

Mass Soils - Composite Weeks Alteck 2016

PAZ

November 2016

Purpose

This file merges weekly composite concentrations and isotope data.

Imports:

- SoilCompConc_W1toW15.csv
- SoilCompIsotopes_W1toW15.csv

Generates:

- WeeklySoils_Rng.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] "/Users/DayTightChunks/Documents/PhD/HydrologicalMonitoring"
```

Lab Parameters

```
source("global.R")
```

Field Assumptions

```
# S-metolachlor Mass [g]
# Conc. [ug/g dry soil] * [g/106 ug] * density [g/m3] * depth [m]* A [m2]
# Soil bulk density: 2.2 [g/cm3] or 0.99 [g/cm3] -> Leaching experiments: 0.99 [g/cm3] or 0.99 x 106 g

# Fresh tilled
rho1 = 0.98*106 # soil density [g/m3] Leaching experiment, "freshly tilled" soil
depth1 = 0.015 # [m] # Fresh tilled

rho1.Sa = 0.98*106 # S is different due to less area prop being fresh tilled
depth1.Sa = 0.011 # [m]
```

```

rho1.Sb = 0.98*106 # S is different due to fresh tilling on Burger near April 14
depth1.Sb = 0.015 # [m]

rho1.T = 0.98*106 # T is different due to observed early crusting
depth1.T = 0.01 # [m]

# Mid April
# rho2 = 2.20*106 # soil density [g/m3] Lefrancq's measuremnts after major May rainfall event
rho2 = 0.99*106
depth2 = 0.015 # [m] # Mid april

# Early May
rho3 = 0.99*106 # 0.99*106
depth3 = 0.0046 # [m] # Early may

# Extrapolated Transect Areas pre-corn applications
# Area_Na = 13.92663*104 # [m2]

# Extrapolated
# Assumptions on Non-measured plots - Transect assignment:
#Area_Ta = 6.55813*104 # [m2] # South Burger's as Talweg
#Area_Sa = 11.05376*104 # [m2] # South Burger's as Talweg
# Area_Ta = 4.37134*104 # [m2]
# Area_Sa = 13.3175*104 # [m2] # South Burger's as South

# Transect Areas post Corn applications (not on transect)
#Area_Nb = 14.9949*104 # [m2]

# Assumptions on Non-measured plots - Transect assignment:
#Area_Tb = 6.55813*104 # [m2] # South Burger's as Talweg
#Area_Sb = 11.65202*104 # [m2] # South Burger's as Talweg
#Area_Tb = 4.37134*104 # [m2]
#Area_Sb = 13.91767*104 # [m2] # South Burger's as South

# Not extrapolated (only where mass was applied & measured)
# Area_Na = 84580.901
# Area_Ta = 29863.690
# Area_Sa = 94205.501

Area_Nb = 101721.702
Area_Tb = 39247.330
Area_Sb = 100245.721

Area_Na = Area_Nb
Area_Ta = Area_Tb
Area_Sa = Area_Sb

Area_tot <- Area_Nb + Area_Tb + Area_Sb
Area_tot/104

## [1] 24.12148

```

Composite Concentrations & Isotope Data - Alteckendorf 2016

1. Import CSV files

```
#weeklySoilConc = read.csv2("Data/SoilCompConc_W1toW15.csv", header = TRUE)
# Date format stopped working in CSV
# Convert in CSV via "=TEXT(CELL.ID, "dd/mm/yyyy hh:mm")" based on xls-file date

weeklySoilConc = read.csv2("Data/SoilCompConc_W1toW15.csv", header = TRUE, dec = ".")
if (length(weeklySoilConc) == 1){
  weeklySoilConc = read.csv("Data/SoilCompConc_W1toW15.csv", header = TRUE)
}
head(weeklySoilConc)

##   Filename ID Transect Wnum Sample.Date      Date.Soil
## 1  AW-N-Ox AW         N   -1  30/03/2016  25/03/2016  00:04
## 2  AW-T-Ox AW         T   -1  30/03/2016  25/03/2016  00:04
## 3  AW-S-Ox AW         S   -1  30/03/2016  25/03/2016  00:04
## 4   AW-N-O AW         N    0  30/03/2016  30/03/2016  12:18
## 5   AW-T-O AW         T    0  30/03/2016  30/03/2016  12:18
## 6   AW-S-O AW         S    0  30/03/2016  30/03/2016  12:18
##   Conc.mug.g.dry.soil Conc.ComSoil.SD Mass.Soil.g theta.prct
## 1             0.06859297           0.01028895          NA      NA
## 2             0.04380646           0.00657097          NA      NA
## 3             0.07602098           0.01140315          NA      NA
## 4             1.03755848           0.15563377          NA      NA
## 5             0.93422934           0.14013440          NA      NA
## 6             3.73797761           0.56069664          NA      NA

weeklySoilConc$Date.ti <- as.POSIXct(strptime(weeklySoilConc$Date.Soil, "%d/%m/%Y %H:%M", tz="EST"))
sum(is.na(weeklySoilConc$Date.ti))

## [1] 0

# View(weeklySoilConc)
names(weeklySoilConc)

## [1] "Filename"          "ID"                 "Transect"
## [4] "Wnum"              "Sample.Date"        "Date.Soil"
## [7] "Conc.mug.g.dry.soil" "Conc.ComSoil.SD"    "Mass.Soil.g"
## [10] "theta.prct"        "Date.ti"

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

colnames(weeklySoilConc)[colnames(weeklySoilConc) == "Filename"] <- "ID"
print("Soil Composites- Concentrations")

## [1] "Soil Composites- Concentrations"
```

```

str(weeklySoilConc)

## 'data.frame':   51 obs. of  9 variables:
##  $ ID                : Factor w/ 51 levels "AW-N-0","AW-N-0x",...: 2 36 19 1 35 18 3 10 11 12 ...
##  $ Transect          : Factor w/ 3 levels "N","S","T": 1 3 2 1 3 2 1 1 1 1 ...
##  $ Wnum              : int  -1 -1 -1 0 0 0 1 2 3 4 ...
##  $ Date.Soil         : Factor w/ 17 levels "03/05/2016 13:10",...: 13 13 13 16 16 16 3 7 10 14 ...
##  $ Date.ti           : POSIXct, format: "2016-03-25 00:04:00" "2016-03-25 00:04:00" ...
##  $ Conc.mug.g.dry.soil: num  0.0686 0.0438 0.076 1.0376 0.9342 ...
##  $ Conc.ComSoil.SD    : num  0.01029 0.00657 0.0114 0.15563 0.14013 ...
##  $ Mass.Soil.g        : num  NA NA NA NA NA ...
##  $ theta.prct         : num  NA NA NA NA NA ...

# After nanogram revision
weeklySoilIso = read.csv2("Data/SoilCompIsotopes_W1toW15.csv", header = TRUE, dec = ".")
if (length(weeklySoilIso) == 1){
  weeklySoilIso = read.csv("Data/SoilCompIsotopes_W1toW15.csv", header = T)
}
colnames(weeklySoilIso)

## [1] "Filename" "ID" "Transect" "Num" "Repl" "d.13C.12C"

weeklySoilIso$ID <- NULL
weeklySoilIso <- weeklySoilIso[complete.cases(weeklySoilIso[, "d.13C.12C"]), ]

# Correct for soil shift
weeklySoilIso$d.13C.12C = round( (weeklySoilIso$d.13C.12C - meanshift), 1)
weeklySoilIso$DD13 <- weeklySoilIso$d.13C.12C - initialDelta
colnames(weeklySoilIso)[colnames(weeklySoilIso) == "Filename"] <- "ID"

weeklySoilIso <- weeklySoilIso[, c("ID",
                                   # "Repl",
                                   "d.13C.12C",
                                   "DD13"
                                   )]

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),
  N_isoComp = length(d.13C.12C)
  # comp.d13C.SE = comp.d13C.SD / sqrt(N_compsoil),
  # N_ngC = length(ngC),
  # ngC.mean = mean(ngC),
  # ngC.SD = sd(ngC) #,
  # ngC.SE = ngC.SD/sqrt(N_ngC)
)

isoCompSummary$prctError <- (isoCompSummary$comp.d13C.SD/isoCompSummary$comp.d13C)*-100
mean(!is.na(isoCompSummary$prctError))

## [1] 0.9705882

# sum(isoCompSummary$N_ngC == 2)/(sum(isoCompSummary$N_ngC == 2) + sum(isoCompSummary$N_ngC > 2))

```

```
print("Soil Composites - Isotopes All")
```

```
## [1] "Soil Composites - Isotopes All"
```

```
str(weeklySoilIso)
```

```
## 'data.frame': 96 obs. of 3 variables:
## $ ID : Factor w/ 41 levels "AW-N-1","AW-N-10",...: 1 1 1 2 2 2 3 3 4 6 ...
## $ d.13C.12C: num -31.9 -31.4 -30.9 -29.9 -29.6 -29.9 -29.4 -29.5 -29.5 -31.2 ...
## $ DD13 : num 0.4 0.9 1.4 2.4 2.7 ...
```

```
print("Soil Composites - Isotopes Ave and St.Dev.")
```

```
## [1] "Soil Composites - Isotopes Ave and St.Dev."
```

```
str(isoCompSummary)
```

```
## 'data.frame': 34 obs. of 6 variables:
## $ ID : Factor w/ 41 levels "AW-N-1","AW-N-10",...: 1 2 3 4 5 6 7 8 9 10 ...
## $ N_compsoil : int 3 3 2 1 2 3 3 3 2 3 ...
## $ comp.d13C : num -31.4 -29.8 -29.4 -29.5 -28.9 ...
## $ comp.d13C.SD: num 0.5 0.1732 0.0707 NA 0.3536 ...
## $ N_isoComp : int 3 3 2 1 2 3 3 3 2 3 ...
## $ prctError : num 1.592 0.581 0.24 NA 1.221 ...
```

2. Merge lab concentrations and isotopes

```
comp.CoIs = merge(weeklySoilConc, isoCompSummary, by = "ID", all = T)
comp.CoIs$Wnum = as.numeric(comp.CoIs$Wnum)
comp.CoIs <- comp.CoIs[order(comp.CoIs$Wnum),]
comp.CoIs$DD13C.comp <- (comp.CoIs$comp.d13C - (d13Co))
```

```
comp.CoIs$comp.IMP.d13C <- comp.CoIs$comp.d13C
comp.CoIs$comp.IMP.d13C[is.na(comp.CoIs$comp.d13C)] <-
  ave(comp.CoIs$comp.d13C,
      comp.CoIs$Wnum,
      FUN= function(x) mean(x, na.rm = T))[is.na(comp.CoIs$comp.d13C)]
```

```
# comp.CoIs$comp.d13C <- ifelse(is.na(comp.CoIs$comp.d13C), comp.CoIs$comp.IMP.d13C, comp.CoIs$comp.d13C)
```

```
print("Merged Soil Concentrations and Isotopes")
```

```
## [1] "Merged Soil Concentrations and Isotopes"
```

```
str(comp.CoIs)
```

```
## 'data.frame': 51 obs. of 16 variables:
## $ ID : Factor w/ 51 levels "AW-N-0","AW-N-0x",...: 2 19 36 1 18 35 3 20 37 10 ...
## $ Transect : Factor w/ 3 levels "N","S","T": 1 2 3 1 2 3 1 2 3 1 ...
## $ Wnum : num -1 -1 -1 0 0 0 1 1 1 2 ...
## $ Date.Soil : Factor w/ 17 levels "03/05/2016 13:10",...: 13 13 13 16 16 16 3 3 3 7 ...
## $ Date.ti : POSIXct, format: "2016-03-25 00:04:00" "2016-03-25 00:04:00" ...
## $ Conc.mug.g.dry.soil: num 0.0686 0.076 0.0438 1.0376 3.738 ...
## $ Conc.ComSoil.SD : num 0.01029 0.0114 0.00657 0.15563 0.5607 ...
## $ Mass.Soil.g : num NA NA NA NA NA ...
## $ theta.prct : num NA NA NA NA NA ...
## $ N_compsoil : int NA NA NA NA NA NA 3 3 3 3 ...
```

```
## $ comp.d13C          : num  NA NA NA NA NA ...
## $ comp.d13C.SD       : num  NA NA NA NA NA ...
## $ N_isoComp          : int   NA NA NA NA NA NA 3 3 3 ...
## $ prctError          : num   NA NA NA NA NA ...
## $ DD13C.comp         : num   NA NA NA NA NA ...
## $ comp.IMP.d13C      : num  NaN NaN NaN NaN NaN ...
```

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

3. Compute Soil S-metolachlor Mass at time t across space

For non-measured plots, the soil concentration and isotope measured at the nearest transect is assumed. The total area for each transect at the end of the season is shown below. Corn fields in the catchment were known to have received S-metolachlor applications only during the last week of May, 2017. Given that two of these plots were not included within the transects, their area was not accounted for but until after the known application dates for corn plots.

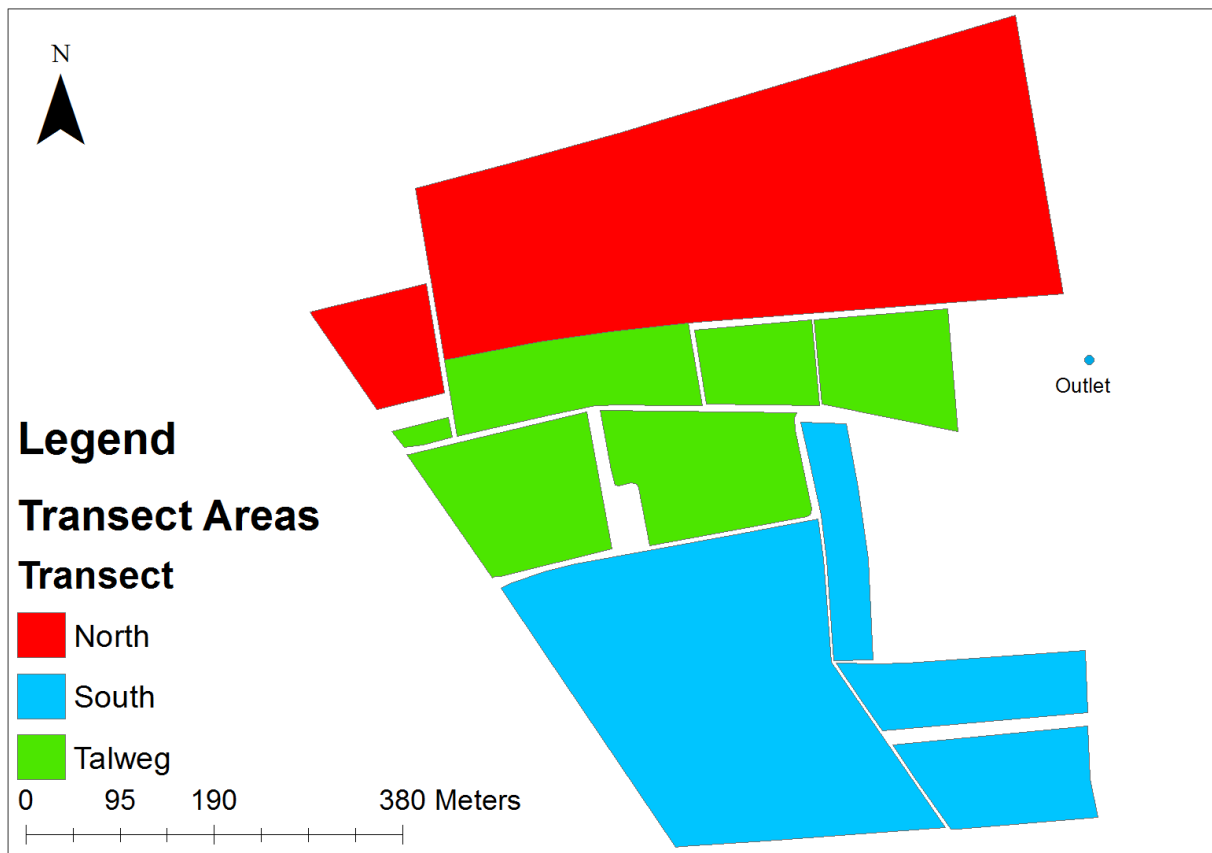


Figure 1: Transect Areas [Ha] (North: 14.995; Talweg: 4.371; South: 13.918)

```
# Check values:
Area_Nb/10000
```

```
## [1] 10.17217
```

```
Area_Tb/10000
```

```
## [1] 3.924733
```

```
Area_Sb/10000
```

```
## [1] 10.02457
```

The total pesticide mass for each transect at time t is then given by:

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

```
# S-metolachlor Mass [g]
# Conc. [ug/g dry soil] * [g/10^6 ug] * density [g/m3] * depth [m]* A [m2]
# Soil bulk density: 2200 or 0.99? -> Leaching experiments: 0.99 [g/cm3]
rho1 # soil density [g/m3]
```

```
## [1] 980000
```

```
rho2 # soil density [g/m3]
```

```
## [1] 990000
```

```
depth1 # [m]
```

```
## [1] 0.015
```

```
depth2
```

```
## [1] 0.015
```

```
# Transect Areas pre-corn applications
```

```
Area_Na # [m2]
```

```
## [1] 101721.7
```

```
Area-Ta # [m2]
```

```
## [1] 39247.33
```

```
Area-Sa # [m2]
```

```
## [1] 100245.7
```

```
Area_early <- Area_Na + Area-Ta + Area-Sa
```

```
# Transect Areas post Corn applications (not on transect)
```

```
Area-Nb # [m2]
```

```
## [1] 101721.7
```

```
Area-Tb # [m2]
```

```
## [1] 39247.33
```

```
Area-Sb # [m2]
```

```
## [1] 100245.7
```

```
# Assign new column for S-metolachlor mass in grams
```

```
comp.CoIs$MassSoil.g <- NA
```

```
comp.CoIs$MassSoil.g.SD <- NA
```

```
# Areas with S-metolachlor before week 9 (no longer used, as Effected Composite Area is used)
```

```
#comp.CoIs$MassSoil.g <-
```

```
# ifelse((comp.CoIs$Transect == "N" & comp.CoIs$Wnum < 8),
```

```
# comp.CoIs$Conc.mug.g.dry.soil*10^-6*rho*depth*Area_Na,
```

```

# ifelse((comp.CoIs$Transect == "T" & comp.CoIs$Wnum < 8),
#       comp.CoIs$Conc.mug.g.dry.soil*10-6*rho*depth*Area_Ta,
#       ifelse((comp.CoIs$Transect == "S" & comp.CoIs$Wnum < 8),
#             comp.CoIs$Conc.mug.g.dry.soil*10-6*rho*depth*Area_Sa, comp.CoIs$MassSoil.g)))

#comp.CoIs$MassSoil.g.SD <-
# ifelse((comp.CoIs$Transect == "N" & comp.CoIs$Wnum < 8),
#       comp.CoIs$Conc.ComSoil.SD*10-6*rho*depth*Area_Na,
#       ifelse((comp.CoIs$Transect == "T" & comp.CoIs$Wnum < 8),
#             comp.CoIs$Conc.ComSoil.SD*10-6*rho*depth*Area_Ta,
#             ifelse((comp.CoIs$Transect == "S" & comp.CoIs$Wnum < 8),
#                   comp.CoIs$Conc.ComSoil.SD*10-6*rho*depth*Area_Sa, comp.CoIs$MassSoil.g.SD)))

# Difference in Bulk Density after 100 mm cumulative rain
comp.CoIs$MassSoil.g <-
  ifelse((comp.CoIs$Transect == "N"
    & comp.CoIs$Date.ti <= as.POSIXct("2016-04-14 13:52:00", tz = "EST")),
    comp.CoIs$Conc.mug.g.dry.soil*10-6*rho1*depth1*Area_Na,
    ifelse((comp.CoIs$Transect == "T"
    & comp.CoIs$Date.ti <= as.POSIXct("2016-04-14 13:52:00", tz = "EST")),
    comp.CoIs$Conc.mug.g.dry.soil*10-6*rho1.T*depth1.T*Area_Ta,
    ifelse((comp.CoIs$Transect == "S"
    & comp.CoIs$Date.ti < as.POSIXct("2016-04-14 13:52:00", tz = "EST")), # Note only "<"
    comp.CoIs$Conc.mug.g.dry.soil*10-6*rho1.Sa*depth1.Sa*Area_Sa, comp.CoIs$MassSoil.g)))

comp.CoIs$MassSoil.g.SD <-
  ifelse((comp.CoIs$Transect == "N" & comp.CoIs$Date.ti <= as.POSIXct("2016-04-14 13:52:00", tz = "EST"),
    comp.CoIs$Conc.ComSoil.SD*10-6*rho1*depth1*Area_Na,
    ifelse((comp.CoIs$Transect == "T" & comp.CoIs$Date.ti <= as.POSIXct("2016-04-14 13:52:00", tz = "EST"),
    comp.CoIs$Conc.ComSoil.SD*10-6*rho1*depth1*Area_Ta,
    ifelse((comp.CoIs$Transect == "S" & comp.CoIs$Date.ti < as.POSIXct("2016-04-14 13:52:00", tz = "EST"),
    comp.CoIs$Conc.ComSoil.SD*10-6*rho1*depth1*Area_Sa, comp.CoIs$MassSoil.g.SD)))

# Mid april - Mid May
comp.CoIs$MassSoil.g <-
  ifelse((comp.CoIs$Transect == "N"
    & comp.CoIs$Date.ti > as.POSIXct("2016-04-14 13:52:00", tz = "EST")
    & comp.CoIs$Date.ti <= as.POSIXct("2016-05-10 00:06:00", tz = "EST")),
    comp.CoIs$Conc.mug.g.dry.soil*10-6*rho2*depth2*Area_Na,
    ifelse((comp.CoIs$Transect == "T"
    & comp.CoIs$Date.ti > as.POSIXct("2016-04-14 13:52:00", tz = "EST")
    & comp.CoIs$Date.ti <= as.POSIXct("2016-05-10 00:06:00", tz = "EST")),
    comp.CoIs$Conc.mug.g.dry.soil*10-6*rho2*depth2*Area_Ta,
    ifelse((comp.CoIs$Transect == "S"
    & comp.CoIs$Date.ti == as.POSIXct("2016-04-14 13:52:00", tz = "EST")),
    comp.CoIs$Conc.mug.g.dry.soil*10-6*rho1.Sb*depth1.Sb*Area_Sa,
    ifelse((comp.CoIs$Transect == "S"
    & comp.CoIs$Date.ti > as.POSIXct("2016-04-14 13:52:00", tz = "EST")
    & comp.CoIs$Date.ti <= as.POSIXct("2016-05-10 00:06:00", tz = "EST")),
    comp.CoIs$Conc.mug.g.dry.soil*10-6*rho2*depth2*Area_Sa, comp.CoIs$MassSoil.g))))

comp.CoIs$MassSoil.g.SD <-
  ifelse((comp.CoIs$Transect == "N"

```



```

      & comp.CoIs$Date.ti > as.POSIXct("2016-04-14 13:52:00", tz = "EST")
      & comp.CoIs$Date.ti <= as.POSIXct("2016-05-10 00:06:00", tz = "EST")),
    comp.CoIs$Conc.ComSoil.SD*10-6*rho2*depth2*Area_Na,
  ifelse((comp.CoIs$Transect == "T"
    & comp.CoIs$Date.ti > as.POSIXct("2016-04-14 13:52:00", tz = "EST")
    & comp.CoIs$Date.ti <= as.POSIXct("2016-05-10 00:06:00", tz = "EST")),
    comp.CoIs$Conc.ComSoil.SD*10-6*rho2*depth2*Area_Ta,
  ifelse((comp.CoIs$Transect == "S"
    & comp.CoIs$Date.ti > as.POSIXct("2016-04-14 13:52:00", tz = "EST")
    & comp.CoIs$Date.ti <= as.POSIXct("2016-05-10 00:06:00", tz = "EST")),
    comp.CoIs$Conc.ComSoil.SD*10-6*rho2*depth2*Area_Sa, comp.CoIs$MassSoil.g.SD)))

# Mid May onwards
comp.CoIs$MassSoil.g <-
  ifelse((comp.CoIs$Transect == "N" & comp.CoIs$Date.ti > as.POSIXct("2016-05-10 00:06:00", tz = "EST")),
    comp.CoIs$Conc.mug.g.dry.soil*10-6*rho3*depth3*Area_Nb,
  ifelse((comp.CoIs$Transect == "T" & comp.CoIs$Date.ti >= as.POSIXct("2016-05-10 00:06:00", tz = "EST")),
    comp.CoIs$Conc.mug.g.dry.soil*10-6*rho3*depth3*Area_Tb,
  ifelse((comp.CoIs$Transect == "S" & comp.CoIs$Date.ti >= as.POSIXct("2016-05-10 00:06:00", tz = "EST")),
    comp.CoIs$Conc.mug.g.dry.soil*10-6*rho3*depth3*Area_Sb, comp.CoIs$MassSoil.g)))

comp.CoIs$MassSoil.g.SD <-
  ifelse((comp.CoIs$Transect == "N" & comp.CoIs$Date.ti >= as.POSIXct("2016-05-10 00:06:00", tz = "EST")),
    comp.CoIs$Conc.ComSoil.SD*10-6*rho3*depth3*Area_Nb,
  ifelse((comp.CoIs$Transect == "T" & comp.CoIs$Date.ti >= as.POSIXct("2016-05-10 00:06:00", tz = "EST")),
    comp.CoIs$Conc.ComSoil.SD*10-6*rho3*depth3*Area_Tb,
  ifelse((comp.CoIs$Transect == "S" & comp.CoIs$Date.ti >= as.POSIXct("2016-05-10 00:06:00", tz = "EST")),
    comp.CoIs$Conc.ComSoil.SD*10-6*rho3*depth3*Area_Sb, comp.CoIs$MassSoil.g.SD)))

# Areas as variables (for later computation of bulk catchment mass)
comp.CoIs$Area.N <-
  ifelse((comp.CoIs$Wnum < 8), Area_Na, Area_Nb)

comp.CoIs$Area.T <-
  ifelse((comp.CoIs$Wnum < 8), Area_Ta, Area_Tb)

comp.CoIs$Area.S <-
  ifelse((comp.CoIs$Wnum < 8), Area_Sa, Area_Sb)

# Needed to compute Transect res
#comp.CoIs$Area_Nt <- Area_Nt # [m2]
#comp.CoIs$Area_Tt <- Area_Tt
#comp.CoIs$Area_St <- Area_St

names(comp.CoIs)

## [1] "ID" "Transect" "Wnum"
## [4] "Date.Soil" "Date.ti" "Conc.mug.g.dry.soil"
## [7] "Conc.ComSoil.SD" "Mass.Soil.g" "theta.prct"
## [10] "N_compsoil" "comp.d13C" "comp.d13C.SD"
## [13] "N_isoComp" "prctError" "DD13C.comp"
## [16] "comp.IMP.d13C" "MassSoil.g" "MassSoil.g.SD"
## [19] "Area.N" "Area.T" "Area.S"

```

```
print("S-meto mass per transect at time-t")
```

```
## [1] "S-meto mass per transect at time-t"
```

```
str(comp.CoIs)
```

```
## 'data.frame': 51 obs. of 21 variables:
## $ ID : Factor w/ 51 levels "AW-N-0","AW-N-0x",...: 2 19 36 1 18 35 3 20 37 10 ...
## $ Transect : Factor w/ 3 levels "N","S","T": 1 2 3 1 2 3 1 2 3 1 ...
## $ Wnum : num -1 -1 -1 0 0 0 1 1 1 2 ...
## $ Date.Soil : Factor w/ 17 levels "03/05/2016 13:10",...: 13 13 13 16 16 16 3 3 3 7 ...
## $ Date.ti : POSIXct, format: "2016-03-25 00:04:00" "2016-03-25 00:04:00" ...
## $ Conc.mug.g.dry.soil: num 0.0686 0.076 0.0438 1.0376 3.738 ...
## $ Conc.ComSoil.SD : num 0.01029 0.0114 0.00657 0.15563 0.5607 ...
## $ Mass.Soil.g : num NA NA NA NA NA ...
## $ theta.prct : num NA NA NA NA NA ...
## $ N_compsoil : int NA NA NA NA NA NA 3 3 3 3 ...
## $ comp.d13C : num NA NA NA NA NA ...
## $ comp.d13C.SD : num NA NA NA NA NA ...
## $ N_isoComp : int NA NA NA NA NA NA 3 3 3 3 ...
## $ prctError : num NA NA NA NA NA ...
## $ DD13C.comp : num NA NA NA NA NA ...
## $ comp.IMP.d13C : num NaN NaN NaN NaN NaN ...
## $ MassSoil.g : num 102.6 82.2 16.8 1551.5 4039.4 ...
## $ MassSoil.g.SD : num 15.39 16.8 3.79 232.72 826.25 ...
## $ Area.N : num 101722 101722 101722 101722 101722 ...
## $ Area.T : num 39247 39247 39247 39247 39247 ...
## $ Area.S : num 1e+05 1e+05 1e+05 1e+05 1e+05 ...
```

```
tail(comp.CoIs)
```

```
##      ID Transect Wnum      Date.Soil      Date.ti
## 8  AW-N-14      N   14 04/07/2016 14:42 2016-07-04 14:42:00
## 25 AW-S-14      S   14 04/07/2016 14:42 2016-07-04 14:42:00
## 42 AW-T-14      T   14 04/07/2016 14:42 2016-07-04 14:42:00
## 9  AW-N-15      N   15 12/07/2016 01:00 2016-07-12 01:00:00
## 26 AW-S-15      S   15 12/07/2016 01:00 2016-07-12 01:00:00
## 43 AW-T-15      T   15 12/07/2016 01:00 2016-07-12 01:00:00
##      Conc.mug.g.dry.soil Conc.ComSoil.SD Mass.Soil.g theta.prct N_compsoil
## 8      0.8117856      0.1017618      5.1659      7.837371      2
## 25      1.1923654      0.1788548      5.0243      8.031772      NA
## 42      1.8513245      0.2776987      5.1650     10.131878      2
## 9      1.1158234      0.1673735      5.0318     13.933539      NA
## 26      1.3545025      0.2031754      5.0093     13.933539      NA
## 43      1.5305563      0.2295834      5.0413     13.062549      NA
##      comp.d13C comp.d13C.SD N_isoComp prctError DD13C.comp comp.IMP.d13C
## 8      -28.95      0.3535534      2 1.2212552      3.35      -28.950
## 25      NA      NA      NA      NA      NA      -28.425
## 42      -27.90      0.1414214      2 0.5068866      4.40      -27.900
## 9      NA      NA      NA      NA      NA      NaN
## 26      NA      NA      NA      NA      NA      NaN
## 43      NA      NA      NA      NA      NA      NaN
##      MassSoil.g MassSoil.g.SD Area.N Area.T Area.S
## 8      376.0521      47.14021 101721.7 39247.33 100245.7
## 25      544.3375      81.65062 101721.7 39247.33 100245.7
```

```
## 42    330.8916      49.63373 101721.7 39247.33 100245.7
## 9     516.8947      77.53421 101721.7 39247.33 100245.7
## 26    618.3561      92.75342 101721.7 39247.33 100245.7
## 43    273.5599      41.03399 101721.7 39247.33 100245.7
write.csv2(comp.CoIs, 'Data/WeeklySoils_Rng.csv', row.names = F)
```