(x = Percentage ~ Mound_Shape | Class,
```

```

data      = sand_clay,
ylab      = "Soil Type Percentages",
ylim      = c(0,100),
xlab      = "Mound Shape",
par.settings = list(strip.background = list(col = "white"),
                    box.dot         = list(col = "black", pch = "|"),
                    dot.symbol      = list(col = "black", fg = "black"),
                    box.rectangle   = list(col = "black", lty = "solid"),
                    box.umbrella    = list(col = "black", lty = "solid"),
                    plot.symbol     = list(col = "black", pch = 16)
                    )
)

```



```
remove(sand_clay)
```

Figure 8

```

sand      = data.frame(Cone_Size = MOUNDS_DATA$Cone_Size[      MOUNDS_DATA$Cone_Size != 0],
                      Percentage = MOUNDS_DATA$Soil_Sand_Percentage[MOUNDS_DATA$Cone_Size != 0])
sand$Class = "Sand"

clay      = data.frame(Cone_Size = MOUNDS_DATA$Cone_Size[      MOUNDS_DATA$Cone_Size != 0],
                      Percentage = MOUNDS_DATA$Soil_Clay_Percentage[MOUNDS_DATA$Cone_Size != 0])
clay$Class = "Clay"

sand_clay = rbind(sand,

```

```

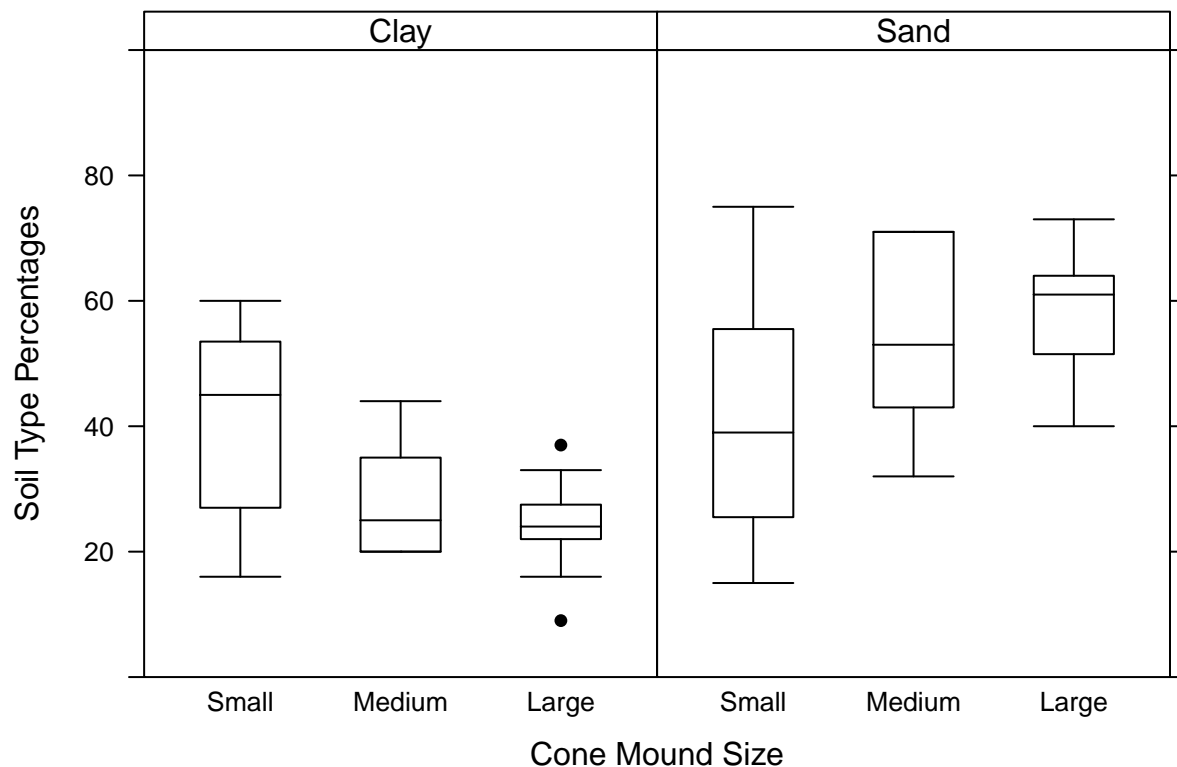
        clay)

remove(sand,
       clay)

sand_clay$Cone_Size = factor(x      = sand_clay$Cone_Size,
                             levels = c("Small",
                                         "Medium",
                                         "Large")
                             )

bwplot(x = Percentage ~ Cone_Size | Class,
       data      = sand_clay,
       ylab      = "Soil Type Percentages",
       ylim      = c(0,100),
       xlab      = "Cone Mound Size",
       par.settings = list(strip.background = list(col = "white"),
                           box.dot         = list(col = "black", pch = "|"),
                           dot.symbol      = list(col = "black", fg = "black"),
                           box.rectangle   = list(col = "black", lty = "solid"),
                           box.umbrella    = list(col = "black", lty = "solid"),
                           plot.symbol     = list(col = "black", pch = 16)
                           )
)

```



```
remove(sand_clay)
```

Figure 9

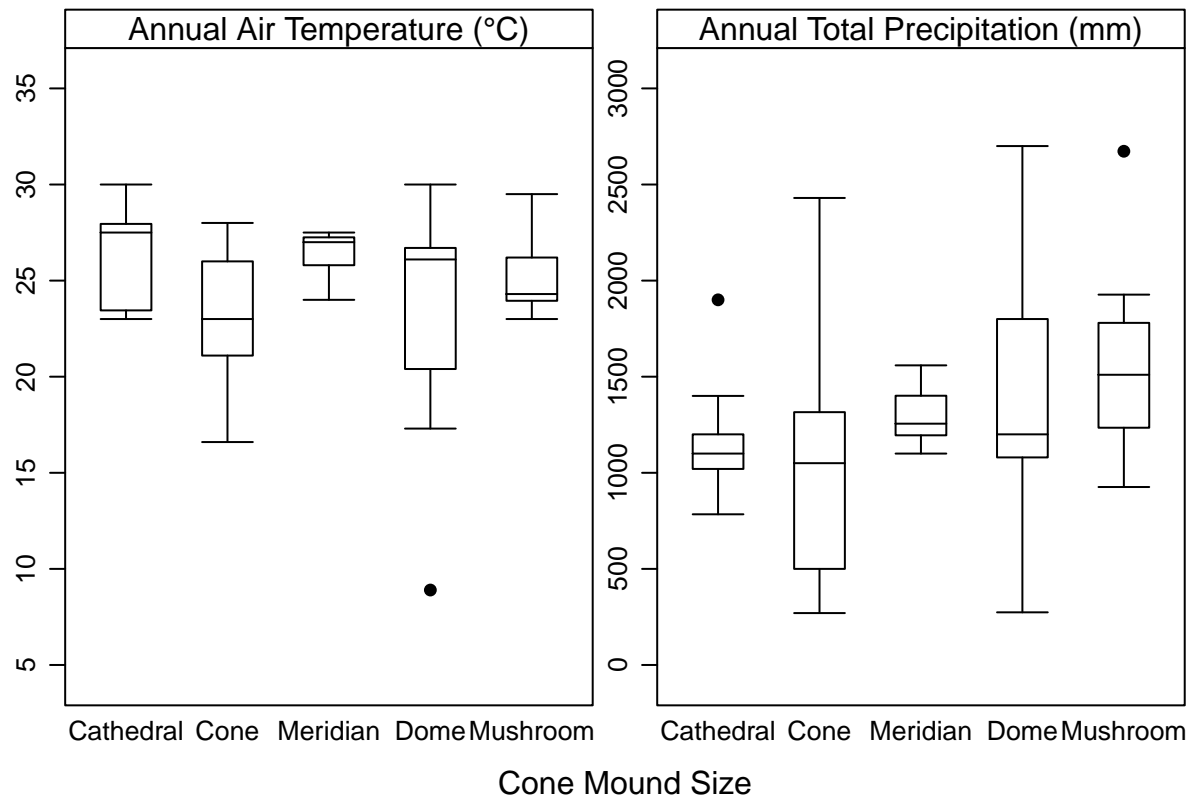
```
temp      = data.frame(Mound_Shape = MOUNDS_DATA$Mound_Shape,
                        ClimateValue = MOUNDS_DATA$Mean_Annual_Temperature)
temp$ClimVar = "Annual Air Temperature (°C)"

prec      = data.frame(Mound_Shape = MOUNDS_DATA$Mound_Shape,
                        ClimateValue = MOUNDS_DATA$Mean_Annual_RainFall)
prec$ClimVar = "Annual Total Precipitation (mm)"

climate = rbind(temp,
                prec)

climate$Mound_Shape = factor(x      = climate$Mound_Shape,
                             levels = c("Cathedral",
                                         "Cone",
                                         "Meridian",
                                         "Dome",
                                         "Mushroom")
                             )

bwplot(x = ClimateValue ~ Mound_Shape | ClimVar,
       data      = climate,
       xlab      = "Cone Mound Size",
       scales    = list(relation = "free"),
       ylab      = "",
       ylim      = list( c(5, 35),
                         c(0,3000) ),
       par.settings = list(strip.background = list(col = "white"),
                           box.dot          = list(col = "black", pch = "|"),
                           dot.symbol       = list(col = "black", fg  = "black"),
                           box.rectangle    = list(col = "black", lty = "solid"),
                           box.umbrella     = list(col = "black", lty = "solid"),
                           plot.symbol      = list(col = "black", pch = 16)
                           )
       )
```



```
remove(climate,
       temp,prec)
```