Plots - Lithic analysis from three sites: Balver Höhle, Buhlen & Ramioul

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# Goal of the script

This script reads the xlsx file (derived data) containing all the information gained through a lithic analysis.  
The script will:

1. Reads the xlsx file
2. Plots all relevant variables in various combinations
3. Saves the plot as PDFs

dir\_in <- "analysis/all\_Sites/derived\_data/"  
dir\_out <- "analysis/all\_sites/plots/"

Raw data must be located in “analysis/all\_Sites/derived\_data/”.  
Formatted data will be saved in “analysis/all\_sites/plots/”. The knit directory for this script is the project directory.

# Load packages

library(openxlsx)  
library(readxl)  
library(R.utils)  
library(tools)  
library(chron)  
library(ggplot2)  
library(wesanderson)

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

library(dplyr)  
library(ggsci)

# Get name, path and information of the file

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

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

[1] files checksum  
<0 rows> (or 0-length row.names)

# Load data into R object

imp\_data <- read.xlsx(xlsxFile = data\_file, sheet = 1, startRow = 1, colNames = TRUE,  
 rowNames = FALSE, skipEmptyRows = FALSE)

Error in file(description = xlsxFile): invalid 'description' argument

# Data analsysis - plots

## Histogram

### Histogram dimensions - Keilmesser

# Load data sheet Keilmesser   
KM\_dim <- read.xlsx(xlsxFile = data\_file, sheet = 3)

Error in file(description = xlsxFile): invalid 'description' argument

# removes incomplete artefacts   
KM\_dim <- KM\_dim[ , ] %>% arrange(artefact.state)

Error in eval(lhs, parent, parent): object 'KM\_dim' not found

KM.tip\_dim <- KM\_dim[-c(279, 316:330), ]

Error in eval(expr, envir, enclos): object 'KM\_dim' not found

# Keilmesser length   
# Calculates the mean value for the plot and ascribes the N value   
mean\_length <- mean(KM.tip\_dim$length, na.rm = TRUE)

Error in mean(KM.tip\_dim$length, na.rm = TRUE): object 'KM.tip\_dim' not found

n <- doBy::summaryBy(length ~ artefact.state, data = KM.tip\_dim, FUN = length)

Error in doBy::summaryBy(length ~ artefact.state, data = KM.tip\_dim, FUN = length): object 'KM.tip\_dim' not found

tag <- gsub(pattern = "\_", replacement = " ", paste0(n[[1]], " (n = ", n[[2]], ")"))

Error in n[[1]]: object of type 'closure' is not subsettable

# Histogram Keilmesser length  
KM.length <- ggplot(KM.tip\_dim, aes(x = length, fill = artefact.state)) +   
 geom\_histogram(binwidth = 1) +  
 labs(x = "length [mm]", y = "n", title = "", fill = "artefact state",   
 size = 12) +  
 theme\_classic() +  
 geom\_vline(aes(xintercept = mean\_length), linetype="dashed", size = 1) +  
 geom\_text(aes(y = mean\_length, x = 67, label = round(mean\_length, 1)),   
 nudge\_y = -38) +  
 scale\_fill\_manual(values = wes\_palette(n = 2, name = "Zissou1"), labels = tag)

Error in ggplot(KM.tip\_dim, aes(x = length, fill = artefact.state)): object 'KM.tip\_dim' not found

print(KM.length)

Error in print(KM.length): object 'KM.length' not found

file\_out <- paste0(file\_path\_sans\_ext(info\_in[["file"]]), "KM.length", ".pdf")  
ggsave(filename = file\_out, plot = KM.length, path = dir\_out, device = "pdf", width = 170, height = 250, units = "mm")

Error in grDevices::pdf(file = filename, ..., version = version): cannot open file 'analysis/all\_sites/plots//KM.length.pdf'

# Keilmesser width  
# Calculates the mean value for the plot and ascribes the N value   
mean\_width <- mean(KM.tip\_dim$width, na.rm = TRUE)

Error in mean(KM.tip\_dim$width, na.rm = TRUE): object 'KM.tip\_dim' not found

n <- doBy::summaryBy(width ~ artefact.state, data = KM.tip\_dim, FUN = length)

Error in doBy::summaryBy(width ~ artefact.state, data = KM.tip\_dim, FUN = length): object 'KM.tip\_dim' not found

tag <- gsub(pattern = "\_", replacement = " ", paste0(n[[1]], " (n = ", n[[2]], ")"))

Error in n[[1]]: object of type 'closure' is not subsettable

# Histogram Keilmesser width  
KM.width <- ggplot(KM.tip\_dim, aes(x = width, fill = artefact.state)) +   
 geom\_histogram(binwidth = 1) +  
 labs(x = "width [mm]", y = "n", title = "", fill = "artefact state",   
 size = 12) +  
 theme\_classic() +  
 geom\_vline(aes(xintercept = mean\_width), linetype = "dashed", size = 1) +  
 geom\_text(aes(y = mean\_length, x = 42, label = round(mean\_width, 1)),   
 nudge\_y = -34) +  
 scale\_fill\_manual(values = wes\_palette(n = 2, name = "Zissou1"), labels = tag)

Error in ggplot(KM.tip\_dim, aes(x = width, fill = artefact.state)): object 'KM.tip\_dim' not found

print(KM.width)

Error in print(KM.width): object 'KM.width' not found

file\_out <- paste0(file\_path\_sans\_ext(info\_in[["file"]]), "KM.width", ".pdf")  
ggsave(filename = file\_out, plot = KM.width, path = dir\_out, device = "pdf", width = 170, height = 250, units = "mm")

Error in grDevices::pdf(file = filename, ..., version = version): cannot open file 'analysis/all\_sites/plots//KM.width.pdf'

# Keilmesser thickness  
# Calculates the mean value for the plot and ascribes the N value   
mean\_thickness <- mean(KM.tip\_dim$thickness, na.rm = TRUE)

Error in mean(KM.tip\_dim$thickness, na.rm = TRUE): object 'KM.tip\_dim' not found

n <- doBy::summaryBy(thickness ~ artefact.state, data = KM\_dim, FUN = length)

Error in doBy::summaryBy(thickness ~ artefact.state, data = KM\_dim, FUN = length): object 'KM\_dim' not found

tag <- gsub(pattern = "\_", replacement = " ", paste0(n[[1]], " (n = ", n[[2]], ")"))

Error in n[[1]]: object of type 'closure' is not subsettable

# Histogram Keilmesser thickness   
KM.thickness <- ggplot(KM.tip\_dim, aes(y = thickness, fill = artefact.state)) +   
 geom\_histogram(binwidth = 0.8) +  
 labs(y = "thickness [mm]", x = "n", title = "", fill = "artefact state",  
 size = 12) +  
 theme\_classic() +  
 geom\_hline(aes(yintercept = mean\_thickness), linetype = "dashed",   
 size = 1) +  
 geom\_text(aes(y = mean\_thickness, x = 37.5, label = round(mean\_thickness,  
 1)), nudge\_y = 1) +  
 scale\_fill\_manual(values = wes\_palette(n = 2, name = "Zissou1"),   
 labels = tag)

Error in ggplot(KM.tip\_dim, aes(y = thickness, fill = artefact.state)): object 'KM.tip\_dim' not found

print(KM.thickness)

Error in print(KM.thickness): object 'KM.thickness' not found

file\_out <- paste0(file\_path\_sans\_ext(info\_in[["file"]]), "KM.thickness", ".pdf")  
ggsave(filename = file\_out, plot = KM.thickness, path = dir\_out, device = "pdf",   
 width = 250, height = 170, units = "mm")

Error in grDevices::pdf(file = filename, ..., version = version): cannot open file 'analysis/all\_sites/plots//KM.thickness.pdf'

# Keilmesser Back   
# Load data sheet Keilmesser thickness back   
KM\_back <- read.xlsx(xlsxFile = data\_file, sheet = 13)

Error in file(description = xlsxFile): invalid 'description' argument

KM\_back <- KM\_back[-c(279, 316:330), ]

Error in eval(expr, envir, enclos): object 'KM\_back' not found

# Calculates the mean value for the plot and ascribes the N value   
mean\_KM\_back <- mean(KM\_back$thickness.back, na.rm = TRUE)

Error in mean(KM\_back$thickness.back, na.rm = TRUE): object 'KM\_back' not found

n <- doBy::summaryBy(thickness.back ~ artefact.state, data = KM\_back, FUN = length)

Error in doBy::summaryBy(thickness.back ~ artefact.state, data = KM\_back, : object 'KM\_back' not found

tag <- gsub(pattern = "\_", replacement = " ", paste0(n[[1]], " (n = ", n[[2]], ")"))

Error in n[[1]]: object of type 'closure' is not subsettable

# Histogram Keilmesser thickness back   
KM.back <- ggplot(KM\_back, aes(y = thickness.back, fill = artefact.state)) +   
 geom\_histogram(binwidth = 0.8) +  
 labs(x = "thickness [mm]", y = "n", title = "", fill = "artefact state",  
 size = 12) +  
 theme\_classic() +  
 geom\_hline(aes(yintercept = mean\_KM\_back), linetype = "dashed",   
 size = 1) +  
 geom\_text(aes(y = mean\_KM\_back, x = 28.5, label = round(mean\_KM\_back, 1)),  
 nudge\_y = -0.7) +  
 scale\_fill\_manual(values = wes\_palette(n = 3, name = "Zissou1"),   
 labels = tag)

Error in ggplot(KM\_back, aes(y = thickness.back, fill = artefact.state)): object 'KM\_back' not found

print(KM.back)

Error in print(KM.back): object 'KM.back' not found

file\_out <- paste0(file\_path\_sans\_ext(info\_in[["file"]]), "KM.back", ".pdf")  
ggsave(filename = file\_out, plot = KM.back, path = dir\_out, device = "pdf", width = 250, height = 170, units = "mm")

Error in grDevices::pdf(file = filename, ..., version = version): cannot open file 'analysis/all\_sites/plots//KM.back.pdf'

### Histogram dimensions - Pradnik scraper

# Load data sheet Pradnik scraper   
PS\_dim <- read.xlsx(xlsxFile = data\_file, sheet = 4)

Error in file(description = xlsxFile): invalid 'description' argument

# Pradnik scraper length   
# Calculates the mean value for the plot and ascribes the N value   
mean\_PS\_length <- mean(PS\_dim$length, na.rm = TRUE)

Error in mean(PS\_dim$length, na.rm = TRUE): object 'PS\_dim' not found

n <- doBy::summaryBy(length ~ artefact.state, data = PS\_dim, FUN = length)

Error in doBy::summaryBy(length ~ artefact.state, data = PS\_dim, FUN = length): object 'PS\_dim' not found

tag <- gsub(pattern = "\_", replacement = " ", paste0(n[[1]], " (n = ", n[[2]], ")"))

Error in n[[1]]: object of type 'closure' is not subsettable

# Histogram Pradnik scraper length  
PS.length <- ggplot(PS\_dim, aes(x = length, fill = artefact.state)) +   
 geom\_histogram(binwidth = 1) +  
 labs(x = "length [mm]", y = "n", title = "", fill = "artefact state",   
 size = 12) +  
 theme\_classic() +  
 geom\_vline(aes(xintercept = mean\_PS\_length), linetype = "dashed",   
 size = 1) +  
 geom\_text(aes(y = mean\_PS\_length, x = 52, label = round(mean\_PS\_length, 1)),  
 nudge\_y = -40.4) +  
 scale\_fill\_manual(values = wes\_palette(n = 1, name = "BottleRocket1"),   
 labels = tag)

Error in ggplot(PS\_dim, aes(x = length, fill = artefact.state)): object 'PS\_dim' not found

print(PS.length)

Error in print(PS.length): object 'PS.length' not found

file\_out <- paste0(file\_path\_sans\_ext(info\_in[["file"]]), "PS.length", ".pdf")  
ggsave(filename = file\_out, plot = PS.length, path = dir\_out, device = "pdf", width = 170, height = 250, units = "mm")

Error in grDevices::pdf(file = filename, ..., version = version): cannot open file 'analysis/all\_sites/plots//PS.length.pdf'

# Pradnik scraper width   
# Calculates the mean value for the plot and ascribes the N value   
mean\_PS\_width <- mean(PS\_dim$width, na.rm = TRUE)

Error in mean(PS\_dim$width, na.rm = TRUE): object 'PS\_dim' not found

n <- doBy::summaryBy(width ~ artefact.state, data = PS\_dim, FUN = length)

Error in doBy::summaryBy(width ~ artefact.state, data = PS\_dim, FUN = length): object 'PS\_dim' not found

tag <- gsub(pattern = "\_", replacement = " ", paste0(n[[1]], " (n = ", n[[2]], ")"))

Error in n[[1]]: object of type 'closure' is not subsettable

# Histogram Pradnik scraper width  
PS.width <- ggplot(PS\_dim, aes(x = width, fill = artefact.state)) +   
 geom\_histogram(binwidth = 1) +  
 labs(x = "width [mm]", y = "n", title = "", fill = "artefact state",   
 size = 12) +  
 theme\_classic() +  
 geom\_vline(aes(xintercept = mean\_PS\_width), linetype="dashed", size = 1) +  
 geom\_text(aes(y = mean\_PS\_width, x = 35, label = round(mean\_PS\_width, 2)),  
 nudge\_y = -24.1) +  
 scale\_fill\_manual(values = wes\_palette(n = 1, name = "BottleRocket1"),   
 labels = tag)

Error in ggplot(PS\_dim, aes(x = width, fill = artefact.state)): object 'PS\_dim' not found

print(PS.width)

Error in print(PS.width): object 'PS.width' not found

file\_out <- paste0(file\_path\_sans\_ext(info\_in[["file"]]), "PS.width", ".pdf")  
ggsave(filename = file\_out, plot = PS.width, path = dir\_out, device = "pdf", width = 170, height = 250, units = "mm")

Error in grDevices::pdf(file = filename, ..., version = version): cannot open file 'analysis/all\_sites/plots//PS.width.pdf'

# Pradnik scraper thickness  
# Calculates the mean value for the plot and ascribes the n value   
mean\_PS\_thickness <- mean(PS\_dim$thickness, na.rm = TRUE)

Error in mean(PS\_dim$thickness, na.rm = TRUE): object 'PS\_dim' not found

n <- doBy::summaryBy(thickness ~ artefact.state, data = PS\_dim, FUN = length)

Error in doBy::summaryBy(thickness ~ artefact.state, data = PS\_dim, FUN = length): object 'PS\_dim' not found

tag <- gsub(pattern = "\_", replacement = " ", paste0(n[[1]], " (n = ", n[[2]], ")"))

Error in n[[1]]: object of type 'closure' is not subsettable

# Histogram Pradnik scraper thickness   
PS.thickness <- ggplot(PS\_dim, aes(y = thickness, fill = artefact.state)) +   
 geom\_histogram(binwidth = 1) +  
 labs(y = "thickness [mm]", x = "n", title = "", fill = "artefact state",  
 size = 12) +  
 theme\_classic() +  
 geom\_hline(aes(yintercept = mean\_PS\_thickness), linetype = "dashed",   
 size = 1) +  
 geom\_text(aes(y = mean\_PS\_thickness, x = 6.8,   
 label = round(mean\_PS\_thickness, 1)), nudge\_y = -0.5) +  
 scale\_fill\_manual(values = wes\_palette(n = 1 , name = "BottleRocket1"),  
 labels = tag)

Error in ggplot(PS\_dim, aes(y = thickness, fill = artefact.state)): object 'PS\_dim' not found

print(PS.thickness)

Error in print(PS.thickness): object 'PS.thickness' not found

file\_out <- paste0(file\_path\_sans\_ext(info\_in[["file"]]), "PS.thickness", ".pdf")  
ggsave(filename = file\_out, plot = PS.thickness, path = dir\_out, device = "pdf", width = 250, height = 170, units = "mm")

Error in grDevices::pdf(file = filename, ..., version = version): cannot open file 'analysis/all\_sites/plots//PS.thickness.pdf'

# Back Pradnik scraper thickness  
# Load data sheet Pradnik scraper thickness back   
PS\_back <- read.xlsx(xlsxFile = data\_file, sheet = 14)

Error in file(description = xlsxFile): invalid 'description' argument

# Calculates the mean value for the plot and ascribes the n value   
mean\_PS\_back <- mean(PS\_back$thickness.back, na.rm = TRUE)

Error in mean(PS\_back$thickness.back, na.rm = TRUE): object 'PS\_back' not found

n <- doBy::summaryBy(thickness.back ~ artefact.state, data = PS\_back, FUN = length)

Error in doBy::summaryBy(thickness.back ~ artefact.state, data = PS\_back, : object 'PS\_back' not found

tag <- gsub(pattern = "\_", replacement = " ", paste0(n[[1]], " (n = ", n[[2]], ")"))

Error in n[[1]]: object of type 'closure' is not subsettable

# Histogram Pradnik scraper thickness back   
PS.back <- ggplot(PS\_back, aes(y = thickness.back, fill = artefact.state)) +   
 geom\_histogram(binwidth = 0.8) +  
 labs(y = "thickness [mm]", x = "n", title = "", fill = "artefact state",  
 size = 12) +  
 theme\_classic() +  
 geom\_hline(aes(yintercept = mean\_PS\_back), linetype = "dashed",   
 size = 1) +  
 geom\_text(aes(y = mean\_PS\_back, x = 6.8, label = round(mean\_PS\_back, 1)),  
 nudge\_y = -0.5) +  
 scale\_fill\_manual(values = wes\_palette(n = 3, name = "BottleRocket1"),  
 labels = tag)

Error in ggplot(PS\_back, aes(y = thickness.back, fill = artefact.state)): object 'PS\_back' not found

print(PS.back)

Error in print(PS.back): object 'PS.back' not found

file\_out <- paste0(file\_path\_sans\_ext(info\_in[["file"]]), "PS.back", ".pdf")  
ggsave(filename = file\_out, plot = PS.back, path = dir\_out, device = "pdf", width = 250, height = 170, units = "mm")

Error in grDevices::pdf(file = filename, ..., version = version): cannot open file 'analysis/all\_sites/plots//PS.back.pdf'

### Histogram dimension - Lateral sharpening spall

# Load data sheet lateral sharpening spall   
LSS\_dim <- read.xlsx(xlsxFile = data\_file, sheet = 5)

Error in file(description = xlsxFile): invalid 'description' argument

# removes incomplete artefacts   
LSS\_dim <-LSS\_dim[ , ] %>% arrange(artefact.state)

Error in eval(lhs, parent, parent): object 'LSS\_dim' not found

LSS\_dim <- LSS\_dim[-c(147:159), ]

Error in eval(expr, envir, enclos): object 'LSS\_dim' not found

# Lateral sharpening spall length   
# Calculates the mean value for the plot and ascribes the n value   
mean\_LSS\_length <- mean(LSS\_dim$length, na.rm = TRUE)

Error in mean(LSS\_dim$length, na.rm = TRUE): object 'LSS\_dim' not found

n <- doBy::summaryBy(length ~ artefact.state, data = LSS\_dim, FUN = length)

Error in doBy::summaryBy(length ~ artefact.state, data = LSS\_dim, FUN = length): object 'LSS\_dim' not found

tag <- gsub(pattern = "\_", replacement = " ", paste0(n[[1]], " (n = ", n[[2]], ")"))

Error in n[[1]]: object of type 'closure' is not subsettable

# Histogram lateral sharpening spall length  
LSS.length <- ggplot(LSS\_dim, aes(x = length, fill = artefact.state)) +   
 geom\_histogram(binwidth = 1) +  
 labs(x = "length [mm]", y = "n", title = "", fill = "artefact state",   
 size = 12) +  
 theme\_classic() +  
 geom\_vline(aes(xintercept = mean\_LSS\_length), linetype = "dashed",   
 size = 1) +  
 geom\_text(aes(y = mean\_LSS\_length, x = 35, label = round(mean\_LSS\_length,  
 1)), nudge\_y = -17.7) +  
 scale\_fill\_manual(values = wes\_palette(n = 1, name = "Chevalier1"),   
 labels = tag)

Error in ggplot(LSS\_dim, aes(x = length, fill = artefact.state)): object 'LSS\_dim' not found

print(LSS.length)

Error in print(LSS.length): object 'LSS.length' not found

file\_out <- paste0(file\_path\_sans\_ext(info\_in[["file"]]), "LSS.length", ".pdf")  
ggsave(filename = file\_out, plot = LSS.length, path = dir\_out, device = "pdf", width = 170, height = 250, units = "mm")

Error in grDevices::pdf(file = filename, ..., version = version): cannot open file 'analysis/all\_sites/plots//LSS.length.pdf'

# Lateral sharpening spall width   
# Calculates the mean value for the plot and ascribes the n value   
mean\_LSS\_width <- mean(LSS\_dim$width, na.rm = TRUE)

Error in mean(LSS\_dim$width, na.rm = TRUE): object 'LSS\_dim' not found

n <- doBy::summaryBy(width ~ artefact.state, data = LSS\_dim, FUN = length)

Error in doBy::summaryBy(width ~ artefact.state, data = LSS\_dim, FUN = length): object 'LSS\_dim' not found

tag <- gsub(pattern = "\_", replacement = " ", paste0(n[[1]], " (n = ", n[[2]], ")"))

Error in n[[1]]: object of type 'closure' is not subsettable

# Histogram lateral sharpening spall width  
LSS.width <- ggplot(LSS\_dim, aes(x = width, fill = artefact.state)) +   
 geom\_histogram(binwidth = 1) +  
 labs(x = "width [mm]", y = "n", title = "", fill = "artefact state",   
 size = 12) +  
 theme\_classic() +  
 geom\_vline(aes(xintercept = mean\_LSS\_width), linetype = "dashed",   
 size = 1) +  
 geom\_text(aes(y = mean\_LSS\_width, x = 19.8, label = round(mean\_LSS\_width, 1)),  
 nudge\_y = -1.55) +  
 scale\_fill\_manual(values = wes\_palette(n = 4, name = "Chevalier1"),   
 labels = tag)

Error in ggplot(LSS\_dim, aes(x = width, fill = artefact.state)): object 'LSS\_dim' not found

print(LSS.width)

Error in print(LSS.width): object 'LSS.width' not found

file\_out <- paste0(file\_path\_sans\_ext(info\_in[["file"]]), "LSS.width", ".pdf")  
ggsave(filename = file\_out, plot = LSS.width, path = dir\_out, device = "pdf", width = 170, height = 250, units = "mm")

Error in grDevices::pdf(file = filename, ..., version = version): cannot open file 'analysis/all\_sites/plots//LSS.width.pdf'

# Lateral sharpening spall thickness  
# Calculates the mean value for the plot and ascribes the n value   
mean\_LSS\_thickness <- mean(LSS\_dim$thickness, na.rm = TRUE)

Error in mean(LSS\_dim$thickness, na.rm = TRUE): object 'LSS\_dim' not found

n <- doBy::summaryBy(thickness ~ artefact.state, data = LSS\_dim, FUN = length)

Error in doBy::summaryBy(thickness ~ artefact.state, data = LSS\_dim, FUN = length): object 'LSS\_dim' not found

tag <- gsub(pattern = "\_", replacement = " ", paste0(n[[1]], " (n = ", n[[2]], ")"))

Error in n[[1]]: object of type 'closure' is not subsettable

# Histogram lateral sharpening spall thickness   
LSS.thickness <- ggplot(LSS\_dim, aes(y = thickness, fill = artefact.state)) +   
 geom\_histogram(binwidth = 0.5) +  
 labs(y = "thickness[mm]", x = "n", title = "", fill = "artefact state",  
 size = 12) +  
 theme\_classic() +   
 geom\_hline(aes(yintercept = mean\_LSS\_thickness), linetype = "dashed",   
 size = 1) +  
 geom\_text(aes(y = mean\_LSS\_thickness, x = 23.9, label =  
 round(mean\_LSS\_thickness, 2)), nudge\_y = -0.3) +  
 scale\_fill\_manual(values = wes\_palette(n = 4, name = "Chevalier1"),   
 labels = tag)

Error in ggplot(LSS\_dim, aes(y = thickness, fill = artefact.state)): object 'LSS\_dim' not found

print(LSS.thickness)

Error in print(LSS.thickness): object 'LSS.thickness' not found

file\_out <- paste0(file\_path\_sans\_ext(info\_in[["file"]]), "LSS.thickness", ".pdf")  
ggsave(filename = file\_out, plot = LSS.thickness, path = dir\_out, device = "pdf", width = 250, height = 170, units = "mm")

Error in grDevices::pdf(file = filename, ..., version = version): cannot open file 'analysis/all\_sites/plots//LSS.thickness.pdf'

## Scatterplot

### Length-width ratio

# Load data sheet Keilmesser   
KM\_dim <- read.xlsx(xlsxFile = data\_file, sheet = 3)

Error in file(description = xlsxFile): invalid 'description' argument

KM\_dim <- KM\_dim[ , ] %>% arrange(artefact.state)

Error in eval(lhs, parent, parent): object 'KM\_dim' not found

KM\_comp\_dim <- KM\_dim[-c(279:330 ), ]

Error in eval(expr, envir, enclos): object 'KM\_dim' not found

# Keilmesser length VS width   
# Ascribes the n value   
n <- doBy::summaryBy(width + length ~ site, data = KM\_comp\_dim, FUN = length)

Error in doBy::summaryBy(width + length ~ site, data = KM\_comp\_dim, FUN = length): object 'KM\_comp\_dim' not found

tag <- gsub(pattern = "\_", replacement = " ", paste0(n[[1]], " (n = ", n[[2]], ")"))

Error in n[[1]]: object of type 'closure' is not subsettable

# Scatterplot Keilmesser (complete + tip) length VS width   
KM.length\_width <- ggplot(KM\_comp\_dim, aes(y = length, x = width, fill = site)) +  
 geom\_point(size = 3, shape = 21) +  
 labs(y = "length [mm]", x = "width [mm]", title = "", fill = "",   
 size = 12) +  
 xlim(0, 160) + ylim(0, 160) +  
 theme\_classic() +  
 scale\_fill\_manual(values = wes\_palette(n = 3, name = "FantasticFox1",  
 type = "continuous"), labels = tag)

Error in ggplot(KM\_comp\_dim, aes(y = length, x = width, fill = site)): object 'KM\_comp\_dim' not found

print(KM.length\_width)

Error in print(KM.length\_width): object 'KM.length\_width' not found

file\_out <- paste0(file\_path\_sans\_ext(info\_in[["file"]]), "KM.length\_width", ".pdf")  
ggsave(filename = file\_out, plot = KM.length\_width, path = dir\_out, device = "pdf",  
 width = 170, height = 250, units = "mm")

Error in grDevices::pdf(file = filename, ..., version = version): cannot open file 'analysis/all\_sites/plots//KM.length\_width.pdf'

# Keilmesser complete + tips length vs width   
# Define the rows with complete Keilmesser and Keilmesser tips   
KM\_comp.tip\_dim <- KM\_dim[-c(279, 316:330), ]

Error in eval(expr, envir, enclos): object 'KM\_dim' not found

# Ascribes the n value   
n <- doBy::summaryBy(length + width ~ site, data = KM\_comp.tip\_dim, FUN = length)

Error in doBy::summaryBy(length + width ~ site, data = KM\_comp.tip\_dim, : object 'KM\_comp.tip\_dim' not found

tag <- gsub(pattern = "\_", replacement = " ", paste0(n[[1]], " (n = ", n[[2]], ")"))

Error in n[[1]]: object of type 'closure' is not subsettable

# Scatterplot Keilmesser (complete + tip) length VS width   
KM.tip.length\_width <- ggplot(KM\_comp.tip\_dim, aes(y = length, x = width, colour =   
 site, shape = artefact.state)) +  
 geom\_point(size = 2) +  
 scale\_colour\_manual(values = wes\_palette(n = 3, name = "FantasticFox1",  
 type = "continuous"), labels = tag) +  
 labs(y = "length [mm]", x = "width [mm]", title = "", fill = "",   
 size = 12) +  
 xlim(0, 160) + ylim(0, 160) +  
 theme\_classic()

Error in ggplot(KM\_comp.tip\_dim, aes(y = length, x = width, colour = site, : object 'KM\_comp.tip\_dim' not found

print(KM.tip.length\_width)

Error in print(KM.tip.length\_width): object 'KM.tip.length\_width' not found

file\_out <- paste0(file\_path\_sans\_ext(info\_in[["file"]]), "KM.tip.length\_width", ".pdf")  
ggsave(filename = file\_out, plot = KM.tip.length\_width, path = dir\_out, device = "pdf", width = 170, height = 250, units = "mm")

Error in grDevices::pdf(file = filename, ..., version = version): cannot open file 'analysis/all\_sites/plots//KM.tip.length\_width.pdf'

# Pradnik scraper length VS width   
# Ascribes the n value   
n <- doBy::summaryBy(length + width ~ site, data = PS\_dim, FUN = length)

Error in doBy::summaryBy(length + width ~ site, data = PS\_dim, FUN = length): object 'PS\_dim' not found

tag <- gsub(pattern = "\_", replacement = " ", paste0(n[[1]], " (N = ", n[[2]], ")"))

Error in n[[1]]: object of type 'closure' is not subsettable

# Scatterplot Pradnik scraper length VS width   
PS.length\_width <- ggplot(PS\_dim, aes(y = length, x = width, fill = site)) +  
 geom\_point(size = 3, shape = 21) +  
 labs(y = "length [mm]", x = "width [mm]", title = "",fill = " ",   
 size = 12) +  
 xlim(0, 80) + ylim(0, 80) +  
 theme\_classic() +  
 scale\_fill\_manual(values = wes\_palette(n = 3, name = "Darjeeling1"),  
 labels = tag)

Error in ggplot(PS\_dim, aes(y = length, x = width, fill = site)): object 'PS\_dim' not found

print(PS.length\_width)

Error in print(PS.length\_width): object 'PS.length\_width' not found

file\_out <- paste0(file\_path\_sans\_ext(info\_in[["file"]]), "PS.length\_width", ".pdf")  
ggsave(filename = file\_out, plot = PS.length\_width, path = dir\_out, device = "pdf",  
 width = 170, height = 250, units = "mm")

Error in grDevices::pdf(file = filename, ..., version = version): cannot open file 'analysis/all\_sites/plots//PS.length\_width.pdf'

# Lateral sharpening spall length VS width   
# Defines only the rows with complete LSS   
LSS\_dim <- LSS\_dim[ , ] %>% arrange(artefact.state)

Error in eval(lhs, parent, parent): object 'LSS\_dim' not found

LSS.comp\_dim <- LSS\_dim[1:146, ]

Error in eval(expr, envir, enclos): object 'LSS\_dim' not found

# Lateral sharpening spall length VS width   
# Ascribes the n value   
n <- doBy::summaryBy(length + width ~ site, data = LSS.comp\_dim, FUN = length)

Error in doBy::summaryBy(length + width ~ site, data = LSS.comp\_dim, FUN = length): object 'LSS.comp\_dim' not found

tag <- gsub(pattern = "\_", replacement = " ", paste0(n[[1]], " (n = ", n[[2]], ")"))

Error in n[[1]]: object of type 'closure' is not subsettable

# Scatterplot lateral sharpening spall length VS width   
LSS.length\_width <- ggplot(LSS.comp\_dim, aes(y = length, x = width, fill = site)) +  
 geom\_point(size = 3, shape = 21) +  
 labs(y = "length [mm]", x = "width [mm]", title = "", fill = "",   
 size = 12) +  
 xlim(0, 65) + ylim(0, 65) +  
 theme\_classic() +  
 scale\_fill\_manual(values = wes\_palette(n = 2, name = "Chevalier1"),  
 labels = tag)

Error in ggplot(LSS.comp\_dim, aes(y = length, x = width, fill = site)): object 'LSS.comp\_dim' not found

print(LSS.length\_width)

Error in print(LSS.length\_width): object 'LSS.length\_width' not found

file\_out <- paste0(file\_path\_sans\_ext(info\_in[["file"]]), "LSS.length\_width", ".pdf")  
ggsave(filename = file\_out, plot = LSS.length\_width, path = dir\_out, device = "pdf",   
 width = 170, height = 250, units = "mm")

Error in grDevices::pdf(file = filename, ..., version = version): cannot open file 'analysis/all\_sites/plots//LSS.length\_width.pdf'

# Keilmesser (complete) + Pradnik scraper length VS width  
# Load data sheet dimensions   
dim <- read.xlsx(xlsxFile = data\_file, sheet = 2)

Error in file(description = xlsxFile): invalid 'description' argument

dim <- dim[ , ] %>% arrange(artefact.state)

Error in dim[, ]: object of type 'builtin' is not subsettable

# Defines only the relevant rows   
KM.PS\_dim <- dim[c(4:281, 428:481), ]

Error in dim[c(4:281, 428:481), ]: object of type 'builtin' is not subsettable

# Ascribes the n value   
n <- doBy::summaryBy(length + width ~ technological.class, data = KM.PS\_dim, FUN = length)

Error in doBy::summaryBy(length + width ~ technological.class, data = KM.PS\_dim, : object 'KM.PS\_dim' not found

tag <- gsub(pattern = "\_", replacement = " ", paste0(n[[1]], " (n = ", n[[2]], ")"))

Error in n[[1]]: object of type 'closure' is not subsettable

KM.PS.length\_width <- ggplot(KM.PS\_dim, aes(y = length, x = width, fill = technological.class)) +  
 geom\_point(size = 3, shape = 21) +  
 labs(y = "length [mm]", x = "width [mm]", title = "",  
 fill = "artefact category", size = 12) +  
 xlim(0, 150) + ylim(0, 150) +  
 theme\_classic() +  
 scale\_fill\_manual(values = wes\_palette(n = 3, name = "FantasticFox1",  
 type = "continuous"), labels = tag)

Error in ggplot(KM.PS\_dim, aes(y = length, x = width, fill = technological.class)): object 'KM.PS\_dim' not found

print(KM.PS.length\_width)

Error in print(KM.PS.length\_width): object 'KM.PS.length\_width' not found

file\_out <- paste0(file\_path\_sans\_ext(info\_in[["file"]]), "KM.PS.length\_width", ".pdf")  
ggsave(filename = file\_out, plot = KM.PS.length\_width, path = dir\_out, device = "pdf", width = 170, height = 250, units = "mm")

Error in grDevices::pdf(file = filename, ..., version = version): cannot open file 'analysis/all\_sites/plots//KM.PS.length\_width.pdf'

# Keilmesser (complete): length-width combined with morpho type  
# Load data sheet Keilmesser morpho type   
KM\_morpho.type <- read.xlsx(xlsxFile = data\_file, sheet = 15)

Error in file(description = xlsxFile): invalid 'description' argument

# Arranges the data and defines only the relevant rows  
KM\_morpho.type <- KM\_morpho.type[ , ] %>% arrange(artefact.state)

Error in eval(lhs, parent, parent): object 'KM\_morpho.type' not found

KM\_morpho.type <- KM\_morpho.type[-c(279:330), ]

Error in eval(expr, envir, enclos): object 'KM\_morpho.type' not found

KM\_morpho.type <- KM\_morpho.type[ , ] %>% arrange(morpho.type)

Error in eval(lhs, parent, parent): object 'KM\_morpho.type' not found

KM\_morpho.type <- KM\_morpho.type[-c(273:278), ]

Error in eval(expr, envir, enclos): object 'KM\_morpho.type' not found

# Ascribes the N value   
n <- doBy::summaryBy(length + width ~ morpho.type, data = KM\_morpho.type, FUN = length)

Error in doBy::summaryBy(length + width ~ morpho.type, data = KM\_morpho.type, : object 'KM\_morpho.type' not found

tag <- gsub(pattern = "\_", replacement = " ", paste0(n[[1]], " (n = ", n[[2]], ")"))

Error in n[[1]]: object of type 'closure' is not subsettable

# Scatterplot Keilmesser (complete): length-width combined with morpho type   
KM.width\_length\_morpho <- ggplot(KM\_morpho.type, aes(y = length, x = width,   
 fill = morpho.type)) +  
 geom\_point(size = 2, shape = 21) +  
 labs(y = "length [mm]", x = "width [mm]", title = "",   
 fill = "morpho type", size = 12) +  
 xlim(0, 160) + ylim(0, 160) +  
 theme\_classic() +  
 scale\_fill\_manual(values = wes\_palette(n = 7, name = "FantasticFox1",  
 type = "continuous"), labels = tag)

Error in ggplot(KM\_morpho.type, aes(y = length, x = width, fill = morpho.type)): object 'KM\_morpho.type' not found

print(KM.width\_length\_morpho)

Error in print(KM.width\_length\_morpho): object 'KM.width\_length\_morpho' not found

file\_out <- paste0(file\_path\_sans\_ext(info\_in[["file"]]), "KM.width\_length\_morpho", ".pdf")  
ggsave(filename = file\_out, plot = KM.width\_length\_morpho, path = dir\_out, device = "pdf",  
 width = 170, height = 250, units = "mm")

Error in grDevices::pdf(file = filename, ..., version = version): cannot open file 'analysis/all\_sites/plots//KM.width\_length\_morpho.pdf'

# Pradnik scraper (complete): length-width combined with morpho type  
# Load data sheet Pradnik morpho type   
PS\_morpho.type <- read.xlsx(xlsxFile = data\_file, sheet = 16)

Error in file(description = xlsxFile): invalid 'description' argument

# Arranges the data and defines only the relevant rows  
PS\_morpho.type <- PS\_morpho.type[ , ] %>% arrange(morpho.type)

Error in eval(lhs, parent, parent): object 'PS\_morpho.type' not found

PS\_morpho.type <- PS\_morpho.type[-54, ]

Error in eval(expr, envir, enclos): object 'PS\_morpho.type' not found

# Ascribes the N value   
n <- doBy::summaryBy(length + width ~ morpho.type, data = PS\_morpho.type, FUN = length)

Error in doBy::summaryBy(length + width ~ morpho.type, data = PS\_morpho.type, : object 'PS\_morpho.type' not found

tag <- gsub(pattern = "\_", replacement = " ", paste0(n[[1]], " (n = ", n[[2]], ")"))

Error in n[[1]]: object of type 'closure' is not subsettable

# Scatterplot Keilmesser (complete): length-width combined with morpho type   
PS.width\_length\_morpho <- ggplot(PS\_morpho.type, aes(y = length, x = width, fill = morpho.type)) +  
 geom\_point(size = 2, shape = 21) +  
 labs(y = "length [mm]", x = "width [mm]", title = "",   
 fill = "morpho type", size = 12) +  
 xlim(0, 80) + ylim(0, 80) +  
 theme\_classic() +  
 scale\_fill\_manual(values = wes\_palette(n = 5, name = "FantasticFox1",  
 type = "continuous"), labels = tag)

Error in ggplot(PS\_morpho.type, aes(y = length, x = width, fill = morpho.type)): object 'PS\_morpho.type' not found

print(PS.width\_length\_morpho)

Error in print(PS.width\_length\_morpho): object 'PS.width\_length\_morpho' not found

file\_out <- paste0(file\_path\_sans\_ext(info\_in[["file"]]), "PS.width\_length\_morpho", ".pdf")  
ggsave(filename = file\_out, plot = PS.width\_length\_morpho, path = dir\_out, device = "pdf",  
 width = 170, height = 250, units = "mm")

Error in grDevices::pdf(file = filename, ..., version = version): cannot open file 'analysis/all\_sites/plots//PS.width\_length\_morpho.pdf'

## Barplot

### Morphotype

# Keilmesser morpho type   
# Load data sheet Keilmesser morpho type   
KM\_morpho.type <- read.xlsx(xlsxFile = data\_file, sheet = 15)

Error in file(description = xlsxFile): invalid 'description' argument

# Defines only the rows with complete Keilmesser   
KM\_morpho.type <- KM\_morpho.type[1:279,]

Error in eval(expr, envir, enclos): object 'KM\_morpho.type' not found

# Barplot Keilmesser morpho type   
KM.morpho.type <- ggplot(data = KM\_morpho.type) + aes(x = morpho.type,   
 fill = morpho.type) +   
 geom\_bar(stat = "count", width = 0.7) +  
 theme\_classic() +  
 theme(legend.position = "none") +   
 labs(x = " ", y = "n") +   
 scale\_fill\_manual(values = wes\_palette(n = 8 , name = "Royal1", type = "continuous"))

Error in ggplot(data = KM\_morpho.type): object 'KM\_morpho.type' not found

print(KM.morpho.type)

Error in print(KM.morpho.type): object 'KM.morpho.type' not found

file\_out <- paste0(file\_path\_sans\_ext(info\_in[["file"]]), "KM.morpho.type", ".pdf")  
ggsave(filename = file\_out, plot = KM.morpho.type, path = dir\_out, device = "pdf",   
 width = 190, height = 210, units = "mm")

Error in grDevices::pdf(file = filename, ..., version = version): cannot open file 'analysis/all\_sites/plots//KM.morpho.type.pdf'

# Pradnik scraper morpho type   
# Load data sheet Pradnik scraper morpho type   
PS\_morpho.type <- read.xlsx(xlsxFile = data\_file, sheet = 16)

Error in file(description = xlsxFile): invalid 'description' argument

# Barplot Pradnik scraper morpho type   
PS.morpho.type <- ggplot(data = PS\_morpho.type) + aes(x = morpho.type,   
 fill = morpho.type) +   
 geom\_bar(stat = "count", width = 0.5) +  
 theme\_classic() +  
 theme(legend.position = "none") +   
 labs(x = " ", y = "n") +   
 scale\_fill\_manual(values = wes\_palette(n = 6, name = "Royal1", type = "continuous"))

Error in ggplot(data = PS\_morpho.type): object 'PS\_morpho.type' not found

print(PS.morpho.type)

Error in print(PS.morpho.type): object 'PS.morpho.type' not found

file\_out <- paste0(file\_path\_sans\_ext(info\_in[["file"]]), "PS.morpho.type", ".pdf")  
ggsave(filename = file\_out, plot = PS.morpho.type, path = dir\_out, device = "pdf",   
 width = 170, height = 200, units = "mm")

Error in grDevices::pdf(file = filename, ..., version = version): cannot open file 'analysis/all\_sites/plots//PS.morpho.type.pdf'

## Barplot

### Raw material

# Keilmesser raw material  
# Load data sheet Keilmesser raw material  
KM\_raw\_material <- read.xlsx(xlsxFile = data\_file, sheet = 8)

Error in file(description = xlsxFile): invalid 'description' argument

# Barplot Keilmesser raw material   
KM.raw\_material <- ggplot(data = KM\_raw\_material) + aes(x = raw.material,   
 fill = raw.material) +   
 geom\_bar(stat = "count", width = 0.2) +  
 theme\_classic() +  
 theme(legend.position = "none") +   
 labs(x = " ", y = "n") +   
 scale\_x\_discrete(labels=c("Baltic flint", "silicified schist")) +  
 scale\_fill\_manual(values = wes\_palette(n = 2, name = "Darjeeling2"))

Error in ggplot(data = KM\_raw\_material): object 'KM\_raw\_material' not found

print(KM.raw\_material)

Error in print(KM.raw\_material): object 'KM.raw\_material' not found

file\_out <- paste0(file\_path\_sans\_ext(info\_in[["file"]]), "KM.raw\_material", ".pdf")  
ggsave(filename = file\_out, plot = KM.raw\_material, path = dir\_out, device = "pdf")

Error in grDevices::pdf(file = filename, ..., version = version): cannot open file 'analysis/all\_sites/plots//KM.raw\_material.pdf'

# Pradnik scraper raw material  
# Load data sheet Pradnik scraper raw material  
PS\_raw\_material <- read.xlsx(xlsxFile = data\_file, sheet = 9)

Error in file(description = xlsxFile): invalid 'description' argument

# Barplot Pradnik scraper raw material   
PS.raw\_material <- ggplot(data = PS\_raw\_material) + aes(x = raw.material,   
 fill = raw.material) +   
 geom\_bar(stat = "count", width = 0.2) +  
 theme\_classic() +  
 theme(legend.position = "none") +   
 labs(x = " ", y = "n") +   
 scale\_x\_discrete(labels=c("Baltic flint", "silicified schist")) +  
 scale\_fill\_manual(values = wes\_palette(n = 2, name = "Darjeeling2"))

Error in ggplot(data = PS\_raw\_material): object 'PS\_raw\_material' not found

print(PS.raw\_material)

Error in print(PS.raw\_material): object 'PS.raw\_material' not found

file\_out <- paste0(file\_path\_sans\_ext(info\_in[["file"]]), "PS.raw\_material", ".pdf")  
ggsave(filename = file\_out, plot = PS.raw\_material, path = dir\_out, device = "pdf",  
 width = 210, height = 150, units = "mm")

Error in grDevices::pdf(file = filename, ..., version = version): cannot open file 'analysis/all\_sites/plots//PS.raw\_material.pdf'

# All tool types raw material  
# Load data sheet all tool types raw material  
all\_raw\_material <- read.xlsx(xlsxFile = data\_file, sheet = 1)

Error in file(description = xlsxFile): invalid 'description' argument

# Barplot Pradnik scraper raw material   
all.raw\_material <- ggplot(data = all\_raw\_material) + aes(x = raw.material,   
 fill = raw.material) +   
 geom\_bar(stat = "count", width = 0.2) +  
 theme\_classic() +  
 theme(legend.position = "none") +   
 labs(x = " ", y = "n") +   
 scale\_x\_discrete(labels=c("Baltic flint", "silicified schist")) +  
 scale\_fill\_manual(values = wes\_palette(n = 2, name = "Darjeeling2"))

Error in ggplot(data = all\_raw\_material): object 'all\_raw\_material' not found

print(all.raw\_material)

Error in print(all.raw\_material): object 'all.raw\_material' not found

file\_out <- paste0(file\_path\_sans\_ext(info\_in[["file"]]), "all.raw\_material", ".pdf")  
ggsave(filename = file\_out, plot = all.raw\_material, path = dir\_out, device = "pdf")

Error in grDevices::pdf(file = filename, ..., version = version): cannot open file 'analysis/all\_sites/plots//all.raw\_material.pdf'

## Barplot

### Morphology back

# Keilmesser morphology back   
# Load data sheet Keilmesser raw material  
KM\_back <- read.xlsx(xlsxFile = data\_file, sheet = 13)

Error in file(description = xlsxFile): invalid 'description' argument

# Barplot Keilmesser raw material   
KM.back\_morpho <- ggplot(data = KM\_back) + aes(x = morphology.back, fill = morphology.back) +   
 geom\_bar(stat = "count", width = 0.5) +  
 theme\_classic() +  
 theme(legend.position = "none") +   
 labs(x = " ", y = "n") +   
 scale\_x\_discrete(labels=c("cortex + partly retouched", "cortex/unworked", "N/A",  
 "partly retouched", "retouched")) +  
 scale\_fill\_manual(values = wes\_palette(n = 7, name = "Darjeeling2",   
 type = "continuous"))

Error in ggplot(data = KM\_back): object 'KM\_back' not found

print(KM.back\_morpho)

Error in print(KM.back\_morpho): object 'KM.back\_morpho' not found

file\_out <- paste0(file\_path\_sans\_ext(info\_in[["file"]]), "KM.back\_morpho", ".pdf")  
ggsave(filename = file\_out, plot = KM.back\_morpho, path = dir\_out, device = "pdf",  
 width = 250, height = 170, units = "mm")

Error in grDevices::pdf(file = filename, ..., version = version): cannot open file 'analysis/all\_sites/plots//KM.back\_morpho.pdf'

# Pradnik scraper morphology back   
# Load data sheet Pradnik scraper raw material  
PS\_back <- read.xlsx(xlsxFile = data\_file, sheet = 14)

Error in file(description = xlsxFile): invalid 'description' argument

# Barplot Pradnik scraper raw material   
PS.back\_morpho <- ggplot(data = PS\_back) + aes(x = morphology.back,   
 fill = morphology.back) +   
 geom\_bar(stat = "count", width = 0.4) +  
 theme\_classic() +  
 theme(legend.position = "none") +   
 labs(x = " ", y = "n") +   
 scale\_x\_discrete(labels=c("cortex + partly retouched", "cortex/unworked",   
 "partly retouched", "retouched")) +  
 scale\_fill\_manual(values = wes\_palette(n = 7, name = "Darjeeling2",   
 type = "continuous"))

Error in ggplot(data = PS\_back): object 'PS\_back' not found

print(PS.back\_morpho)

Error in print(PS.back\_morpho): object 'PS.back\_morpho' not found

file\_out <- paste0(file\_path\_sans\_ext(info\_in[["file"]]), "PS.back\_morpho", ".pdf")  
ggsave(filename = file\_out, plot = PS.back\_morpho, path = dir\_out, device = "pdf",   
 width = 250, height = 170, units = "mm")

Error in grDevices::pdf(file = filename, ..., version = version): cannot open file 'analysis/all\_sites/plots//PS.back\_morpho.pdf'

# Keilmesser blanks  
# Load data sheet Keilmesser blanks   
KM\_cortex\_blanks <- read.xlsx(xlsxFile = data\_file, sheet = 11)

Error in file(description = xlsxFile): invalid 'description' argument

# Barplot Keilmesser blanks   
KM.cortex\_blanks <- ggplot(data = KM\_cortex\_blanks) + aes(x = blank, fill = cortex) +   
 geom\_bar(stat = "count", width = 0.3) +  
 theme\_classic() +  
 labs(x = " ", y = "n") +   
 scale\_x\_discrete(labels=c("core", "flake", "N/A")) +  
 scale\_fill\_manual(values = wes\_palette(n = 7, name = "Darjeeling2",   
 type = "continuous"))

Error in ggplot(data = KM\_cortex\_blanks): object 'KM\_cortex\_blanks' not found

print(KM.cortex\_blanks)

Error in print(KM.cortex\_blanks): object 'KM.cortex\_blanks' not found

file\_out <- paste0(file\_path\_sans\_ext(info\_in[["file"]]), "KM.cortex\_blanks", ".pdf")  
ggsave(filename = file\_out, plot = KM.cortex\_blanks, path = dir\_out, device = "pdf",   
 width = 250, height = 170, units = "mm")

Error in grDevices::pdf(file = filename, ..., version = version): cannot open file 'analysis/all\_sites/plots//KM.cortex\_blanks.pdf'

# Pradnik scraper blanks  
# Load data sheet Pradnik scraper blanks   
PS\_cortex\_blanks <- read.xlsx(xlsxFile = data\_file, sheet = 12)

Error in file(description = xlsxFile): invalid 'description' argument

# Barplot Pradnik scraper blanks   
PS.cortex\_blanks <- ggplot(data = PS\_cortex\_blanks) + aes(x = blank, fill = cortex) +   
 geom\_bar(stat = "count", width = 0.25) +  
 theme\_classic() +  
 labs(x = " ", y = "n") +   
 scale\_x\_discrete(labels=c("core", "flake", "N/A")) +  
 scale\_fill\_manual(values = wes\_palette(n = 7, name = "Darjeeling2",   
 type = "continuous"))

Error in ggplot(data = PS\_cortex\_blanks): object 'PS\_cortex\_blanks' not found

print(PS.cortex\_blanks)

Error in print(PS.cortex\_blanks): object 'PS.cortex\_blanks' not found

file\_out <- paste0(file\_path\_sans\_ext(info\_in[["file"]]), "PS.cortex\_blanks", ".pdf")  
ggsave(filename = file\_out, plot = PS.cortex\_blanks, path = dir\_out, device = "pdf",   
 width = 250, height = 170, units = "mm")

Error in grDevices::pdf(file = filename, ..., version = version): cannot open file 'analysis/all\_sites/plots//PS.cortex\_blanks.pdf'

## Barplot

### Pradnik method

# Keilmesser application Pradnik method  
# Load data sheet Keilmesser Pradnik method  
KM\_Pradnik.method <- read.xlsx(xlsxFile = data\_file, sheet = 17)

Error in file(description = xlsxFile): invalid 'description' argument

# Barplot Keilmesser Pradnik method   
KM.PM <- ggplot(data = KM\_Pradnik.method) + aes(x = application.Pradnikmethod,   
 fill = application.Pradnikmethod) +   
 geom\_bar(stat = "count", width = 0.3) +   
 theme\_classic() +  
 labs(x = " ", y = "n") +   
 theme(legend.position = "none") +   
 scale\_x\_discrete(labels=c("no", "N/A", "yes")) +  
 scale\_fill\_manual(values = wes\_palette(n = 5, name = "GrandBudapest1",   
 type = "continuous"))

Error in ggplot(data = KM\_Pradnik.method): object 'KM\_Pradnik.method' not found

print(KM.PM)

Error in print(KM.PM): object 'KM.PM' not found

file\_out <- paste0(file\_path\_sans\_ext(info\_in[["file"]]), "KM.PM", ".pdf")  
ggsave(filename = file\_out, plot = KM.PM, path = dir\_out, device = "pdf",   
 width = 250, height = 170, units = "mm")

Error in grDevices::pdf(file = filename, ..., version = version): cannot open file 'analysis/all\_sites/plots//KM.PM.pdf'

## Diverging barplot

### Lateralisation

# Keilmesser lateralisation  
# Load data sheet Keilmesser lateralisation  
KM\_lateralisation <- read.xlsx(xlsxFile = data\_file, sheet = 19)

Error in file(description = xlsxFile): invalid 'description' argument

KM\_lateralisation[grep("sin.", KM\_lateralisation[["tool.lateralisation"]]), "value"] <-  
 "-1"

Error in KM\_lateralisation[grep("sin.", KM\_lateralisation[["tool.lateralisation"]]), : object 'KM\_lateralisation' not found

KM\_lateralisation[grep("dex.", KM\_lateralisation[["tool.lateralisation"]]), "value"] <-   
 "1"

Error in KM\_lateralisation[grep("dex.", KM\_lateralisation[["tool.lateralisation"]]), : object 'KM\_lateralisation' not found

# Defines only the rows with complete Keilmesser   
KM\_lateralisation <- KM\_lateralisation[1:279,]

Error in eval(expr, envir, enclos): object 'KM\_lateralisation' not found

# Barplot Keilmesser lateralisation  
KM.lat <- ggplot(KM\_lateralisation, aes(y = value, x = technological.class,   
 fill = tool.lateralisation)) +   
 geom\_bar(stat = "identity", width = 0.15) +  
 theme\_minimal() +  
 labs(x = NULL, y = NULL) +  
 theme(axis.text.x = element\_blank(), axis.text.y = element\_blank()) +  
 scale\_fill\_manual(values = wes\_palette(n = 5, name = "Darjeeling2",   
 type = "continuous")) +   
 guides(fill = guide\_legend(reverse=TRUE)) +  
 labs(fill = "tool lateralisation") +  
 coord\_flip()

Error in ggplot(KM\_lateralisation, aes(y = value, x = technological.class, : object 'KM\_lateralisation' not found

print(KM.lat)

Error in print(KM.lat): object 'KM.lat' not found

file\_out <- paste0(file\_path\_sans\_ext(info\_in[["file"]]), "KM.lat", ".pdf")  
ggsave(filename = file\_out, plot = KM.lat, path = dir\_out, device = "pdf")

Error in grDevices::pdf(file = filename, ..., version = version): cannot open file 'analysis/all\_sites/plots//KM.lat.pdf'

# Pradnik scraper lateralisation  
# Load data sheet Pradnik scraper lateralisation  
PS\_lateralisation <- read.xlsx(xlsxFile = data\_file, sheet = 20)

Error in file(description = xlsxFile): invalid 'description' argument

PS\_lateralisation <- PS\_lateralisation [-c(37, 43), ]

Error in eval(expr, envir, enclos): object 'PS\_lateralisation' not found

PS\_lateralisation[grep("sin.", PS\_lateralisation[["tool.lateralisation"]]), "value"] <-  
 "-1"

Error in PS\_lateralisation[grep("sin.", PS\_lateralisation[["tool.lateralisation"]]), : object 'PS\_lateralisation' not found

PS\_lateralisation[grep("dex.", PS\_lateralisation[["tool.lateralisation"]]), "value"] <-   
 "1"

Error in PS\_lateralisation[grep("dex.", PS\_lateralisation[["tool.lateralisation"]]), : object 'PS\_lateralisation' not found

# Barplot Pradnik scraper lateralisation  
PS.lat <- ggplot(PS\_lateralisation, aes(y = value, x = technological.class,   
 fill = tool.lateralisation)) +   
 geom\_bar(stat = "identity", width = 0.15) +  
 theme\_minimal() +  
 labs(x = NULL, y = NULL) +  
 theme(axis.text.x = element\_blank(), axis.text.y = element\_blank()) +  
 scale\_fill\_manual(values = wes\_palette(n = 5, name = "Darjeeling2",   
 type = "continuous")) +   
 guides(fill = guide\_legend(reverse=TRUE)) +  
 labs(fill = "tool lateralisation") +  
 coord\_flip()

Error in ggplot(PS\_lateralisation, aes(y = value, x = technological.class, : object 'PS\_lateralisation' not found

print(PS.lat)

Error in print(PS.lat): object 'PS.lat' not found

file\_out <- paste0(file\_path\_sans\_ext(info\_in[["file"]]), "PS.lat", ".pdf")  
ggsave(filename = file\_out, plot = PS.lat, path = dir\_out, device = "pdf")

Error in grDevices::pdf(file = filename, ..., version = version): cannot open file 'analysis/all\_sites/plots//PS.lat.pdf'

## Barplot

### Barplot lateral resharpening spall type

# Lateral resharpening spall type  
# Load data sheet lateral resharpening spall type  
LSS\_type <- read.xlsx(xlsxFile = data\_file, sheet = 21)

Error in file(description = xlsxFile): invalid 'description' argument

# Barplot lateral resharpening spall type  
LSS.type <- ggplot(data = LSS\_type) + aes(x = type.lateral.sharpening.spall,   
 fill = tool.lateralisation) +   
 geom\_bar(stat = "count", width = 0.2) +   
 theme\_classic() +  
 labs(x = " ", y = "n") +   
 labs(fill = "tool lateralisation") +  
 scale\_x\_discrete() +  
 scale\_fill\_manual(values = wes\_palette(n = 5, name = "GrandBudapest1",   
 type = "continuous"))

Error in ggplot(data = LSS\_type): object 'LSS\_type' not found

print(LSS.type)

Error in print(LSS.type): object 'LSS.type' not found

file\_out <- paste0(file\_path\_sans\_ext(info\_in[["file"]]), "LSS.type", ".pdf")  
ggsave(filename = file\_out, plot = LSS.type, path = dir\_out, device = "pdf")

Error in grDevices::pdf(file = filename, ..., version = version): cannot open file 'analysis/all\_sites/plots//LSS.type.pdf'

## Ternary plot

### Perimeter

library(ggtern)  
# Perimeter Keilmesser   
# Load data sheet Keilmesser perimeter  
KM\_perimeter <- read.xlsx(xlsxFile = data\_file, sheet = 6)

Error in file(description = xlsxFile): invalid 'description' argument

# Defines only the rows with complete Keilmesser   
KM\_perimeter <- KM\_perimeter[1:278, ]

Error in eval(expr, envir, enclos): object 'KM\_perimeter' not found

KM\_perimeter <- KM\_perimeter[ , ] %>% arrange(morpho.type)

Error in eval(lhs, parent, parent): object 'KM\_perimeter' not found

KM\_perimeter <- KM\_perimeter[-c(273:278), ]

Error in eval(expr, envir, enclos): object 'KM\_perimeter' not found

# Ternary diagram Keilmesser perimeter  
KM.perimeter <- ggtern(data = KM\_perimeter, aes(x = perimeter.distal.posterior.part,   
 y = perimeter.active.edge,   
 z = perimeter.basis.back)) +  
 geom\_point(aes(colour = morpho.type)) +  
 theme\_bw() +  
 scale\_colour\_startrek() +  
 theme\_hidetitles() +  
 theme\_showarrows() +  
 xlab("distal posterior part")+   
 ylab("active edge")+  
 zlab("basis + back")+   
 labs(colour = "morpho type") +  
 tern\_limits(labels=c(0, 20, 40, 60, 80, 100)) +  
 theme\_rotate(degrees = 330)

Error in ggplot(data = data, mapping = mapping, environment = environment, : object 'KM\_perimeter' not found

print(KM.perimeter)

Error in print(KM.perimeter): object 'KM.perimeter' not found

file\_out <- paste0(file\_path\_sans\_ext(info\_in[["file"]]), "KM.perimeter", ".pdf")  
ggsave(filename = file\_out, plot = KM.perimeter, path = dir\_out, device = "pdf")

Error in grDevices::pdf(..., version = version): cannot open file 'analysis/all\_sites/plots//KM.perimeter.pdf'

# Perimeter Pradnik scraper  
# Load data sheet Pradnik scraper perimeter  
PS\_perimeter <- read.xlsx(xlsxFile = data\_file, sheet = 7)

Error in file(description = xlsxFile): invalid 'description' argument

PS\_perimeter <- PS\_perimeter[ , ] %>% arrange(morpho.type)

Error in eval(lhs, parent, parent): object 'PS\_perimeter' not found

PS\_perimeter <- PS\_perimeter[-c(54), ]

Error in eval(expr, envir, enclos): object 'PS\_perimeter' not found

# Ternary diagram Pradnik scraper perimeter  
PS.perimeter <- ggtern(data = PS\_perimeter, aes(x = perimeter.distal.posterior.part,   
 y = perimeter.active.edge,   
 z = perimeter.basis.back)) +  
 geom\_point(aes(colour = morpho.type)) +  
 theme\_bw() +  
 scale\_colour\_startrek() +  
 theme\_hidetitles() +  
 theme\_showarrows() +  
 xlab("arch")+   
 ylab("active edge")+  
 zlab("basis + back")+   
 labs(colour = "morpho type") +  
 tern\_limits(labels=c(0, 20, 40, 60, 80, 100)) +  
 theme\_rotate(degrees = 330)

Error in ggplot(data = data, mapping = mapping, environment = environment, : object 'PS\_perimeter' not found

print(PS.perimeter)

Error in print(PS.perimeter): object 'PS.perimeter' not found

file\_out <- paste0(file\_path\_sans\_ext(info\_in[["file"]]), "PS.perimeter", ".pdf")  
ggsave(filename = file\_out, plot = PS.perimeter, path = dir\_out, device = "pdf")

Error in grDevices::pdf(..., version = version): cannot open file 'analysis/all\_sites/plots//PS.perimeter.pdf'

# Show plot files information

info\_out <- list.files(path = dir\_out, pattern = "\\.pdf$", full.names = TRUE) %>%   
 md5sum()

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

named character(0)

# 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] ggtern\_3.3.0 ggsci\_2.9 dplyr\_1.0.2 wesanderson\_0.3.6  
 [5] ggplot2\_3.3.2 chron\_2.3-56 R.utils\_2.10.1 R.oo\_1.24.0   
 [9] R.methodsS3\_1.8.1 readxl\_1.3.1 openxlsx\_4.1.5   
  
loaded via a namespace (and not attached):  
 [1] tidyselect\_1.1.0 xfun\_0.16 purrr\_0.3.4 lattice\_0.20-41   
 [5] latex2exp\_0.4.0 colorspace\_1.4-1 vctrs\_0.3.4 generics\_0.0.2   
 [9] doBy\_4.6.7 htmltools\_0.5.0 yaml\_2.2.1 compositions\_2.0-0  
[13] rlang\_0.4.7 pillar\_1.4.6 glue\_1.4.2 withr\_2.2.0   
[17] lifecycle\_0.2.0 plyr\_1.8.6 robustbase\_0.93-6 stringr\_1.4.0   
[21] munsell\_0.5.0 gtable\_0.3.0 cellranger\_1.1.0 zip\_2.1.1   
[25] evaluate\_0.14 knitr\_1.29 DEoptimR\_1.0-8 broom\_0.7.0   
[29] proto\_1.0.0 Rcpp\_1.0.5 scales\_1.1.1 backports\_1.1.9   
[33] Deriv\_4.0.1 gridExtra\_2.3 tensorA\_0.36.1 digest\_0.6.25   
[37] stringi\_1.5.3 grid\_4.0.2 magrittr\_1.5 tibble\_3.0.3   
[41] crayon\_1.3.4 tidyr\_1.1.2 pkgconfig\_2.0.3 bayesm\_3.1-4   
[45] ellipsis\_0.3.1 MASS\_7.3-51.6 Matrix\_1.2-18 rmarkdown\_2.3   
[49] R6\_2.4.1 compiler\_4.0.2

END OF SCRIPT