Soils & Discharge Merged

PAZ

17 novembre 2016

Purpose

This file merges outlet data with soil data to plot cumulative exported and remaining S-metolachlor mass. The nearest soil sample date for each transect is used to match the initial time ("ti") of the sampling discharge period. This is most adequate merging location given that samples took place shortly before relaunching the automatic sampler.

Note that week numbers for water and soils are offset by one. I.e. Week 1 soils influence/regulate Week 2's water sample results.

Imports:

- **WeeklyHydroContam__R.csv**
- **WeeklySoils__R.csv**

Generates:

- **WeekSoilHydroCont__R.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"
```

Import files

```
outlet = read.csv2("Data/WeeklyHydroContam_R.csv", header = T)
outlet$ti <- as.POSIXct(outlet$ti, "%Y-%m-%d %H:%M", tz = "EST")
sum(is.na(outlet$ti))
```

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

1

```r
head(outlet)
```

```
##                     ti WeekSubWeek                  tf      iflux      fflux
## 1 2016-03-25 00:04:00       W0-0x 2016-03-25 12:02:00   1.248600   1.129227
## 2 2016-03-25 12:04:00       W0-1  2016-03-28 22:36:00   1.124382   1.313125
## 3 2016-03-28 22:38:00       W0-2x 2016-03-30 12:16:00   1.308100   1.456349
## 4 2016-03-30 12:18:00       W1-1  2016-03-31 15:34:00   1.456080  16.445436
## 5 2016-03-31 15:36:00       W1-2  2016-04-01 14:44:00  16.334349  15.184536
## 6 2016-04-01 14:46:00       W1-3x 2016-04-05 15:06:00  15.203629   5.856380
##    changeflux      peak    valley    tdiff   chExtreme AveDischarge.m3.h
## 1  -0.1193728  1.248600  1.118296 11.96667  -0.1303036          1.204775
## 2   0.1887431  1.380388  1.082199 82.53333   0.2560062          1.213511
## 3   0.1482496  1.637782  0.929055 37.63333   0.3296817          1.284719
## 4  14.9893566 38.399790  1.448977 27.26667  36.9437102         14.316647
## 5  -1.1498131 18.668972 13.201113 23.13333  -3.1332355         15.529299
## 6  -9.3472489 15.895640  5.471042 96.33333  -9.7325862          9.107720
##    Volume.m3 Sampled.Hrs     Sampled Conc.mug.L Conc.SD N.x diss.d13C
## 1   14.41714    11.96667 Not Sampled        NA      NA  NA        NA
## 2  100.15508    82.53333     Sampled  0.2456594 0.01931   3 -26.66467
## 3   48.34827    37.63333 Not Sampled        NA      NA  NA        NA
## 4  390.36726    27.26667     Sampled  6.7882463 0.28942   3 -30.46867
## 5  359.24445    23.13333     Sampled  6.5609982 0.19064   3 -30.61967
## 6  877.37700    96.33333 Not Sampled        NA      NA  NA        NA
##      SD.d13C      se.d13C MES.mg.L MES.sd MO.mg.L Conc.Solids.mug.gMES N.y
## 1        NA           NA       NA     NA      NA                   NA  NA
## 2 0.9357993 0.54028398 53.44444     NA   0e+00            0.6447290  NA
## 3        NA           NA       NA     NA      NA                   NA  NA
## 4 0.1060016 0.06120004 62.50000     NA   1e-03            0.1258897  NA
## 5 0.1513550 0.08738484 22.50000     NA   1e-04            0.4357872  NA
## 6        NA           NA       NA     NA      NA                   NA  NA
##    filt.d13C filt.SD.d13C filt.se.d13C DD13C.diss DD13C.filt     f.diss
## 1        NA           NA           NA         NA         NA         NA
## 2        NA           NA           NA  4.5453333         NA 0.05462172
## 3        NA           NA           NA         NA         NA         NA
## 4        NA           NA           NA  0.7413333         NA 0.62181820
## 5        NA           NA           NA  0.5903333         NA 0.68498131
## 6        NA           NA           NA         NA         NA         NA
##    f.filt    B.diss B.filt NH4.mM TIC.ppm.filt   Cl.mM NO3...mM PO4..mM
## 1      NA        NA     NA     NA           NA      NA       NA      NA
## 2      NA  94.53783     NA     NA           NA      NA       NA      NA
## 3      NA        NA     NA     NA           NA      NA       NA      NA
## 4      NA  37.81818     NA   0.05         51.8    1.48      616      NA
## 5      NA  31.50187     NA     NA         44.8 1574.00      778      NA
## 6      NA        NA     NA     NA           NA      NA       NA      NA
##    NPOC.ppm TIC.ppm.unfilt TOC.ppm.unfilt ExpMES.Kg DissSmeto.mg
## 1        NA             NA             NA        NA           NA
## 2        NA             NA             NA  5.352733     24.60403
## 3        NA             NA             NA        NA           NA
## 4       4.0           44.8            4.7 24.397953   2649.90908
## 5       4.4           26.4            5.4  8.083000   2357.00221
## 6        NA             NA             NA        NA           NA
##    FiltSmeto.mg TotMassOut.mg  FracDiss   FracFilt Appl.Mass.g
## 1            NA            NA        NA         NA    6369.396
```

```
## 2      3.451062      28.0551 0.8769898 0.123010164        0.000
## 3            NA           NA        NA          NA        0.000
## 4      3.071452    2652.9805 0.9988423 0.001157736        0.000
## 5      3.522468    2360.5247 0.9985078 0.001492239        0.000
## 6            NA           NA        NA          NA        0.000
##    CumAppMass.g SimOutDiss.g SimOutFilt.g SimOutSmeto.g CumOutDiss.g
## 1      6369.396   0.00000000  0.000000000     0.0000000   0.00000000
## 2      6369.396   0.02460403  0.003451062     0.0280551   0.02460403
## 3      6369.396   0.00000000  0.000000000     0.0000000   0.02460403
## 4      6369.396   2.64990908  0.003071452     2.6529805   2.67451312
## 5      6369.396   2.35700221  0.003522468     2.3605247   5.03151533
## 6      6369.396   0.00000000  0.000000000     0.0000000   5.03151533
##    CumOutFilt.g CumOutSmeto.g BalMassDisch.g   FracMassOut  FracDeltaOut
## 1   0.000000000     0.0000000       6369.396 0.0000000000   0.000000000
## 2   0.003451062     0.0280551       6369.368 0.0003079361  -0.008211013
## 3   0.003451062     0.0280551       6369.368 0.0000000000   0.000000000
## 4   0.006522514     2.6810356       6366.715 0.0291194331  -0.887230300
## 5   0.010044982     5.0415603       6364.354 0.0259094025  -0.793337267
## 6   0.010044982     5.0415603       6364.354 0.0000000000   0.000000000
```

```r
soils = read.csv2("Data/WeeklySoils_R.csv", header =T)
soils$Date.ti <- as.POSIXct(soils$Date.ti, "%Y-%m-%d %H:%M", tz = "EST")
#soils$Date.ti <- as.POSIXct(soils$Date.ti, "%d/%m/%Y %H:%M", tz = "EST")
sum(is.na(soils$Date.ti))
```

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

```r
head(soils)
```

```
##        ID Transect Wnum        Date.Soil              Date.ti
## 1 AW-N-0x        N   -1 25/03/2016 00:04 2016-03-25 00:04:00
## 2 AW-S-0x        S   -1 25/03/2016 00:04 2016-03-25 00:04:00
## 3 AW-T-0x        T   -1 25/03/2016 00:04 2016-03-25 00:04:00
## 4  AW-N-0        N    0 30/03/2016 12:18 2016-03-30 12:18:00
## 5  AW-S-0        S    0 30/03/2016 12:18 2016-03-30 12:18:00
## 6  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
## 1               0.018              NA         NA        NA           NA
## 2               0.029              NA         NA        NA           NA
## 3               0.020              NA         NA        NA           NA
## 4               1.398              NA         NA        NA           NA
## 5               2.881              NA         NA        NA           NA
## 6               1.125              NA         NA        NA           NA
##   comp.d13C.SE DD13C.comp f.comp B.comp f.min.comp B.min.comp MassSoil.g
## 1           NA         NA     NA     NA         NA         NA   24.81725
## 2           NA         NA     NA     NA         NA         NA   31.73534
## 3           NA         NA     NA     NA         NA         NA   12.98510
## 4           NA         NA     NA     NA         NA         NA 1927.47345
## 5           NA         NA     NA     NA         NA         NA 3152.74237
## 6           NA         NA     NA     NA         NA         NA  730.41173
```

Select variables for new dataframe

```
outlet <- outlet[, c("ti", "WeekSubWeek", "B.diss", "B.filt", "CumOutDiss.g", "CumOutFilt.g", "CumAppMa

soils.N <- subset(soils, soils$Transect == "N")
soils.N <- soils.N[, c("Date.ti", "B.comp", "MassSoil.g", "ID")]
colnames(soils.N) <- c("ti",  "B.comp.North", "MassSoil.g.North", "ID.N")

soils.T <- subset(soils, soils$Transect == "T")
soils.T <- soils.T[, c("Date.ti", "B.comp", "MassSoil.g", "ID")]
colnames(soils.T) <- c("ti",  "B.comp.Talweg", "MassSoil.g.Talweg", "ID.T")

soils.S <- subset(soils, soils$Transect == "S")
soils.S <- soils.S[, c("Date.ti", "B.comp", "MassSoil.g", "ID")]
colnames(soils.S) <- c("ti",  "B.comp.South", "MassSoil.g.South", "ID.S")
```

Merge 4 data frames

```
library(zoo)
```

```
##
## Attaching package: 'zoo'
```

```
## The following objects are masked from 'package:base':
##
##      as.Date, as.Date.numeric
```

```
class(outlet$ti)
```

```
## [1] "POSIXct" "POSIXt"
```

```
class(soils.T$ti)
```

```
## [1] "POSIXct" "POSIXt"
```

```
soilsOut <- merge(outlet, soils.N, by = "ti", all = T)
soilsOut <- merge(soilsOut, soils.T, by = "ti", all = T)
soilsOut <- merge(soilsOut, soils.S, by = "ti", all = T)

soilsOut$CatchMassSoil.g <- soilsOut$MassSoil.g.North + soilsOut$MassSoil.g.Talweg + soilsOut$MassSoil.

#soilsOut$CatchMassSoil.g[1] <-100
soilsOut$MassSoilApprox.g <- na.locf(soilsOut$CatchMassSoil.g)
```

Plot

```r
library("ggplot2")
library("scales")
library("reshape2")


ggplot(soilsOut, aes(ti)) +
  geom_line(aes(y = CumAppMass.g), color = "red") +
  geom_line(aes(y = CumOutDiss.g), color = "blue") +
  geom_line(aes(y = CumOutFilt.g), color = "steelblue") +
  geom_line(aes(y = MassSoilApprox.g), color = "brown") +
  scale_y_continuous(trans=log_trans(), breaks=c(1,5,10, 50,100 , 500,1000, 5000)) +
  theme_bw() +
  xlab("Date") +
  ylab("Catchment-wide S-metolachlor mass [g]")
```
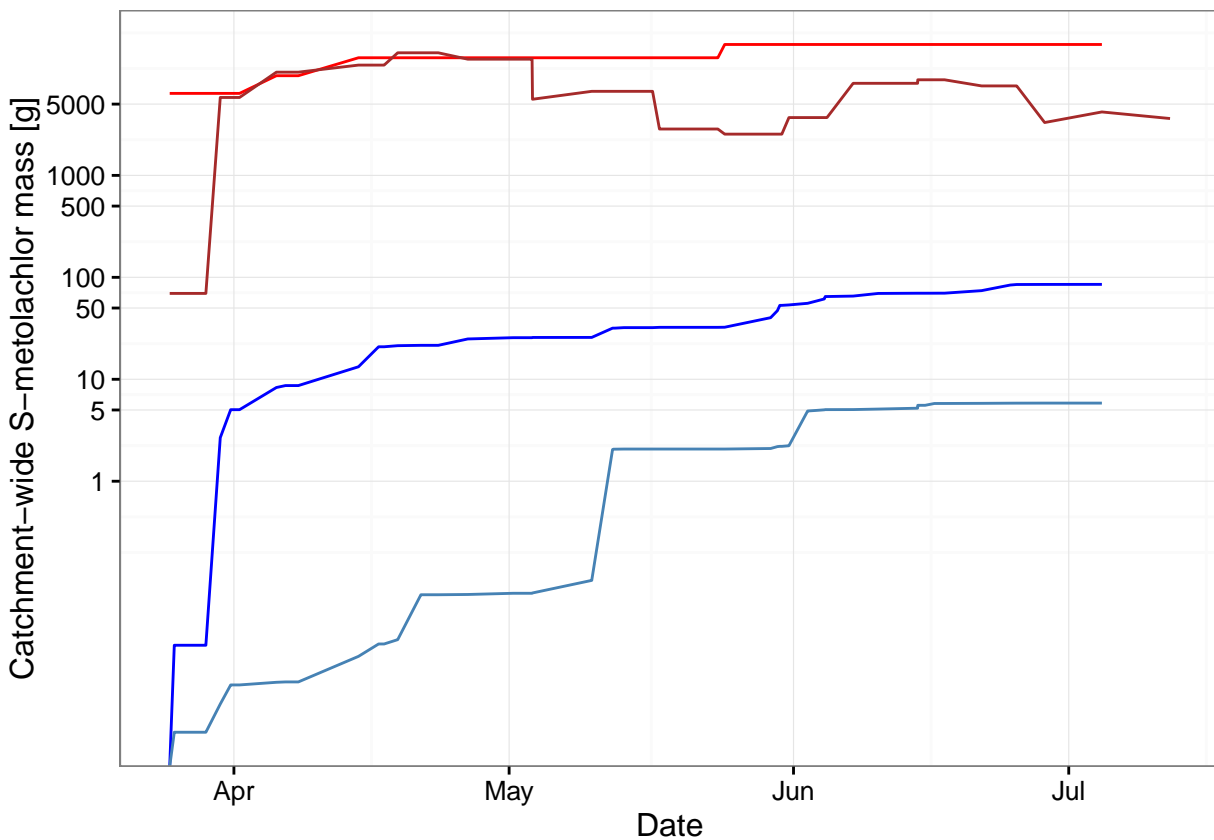
```
## Warning: Removed 1 rows containing missing values (geom_path).

## Warning: Removed 1 rows containing missing values (geom_path).

## Warning: Removed 1 rows containing missing values (geom_path).
```

```
    #scale_x_datetime(breaks = date_breaks("week"), labels = date_format("%d/%m"))
```

```
#moltendSO <- melt(soilsOut, id = "ti")
```

```
#ggplot(moltendSO, aes(x=ti, y=value))
```