# LMM_NvS

**Created January 28, 2025**

Changes

- 1/28/25: loading data

```
library(lme4)
```

```
## Loading required package: Matrix
```

```
library(dplyr)
```

```
##
## Attaching package: 'dplyr'

## The following objects are masked from 'package:stats':
##
##     filter, lag

## The following objects are masked from 'package:base':
##
##     intersect, setdiff, setequal, union
```

```
library(ggplot2)
```

## Load Data

```
# File from github
filepath = "https://raw.githubusercontent.com/shabanm2/Utqiagvik/main/Analysis_Ready_Data/"
df <- read.csv(paste0(filepath, "daily_2022_2024.csv"))
df <- df %>% select(-X) %>% select(-X.1)
df$Date <- as.POSIXct(df$date, format="%Y-%m-%d")
```

## Select and Transform Data

North vs South

TNHA:

North = TNHA-SC

South = TNHA-SA

SSMH:

North = SSMH-SB

South = SSMH-SA

BEO (Control): does not have different aspects

```
nvs <- df %>% filter(fullname == "TNHA-SA" | fullname == "TNHA-SC" | fullname == "SSMH-SB" | fullname ==
# ignore wind speed and wind direction for now
```

```
# filter out data from before data collection
# filter to get only depth of 10cm for now
df_10cm <- nvs %>% filter(grounddepth == 8) %>% filter(Date >= "2022-06-19")
```

# Fit LMM

```
lmm1 <- lmer(groundtemp ~ airtemp + vwc + solar + aspect + (1|site), data = df_10cm)
summary(lmm1)
```

```
## Linear mixed model fit by REML ['lmerMod']
## Formula: groundtemp ~ airtemp + vwc + solar + aspect + (1 | site)
##    Data: df_10cm
##
## REML criterion at convergence: 10926.9
##
## Scaled residuals:
##     Min      1Q  Median      3Q     Max
## -3.8346 -0.4751  0.0114  0.5207  7.8056
##
## Random effects:
##  Groups   Name        Variance Std.Dev.
##  site     (Intercept) 0.05317  0.2306
##  Residual             6.47347  2.5443
## Number of obs: 2317, groups:  site, 2
##
## Fixed effects:
##                Estimate Std. Error t value
## (Intercept) -0.1796726  0.2343280  -0.767
## airtemp      0.6758010  0.0086438  78.183
## vwc          3.5232102  0.5019738   7.019
## solar       -0.0052399  0.0009253  -5.663
## aspectSouth  1.0820043  0.1127689   9.595
##
## Correlation of Fixed Effects:
##             (Intr) airtmp vwc    solar
## airtemp      0.499
## vwc         -0.592 -0.658
## solar       -0.307 -0.281  0.121
## aspectSouth -0.322 -0.154  0.271 -0.183
```

```r
coef(lmm1)
```

```
## $site
##      (Intercept)  airtemp     vwc       solar aspectSouth
## SSMH -0.02520229 0.675801 3.52321 -0.00523987    1.082004
## TNHA -0.33414284 0.675801 3.52321 -0.00523987    1.082004
##
## attr(,"class")
## [1] "coef.mer"
```

It seems like there is not too much of a difference between the two sites, but there is still presence of a difference as shown by the two different intercepts for SSMH vs TNHA.