Import CSV from ConfoMap ISO25178 - use-wear archaeology & experiments

Lisa Schunk

2021-02-04 14:11:06

# Goal of the script

This script formats the output resulting from applying a template computing ISO 25178 parameters in ConfoMap. The script will:

1. Read in the original Rbin-files
2. Format the data in order to make the three data sets fitting
3. Write an XLSX-file and save an R object ready for further analysis in R

dir\_in <- "analysis/raw\_data"  
dir\_out <- "analysis/derived\_data/"

Raw data must be located in ~/analysis/raw\_data.  
Formatted data will be saved in ~/analysis/derived\_data/.

The knit directory for this script is the project directory.

# Load packages

library(openxlsx)

Warning: package 'openxlsx' was built under R version 4.0.3

library(tools)  
library(R.utils)  
library(chron)  
library(tidyverse)

Warning: package 'ggplot2' was built under R version 4.0.3

Warning: package 'readr' was built under R version 4.0.3

Warning: package 'dplyr' was built under R version 4.0.3

Warning: package 'forcats' was built under R version 4.0.3

# Get names, path and information of all files

data\_files <- list.files(dir\_in, pattern = "\\.Rbin$", full.names = TRUE)  
md5\_in <- md5sum(data\_files)  
info\_in <- data.frame(files = basename(names(md5\_in)), checksum = md5\_in,   
 row.names = NULL)

The checksum (MD5 hashes) of the imported files are:

files checksum  
1 AvsN\_use-wear.Rbin 0bbb6fa72fc579f481ad716752f28d5d  
2 TFE\_use-wear.Rbin 433a3db62e03eee5450b37da5616b1a7  
3 Use-wear.Rbin 558d5b8d978e0d27f0cf6d308b0734de

# Read in original CSV-files

# data from 'aVSn' experiment, tool function experiment and archaeology   
AvsN\_imp <- loadObject(data\_files[1])  
str(AvsN\_imp)

'data.frame': 60 obs. of 55 variables:  
 $ Sample : chr "FLT4-12" "FLT4-12" "FLT4-12" "FLT4-12" ...  
 $ Cycle : Factor w/ 2 levels "before","2000": 1 1 1 2 2 2 1 1 1 1 ...  
 $ Location : chr "B1" "B1" "B1" "B1" ...  
 $ Area : chr "01" "01" "01" "01" ...  
 $ Spot : chr "a" "b" "c" "a" ...  
 $ Objective : Factor w/ 2 levels "50x075","50x095": 2 2 2 2 2 2 1 1 1 1 ...  
 $ Raw.material : Factor w/ 2 levels "flint","lydite": 1 1 1 1 1 1 1 1 1 1 ...  
 $ Contact.material : chr "skin pad" "skin pad" "skin pad" "skin pad" ...  
 $ Analysis.date : Date, format: "2020-08-17" "2020-08-17" ...  
 $ Analysis.time : 'times' num 14:48:58 14:49:34 14:50:09 14:50:43 14:51:18 ...  
 ..- attr(\*, "format")= chr "h:m:s"  
 $ Acquisition.date.time : chr "7/20/2020 2:39:46 PM" "7/20/2020 2:55:08 PM" "7/20/2020 3:12:51 PM" "7/20/2020 3:29:51 PM" ...  
 $ Axis.length.X : num 255 255 255 255 255 ...  
 $ Axis.size.X : num 1198 1198 1198 1198 1198 ...  
 $ Axis.spacing.X : num 0.213 0.213 0.213 0.213 0.213 ...  
 $ Axis.length.Y : num 255 255 255 255 255 ...  
 $ Axis.size.Y : num 1198 1198 1198 1198 1198 ...  
 $ Axis.spacing.Y : num 0.213 0.213 0.213 0.213 0.213 ...  
 $ Axis.length.Z : num 27287 27231 26655 13395 13291 ...  
 $ Axis.size.Z : num 63694 65201 63762 65466 65538 ...  
 $ Axis.spacing.Z : num 0.428 0.418 0.418 0.205 0.203 ...  
 $ NM.points.ratio.Z : num 0 0 0 0 0 0 0 0 0 0 ...  
 $ Sq : num 160 151 196 227 160 ...  
 $ Ssk : num -0.0199 4.1704 2.0253 2.2084 2.0238 ...  
 $ Sku : num 6.21 37.01 10.42 11.22 9.9 ...  
 $ Sp : num 1153 1693 1606 1740 1174 ...  
 $ Sv : num 716 594 406 473 321 ...  
 $ Sz : num 1870 2286 2013 2212 1496 ...  
 $ Sa : num 115.8 84.7 138.7 154.4 111.9 ...  
 $ Smr : num 12.722 0.832 1.59 1.645 10.656 ...  
 $ Smc : num 177 111 232 250 184 ...  
 $ Sxp : num 362 192 211 245 175 ...  
 $ Sal : num 5.94 7.73 8.18 12.2 8.71 ...  
 $ Str : num 0.0746 0.669 0.226 0.6994 0.1989 ...  
 $ Std : num 170 133 50.5 101 81.5 ...  
 $ Sdq : num 0.1019 0.0833 0.1177 0.1378 0.1048 ...  
 $ Sdr : num 0.513 0.337 0.68 0.916 0.54 ...  
 $ Vm : num 0.0103 0.0176 0.0206 0.0263 0.0175 ...  
 $ Vv : num 0.187 0.128 0.252 0.276 0.202 ...  
 $ Vmp : num 0.0103 0.0176 0.0206 0.0263 0.0175 ...  
 $ Vmc : num 0.119 0.073 0.133 0.143 0.106 ...  
 $ Vvc : num 0.164 0.115 0.241 0.262 0.192 ...  
 $ Vvv : num 0.0233 0.0128 0.0112 0.0138 0.0092 ...  
 $ Maximum.depth.of.furrows: num 905 865 814 881 640 ...  
 $ Mean.depth.of.furrows : num 257 174 386 409 311 ...  
 $ Mean.density.of.furrows : num 3081 3318 3101 3225 3191 ...  
 $ First.direction : num 1.69e+02 1.35e+02 8.76e-03 9.00e+01 9.00e+01 ...  
 $ Second.direction : num 180 90 135 135 45 ...  
 $ Third.direction : num 135 45 117 116 135 ...  
 $ Isotropy : num 6.16 66.63 52.93 77.77 55.86 ...  
 $ epLsar : num 0.00356 0.00393 0.00189 0.00195 0.00041 ...  
 $ NewEplsar : num 0.0187 0.0188 0.0179 0.0179 0.0175 ...  
 $ Asfc : num 1.145 0.703 1.494 2.067 1.207 ...  
 $ Smfc : num 3.08 3.3 2.88 2.52 2.52 ...  
 $ HAsfc9 : num 0.201 0.636 0.191 0.512 0.239 ...  
 $ HAsfc81 : num 0.264 0.939 0.388 0.722 0.386 ...  
 - attr(\*, "comment")= Named chr [1:44] "µm" "points" "µm" "µm" ...  
 ..- attr(\*, "names")= chr [1:44] "Axis length - X" "Axis size - X" "Axis spacing - X" "Axis length - Y" ...

TFE\_imp <- loadObject(data\_files[2])  
str(TFE\_imp)

'data.frame': 24 obs. of 57 variables:  
 $ Sample : chr "FLT8-10" "FLT8-10" "FLT8-10" "FLT8-2" ...  
 $ Cycle : chr "2000" "2000" "2000" "2000" ...  
 $ Location : chr "C1" "C1" "C1" "D1" ...  
 $ Area : chr "01" "01" "01" "01" ...  
 $ Spot : chr "a" "b" "c" "a" ...  
 $ Objective : chr "50x095" "50x095" "50x095" "50x095" ...  
 $ Raw.material : Factor w/ 2 levels "flint","lydite": 1 1 1 1 1 1 1 1 1 1 ...  
 $ Contact.material : Factor w/ 1 level "bone plate": 1 1 1 1 1 1 1 1 1 1 ...  
 $ Task : Factor w/ 2 levels "carving","cutting": 1 1 1 2 2 2 2 2 2 1 ...  
 $ Edge.angle : Factor w/ 2 levels "35°","45°": 2 2 2 2 2 2 1 1 1 1 ...  
 $ Analysis.date : Date, format: "2020-08-27" "2020-08-27" ...  
 $ Analysis.time : 'times' num 15:01:32 15:02:11 15:02:48 15:03:28 15:04:06 ...  
 ..- attr(\*, "format")= chr "h:m:s"  
 $ Acquisition.date.time : chr "8/27/2020 11:10:06 AM" "8/27/2020 11:41:47 AM" "8/27/2020 11:54:14 AM" "8/26/2020 4:10:04 PM" ...  
 $ Axis.length.X : num 255 255 255 255 255 ...  
 $ Axis.size.X : num 1198 1198 1198 1198 1198 ...  
 $ Axis.spacing.X : num 0.213 0.213 0.213 0.213 0.213 ...  
 $ Axis.length.Y : num 255 255 255 255 255 ...  
 $ Axis.size.Y : num 1198 1198 1198 1198 1198 ...  
 $ Axis.spacing.Y : num 0.213 0.213 0.213 0.213 0.213 ...  
 $ Axis.length.Z : num 34010 95224 7771 60579 60641 ...  
 $ Axis.size.Z : num 73180 61441 61664 52314 57436 ...  
 $ Axis.spacing.Z : num 0.465 1.55 0.126 1.158 1.056 ...  
 $ NM.points.ratio.Z : num 0 0 0 0 0 0 0 0 0 0 ...  
 $ Sq : num 1640 7217 315 2525 1718 ...  
 $ Ssk : num -0.626 0.517 -1.202 -0.51 -1.432 ...  
 $ Sku : num 7.12 4.34 6.34 6.94 12.01 ...  
 $ Sp : num 5603 24832 716 8900 5842 ...  
 $ Sv : num 7354 24749 1929 12958 11581 ...  
 $ Sz : num 12956 49581 2645 21858 17423 ...  
 $ Sa : num 1080 5359 239 1814 1117 ...  
 $ Smr : num 0.887 0.151 84.156 0.519 0.768 ...  
 $ Smc : num 1669 8453 350 2620 1633 ...  
 $ Sxp : num 4454 13827 770 5202 3974 ...  
 $ Sal : num 19.3 18.3 11.3 20.1 17.7 ...  
 $ Str : num 0.26 NA 0.286 NA 0.154 ...  
 $ Std : num 159 169 156 148 148 ...  
 $ Sdq : num 0.269 1.165 0.166 0.336 0.294 ...  
 $ Sdr : num 3.01 19.2 1.35 4.62 3.61 ...  
 $ Vm : num 0.1354 0.6714 0.0093 0.1819 0.1149 ...  
 $ Vv : num 1.804 9.125 0.359 2.802 1.748 ...  
 $ Vmp : num 0.1354 0.6714 0.0093 0.1819 0.1149 ...  
 $ Vmc : num 0.928 5.19 0.266 1.856 1.034 ...  
 $ Vvc : num 1.553 8.34 0.309 2.488 1.485 ...  
 $ Vvv : num 0.2512 0.7845 0.0502 0.314 0.2637 ...  
 $ Maximum.depth.of.furrows: num 7251 27509 2061 7182 6417 ...  
 $ Mean.depth.of.furrows : num 1161 8568 433 2115 1408 ...  
 $ Mean.density.of.furrows : num 2724 2613 3036 2486 2519 ...  
 $ First.direction : num 90 169 90 135 135 ...  
 $ Second.direction : num 135 174 154 154 154 ...  
 $ Third.direction : num 0.0017 179.9953 135.0327 0.0028 161.4949 ...  
 $ Isotropy : num 18.3 NA 38.2 NA 35.8 ...  
 $ epLsar : num 0.00234 0.00814 0.00109 0.00501 0.00521 ...  
 $ NewEplsar : num 0.0185 0.021 0.0178 0.0199 0.02 ...  
 $ Asfc : num 4.31 37.84 2.9 5.11 4.67 ...  
 $ Smfc : num 4.93 759.24 3.3 32.33 6.9 ...  
 $ HAsfc9 : num 0.6628 6.9889 0.0727 0.5633 0.4985 ...  
 $ HAsfc81 : num 0.708 6.728 0.198 1.53 1.352 ...  
 - attr(\*, "comment")= Named chr [1:44] "µm" "points" "µm" "µm" ...  
 ..- attr(\*, "names")= chr [1:44] "Axis length - X" "Axis size - X" "Axis spacing - X" "Axis length - Y" ...

Arch\_imp <- loadObject(data\_files[3])  
str(Arch\_imp)

'data.frame': 150 obs. of 57 variables:  
 $ Sample : chr "MU-232" "MU-232" "MU-232" "MU-003" ...  
 $ Site : Factor w/ 3 levels "Balve","Buhlen",..: 1 1 1 1 1 1 1 1 1 1 ...  
 $ Tool.type : Factor w/ 4 levels "Keilmesser","Pradnik scraper",..: 1 1 1 1 1 1 1 1 1 4 ...  
 $ Raw.material : Factor w/ 2 levels "flint","lydite": 2 2 2 2 2 2 2 2 2 2 ...  
 $ Location : chr "B" "B" "B" "D" ...  
 $ Sublocation : chr "2" "2" "2" "1" ...  
 $ Area : chr "01" "01" "01" "01" ...  
 $ Spot : chr "a" "b" "c" "a" ...  
 $ Usewear.type : Factor w/ 11 levels "A","B","B2","C",..: 9 9 9 2 2 2 4 4 4 3 ...  
 $ Objective : Factor w/ 3 levels "20x07","50x075",..: 1 1 1 3 3 3 2 2 2 3 ...  
 $ Analysis.date : Date, format: "2020-09-07" "2020-09-07" ...  
 $ Analysis.time : 'times' num 15:08:03 15:08:27 15:08:51 15:09:16 15:09:41 ...  
 ..- attr(\*, "format")= chr "h:m:s"  
 $ Acquisition.date.time : chr "07.07.2020 16:58" "07.08.2020 10:35" "07.08.2020 12:10" "07.03.2020 10:44" ...  
 $ Axis.length.X : num 255 255 255 255 255 ...  
 $ Axis.size.X : num 1198 1198 1198 1198 1198 ...  
 $ Axis.spacing.X : num 0.213 0.213 0.213 0.213 0.213 ...  
 $ Axis.length.Y : num 255 255 255 255 255 ...  
 $ Axis.size.Y : num 1198 1198 1198 1198 1198 ...  
 $ Axis.spacing.Y : num 0.213 0.213 0.213 0.213 0.213 ...  
 $ Axis.length.Z : num 249564 99661 162726 38576 39610 ...  
 $ Axis.size.Z : num 65505 35461 32419 65340 66654 ...  
 $ Axis.spacing.Z : num 3.81 2.81 5.019 0.59 0.594 ...  
 $ NM.points.ratio.Z : num 0 0 0 0 0 0 0 0 0 0 ...  
 $ Sq : num 3243 2493 4332 1912 1936 ...  
 $ Ssk : num 0.0634 -0.9445 0.1816 -0.058 -0.2928 ...  
 $ Sku : num 3.46 7.36 3.08 3.75 3.47 ...  
 $ Sp : num 10477 7460 12748 6231 5796 ...  
 $ Sv : num 10005 12962 16115 6843 6575 ...  
 $ Sz : num 20482 20422 28864 13075 12371 ...  
 $ Sa : num 2506 1813 3409 1464 1495 ...  
 $ Smr : num 0.551 0.697 0.388 0.784 0.586 ...  
 $ Smc : num 3754 2956 5778 2454 2429 ...  
 $ Sxp : num 6582 4878 7854 3949 4400 ...  
 $ Sal : num 25.9 20.5 23.4 24.4 24.9 ...  
 $ Str : num 0.321 0.215 0.241 0.784 0.767 ...  
 $ Std : num 42.5 93 51 103.7 106.7 ...  
 $ Sdq : num 0.603 0.376 0.557 0.301 0.298 ...  
 $ Sdr : num 9.99 5.11 10.54 4.13 4.09 ...  
 $ Vm : num 0.2094 0.1157 0.2311 0.0944 0.0828 ...  
 $ Vv : num 3.96 3.07 6.01 2.55 2.51 ...  
 $ Vmp : num 0.2094 0.1157 0.2311 0.0944 0.0828 ...  
 $ Vmc : num 2.78 1.82 3.63 1.59 1.6 ...  
 $ Vvc : num 3.56 2.73 5.53 2.31 2.24 ...  
 $ Vvv : num 0.403 0.342 0.48 0.238 0.275 ...  
 $ Maximum.depth.of.furrows: num 12698 14381 16377 7155 7130 ...  
 $ Mean.depth.of.furrows : num 2586 2471 3670 2350 2229 ...  
 $ Mean.density.of.furrows : num 2987 1790 1901 2032 2098 ...  
 $ First.direction : num 44.9809 90.00638 89.98321 0.01527 0.00574 ...  
 $ Second.direction : num 26.5 135 63.5 116.5 135 ...  
 $ Third.direction : num 63.5 116.4 45 135 90 ...  
 $ Isotropy : num 13.5 64.5 14.9 87 86.3 ...  
 $ epLsar : num 0.00368 0.0024 0.00301 0.00161 0.00236 ...  
 $ NewEplsar : num 0.0181 0.0177 0.0179 0.0171 0.0171 ...  
 $ Asfc : num 12.8 6.85 12.12 5.51 5.36 ...  
 $ Smfc : num 2.51 67.38 48.16 94.68 55.32 ...  
 $ HAsfc9 : num 0.629 0.444 0.496 0.666 0.75 ...  
 $ HAsfc81 : num 0.81 2.106 1.515 0.845 0.704 ...  
 - attr(\*, "comment")= Named chr [1:44] "µm" "points" "µm" "µm" ...  
 ..- attr(\*, "names")= chr [1:44] "Axis length - X" "Axis size - X" "Axis spacing - X" "Axis length - Y" ...

# Add columns with further information

location <- substr(AvsN\_imp["Location"][,1], 1, 1)  
sublocation <- substr(AvsN\_imp["Location"][,1], 2, 2)  
  
AvsN\_imp$Location = location  
AvsN\_imp$Sublocation = sublocation  
  
  
location <- substr(TFE\_imp["Location"][,1], 1, 1)  
sublocation <- substr(TFE\_imp["Location"][,1], 2, 2)  
  
TFE\_imp$Location = location  
TFE\_imp$Sublocation = sublocation  
  
# adds the name of the experiment as "site"  
AvsN\_imp[grep("LYDIT4-", AvsN\_imp[["Sample"]]), "Site"] <- "aVSn"  
AvsN\_imp[grep("FLT4-", AvsN\_imp[["Sample"]]), "Site"] <- "aVSn"  
TFE\_imp[grep("LYDIT5-", TFE\_imp[["Sample"]]), "Site"] <- "TFE"  
TFE\_imp[grep("FLT8-", TFE\_imp[["Sample"]]), "Site"] <- "TFE"  
  
AvsN\_imp[["Site"]] <- factor(AvsN\_imp[["Site"]])  
TFE\_imp[["Site"]] <- factor(TFE\_imp[["Site"]])  
  
# adds the tool type   
AvsN\_imp[grep("aVSn", AvsN\_imp[["Site"]]), "Tool.type"] <- "Standard sample"  
TFE\_imp[grep("TFE", TFE\_imp[["Site"]]), "Tool.type"] <- "Standard sample"  
  
AvsN\_imp[["Tool.type"]] <- factor(AvsN\_imp[["Tool.type"]])  
TFE\_imp[["Tool.type"]] <- factor(TFE\_imp[["Tool.type"]])  
  
# adds a column for "use-wear type" based on cycle  
AvsN\_imp$Usewear.type <- AvsN\_imp$Cycle  
TFE\_imp$Usewear.type <- TFE\_imp$Cycle  
  
# adds the contact material   
Arch\_imp[grep("lydite", Arch\_imp[["Raw.material"]]), "Contact.material"] <- "unknown"  
Arch\_imp[grep("flint", Arch\_imp[["Raw.material"]]), "Contact.material"] <- "unknown"  
  
# adds the task   
Arch\_imp[grep("lydite", Arch\_imp[["Raw.material"]]), "Task"] <- "unknown"  
Arch\_imp[grep("flint", Arch\_imp[["Raw.material"]]), "Task"] <- "unknown"  
AvsN\_imp[grep("aVSn", AvsN\_imp[["Site"]]), "Task"] <- "cutting"  
  
# adds the edge angle   
Arch\_imp[grep("lydite", Arch\_imp[["Raw.material"]]), "Edge.angle"] <- "unknown"  
Arch\_imp[grep("flint", Arch\_imp[["Raw.material"]]), "Edge.angle"] <- "unknown"  
AvsN\_imp[grep("aVSn", AvsN\_imp[["Site"]]), "Edge.angle"] <- "60°"

# Keeps only interesting columns and orders them

# deletes non-important columns   
AvsN\_imp$Cycle <- NULL  
TFE\_imp$Cycle <- NULL  
  
# orders the columns in an identical way  
AvsN\_imp <- AvsN\_imp[c(1, 56:57, 6, 2, 55, 3:4, 58, 7, 59:60, 5, 8:54)]  
TFE\_imp <- TFE\_imp[c(1, 58:59, 6, 2, 57, 3:4, 60,7:9, 5, 10:56)]  
Arch\_imp <- Arch\_imp[c(1:9, 58:60, 10:57)]

# Merges the three datasets

# check pairwise if the three lines of headers are identical among the datasets  
# merges the data based on the three lines of headers while they get only   
# used in the first file   
  
comp <- all(sapply(list(colnames(AvsN\_imp), colnames(TFE\_imp)),   
 FUN = identical, colnames(Arch\_imp)))  
if (comp == TRUE) {  
 merged\_data <- full\_join(AvsN\_imp, TFE\_imp) %>% full\_join(Arch\_imp)  
} else {  
 stop("The headers are not identical among the datasets")  
}  
str(merged\_data)

'data.frame': 234 obs. of 60 variables:  
 $ Sample : chr "FLT4-12" "FLT4-12" "FLT4-12" "FLT4-12" ...  
 $ Site : Factor w/ 5 levels "aVSn","TFE","Balve",..: 1 1 1 1 1 1 1 1 1 1 ...  
 $ Tool.type : Factor w/ 5 levels "Standard sample",..: 1 1 1 1 1 1 1 1 1 1 ...  
 $ Raw.material : Factor w/ 2 levels "flint","lydite": 1 1 1 1 1 1 1 1 1 1 ...  
 $ Location : chr "B" "B" "B" "B" ...  
 $ Sublocation : chr "1" "1" "1" "1" ...  
 $ Area : chr "01" "01" "01" "01" ...  
 $ Spot : chr "a" "b" "c" "a" ...  
 $ Usewear.type : chr "before" "before" "before" "2000" ...  
 $ Contact.material : chr "skin pad" "skin pad" "skin pad" "skin pad" ...  
 $ Task : chr "cutting" "cutting" "cutting" "cutting" ...  
 $ Edge.angle : chr "60°" "60°" "60°" "60°" ...  
 $ Objective : chr "50x095" "50x095" "50x095" "50x095" ...  
 $ Analysis.date : Date, format: "2020-08-17" "2020-08-17" ...  
 $ Analysis.time : 'times' num 14:48:58 14:49:34 14:50:09 14:50:43 14:51:18 ...  
 ..- attr(\*, "format")= chr "h:m:s"  
 $ Acquisition.date.time : chr "7/20/2020 2:39:46 PM" "7/20/2020 2:55:08 PM" "7/20/2020 3:12:51 PM" "7/20/2020 3:29:51 PM" ...  
 $ Axis.length.X : num 255 255 255 255 255 ...  
 $ Axis.size.X : num 1198 1198 1198 1198 1198 ...  
 $ Axis.spacing.X : num 0.213 0.213 0.213 0.213 0.213 ...  
 $ Axis.length.Y : num 255 255 255 255 255 ...  
 $ Axis.size.Y : num 1198 1198 1198 1198 1198 ...  
 $ Axis.spacing.Y : num 0.213 0.213 0.213 0.213 0.213 ...  
 $ Axis.length.Z : num 27287 27231 26655 13395 13291 ...  
 $ Axis.size.Z : num 63694 65201 63762 65466 65538 ...  
 $ Axis.spacing.Z : num 0.428 0.418 0.418 0.205 0.203 ...  
 $ NM.points.ratio.Z : num 0 0 0 0 0 0 0 0 0 0 ...  
 $ Sq : num 160 151 196 227 160 ...  
 $ Ssk : num -0.0199 4.1704 2.0253 2.2084 2.0238 ...  
 $ Sku : num 6.21 37.01 10.42 11.22 9.9 ...  
 $ Sp : num 1153 1693 1606 1740 1174 ...  
 $ Sv : num 716 594 406 473 321 ...  
 $ Sz : num 1870 2286 2013 2212 1496 ...  
 $ Sa : num 115.8 84.7 138.7 154.4 111.9 ...  
 $ Smr : num 12.722 0.832 1.59 1.645 10.656 ...  
 $ Smc : num 177 111 232 250 184 ...  
 $ Sxp : num 362 192 211 245 175 ...  
 $ Sal : num 5.94 7.73 8.18 12.2 8.71 ...  
 $ Str : num 0.0746 0.669 0.226 0.6994 0.1989 ...  
 $ Std : num 170 133 50.5 101 81.5 ...  
 $ Sdq : num 0.1019 0.0833 0.1177 0.1378 0.1048 ...  
 $ Sdr : num 0.513 0.337 0.68 0.916 0.54 ...  
 $ Vm : num 0.0103 0.0176 0.0206 0.0263 0.0175 ...  
 $ Vv : num 0.187 0.128 0.252 0.276 0.202 ...  
 $ Vmp : num 0.0103 0.0176 0.0206 0.0263 0.0175 ...  
 $ Vmc : num 0.119 0.073 0.133 0.143 0.106 ...  
 $ Vvc : num 0.164 0.115 0.241 0.262 0.192 ...  
 $ Vvv : num 0.0233 0.0128 0.0112 0.0138 0.0092 ...  
 $ Maximum.depth.of.furrows: num 905 865 814 881 640 ...  
 $ Mean.depth.of.furrows : num 257 174 386 409 311 ...  
 $ Mean.density.of.furrows : num 3081 3318 3101 3225 3191 ...  
 $ First.direction : num 1.69e+02 1.35e+02 8.76e-03 9.00e+01 9.00e+01 ...  
 $ Second.direction : num 180 90 135 135 45 ...  
 $ Third.direction : num 135 45 117 116 135 ...  
 $ Isotropy : num 6.16 66.63 52.93 77.77 55.86 ...  
 $ epLsar : num 0.00356 0.00393 0.00189 0.00195 0.00041 ...  
 $ NewEplsar : num 0.0187 0.0188 0.0179 0.0179 0.0175 ...  
 $ Asfc : num 1.145 0.703 1.494 2.067 1.207 ...  
 $ Smfc : num 3.08 3.3 2.88 2.52 2.52 ...  
 $ HAsfc9 : num 0.201 0.636 0.191 0.512 0.239 ...  
 $ HAsfc81 : num 0.264 0.939 0.388 0.722 0.386 ...

# Save data

## Format name of output file

file\_out <- "Use-wear\_all"

The files will be saved as “~/Use-wear\_all.[ext]”.

## Write to XLSX

write.xlsx(list(data = merged\_data),   
 file = paste0(dir\_out, file\_out, ".xlsx"))

## Save R object

saveObject(merged\_data, file = paste0(dir\_out, file\_out, ".Rbin"))

# sessionInfo() and RStudio version

sessionInfo()

R version 4.0.2 (2020-06-22)  
Platform: x86\_64-w64-mingw32/x64 (64-bit)  
Running under: Windows 10 x64 (build 19041)  
  
Matrix products: default  
  
locale:  
[1] LC\_COLLATE=German\_Germany.1252 LC\_CTYPE=German\_Germany.1252   
[3] LC\_MONETARY=German\_Germany.1252 LC\_NUMERIC=C   
[5] LC\_TIME=German\_Germany.1252   
  
attached base packages:  
[1] tools stats graphics grDevices utils datasets methods   
[8] base   
  
other attached packages:  
 [1] forcats\_0.5.1 stringr\_1.4.0 dplyr\_1.0.3 purrr\_0.3.4   
 [5] readr\_1.4.0 tidyr\_1.1.2 tibble\_3.0.6 ggplot2\_3.3.3   
 [9] tidyverse\_1.3.0 chron\_2.3-56 R.utils\_2.10.1 R.oo\_1.24.0   
[13] R.methodsS3\_1.8.1 openxlsx\_4.2.3   
  
loaded via a namespace (and not attached):  
 [1] tidyselect\_1.1.0 xfun\_0.20 haven\_2.3.1 colorspace\_2.0-0   
 [5] vctrs\_0.3.6 generics\_0.1.0 htmltools\_0.5.1.1 yaml\_2.2.1   
 [9] rlang\_0.4.10 pillar\_1.4.7 withr\_2.4.1 glue\_1.4.2   
[13] DBI\_1.1.1 dbplyr\_2.0.0 modelr\_0.1.8 readxl\_1.3.1   
[17] lifecycle\_0.2.0 munsell\_0.5.0 gtable\_0.3.0 cellranger\_1.1.0   
[21] rvest\_0.3.6 zip\_2.1.1 evaluate\_0.14 knitr\_1.31   
[25] broom\_0.7.4 Rcpp\_1.0.6 backports\_1.2.1 scales\_1.1.1   
[29] jsonlite\_1.7.2 fs\_1.5.0 hms\_1.0.0 digest\_0.6.27   
[33] stringi\_1.5.3 grid\_4.0.2 cli\_2.3.0 magrittr\_2.0.1   
[37] crayon\_1.4.0 pkgconfig\_2.0.3 ellipsis\_0.3.1 xml2\_1.3.2   
[41] reprex\_1.0.0 lubridate\_1.7.9.2 rstudioapi\_0.13 assertthat\_0.2.1   
[45] rmarkdown\_2.6 httr\_1.4.2 R6\_2.5.0 compiler\_4.0.2

RStudio version 1.3.1073.

END OF SCRIPT