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

```
# Pure and cuve isotope average
d13Co = -32.253
```

Field Assumptions

```
# S-metolachlor Mass [g]
# Conc. [ug/g dry soil] * [g/10^6 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 10^6 g

# Fresh tilled
rho1 = 0.98*10^6 # soil density [g/m3] Leaching experiment, "freshly tilled" soil
depth1 = 0.015 # [m] # Fresh tilled

rho1.Sa = 0.98*10^6 # S is different due to less area prop being fresh tilled
```

```
depth1.Sa = 0.011 # [m]

rho1.Sb = 0.98*10^6 # S is different due to fresh tilling on Burger near April 14
depth1.Sb = 0.015 # [m]

rho1.T = 0.98*10^6 # T is different due to observed early crusting
depth1.T = 0.01 # [m]

# Mid April
# rho2 = 2.20*10^6 # soil density [g/m3] Lefrancq's measuremnts after major May rainfall event
rho2 = 0.99*10^6
depth2 = 0.015 # [m] # Mid april

# Early May
rho3 = 0.99*10^6 # 0.99*10^6
depth3 = 0.0046 # [m] # Early may

# Extrapolated Transect Areas pre-corn applications
# Area_Na = 13.92663*10^4 # [m2]

# Extrapolated
# Assumptions on Non-measured plots - Transect assignment:
#Area_Ta = 6.55813*10^4  # [m2] # South Burger's as Talweg
#Area_Sa = 11.05376*10^4 # [m2] # South Burger's as Talweg
# Area_Ta = 4.37134*10^4  # [m2]
# Area_Sa = 13.3175*10^4 # [m2] # South Burger's as South



# Transect Areas post Corn applications (not on transect)
#Area_Nb = 14.9949*10^4 # [m2]

# Assumptions on Non-measured plots - Transect assignment:
#Area_Tb = 6.55813*10^4  # [m2] # South Burger's as Talweg
#Area_Sb = 11.65202*10^4 # [m2] # South Burger's as Talweg
#Area_Tb = 4.37134*10^4  # [m2]
#Area_Sb = 13.91767*10^4 # [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/10^4
```

```
## [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-0x AW        N   -1  30/03/2016 25/03/2016 00:04
## 2  AW-T-0x AW        T   -1  30/03/2016 25/03/2016 00:04
## 3  AW-S-0x AW        S   -1  30/03/2016 25/03/2016 00:04
## 4   AW-N-0 AW        N    0  30/03/2016 30/03/2016 12:18
## 5   AW-T-0 AW        T    0  30/03/2016 30/03/2016 12:18
## 6   AW-S-0 AW        S    0  30/03/2016 30/03/2016 12:18
##   Conc.mug.g.dry.soil Conc.ComSoil.SD
## 1          0.06859297      0.01028895
## 2          0.04380646      0.00657097
## 3          0.07602098      0.01140315
## 4          1.03755848      0.15563377
## 5          0.93422934      0.14013440
## 6          3.73797761      0.56069664
```

```
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"     "Date.ti"
```

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

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

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

```r
str(weeklySoilConc)
```

```
## 'data.frame':    51 obs. of  7 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 ...
```

```r
# 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"
```

```r
weeklySoilIso$ID <- NULL
weeklySoilIso <- weeklySoilIso[complete.cases(weeklySoilIso[, "d.13C.12C"]), ]
weeklySoilIso$DD13 <- weeklySoilIso$d.13C.12C - -32.253
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
```

```r
# 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 ...
##  $ DD13     : num  0.363 0.863 1.353 2.353 2.693 ...
```

```
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 -29.5 -29.5 -29 ...
##  $ comp.d13C.SD: num  0.495 0.1935 0.0636 NA 0.4031 ...
##  $ N_isoComp   : int  3 3 2 1 2 3 3 3 2 3 ...
##  $ prctError   : num  1.577 0.65 0.216 NA 1.392 ...
```

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.d13

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

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

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

```
## 'data.frame':    51 obs. of  14 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 ...
##  $ 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 ...
```

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

For non-measured plots, the soil concentration and isotope measured at the neareast 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.

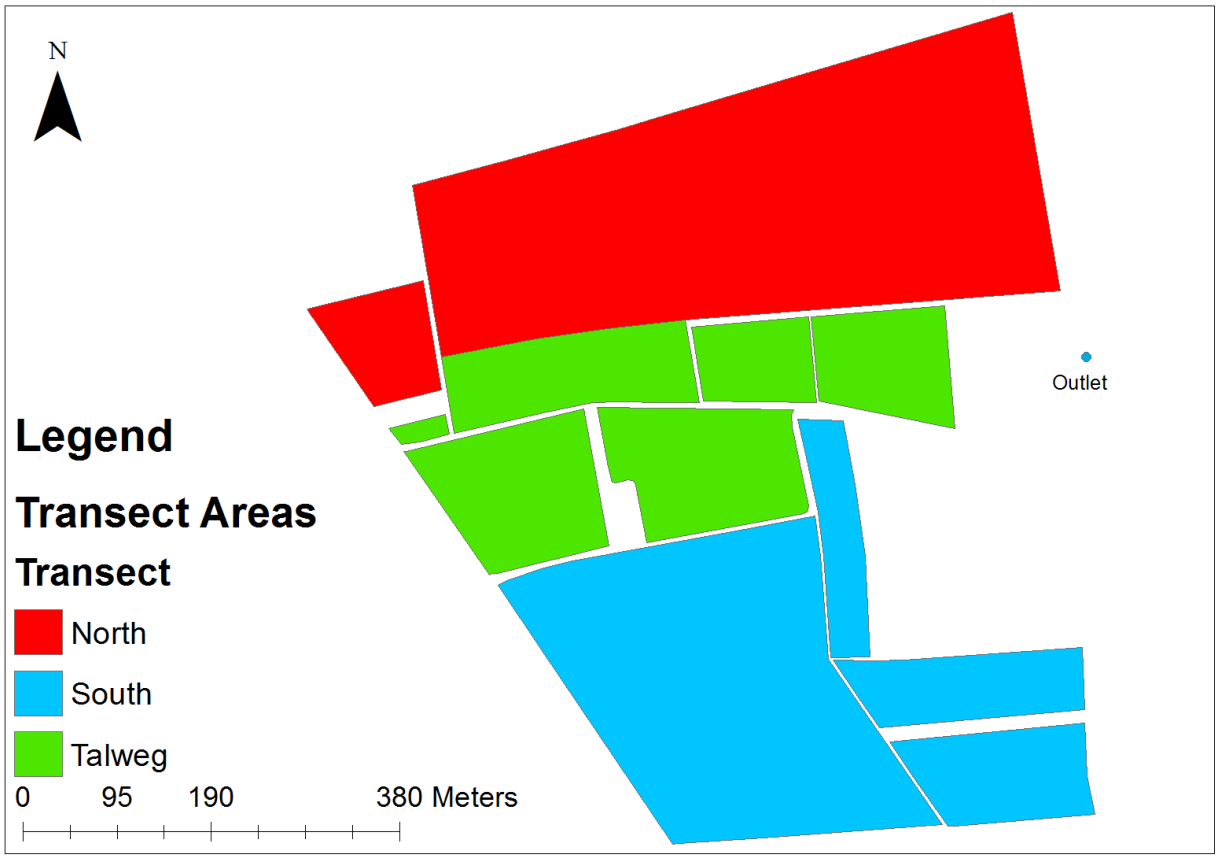

Figure 1: Transect Areas $[Ha]$ (North: 14.995; Talweg: 4.371; South: 13.918)

```
# 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"    "N_compsoil"         "comp.d13C"
## [10] "comp.d13C.SD"       "N_isoComp"          "prctError"
## [13] "DD13C.comp"         "comp.IMP.d13C"      "MassSoil.g"
## [16] "MassSoil.g.SD"      "Area.N"             "Area.T"
## [19] "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  19 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 ...
##  $ 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 N_compsoil comp.d13C comp.d13C.SD
## 8            0.8117856       0.1017618          2   -28.965    0.4030509
## 25           1.1923654       0.1788548         NA        NA           NA
## 42           1.8513245       0.2776987          2   -27.900    0.1414214
## 9            1.1158234       0.1673735         NA        NA           NA
## 26           1.3545025       0.2031754         NA        NA           NA
## 43           1.5305563       0.2295834         NA        NA           NA
##    N_isoComp prctError DD13C.comp comp.IMP.d13C MassSoil.g MassSoil.g.SD
## 8          2 1.3915100      3.288      -28.9650   376.0521      47.14021
## 25        NA        NA         NA      -28.4325   544.3375      81.65062
## 42         2 0.5068866      4.353      -27.9000   330.8916      49.63373
## 9         NA        NA         NA           NaN   516.8947      77.53421
## 26        NA        NA         NA           NaN   618.3561      92.75342
## 43        NA        NA         NA           NaN   273.5599      41.03399
##      Area.N   Area.T   Area.S
## 8  101721.7 39247.33 100245.7
## 25 101721.7 39247.33 100245.7
## 42 101721.7 39247.33 100245.7
## 9  101721.7 39247.33 100245.7
## 26 101721.7 39247.33 100245.7
## 43 101721.7 39247.33 100245.7
```

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