

# BulkCalibration

PAZ

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## Compute Bulk catchment measurements for 1st stage Isotope Calibration

Good set of possible data files:

- ‘Data/MassBalance\_R.csv’
- ‘Data/WeeklySoils\_Rng.csv’

Will need to modify the area considered in the second file because that file assumes total area by counting only the plots in the transect with application. Instead the areas that need to be calculated are those of full transect areas corresponding to the GISA shape file *TransectAreas\_A*, which reads the following:

- North: 139,266.25 m<sup>2</sup>
- Valley: 43,713.44 m<sup>2</sup>
- South: 133,175.05

```
soils = read.csv2(file.path(path, "Data/MassBalance_R.csv")) # Corrected with only ngC > 2.0
names(soils)
```

```
## [1] "ti"                      "WeekSubWeek"
## [3] "Event"                   "Duration.Hrs"
## [5] "timeSinceApp"            "timeSinceApp.NoSo"
## [7] "timeSinceApp.N"          "timeSinceApp.T"
## [9] "timeSinceApp.S"          "diss.d13C"
## [11] "SD.d13C"                 "CumOutDiss.g"
## [13] "CumOutFilt.g"           "TotSMout.g"
## [15] "TotSMout.g.SD"          "MELsm.g"
## [17] "MELsm.g.SD"             "Appl.Mass.g"
## [19] "Appl.Mass.g.OT"         "CumAppMass.g"
## [21] "CumAppMass.g.N"         "CumAppMass.g.T"
## [23] "CumAppMass.g.S"         "CumAppMass.g.OT"
## [25] "CumAppMass.g.N.OT"       "CumAppMass.g.T.OT"
## [27] "CumAppMass.g.S.OT"       "iniCo.ug.g.N"
## [29] "iniCo.ug.g.T"           "iniCo.ug.g.S"
## [31] "CumOutSmeto.g"          "CumOutMELsm.g"
## [33] "MassSoil.g.North"        "MassSoil.g.SD.North"
## [35] "Conc.mug.g.dry.soil.N"   "comp.d13C.North"
## [37] "comp.d13C.SD.North"       "ID.N"
## [39] "Area.N"                  "Area.T"
## [41] "Area.S"                  "MassSoil.g.Talweg"
## [43] "MassSoil.g.SD.Talweg"     "Conc.mug.g.dry.soil.T"
## [45] "comp.d13C.Talweg"         "comp.d13C.SD.Talweg"
## [47] "ID.T"                     "MassSoil.g.South"
## [49] "MassSoil.g.SD.South"       "Conc.mug.g.dry.soil.S"
## [51] "comp.d13C.South"          "comp.d13C.SD.South"
## [53] "ID.S"                     "DD13C.North"
## [55] "DD13C.Talweg"             "DD13C.South"
## [57] "CatchMassSoil.g"          "CatchMassSoil.g.SD"
```

```

## [59] "BulkCatch.d13"           "BulkCatch.d13.SD"
## [61] "DD13.Bulk"                "Area.Catchment"
## [63] "BulkCatch.Conc"           "iniCo.Bulk"

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

```

## Correction of Bulk calculations

The bulk concentrations calculated in Book 07 consider the bulk relative to the transect areas, not the sampled soil mass. The correction is implemented below and used to compare against model.

The isotope bulk calculation also differed here to avoid assumptions of areas and bulk densities, but the differences are not significant.

```

soils$Blk.Conc = (
  soils$MassSoil.g.North * soils$Conc.mug.g.dry.soil.N +
  soils$MassSoil.g.Talweg * soils$Conc.mug.g.dry.soil.T +
  soils$MassSoil.g.South * soils$Conc.mug.g.dry.soil.S) /(
  soils$MassSoil.g.North + soils$MassSoil.g.Talweg + soils$MassSoil.g.South
)

soils$Blk.Conc.SD = (soils$Conc.mug.g.dry.soil.N + soils$Conc.mug.g.dry.soil.T + soils$Conc.mug.g.dry.soil.S) / (soils$Conc.mug.g.dry.soil.N + soils$Conc.mug.g.dry.soil.T + soils$Conc.mug.g.dry.soil.S)^(1/2)

# p_b = 1.05 # Mean bulk density all fields, P. v Dijk
soils$Blk.d13C = (
  soils$MassSoil.g.North * soils$Conc.mug.g.dry.soil.N * soils$comp.d13C.North +
  soils$MassSoil.g.Talweg * soils$Conc.mug.g.dry.soil.T * soils$comp.d13C.Talweg +
  soils$MassSoil.g.South * soils$Conc.mug.g.dry.soil.S * soils$comp.d13C.South) /(
  soils$MassSoil.g.North + soils$Conc.mug.g.dry.soil.N +
  soils$MassSoil.g.Talweg + soils$Conc.mug.g.dry.soil.T +
  soils$MassSoil.g.South + soils$Conc.mug.g.dry.soil.S
)
soils$Bulk.d13C.SD = (soils$comp.d13C.SD.North + soils$comp.d13C.SD.Talweg + soils$comp.d13C.SD.South) / (soils$comp.d13C.SD.North + soils$comp.d13C.SD.Talweg + soils$comp.d13C.SD.South)^(1/2)

bulk = soils[ c(4:nrow(soils)), c('DayMoYr', 'Blk.Conc', 'Blk.Conc.SD', 'Blk.d13C', 'Bulk.d13C.SD')]
bulk = subset(bulk, !is.na(Blk.Conc))

names(bulk)

## [1] "DayMoYr"      "Blk.Conc"      "Blk.Conc.SD"   "Blk.d13C"
## [5] "Bulk.d13C.SD"

colnames(bulk) = c("DayMoYr", "ug.g", "ug.g.SD", "d13C",      "d13C.SD")

bt = merge(time, bulk, by = "DayMoYr", all = T)
bt$IDcal = paste("B-", bt$Jdays, sep = "")

conc = bt[, c("Jdays", "DayMoYr", "IDcal", "ug.g", "ug.g.SD")]
d13c = bt[, c("Jdays", "DayMoYr", "IDcal", "d13C", "d13C.SD")]

conc = subset(conc, !is.na(ug.g))

```

```
d13c = subset(d13c, !is.na(d13C))

if (SAVE){
  write.table(conc, "BEACH_R/conc_bulk_cal.tss", sep="\t", row.names = F)
  write.table(d13c, "BEACH_R/d13c_bulk_cal.tss", sep="\t", row.names = F)
}
```