

Mass Soils - Composite Weeks Alteck 2016

PAZ

November 2016

Purpose

This file computes the merges weekly composite concentrations and isotope data.

Imports:

- SoilCompConc_W1toW15.csv
- SoilCompIsotopes_W1toW15.csv

Generates:

- MassIso_CompositeSoils.csv

Required R-packages:

```
library("plyr")
library("dplyr")
```

Working directory

```
# setwd("D:/Documents/these_pablo/Alteckendorf2016/R")
# setwd("/Users/DayTightChunks/Documents/PhD/Routput/Alteck/R")
# setwd("D:/Documents/these_pablo/Alteckendorf2016/00_TransparencyFolder")
getwd()
```

```
## [1] "D:/Documents/these_pablo/Alteckendorf2016/00_TransparencyFolder"
```

Composite Concentrations & Isotope Data - Alteckendorf 2016

1. Import CSV files

```
weeklySoilConc = read.csv2("Data/SoilCompConc_W1toW15.csv", header = TRUE)
weeklySoilConc$Date.ti <- as.POSIXct(strptime(weeklySoilConc$Date.Soil, "%d/%m/%Y %H:%M", tz="EST"))
sum(is.na(weeklySoilConc$Date.ti))
```

```
## [1] 0
```

```

weeklySoilConc <- weeklySoilConc[,c("Filename",
                                     "Transect",
                                     "Wnum",
                                     "Date.Soil",
                                     "Date.ti",
                                     "Conc.mug.g.dry.soil",
                                     "Conc.ComSoil.SD")]

colnames(weeklySoilConc)[colnames(weeklySoilConc) == "Filename"] <- "ID"
head(weeklySoilConc)

```

```

##      ID Transect Wnum      Date.Soil      Date.ti
## 1 AW-N-Ox      N   -1 25/03/2016 00:04 2016-03-25 00:04:00
## 2 AW-T-Ox      T   -1 25/03/2016 00:04 2016-03-25 00:04:00
## 3 AW-S-Ox      S   -1 25/03/2016 00:04 2016-03-25 00:04:00
## 4 AW-N-O      N    0 30/03/2016 12:18 2016-03-30 12:18:00
## 5 AW-T-O      T    0 30/03/2016 12:18 2016-03-30 12:18:00
## 6 AW-S-O      S    0 30/03/2016 12:18 2016-03-30 12:18:00
## Conc.mug.g.dry.soil Conc.ComSoil.SD
## 1                    0.018
## 2                    0.020
## 3                    0.029
## 4                    1.398
## 5                    1.125
## 6                    2.881

```

```

weeklySoilIso = read.csv2("Data/SoilCompIsotopes_W1toW15.csv", header = TRUE)
weeklySoilIso <- weeklySoilIso[, c("Filename",
                                    "Repl",
                                    "d.13C.12C")]

colnames(weeklySoilIso)[colnames(weeklySoilIso) == "Filename"] <- "ID"

isoCompSummary = ddply(weeklySoilIso, c("ID"), summarise,
                        N_compsoil = length(d.13C.12C),
                        comp.d13C = mean(d.13C.12C),
                        comp.d13C.SD = sd(d.13C.12C),
                        comp.d13C.SE = comp.d13C.SD / sqrt(N_compsoil))

head(weeklySoilIso)

```

```

##      ID Repl d.13C.12C
## 1 AW-N-1    1  -31.846
## 2 AW-N-1    2  -31.123
## 3 AW-N-1    3  -29.546
## 4 AW-N-2    1  -30.167
## 5 AW-N-2    2  -30.289
## 6 AW-N-2    3  -30.079

```

```

head(isoCompSummary)

```

```

##      ID N_compsoil comp.d13C comp.d13C.SD comp.d13C.SE

```

```
## 1 AW-N-1      3 -30.83833    1.1761277    0.6790376
## 2 AW-N-10     2 -27.52900    1.1073292    0.7830000
## 3 AW-N-11     2 -27.97350    0.2057681    0.1455000
## 4 AW-N-12     3 -23.69467    0.3886056    0.2243616
## 5 AW-N-13     3 -22.77033    1.0776634    0.6221892
## 6 AW-N-14     3 -27.16533    1.3381466    0.7725793
```

2. Merge data

```
comp.CoIs = merge(weeklySoilConc, isoCompSummary, by = "ID", all = T)
comp.CoIs$Wnum = as.numeric(comp.CoIs$Wnum)
comp.CoIs <- comp.CoIs[order(comp.CoIs$Wnum),]
head(comp.CoIs)
```

```
##      ID Transect Wnum      Date.Soil      Date.ti
## 2  AW-N-0x      N   -1 25/03/2016 00:04 2016-03-25 00:04:00
## 19 AW-S-0x      S   -1 25/03/2016 00:04 2016-03-25 00:04:00
## 36 AW-T-0x      T   -1 25/03/2016 00:04 2016-03-25 00:04:00
## 1   AW-N-0      N    0 30/03/2016 12:18 2016-03-30 12:18:00
## 18  AW-S-0      S    0 30/03/2016 12:18 2016-03-30 12:18:00
## 35  AW-T-0      T    0 30/03/2016 12:18 2016-03-30 12:18:00
##      Conc.mug.g.dry.soil Conc.ComSoil.SD N_compsoil comp.d13C comp.d13C.SD
## 2              0.018              NA      NA      NA
## 19             0.029              NA      NA      NA
## 36             0.020              NA      NA      NA
## 1              1.398              NA      NA      NA
## 18             2.881              NA      NA      NA
## 35             1.125              NA      NA      NA
##      comp.d13C.SE
## 2              NA
## 19             NA
## 36             NA
## 1              NA
## 18             NA
## 35             NA
```

```
# Pure and cuve isotope average
d13Co = -31.2144

# Lab enrichment:

epsilon_max = -1.5
epsilon_min = -2.0

# Remaining fraction
comp.CoIs$DD13C.comp <- (comp.CoIs$comp.d13C - (d13Co))

# Max epsilon (30C, 20%)
comp.CoIs$f.comp <-
  ((10^(-3)*comp.CoIs$comp.d13C + 1)/(10^(-3)*d13Co + 1))^(1000/(epsilon_max))

comp.CoIs$B.comp <-
  (1 - comp.CoIs$f.comp)*100
```

```
# Min epsilon (20C, 40%)
comp.CoIs$f.min.comp <-
  ((10^(-3)*comp.CoIs$comp.d13C + 1)/(10^(-3)*d13Co + 1))^(1000/(epsilon_min))

comp.CoIs$B.min.comp <-
  (1 - comp.CoIs$f.min.comp)*100
```

3. Compute Spatial Soil S-metolachlor Mass at time t

This method assigns non-measured plots the soil concentration and isotope of its nearest transect. The total area for each transect is calculated such that:

$$M(t)_{Ta} = C(t)_T \cdot \rho \cdot A_T \cdot D.$$

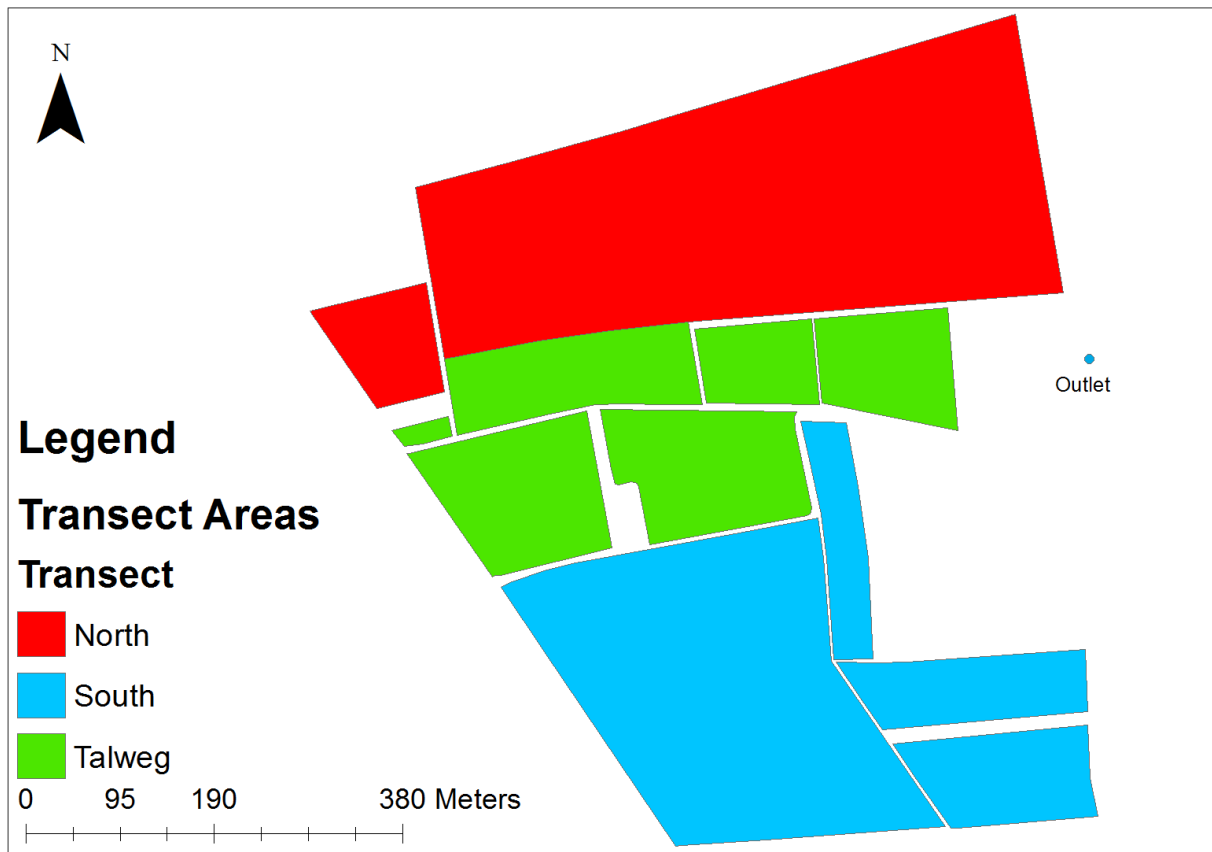


Figure 1: Transect Areas [Ha] (North: 14.995; Talweg: 8.774; South: 12.668)

Save files

```
head(comp.CoIs)
```

##	ID	Transect	Wnum	Date.Soil	Date.ti		
## 2	AW-N-Ox	N	-1	25/03/2016 00:04	2016-03-25 00:04:00		
## 19	AW-S-Ox	S	-1	25/03/2016 00:04	2016-03-25 00:04:00		
## 36	AW-T-Ox	T	-1	25/03/2016 00:04	2016-03-25 00:04:00		
## 1	AW-N-O	N	0	30/03/2016 12:18	2016-03-30 12:18:00		
## 18	AW-S-O	S	0	30/03/2016 12:18	2016-03-30 12:18:00		
## 35	AW-T-O	T	0	30/03/2016 12:18	2016-03-30 12:18:00		
##	Conc.mug.g.dry.soil	Conc.ComSoil.SD	N_compsoil	comp.d13C	comp.d13C.SD		
## 2	0.018		NA	NA	NA		
## 19	0.029		NA	NA	NA		
## 36	0.020		NA	NA	NA		
## 1	1.398		NA	NA	NA		
## 18	2.881		NA	NA	NA		
## 35	1.125		NA	NA	NA		
##	comp.d13C.SE	DD13C.comp	f.comp	B.comp	f.min.comp	B.min.comp	MassSoil.g
## 2	NA	NA	NA	NA	NA	NA	24.81725
## 19	NA	NA	NA	NA	NA	NA	31.73534
## 36	NA	NA	NA	NA	NA	NA	12.98510
## 1	NA	NA	NA	NA	NA	NA	1927.47345
## 18	NA	NA	NA	NA	NA	NA	3152.74237
## 35	NA	NA	NA	NA	NA	NA	730.41173

```
write.csv2(comp.CoIs,
           'Data/WeeklySoils_R.csv', row.names = F)
```